POLITECNICO DI TORINO

Master Degree
in Engineering and Management

Master Degree Thesis

Report on healthcare incubators and accelerators in UK & Germany

Supervisors

Prof. Paolo Landoni

Candidate

Gayathri Kavitha

A.A. 2022-2023

Abstract

There are a lot of research and studies being carried out globally about the role and impact of business incubators and accelerators in the launch of start-ups and also about their support during the entrepreneurial journey. The main objective of this thesis research is to apply the research methodology developed by Social Innovation Monitor (SIM) in order to analyse the business incubators and accelerators operating in healthcare sector in UK & Germany.

In order to achieve this goal, the study was conducted in order to make a list of business incubators and accelerators in each of the country, to find out the various sectors in which they prefer to work and thereby figuring out the organizations working in healthcare sector, to apply the few selection criterions to filter out a sample and to finally make a very thorough and detailed analysis to reach an honest conclusion.

The study began with a literature analysis in order to understand the topic in a more detailed way using past research papers and publications. This helped in knowing more about what incubators and accelerators are with definitions. Literature analysis also provided more knowledge about the different types of incubators and their important objectives. Also, details about other concepts related to innovation and entrepreneurial ecosystem was acquired from this study to have a deeper understanding. Further, past literature on innovation and related ecosystem in Germany and United Kingdom was added to the research since this thesis report is specifically done to incubators in these countries.

A summary of past research on healthcare innovation was also added along with few points regarding COVID-19 pandemic and its impact on healthcare sector to have more idea specifically about this topic. The literature analysis also helped in understanding the research gap that is present in this field of study.

The thesis activity started by making a database of total incubator population in both countries and thus a list of 259 and 269 business incubators/accelerators was made for Germany & UK respectively. Also, a separate list was made to include organizations that did not meet the eligibility criteria. Using this total population, further research was done in order to form a database of organizations supporting healthcare sector. This healthcare incubator population came up to 125 in the case of Germany and 140 in the case of United Kingdom. This included organizations supporting healthcare companies and also the non-specific ones that do not focus on particular sectors.

Further study and data collection was conducted to do a detailed analysis of healthcare incubators in both countries. The analysis started by comparing the healthcare incubator population of each country to the total population to know the focus given to innovation in this sector in both countries. This was followed by geographical distribution analysis of healthcare incubators in both countries to have a good idea about how these organizations are spread throughout the country and various factors that could affect this. Concentration of incubators related to area and population was also added as part of the study to compare the countries on this behalf.

The research also presents a basic understanding of the key information and financial data of healthcare incubators in both the countries. This includes analysis of number of employees, number of organizations supported, revenue, net income and EBITDA. These analysis shows the financial situation and stability of these organizations and also the jobs created, and support given to healthcare sector.

The study also gives a descriptive and detailed analysis of the various sectors within healthcare that is focussed by the incubation programs to see the sub focus within the industry. A comparison on the number of incubators that declared to work in healthcare and those that support healthcare alone have also included to achieve more clarity on this topic. Also, there is a section that looks into the sectors other than healthcare supported by the considered incubators.

Each of the topics discussed have separate sections for both Germany and United Kingdom in order to understand the situation in each country and also a comparison part is included just to brief on the high-level similarities and differences between them. This way it is possible to have a clear idea on what is happening in each country.

Finally, the conclusion section has a detailed summary of final conclusions and comparisons with respect to each of the above analysis. It is a short description of the descriptive analysis part in findings section that will make it possible to understand about the similarities and differences between incubation and innovation activities in Germany and UK.

Acknowledgements

I would like to extend my sincere gratitude to the following people who played a very important role in helping me to complete this research and my master's degree.

My master thesis advisor, Prof. Paolo Landoni, Department of Management and Production Engineering, who gave me the opportunity to work on this thesis topic and be a part of the SIM research activity. I am thankful to Prof. Landoni for his assistance and involvement in aiding me to accomplish this study.

Mr. Davide Moro, PhD fellow, who have been a mentor to me during this whole process. I express my gratitude to him for guiding me throughout this activity and providing me with suggestions and feedbacks.

Politecnico di Torino and its member staffs in providing me an opportunity to pursue higher education in this prestigious institute. I am thankful for all the resources and facilities provided by polito during my studies.

The entire faculty of Department of Management and Production Engineering for their guidance and support. I express my gratitude towards them in helping me to improve my skillsets and value by imparting knowledge throughout the course of this program.

My classmates and especially my group mates in making the last two years a great memory. I am thankful to them for their support and enthusiasm that made it easier to complete this program.

Most importantly, none of this would have been possible without the support of my family and friends. I owe my profound gratitude to my parents, my husband, my sister and other family members and friends for providing continuous encouragement and support throughout my studies and the thesis research activity.

I also extend my sincere gratitude to everyone who directly or indirectly helped me in this process.

Contents

LIST OF FIGURES

LIST OF TABLES

1. Introduction

This section is used to introduce the thesis report subject. Initially there is a brief discussion about the background and scope and then the chapter proceeds to have a look at the research gap, questions answered by the thesis report and finally a summary of the thesis structure.

1.1 Background & Scope

Business incubators and accelerators are a topic that is been discussed worldwide due to their impact in the survival of start-ups and various SMEs. This thesis report can help in providing a better idea about the incubation and acceleration programs in healthcare sector operating in UK & Germany (Hausberg & Korreck, 2018).

According to Gunter (2012), start-ups are one of the most dynamic creators of job since they either become successful economically by quickly improving their innovation or rapidly exiting from business. Many times, the products and services developed by these firms results in radical and disruptive innovations thereby affecting the dynamics of the existing markets. Start-ups that choose to move in slightly different paths, however might face various challenges including the development of reliable business models, reaching early customers and formation of various allies and partnerships. Hence, to get help in solving these issues, start-ups might need the resources and support from various incubation programs.

Nowadays, support provided by incubators and accelerators have become a critical part of the modern entrepreneurial ecosystem. The role and landscape of these organizations have highly evolved from mere workspace or real estate facilities and academic spin offs to more complicated business models with various measures for business development and support. The number of these support centres have also increased significantly. From the first accelerator Y combinator, in 2005, the number increased to a dozen by 2008 in US and to around 3000 in 2013 worldwide (Hausberg & Korreck, 2018).

Incubators and accelerators do play an integral role in boosting the development of new firms by improving the probability and likelihood of their survival. So, it is important that these organizations enable start-ups to have a smooth start and growth (Lukosiute et al, 2019). Also, they regularly monitor the performance and growth of the tenant firms in order to give feedback

that will help them to reduce making mistakes and thereby decreasing risk (Hausberg & Korreck, 2018).

Due to the above reasons, it is vital for the entrepreneurial ecosystem to have a deep and detailed understanding of the influence and role of incubators/accelerators in shaping new ventures and entrepreneurs.

Since the geographical location and the sector of operation of incubators are main factors of the innovation ecosystem, it is also necessary to have a brief understanding on how they can influence these organizations and also to have a comparative study.

1.2. Research Gap

The past research and literature do give optimal information and analysis about business incubators and accelerators. But there is a lack of information about how these organizations function in various sectors and industries in various countries. Most research activities till now focus on either incubators and accelerators in general in particular countries or a particular sector. But it is important to expand the study to multi-sectors and multi-geographies to have better understanding. This thesis report will quantitatively and empirically contribute to the knowledge of these organizations working in healthcare sector in two different countries and ecosystems.

1.3. Research Question

The main research questions answered by this thesis report are:

1. What is the population and concentration of healthcare incubators in UK and Germany?
2. What are the differences in the key features of healthcare incubators in UK and Germany?
3. What are the sectors in which they promote innovation within healthcare and also in other sectors?

1.4. Thesis Structure

The structure of this report is explained in this section.

The first section of the report consists of the background and scope, research gap, research questions and thesis structure. This will give a brief idea about the reason and scope of this research activity, the expected outcomes and the high-level framework of the study.

The second section includes the literature review with basic understanding and definitions of the related topic. This part will help in understanding past research and literature related to this study and will give a hint on the importance of this research topic.

The next part explains the methodology adopted in doing this research activity and the various steps involved in completing the same. This section will explain the entire activity starting from how the healthcare incubator database was prepared until the completion of data collection

Then there is the section that presents all the findings that emerged out of the research which will give a detailed insight about the various factors affecting the healthcare innovation ecosystem in both countries and also the comparisons between them in terms of each of these factors.

Finally, a part on conclusion, limitations and future research is included to give an overall idea about the results obtained from the research, its limitations and proposed future research that can be conducted to gain more information.

2. Literature Review

2.1. What are business incubators?

There has been a lot of studies done in this topic in past years. Business Incubators (BIs) have a significant role in the development and support of technology-based start-ups. They act as the key actor of innovation. Incubators help new technology-based firms to achieve growth and success by linking technology, business and capital (Samaeemofrad et al, 2016). Various definitions have been used to describe them through the years.

Definition	**Source**
"Business incubators provide new firms and entrepreneurs with physical facilities and a variety of business services to help them increase their chances of surviving in the early stages of development."	OECD,1997
"A business incubator is a shared office space facility that seeks to provide it incubates (i.e., ''portfolio-'' or ''client-'' or ''tenant-companies'') with a strategic, value-adding intervention system (i.e., business incubation) of monitoring and business assistance."	Hackett & Dilts, 2004
"An incubator is an entity providing small new ventures with resources that improve their chances of foundation and survival"	Barbero et al, 2013
"Business incubator is an organization designed to accelerate the growth and success of entrepreneurial companies through an array of business support resources and services that could include physical space, capital, coaching, common services, and networking connections"	Entrepreneur, 2014
"An incubator represents an institution where founders or start-ups receive the required environment for making their idea or product market-ready."	Hirte et al, 2017

Table 1: Incubator definitions

According to Samaeemofrad et al (2016) there are various types of incubators based on their strategies, support activities and stakeholders, but the universal motives of them remains the same:

- To improve the commercialization of research activities in universities and other research institutes
- To contribute positively to economic development through entrepreneurship
- To increase the survival chances of new technology firms in the starting stage

Samaeemofrad et al (2016) also states the services and support mechanisms that help in fostering entrepreneurial activities which includes:

- Access to internal and external network
- Mentoring and advising (both business and technology related)
- Facilitating secretarial and administrative services, shared work/office space and reduced rent
- Providing access to capital and financial resources

Active participation of business incubators is an important factor that can help in availing other specific services for entrepreneurs in order to satisfy their requirements and in creating a proper network that is favourable for founders. Knowledge management that is provided by incubators through coaching, training and mentoring activities is also one main factor that can positively influence the success of the ventures. Resource mobilization is another important factor. Business incubators normally provide access to various resources like infrastructure, administrative, potential partners, investors and customers. Also, incubators help the ventures by creating an exposure and marketing tenants using media and thereby making them more visible to the potential investors and customers (Samaeemofrad et al, 2016).

For many years, the tangible elements of resources provided by incubators were considered as key indicators of success, but with time the focus has been turned to social and other intangible factors of business incubation, including mentoring and networking which helps in accessing and using various forms of capital like human, social and financial. This is evident from the analysis of the various generations of business incubators built over the years. First and second generation was focussed more on the space, shared facilities and support services whereas the

third generation is providing support for network development, coaching, proactive support and business acceleration (Theodorakopoulos et al, 2014).

2.2. What are accelerators?

According to Bone et al (2017), Accelerators are different from incubators since most of them offer services which are based on a very selective programme that has a lesser duration, often spanning 3-12 months. Acceleration programs normally provide services including help in making the business plan, prototypes, investor pitch and testing the initial market. Providing seed fund is done by many of the accelerators but not by all.

Typically, accelerators form their business model based on the start-up equity whereas incubation programs receive most of their revenue from the rent and other service fees charged on their tenants. This shows that acceleration programs are more driven by the growth of their tenants and hence one of their main aims is to form businesses that either exponentially scale or fail fast so that resource wastage will be limited. But in some cases, like corporate accelerators, they might sponsor or even subsidise these programs for other strategies like to improve innovation internally, for exchange of culture, corporate social responsibility or in some cases public relations. Accelerators are also increasingly offering support for higher growth or established companies that are looking to increase the scale of their business. Pre-accelerator programs are also often provided in the pre-start-up phase in order to attract start-ups and new businesses to their future acceleration program (Bone et al, 2017).

According to Miller & Bound (2011) and Cohen & Hochberg (2014), accelerators have some common features:

- Length of the program is normally fixed, which is between 3-12 months
- Normally driven by growth and so prefer equity to fees
- Very selective
- Prefer to offer services rather than actual working space
- Services like mentoring, training etc.
- Provision of seed funding

2.3. Origin of incubators

Aernoudt (2004) mentions that development of business incubators happened in a much better way in the United States compared to Europe. But the concept of incubation had its roots in Europe and so the actual process evolved there. In ancient times, people practiced a ritual called incubatio where they would go to a Roman or Greek temple and lay down on fresh hide from animals that were sacrificed. This was done in the belief of getting a visionary dream on ways of curing or overcoming diseases and so the practise of incubatio was done mostly in the temple of God of medicine. This was the opening to a new world in medicine.

From the above-mentioned background, gradually incubator started to be considered as a place of keeping premature born babies in order to be taken care and nurtured and the main idea behind this was these new born require some care in controlled conditions for some time which will enable these babies to develop, grow and survive after they are taken out of these incubators. Similar idea is behind business incubators also where they take in early-stage start-ups and enable them to survive and grow during the vulnerable starting times by nurturing them. "The American National Business Incubator Association (NBIA) defines business incubation as a dynamic process of business enterprise development." This mainly refers to a process of encouraging people in starting new businesses and to facilitate and support start-ups that foster innovation. In order to do so, an actual business incubator is not just co-working and rental office spaces, but they should also offer mentoring, hands-on management, arranging financial resources and access to markets (Aernoudt, 2004).

The above mentioned are the main characteristics of a good incubator. A true incubator will include a lot of young businesses with good development potential, higher survival rate of incubated organizations even after leaving the incubators, good rotation rate, good connection with universities, industry and other innovation centres, a good impact on entrepreneurship culture and ecosystem and a framework that facilitate support from financial markets (Aernoudt, 2004).

2.4. Evolution of incubators

On a general note, business incubators across all generations do facilitate similar support and services. But older generations usually do not utilize their entire service portfolio. This might be due to lack of proper criteria in selecting tenants and lack of clarity in exit policies. So, it might be useful if they can make their service portfolios more updated and have more clarity in selection criteria and exit policies (Bruneel et al, 2012).

In the case of infrastructure value proposition of business incubators over generations, according to Bruneel et al (2012), first generation incubators offering mainly included coworking space and pooled resources and they also accounted for economies of scale. The second generation focused mostly on mentoring and training support and contributed in increasing the learning curve. The third generation provided the tenants with technological and financial access and also access to knowledge and other external resources.

Incubators across all generations facilitate support by coaching to their tenants, but the way they provide such services can be different. Normally coaching services include organizing workshops and seminars and providing complementary information access. This service is provided by incubators in all generations, but when some of them do it by covering a narrow spectrum of business and entrepreneurship topics, others provide access to more grant and wider ones. Considering business services, again the difference between incubator generations is very less. These services are mostly provided by collaborating with university technology transfer offices, consultancies, insurance companies etc. The main difference is in providing financial services which is facilitated only by second and third generations business incubators (Bruneel et al, 2012).

In short, the three-generation considered by Bruneel et al (2012), do not have much differences in case of their offerings to incubated companies. They are mostly similar in support activities offered, mentoring and selection and exit policies. They differ only in the way the tenant companies exploit the service portfolios of incubators founded at different times. As time passed, they expanded the service portfolio by including more business services (second generation) and networking facilities (third generation).

The current incubators considered to be in third generation mostly have tenants that are younger, smaller, and also their periods of incubation are much lesser compared to tenants in older generations. Also, the third-generation incubators mainly concentrate on start-up companies since a good number of them are launched within incubators whereas in older generations there are a good number of them that shifted out of the premises. Also in the current generation is more fostering new venture formation since most of the tenants graduate within three years (Bruneel et al, 2012).

2.5 Types of incubators:

In order to have a more detailed understanding it is important to also look in to the various types of incubators.

2.5.1 Corporate Incubators:

The advancement in digitization and transformations in global market have led to higher innovation pressure and complexity. Mere focus on incremental innovations is not enough in securing long term growth of corporations due to the rise in disruptive innovations and increased product lifecycles. However, it has been difficult for companies to achieve full innovation potential due to their day-to-day business and completely impasse internal structures (Schuh et al, 2017).

A growth strategy that looks into radical innovations along with incremental ones can help the company in achieving economic success in many cases (Chang et al, 2012). Companies with this kind of strategy often suffer from so called innovator's dilemma. The main problems of this dilemma are based on the two options of exit paths -explore and exploit, that have conflicting objectives (Christensen, 1997). Since the path to explore includes exploring an alternative technology without any surety of success in a cast intensive manner, market-based exploitation of existing technologies is a safe option and more attractive choice for companies that are risk adverse (Hill et al, 2014).

As per (Schuh et al, 2017), creativity and flexibility of organization is important for radical innovations. Specifically, start-ups satisfy these requirements of flat hierarchies, higher degree of freedom and organizational structure that are suitable for innovation (Bullinger et al, 2008). So, the correction of strategic orientation related to explore and exploit activities should be the basic objective. Organizational separation of all explore activities can be a possible solution to achieve structural ambidexterity (O'Reilly III et al, 2008). But execution of this separation could lead to different innovation barriers, which can be counteracted by integrating functionally in an organizational unit that is decentralized (Bullinger et al, 2008).

In this context it is also important to talk about Open Innovation. According to (Chesbrough, 2003), "Open Innovation is a paradigm that assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as the firms looks to advance their technology" and in contrary, closed innovation focus more inwardly.

There is another term that is used to define a similar phenomenon – Intrapreneurship. This term can be interpreted as entrepreneurship within the existing organization. So, an intrapreneur firm is one which acts entrepreneurially towards a new opportunity whereas a non-intrapreneurial one will focus on managing the one that currently exists (Antoncic and Hisrich, 2003).

All the terms that are mentioned above roughly contribute to a similar criterion where companies/corporations search for outside opportunities and research to pursue technical innovation. This is where corporate incubators come into play. Incubators helps by providing support for radical implementation by bridging the innovation barriers (Gassmann, 2006). This can include small innovation teams that focus on strategic goals of a company to incubators that act as a link or network for relevant start-ups or entrepreneurs. Also, departments that helps in promoting innovative capability of their own resources can be considered as incubators (Schuh et al, 2017).

According to Hirte et al (2017), the corporate incubator operator model has basically three phases.

1. First phase is Pre-Incubation which involves need diagnosis, integration to the company, tenant selection, formulation of ideas and employee involvement.

2. Second phase deals with Incubation. This mainly includes the incubator program, allocation of resources for mentoring, financing and business support and involving the corporate employees.
3. Third phase is the Exit which is divided into internal and external factors. Here the internal ideas can be sold or integrated to the corporation or spun off whereas the external start-ups could be acquired, their shares purchased or could end up with a supplier contract between the two entities.

This (Hirte et al, 2017) research also mentions two critical success factors in relation to corporate incubators.

1. How the corporate incubator is organizationally integrated to parent company. It is strongly suggested that incubators exist as an independent legal entity with strong connection to high level executives of parent company. This is important since the strategies are set at the top level and incubators are supposed to follow this. Also there is benefit of fast decision making and shorter processes.
2. Involvement of the parent company employees in the incubation process. Corporations utilize competitions and other incentives to promote employee participation so that incubators can exploit their expert advice.

2.5.2 University Incubators:

In Europe, many universities have changed their focus on core missions of teaching and research to achieving a main role in regional development and economic growth since many years. This movement that mainly focus on commercialization, knowledge transfer and innovation as a third pillar of university is described often as “third mission” (Lambert, 2003; Laredo, 2007; Zomer and Benneworth,2011).

Another term that helps to understand this change in focus of universities is Academic entrepreneurship. This term is used to refer to efforts that universities undertake to support commercialization on campus and regions around the university. According to (Siegel & Wright, 2015), the main consequences of this effort are that,

1. Universities are looking into this activity more strategically

2. Increase in number of stakeholders included in academic entrepreneurship

According to Bulut and Moschini (2009), Henderson et al (1998), the entrepreneurial university view highlights two recent trends:

1. Universities are promoting more patenting research that can be commercialized
2. They are trying to increase revenues from licences.

Along with this, universities are also building incubator facilities in order to help faculties, graduates, members of the community and other parties to create new firms to not only improve local growth of economy, but also help the university to generate income. Often in this case, universities hold equity positions in the tenant firms of incubator (Kolympiris & Klein, 2017).

Creating facilities of university incubators can help in improving the economic value and quality of patents in university by promoting flow of knowledge between the market participants and academic inventors. This knowledge can help university inventors to generate ideas that can be valuable patents and also in understanding the commercial value of these inventions. Also, expecting that the collaboration of industry and academia can often result in valuable outcomes, incubators can help to achieve superior quality patents by collaboration between university inventors and incubator tenants (Kolympiris & Klein, 2017).

Anyway, the decision whether to establish an incubator in a university can be endogenous. When incubators are established following increase in patent quality, this shows that university has good projects in pipeline and expect to have good quality patents in future but choose to have an incubator even though there is no direct effect on patent quality. However, if incubator is established after a decline in patent quality, this could indicate that university expects a further decline in patent quality and incubator is established as a driving mechanism to fulfil its mission of entrepreneurship and generating revenue (Kolympiris & Klein, 2017).

Chan et al (2022) points out how university incubators and other players in the innovative ecosystem make use of digital tools like “social, mobile, analytics and cloud (SMAC) technologies” in supporting the interactions between them. University incubators make use of social medial tools like Twitter, LinkedIn, and Facebook to facilitate their selection process and to present to the outside world about the university incubator and the tenants’ success and to showcase the entrepreneurial ecosystem within the university. They also use these digital

tools in creating awareness and to advertise and attract their prospective applicants. Also, many of them manage their application processes using cloud computing technologies. Analytics tools are being used in tracking and analysing the behaviour of potential future tenants. In activities related to business support, university incubators often depend on SMAC tools and technologies as a medium for the implementation of start-up ideas and their development. Also, many times social media is used as a link to connect the tenants with mentors in order to support sharing of resources. To promote collaboration and communication among the start-ups and to provide uninterrupted access to information and other support, mobile technologies are very often used by these organizations. Cloud technologies are also used by university incubators as a medium of information storage, to extend technical support to tenants and also to foster collaborations among them. Basically, these SMAC technologies helped university incubators in empowering and supporting the start-ups and also in their internal activities and to have an overall connection between various actors and resources in their innovative and entrepreneurial ecosystem.

Another main use of SMAC tools is in collaborating the tenant companies with a wider innovation ecosystem. In this case, social media can help in supporting the communication among the tenants, mentors, alumni, and partners and even investors. Mobile technologies help in providing the communication between these ecosystem players irrespective of time and place. Analytics also provide a good method in analysing and understanding the behaviours of these actors of ecosystem well. This way SMAC tools helps incubators to connect various actors and to grow any potential relation between them (Chan et al, 2022).

The incubator activities and processes were widely influenced by COVID-19 which triggered virtualization and innovation. SMAC technologies helped incubators during the pandemic in not only promoting the tenant activities but also to provide support and services to them. This included even coaching and mentoring them through online channels. These tools helped the incubators in supporting the incubates by giving relevant resources and seminars to aid them in surviving in the time of pandemic (Chan et al, 2022).

2.5.3. Social Incubators

Social Entrepreneurship

Social Entrepreneurship has helped in bringing light to local, national and global challenges and to create interest about these topics in social sector, media, corporations and government. Social Entrepren9eurship can be defined as "the practice of targeting social challenges with innovative and market-oriented solutions", and social ventures as "those organizations that primarily target social challenges through innovative and market-oriented solutions." One of the factors that has caught a lot of attention in this topic is the potential for scalability of the same, which refers to the social impact magnitude rather than the size of organization (Casasnovas & Bruno, 2013).

Social venture and corporations

According to (Saebi et al, 2019; Santos, 2012; Wry and York, 2017), social ventures are ventures that rely on market dynamics in order to accomplish a social mission. Social corporations are a specific category of social ventures who are a complete corporate legal entity. They normally form a full-fledged limited liability company and so include their social mission as part of their formal documents. This declaration of mission is important due to two main reasons for these corporate bodies (Serres et al, 2022). First of all, this makes it clear to the investors that they are not focussed on profit and maximising wealth (Jones and Felps, 2013) and second, these governing documents of social corporations include the investors' and the teams' legal rights in undertaking their social objective (Levillain and Segrestin, 2019) and to execute the same in their activities.

Social Incubators

According to Aernoudt (2004), Social incubators aims at:

- Supporting and stimulating growth and development of companies which has employees with poor employment capabilities
- Reduce the social gap by improving employment opportunities for people with low employment capacities which includes disabled people, low-skilled workers, immigrants, refugees etc.

Casasnovas & Bruno (2013) defines social incubators as "programs that support the scaling process of organizations that mainly target social challenges through innovative and market-oriented solutions". They can be profit/non-profit organizations, hybrid or can belong to governments, financial institutions or universities and provide resource including training, mentoring, networking or funding (Casasnovas & Bruno, 2013). The offerings of social incubators hence are similar to that of other types of incubators.

Another problem faced by social entrepreneurship is the lack of financial support. According to the study conducted in India by Sonne (2012) about innovative initiatives supporting inclusive innovation in India, the fund provided by financial inclusion initiatives are very little to provide financial access for innovative entrepreneurs. These initiatives mostly include banks, who are not much interested in financing inclusive innovations and microfinance, where the funds are not big enough in supporting the growth of the ventures. Incubators and venture capitalists have recently emerged as support organizations with social mind and is helping in creating an innovation supportive eco system. Inclusive business incubators are helping inclusive innovation and social entrepreneurs by providing financial and non-financial support (Sonne, 2012).

As a fact, social entrepreneurship and innovation also needs incubation. Incubators helps these ventures in improving business management skills, building and testing prototypes, market research and to formulate competitive business plan which can help these firms to attract external finance (Sonne, 2012).

According to Sansone et al (2020), Social incubators can be considered as incubators specializing and that have advanced knowledge in social innovation. These support institutions give more importance to Corporate Social Responsibility (CSR), training on business ethics and social impact measurement. Social incubators mainly help social start-ups since they focus on services related to social impact. This type of incubators considers support and services related to entrepreneurial and managerial education as more significant whereas business incubators give more importance to shared services and physical spaces.

Sansone et al (2020) classifies incubators into three categories based on the support they offer to tenants aiming at social impact. Business incubators are those that do not offer services to business with the objective of creating positive social impact. Mixed incubators are the ones that extend support for 1% to 50% of start-ups that aim at creating positive social impact and finally, social incubators are the ones that offer support to more than 50% of businesses aimed at producing positive social impact.

Incubators that offer support to social start-ups, that is mixed and social incubators are more focussed on managerial and entrepreneurial education. Mentoring or consulting on corporate social responsibility and business ethics and measuring social impact are some of the most important aims of social incubators. Since business and mixed incubators support start-ups that do not aim in producing social impact, they prefer to focus more on pooled services and physical space more than by social incubators. Considering the efficiency of these different incubators, social ones are as efficient as the other types even though their main focus is not on tenants' financial success which could be beneficial for social entrepreneurs. Due to this fact social incubators might become a source of social innovation knowledge Sansone et al (2020).

Social incubators are as efficient as the other incubators, despite their focus on supporting tenants that are not only interested in economic performances.
(Sansone et al, 2020)

According to Hausberg & Korreck (2017) Social incubators can be classified into following types:

- Social Business Incubator, that aims at facilitating a platform for identifying and executing innovative social solutions which includes creating small social companies. They follow economic sustainability principle, that is incubating ventures that are focused on medium- and long-term financial support to attract human resources and contribute for quality social services.
- Social Business Innovation Centre, that also focus on social impact, but aims to foster technology-based social innovations. These can be considered as a type of corporate incubator with a highlight on CSR.
- Technology-based Social Business Incubator, aims at "empowering communities in need by creating scalable technology solution". They focus on environmental impact, global literacy and human rights.
- Social Business Accelerator,
- Networked Social Business incubator
- Virtual Social Business Incubator

2.6. Similar Actors

There are other organisations and bodies that provide support and services to start-ups and entrepreneurs other than incubators and accelerators. A few of them are mentioned in this section.

2.6.1 Business Angels

According to Mason & Harrison (1996) "Business Angels are generally experienced investors, have a fair degree of financial acumen and are confident in their own ability to evaluate the merits and risks of prospective investments".

Study on Business Angels is a combination of economy, finance and business management. They play a very crucial role in driving the growth of new ventures. Business Angels are an important component of entrepreneurial ecosystem since they promote innovation to the

economy by making investment at venture's early stages even before an institutional investor comes forward. Also, they contribute more value beyond cash by actively participating in company management and also plays the role of advisers. Since they add value by counselling, mentoring and networking and also helps in fund raising at later stages, Business Angels' capital is often called a s 'Smart Money' (Aernoudt, 2005).

Business Angels' investment can be considered as equity investment only or can also be loans from investor to investee. However, most sophisticated, and experienced angels use convertible debt in order to include the interest of entrepreneurs, so that they can get funds without fearing excessive dilution in terms of equity from onset (Argerich & Cruz-Cázares, 2016).

2.6.2. Venture Capital

Venture Capital and Corporate Venture Capital are the main source of outside equity finance mainly for start-ups with high growth potential. This is the most widely recognized equity financing form regardless of the fact that they fund only a little fraction of start-ups (Drover et al, 2017). "Venture capitalists raise funds from a set of limited partners (university endowments, pension funds, etc.) and seek to provide a return to these investors through selective investments into a portfolio of young, innovative companies (Gompers & Lerner, 2000).

Venture Capitalists are experts in solving financial issues related to moral hazard and asymmetric information, which is a main problem faced by young entrepreneurial firms. This is done by connecting investors who are rich in cash to entrepreneurs who are rich in ideas. Economy also has a positive externality by making sure that there is enough funding for innovative firms. This incentivizes governments to develop and promote an active venture capital market (Lerner & Tag, 2013).

Also, the extensive literature study conducted by Lerner & Tag (2013) has found that institutional environment is correlated to local venture capital activities that includes:

- Legal environment
- Financial market development
- Tax system

- Labour market regulation
- Public funding on R&D

According to Bertoni et al (2015), based on differences in ownership and governance, there are various types of venture capital investors. This will also affect their strategies and objectives in investments. The various types include:

- Independent VC
- Non-independent or Captive VC
- Corporate VC
- Bank-affiliated VC
- Governmental VC

2.6.3. Venture Builder/Start-up Studio

(Viglialoro et al, 2020) Defines Venture Builder "as an organisation that creates ventures by providing not only traditional incubation services and equity, but acts as a founder or co-founder of the start-ups involved. The Venture Builder holds a considerable share of equity capital of these new ventures, thereby exerting a significant influence on these new ventures beyond their seed and start-up phase."

Venture Builders can be considered as "serial entrepreneurs", since they aim at creating multiple ventures simultaneously in parallel so that at least few of them will become a success. These are created by various bodies like corporations, universities, social start-ups etc in order to foster various entrepreneurial activities within them. The main difference that venture builders have with respect to incubators is that they not only facilitate incubation facilities and equity but also co-found and produce the new ventures. Start-up studio, start-up factory etc are terms used to refer venture builders (Viglialoro et al, 2020).

2.7. Governance mechanism in incubators

It is important for business incubators in order to figure out proper governance mechanism to provide required resources and nurture the development of new ventures. Even though studies on these mechanisms are very limited, there are two mechanisms mostly accepted by the researchers which are contract mechanism and trust mechanism (Han et al, 2022).

Contract mechanism is one where a contract is signed by both parties in order to have a clear idea of their obligations, rights, penalties and incentives thereby reducing risk to both parties and making an institutional basis for their interactions (Han et al, 2022).

Trust mechanism, like the name suggests functions with the expectations of a partner that the other one can be trusted and relied upon to act in a way that is being predicted and fair (McEvily et al., 2003a, Poppo et al., 2008; Granovetter, 1985; Zaheer et al., 1998) and that they will not exploit the relationship (Dyer and Chu, 2003). This method found its way from social network theory which states that enterprises have strong connection with the social network and that its economic character is influenced by the relation between the parties (Granovetter, 1992).

Contract and trust mechanisms have different pros and cons. Contract mechanism have a weak point when considering flexibility, since contracts are mostly not flexible in the case of unexpected scenarios and this can affect one party in reacting to an uncertainty on time (Gulati and Nickerson, 2008). But while considering the case of risk management, contract mechanism can have an upper hand since it reduces any opportunistic behaviour from parties (Williamson, 1979). In this case, trust mechanism is a weak governance method since it does not have much provisions to prevent risk and exploiting behaviours (Lazzarini et al., 2004).

Another complementary view of contract and trust mechanism developed after interaction with business incubators includes two mixed mechanisms which are contract-based trust mechanism and the trust-based contract mechanism. The former one depends on three factors – standardized behaviour of parties using signed contracts, trust formation as a result of contract-based interactions and this leading to not being too strict in terms of subsequent

implementation. Trust based contract mechanism also have three main characters – this way helps in having a more established trust between actors, mutual trust is the main base for the incubation contract and the contract is more concentrated on incubation terms rather than other punitive contents (Han et al, 2022).

2.8. Entrepreneurship and entrepreneurial process

According to Allen (2006), entrepreneurship is not simple forming s business, but it is a mindset or set of behaviours that mostly focused on opportunity, growth driven, risk taking and innovative. This way of thinking can present in large corporations to non-profit to any individual with a drive to apply their passion to start and execute a business opportunity.

Dollinger (2008) defines entrepreneurship as "the creation of an innovative economic organization (or network of organizations) for the purpose of gain or growth under conditions of risk and uncertainty." This helps in finding the differences between entrepreneurship and any other activity that generate wealth. The main elements found in entrepreneurship includes innovation, identification of resources, creativity, acquisition and economic organization. Two main conditions are important for the growth of entrepreneurship. First one is freedom, to be creative, to launch a new economic venture and to foster innovation. Second is that there should be prosperity, since a positive economic situation is required for a new venture in order to grow and gain.

According to Baron (2008), there is no clarity in defining entrepreneurship and mostly forming a new venture and being an entrepreneur often grows in the actions of a person. He divides the process of entrepreneurship into three main stages. The first one is prelaunch, comprising of activities that happen before the actual launch. Second phase is the start-up or launch, which include actions related to the actual establishment of the firm and the initial activities related to its operation and the last one is post launch which represents the activities that happen in the post-start-up phase. The length of these phases are different depending on the individual entrepreneur.

2.9. Incubators, entrepreneurship, and start-up financing

While considering the situation in Europe, main problem was the lack of entrepreneurship and there was a missing connection with the financing part. So there was a need in analysing the relation between incubators, entrepreneurship and financing in start-ups (Aernoudt, 2004).

In most European countries, entrepreneurship is still an anomaly (Reynolds & Hay, 2001) and this has affected the supply of projects and on the perception of new businesses and incubators. Since this scenario of decrease in entrepreneurship can be both a problem for incubators and at the same time a factor that force change, connecting this gap and finding out ways in which Europe can be made more business friendly is a main objective for incubators (Aernoudt, 2004)

Incubators in Europe commonly is tied to a culture fostering non-profit and most of them work for regional and community development. Hence, the main aim of these incubators is to nurture growth potential business to increase jobs and value. Even though the role of incubators in economic growth is important, they might have a step back from what the world today consider as incubators. So the identity of incubators are as important as there quality (Aernoudt, 2004).

One of the main sources of start-up financing could be business angels who provide both financial resources and experienced management, but in Europe, most of the business angels funds goes as seed money and there is a major obstacle in the development of these angel investments in Europe due to the anomalies involved in entrepreneurship which leads to lack of quality projects (Aernoudt, 1999).

Basically, from the points discussed above, there is a lack of connection between incubators and start-up financing. Based on a Harward Business School study only 10% of incubators raised funds, that too by realising IPO and 60% never raised any funds for their tenants. Thus, a more established interaction between business angels and incubator managers might have a positive impact in the entrepreneurial ecosystem in Europe and thus allowing more

entrepreneurship, more technology-based firms and thus to more incubator projects which will help in developing better angel investment networks (Aernoudt, 2004).

2.10. Effectiveness and impact of business incubators

Business incubators provide the tenant companies with an environment designed to nurture these enterprises, by facilitating working spaces, knowledge, and even capital and other supports, which int turn help these companies to focus on their business model and improve their survival. Performance of tenant companies widely influence the success of the incubators and so it is better for them if the failure rate of tenants is less. One of the main ways of ensuring this is by introducing a comparatively difficult screening process while selecting the tenants (Aerts et al, 2007).

In Europe, the innovation can be boosted by knowing more about the nature of incubators and by encouraging the development and growth of both start-ups and incubators. On an average, incubators in Europe are run by 12 full time equivalents and take up to 7000m^2 which can ensure supporting around 220 tenants. The occupancy rate of most incubators are high which is around 90% for about 48% incubators in Europe. Most of these were formed in between 1990 and 2000 and there was a decline in the number post 2000 which might me due to the impact of reclining economic situation (Aerts et al, 2007).

According to Hansen et al (2000), specialization is one of the best strategies for incubators. Even though, the tenants that are specialized will have to go through all traditional difficulties and start-up issues, in the case of s start-up which is diversified there is no extra value creation. As Ray et al (2004) pointed out in their research, identifying, utilizing, developing and maintaining critical resources can enable a company to have more competitive advantage than its competitors, rather than having too many resources. Even though specialization can have lot of strengths, the main weakness is the increased vulnerability caused by the fact that in case the sector that the companies specialize in suffers, the incubator will also get affected by it.

Some of the positive effects of incubators on start-ups are mentioned in the below table.

Effects	Source
Incubators facilitate networking which can positively impact start-ups	Freel, 2003
Incubator networks helps in limiting information and resource costs thereby reducing the transaction costs	Williamson, 1975
Enable start-ups to achieve economies of scope by sharing of inputs	Bailey and Friedlander, 1982
Incubator networks helps in utilizing and transforming technologies into solutions which are attractive to markets	Ford et al, 1998
Interaction between the tenant companies helps in technology transfer and thus influence the innovation and development of companies	Lorenzoni and Lipparini (1999)
Network contacts and social meetings might lead to more opportunities	Singh, 2000

Table 2: Effects of incubators on tenants

2.10.1. Value proposition

Considering the various value proposition of business incubators, economies of scale is one of them. Since the tenants share office space and other resources among them, they do profit from the scale economies. Primarily it reduces their overhead costs since they share common infrastructure resources like energy, water, cleaning, telecommunication etc. Also, these tenant companies are offered few other common facilities by the incubators which they may not have in other cases during the primary development stages like conference halls. Parking, reception etc. In this way they do not have to carry the burden of planning and paying for all these to other independent parties. This way, the availability of these common resources enables these early-stage businesses in focussing more on their core and innovative activities

rather than wasting time, effort and money in other administrative and real estate ones (Bruneel et al, 2012).

Another important value proposition of incubators is accelerated learning curve. Most of the time, the early-stage tenant firms may not have the necessary skillset and experience in order to manage sudden changes and shift in their ecosystem. Continuous learning-by-doing is the only way they can develop their own set of routines to overcome such uncertain situations. Business incubators provide coaching and training activities that can help in accelerating their learning curves (Bruneel et al, 2012).

Also, incubators help their tenants to face the early-stage scarcity of resources. The growth and survival of start-ups are widely affected by their lack of financial and management capabilities. Incubation programs normally help in building networks and contacts with venture capitalists and business angels which can help in overcoming these issues (Bruneel et al, 2012).

2.11. Incubation in Europe

According to Aernoudt (2004), The main aim of technology incubators in Europe is completely different in each country. While German incubation programs aims mostly into innovative start-ups, attracting big companies and multinationals were the main objective of Belgium and Spain. In the case of France and Netherlands, the model adapted was mainly to focus on university incubators. Meanwhile, other than the national models, European Union also established some initiatives related to incubators.

European Business Innovation Network (EBN) was formed by EU in 1984 after which 150 Business Innovation Centres (BICs) were launched all over Europe in around 20 countries. These are bodies that facilitate technology transfers, consulting services and coaching for innovative small and medium size companies. More than two thirds of 150 BICs were in Italy, France, Spain and Portugal (Aernoudt, 2004).

After analysing 40 technology parks in the United Kingdom, the final result was that four-star hotels, good houses and restaurants and vicinity to international airport had more importance compared to having a university nearby. So in this case, incubators were mainly for-profit

and driven by same and almost 35% of tech parks in UK were occupied by insurance companies, accountants and financial service providers (Aernoudt, 2004).

In the case of Finland, it was after the country joind th EU that incubator activities start to establish. In 1995, there was only one incubator in Helsinki and five years later there were 16. Most of them belong to either mixed type, technology incubators or related to economic development. These tech incubators have strong connection to university research projects and were mostly part of 16 Finnish science and tech parks (Aernoudt, 2004).

Meanwhile in Austria, real estate facility services were limited and so a virtual incubator was established in province of Carinthia. Virtual assisatance were provided in case of hands-on management, marketing and other advices and the primary expense expected for the establishment of incubator facilities were used by tenants as a seed money (European Commision, 2000)

As mentioned in the details above, in the case of incubators in Europe, regional and federal government had a main role in their development. According to the research conducted by K. Aerts et al (2007), most of the incubators got support from these bodies during their formation. R&D institutions and universities were also helpful to many of them during the initial setup. Banks and enterprises also had a role in the early start-up stage financing. Only around 30% of European incubators are for-profit. Most of the incubators are self sufficient with the main income being achieved from the tenants in the form of rent and other service fees. Around 63% of the European incubators obtain aid form regional and national governments in meeting a good percentage of their expenses. More than 30% of incubators are sponsored by the European Union or other organisations. Although universities and other research and development centres do have a crucial role in the establishment of incubators, they rarely come forward as sponsors of these organizations.

2.11.1. Incubators in Germany

In the last 15 years, Germany became one of the leaders in the incubator movement. But emergence of business incubators in Germany started much later compared to other countries. This was due to the delay in policy development at the municipal level which began only in the 80s as a result of reduced influence from the side of local authorities. Later the development was steered by an industry research sector restructuring (Tsaplin & Pozdeeva, 2016).

Technical university of Berlin initiated the establishment of Germany's first business incubator in 1983 after which many of them appeared in various other cities mostly under the initiative of regional offices of banks or chamber of commerce and other powers of the cities. The 1990 unification of Germany was followed by establishment and development of incubators in the country and led to an average 18 new incubators created per year between 1992-2000. This development was mostly done in former East Germany (Tsaplin & Pozdeeva, 2016).

German Association of Innovation, Technology and Business Incubator Centres (ADT) plays a great role in development of business ecosystem in Germany. Over 300 business incubators and innovation centres in the country have objectives including modern technologies and services, support companies focusing the future, foster entrepreneurship among the unemployed, technology transfer and spinoffs and to promote regional economic development. As a result of these mottos, most of the incubators in Germany are not-for-profit (Gross, 1997).

While looking in to the role of state in this sector, regional agencies have a high participation in the business incubation activities. Meanwhile the involvement of federal government is very less. Regional development policies do have a greater role in the performance of above 30% of the incubators in Germany. Along with that municipal bank savings and subsidies are also provided by such bodies. In Western Germany, only 38% of the incubators were able to fund their expenses with their own resources. The rest 62% were subsidy aided (Tsaplin & Pozdeeva, 2016).
To conclude, the survival rate of start-ups incubated in Germany are not satisfying and it need a radical increase in the rate at which new companies are formed and developed with stability and decrease the number of failed companies (Tsaplin & Pozdeeva, 2016).

2.11.2. Incubators in United Kingdom

UK was one of the countries where incubators were initially established. British Steel Industry (BSI), which was a subsidiary of British Steel was formed in 1975 as a way of job creation in steel closure areas (Aernoudt (2004). St.John's Innovation Centre in Cambridge which was established in 1987 is the oldest UK incubator (Bone et al. 2019). Even though many of them are aided with university or public funds and subsidies, most of these organizations are self-funded at least partly by the membership fees and rents collected from their tenant companies (Bone et al. 2017).

At any one time, around 6900 companies are supported by UK incubators. Most of them do not focus on a specific sector or are general or they broadly concentrate on support digital technology businesses. The ones that are specific to a sector generally look into science-based fields like life sciences, healthcare, engineering or energy. Incubators are mostly distributed in the entire region and are widely seen in academic campuses and science and business parks in outskirts (Bone et al. 2017).

Accelerators came much later compared to incubators after the launch of Y combinator programme which was established in US in 2005. In UK, accelerators started few years later to this and their population have been increasing rapidly ever since. Most of them were driven by venture capital at first and now they are also supported with corporate funds. UK accelerators are estimated to support around 3600 new companies every year. Similar to incubators, accelerators in UK also tends to be multi sectoral. In case of the ones which are sector specific, often they are focused around digital businesses like EdTech, FinTech, Smart cities etc (Bone et al. 2019).

2.12. Innovation in healthcare sector

Considering in terms of both scholarly research and new innovative enterprises, healthcare entrepreneurship has gained a wide attention in last 20 years. The innovations and entrepreneurial evolutions in this sector originated and will proceed to emerge by various parties in the healthcare value chain mostly including non-traditional actors in healthcare sector. Like other industries, in healthcare also the competition between actors is growing and any inefficiencies could lead to entry of new players. These gaps in healthcare sector are mostly addressed by entities in the same chain and new innovative entrepreneurs (Wilden et al, 2018).

In healthcare sector, when considering an average, 11% of the pre market approvals information consists of companies formed by physicians and only 4% accounts for non-physician founded. Also, most of the incumbents are more likely to use patents by physician founded companies in their new products or devices. The advancements in new technologies like digitalization have influenced healthcare sector. Before, management of healthcare sector was done by specific organizations in this sector whereas now smartphone applications are able to deliver these services and hence these services can be offered by entrepreneurs and start-ups and hospitals are not always required. This can also force hospitals to do more innovative activities thereby adapting to the changing landscape (Wilden et al, 2018).

Incubators and accelerators can aid healthcare sector by selecting teams with ideas and in various development stages and mentoring them through implementations, testing, pilot studies and clinical trials (Ramadi & Srinivasan, 2021).

2.12.1. Pandemic and healthcare innovation

According to Ramadi and Srinivasan (2021), innovation in healthcare normally include higher cost, requirement of skillsets which are diverse and other regulatory processes that can be complex. Many critical gaps in current structure were exposed during the COVID-19 pandemic mainly the ones between industry scale production and cutting-edge research in academic institutions. Even though most of the countries which had the resources and expert skillsets

were able to find answer to most questions exposed in the pandemic, they lacked a framework in order to put together various institutions and scale up solutions in proper time.

When considering the involvement of academic institutions, they have launched multi-disciplinary research using research centres, cross departmental initiatives, and specific funding. Medical research, engineering and basic science are highly collaborating fields. With the involvement of diverse students and faculties, academic institutions produce creative ideas and provide in depth knowledge and skillsets. Even so, since academia is incentivized by other factors like patents, publications etc, innovation done by them is relatively slow. Another actor in this field are academic medical centres (AMCs) and they implement ideas by forming innovation hubs. These bodies aim at improving patient care and experience along with overall cost reduction (Ramadi & Srinivasan, 2021).

Industry involvement in healthcare innovation mainly in early phases can help in choosing designs and ideas that can be in long term, marketed and manufactured at scale. Financial sustainability in long term is important for innovations in order to attract for-profit institutions (Ramadi & Srinivasan, 2021).

The importance of government in innovation in the healthcare sector depends on national context. Government can be the primary customer in case of countries with centralizes public health system and so the buy-in by government can be crucial in this case for innovation.

Meanwhile, in countries with private health system, government merely act as regulators in approving innovations. In any case, government can as a link that connects various players in the case of specific needs or emergencies like for example, how US government formed Operation Warp Speed to facilitate collaborations, resources and funding during the pandemic (Ramadi & Srinivasan, 2021).

3. Methodology

The research methodology is explained in this section. A lot of research was done as part of the thesis starting from the preparation of database, collecting information and final analysis and conclusion.

We start with an overview of the activity that was conducted as part of the thesis study and then go more in details to each of these steps.

3.1 Overview

Most of the thesis research was done using primary methods i.e., by collecting data from the websites of incubators and also from other databases in order to do a descriptive analysis on a wide range of related topics.

The research activity comprises of five steps/sections which was used to understand the incubators and accelerators.

- Updating the list of incubators and accelerators that are operating in the particular country.
- Updating the database with data related to incubators and accelerators
- Categorizing based on the industry under focus to isolate the ones that are working in healthcare and related fields.
- Collecting the key financial information
- Preparation of sample list
- Final analysis and conclusion

3.2. Updating list of Incubators and Accelerators

Initial research was done in order to understand the population of incubators (of all sectors) in UK & Germany. This was done using available SIM database and other sources from the internet.

For Germany and UK, we started with the existing SIM incubator database and checked whether these organizations are still functioning and doing incubator activities. This database was further updated with the incubators/accelerators identified using secondary research on various sources in internet, journals and lists prepared by other organizations.

After the preparation of the database, other information about the organizations were collected mainly from their websites and also from few other sources. This information were already available for incubators and accelerators formed until 2018 which was part of the earlier database. These details were again checked for the existing ones and for the incubators and accelerators formed after 2018, these data were collected from scratch. Contact information like contact number, email, website link, address, region and city were collected for each incubator and accelerator in both UK & Germany. Following this the VAT number was also collected for organizations in Germany mainly using the "Imprint" section in their respective websites. For UK, this number was not present in the websites.

Proper verification was done in order to confirm that the list consists of only incubators and accelerators and maximum effort was done in order to exclude other organisations like venture capital funds.

Initial research was done in order to understand the population of incubators (of all sectors) in UK & Germany. This was done using available SIM database and other sources from the internet.

The database was an excel file with three main sheets including the list of incubators and accelerators, the list of organizations that were excluded and the third one was used to store the links of organizations and sources that provided the list of incubators and accelerators in each country. The exclusion list was used in order to include organizations that did not fit the eligibility of being incubators and accelerators. These were mainly co-working spaces that essentially provided rented spaces and similar facilities, venture capital firms that only focussed on the funding side and others.

For Germany, the starting point was the SIM 2018 database which had the list of all incubators and accelerators that were functioning as of 2018. This list was created and updated using several methods as mentioned below:

- Using pre-existing list of incubators and accelerators in each country
- By searching for international lists
- By searching the networks of incubators and accelerators and subscribing to their newsletters and using their social media posts
- By searching for consulting companies and other organizations that provided list of incubators and accelerators.
- By doing some search of incubators/accelerators in a given country using public databases like CrunchBase, Google etc., social media like Facebook, Instagram, Twitter etc. and other sources in the internet. This search was extended to states and cities of a given country to accumulate more names to the list.

Each and every result obtained by this search was then checked and verified in order to decide whether to include it in the list or excluded list according to the functions and objectives focussed by each of them to make it clear that they fit into the criteria for incubators or accelerators.

Once the list was updated with the maximum possible entries that could be found out, each of them were checked and verified using their websites and social media pages in order to ensure that they are all still active and are doing incubation and acceleration programs. This was done for both old database entries and the new ones.

3.3. Updating the database

After the preparation of the database, other information about the organizations were collected mainly from their websites and from few other sources. This information was already available for incubators and accelerators formed until 2018 which was part of the earlier database. These details were again checked for the existing ones and for the incubators and accelerators formed after 2018, these data were collected from scratch. Contact information like contact number, email, website link, region and city were collected for each incubator and accelerator in both

UK & Germany. Following this the VAT number was also collected for organizations in Germany mainly using the “Imprint” section in their respective websites. For UK, this number was not present in the websites.

Proper verification was done in order to confirm that the list consists of only incubators and accelerators and maximum effort was done in order to exclude other organisations like venture capital funds.

3.4. Categorizing based on industry

Since in this thesis research we are concentrating on incubators/accelerators working in health care, it was necessary to classify the list that was prepared based on the industry under focus. This was done mainly by collecting data about these organizations from their websites. This was done by doing a thorough research on the websites of each of the organizations. For some of them, the focussed industries were declared in their “Home” or “About” pages. For others we had to go through the company portfolios in the websites and other sources to get this information.

Here we have considered the incubators working in healthcare related sectors as well as the general ones which are not sector specific. These non-specific incubators are open to any field (which means also healthcare) and could be working with healthcare companies or might even be experts in the field and so it was in consistent with the idea of this thesis research in order to add them to the study.

3.5. Collection of financial information

Further research was done to collect key financial information about the organizations. Orbis database was used to collect financial information about incubators and accelerators in both UK & Germany. The name of incubators and BvD ID were used as identifiers in gathering information from Orbis. Data collected included number of employees, net income, revenue from sales and service and EBITDA.

This kind of information was not present for a good number of organizations. According to the information obtained from Orbis customer care, not all companies have published their financial and key information in the database. Some incubators were not present in the database. In the case of some others, there was literally no information available other than their name and address. Number of employees were published by most of the incubators whose had published at least few data in Orbis. The financial data was present only for very few of them and so only those organizations were considered for the financial analysis.

3.6. Preparation of sample list

After this data collection, a sample list was prepared to collect few extra information. For this first step was to remove all the incubators whose data was not found on Orbis database. Only those which had at least the information on number of employees were used in order to prepare the final sample. This was made with the first 40 incubators and accelerators with the highest number of employees for each country.

Then, more data was collected for these organisations to get more idea about their location, year of foundation, number of companies incubated by each of them, incubator type and also the preferred sectors declared and the other sectors they work for. The address and year of foundation were collected either from the respective websites of incubators or from the Orbis database. The number of supported/incubated companies basically refers to the number of organizations incubator has in their portfolio. For few of them, the actual number was mentioned in the websites and for few others this information was obtained by searching more deeply into their portfolio, press release etc.
The details on sector declared by incubators and the ones they work on were also found from their websites by referring to the "About us" page and the portfolio page. The declared sectors were mostly mentioned in the introduction pages and to find details on the sectors they work on, a thorough analysis was done using their portfolio and case studies that were published in the websites. The incubator type was also found out by going through the introduction pages.

3.7. Final analysis and conclusion

The data collected was then used in order to do a detailed analysis on various factors concerning the healthcare incubators in both countries. Starting from the proportion of healthcare incubators in the total incubator population, geographical distribution and concentration, key information and financial data to various sectors that these incubators work other than healthcare were analysed to get a complete view. Each of these data were analysed for both countries as well as a comparison section was added to have a connected study.

Finally, a conclusion part is added in order to brief the main points in each of the topics analysed and to have a final say in each of them. Limitations of this research and prospective future research ideas were also included to aid for further study.

4. Findings

The main findings and analysis from the research on healthcare incubators and accelerators in UK & Germany are included in this section. We start with a basic understanding of the population and geographical details of organizations to more detailed analysis of their number of employees, financial data, sector of work and support activities. Each topic here presents deep analysis of organizations in both countries.

4.1. Population of healthcare incubators

In this analysis we are basically explaining the ratio of total incubator population in each country to the population of healthcare incubators.

4.1.1. Germany

In Germany, the total number of incubators present as of 2022 is 259. From this according to the sector in which they operate, 125 incubators were selected that either support healthcare companies or are general which operates in all fields. So, in this case almost 50% of the total incubator population do facilitate support for healthcare sector.

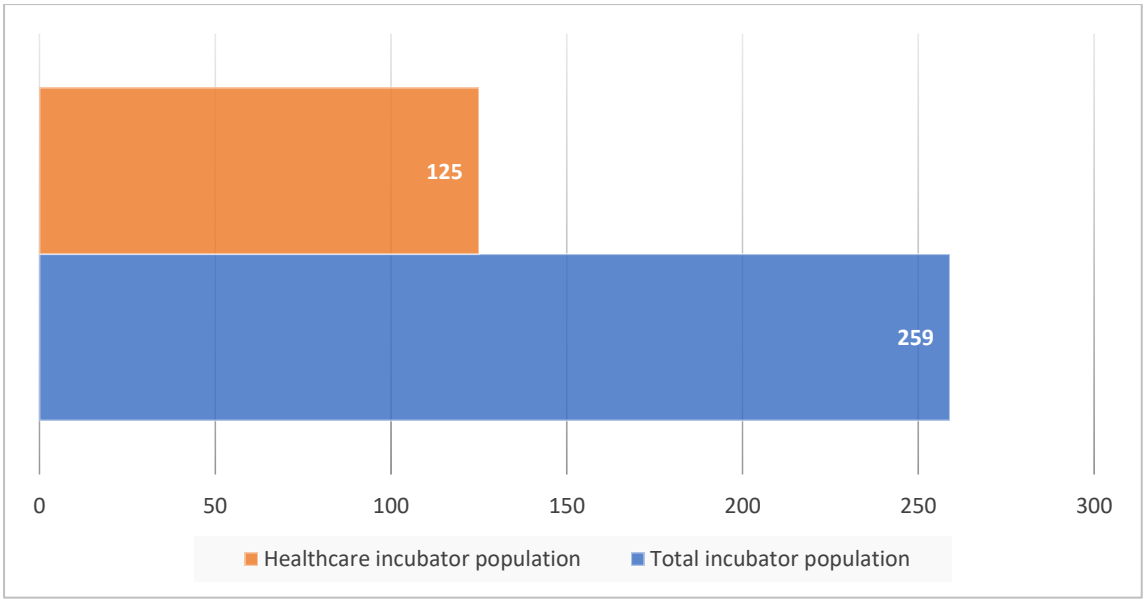

Figure 1 : Healthcare incubator population in Germany

4.1.2. United Kingdom

In this case, we started with a total incubator population of 269 and after analysing the sectors in which each of them avails support, 140 were found to operate in healthcare or generally without any specific field. This is almost 54% of the total population.

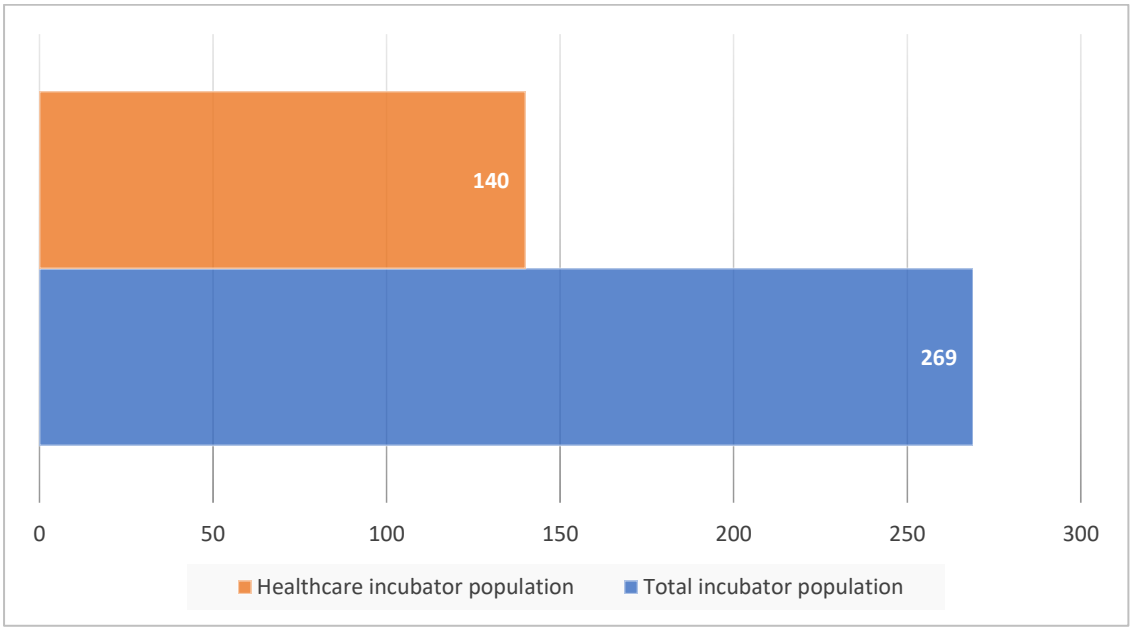

Figure 2: Healthcare incubator population in United Kingdom

4.1.3. Comparison

Considering the fact that total population of incubators irrespective of the sector supported by them is almost similar, United Kingdom does have more of them working in healthcare sector compared to the ones in Germany. This shows that innovation in healthcare is supported more in UK

4.2. Population & sample analysis

4.2.1. Germany

For Germany, from a total incubator population of 259, we filtered the ones that are working in healthcare/General sectors, which were 125. So, the actual population of healthcare incubators are 125. From this using various criterion (financial data, number of employees etc.), we took 40 of them and collected few more information to help in doing this analysis.

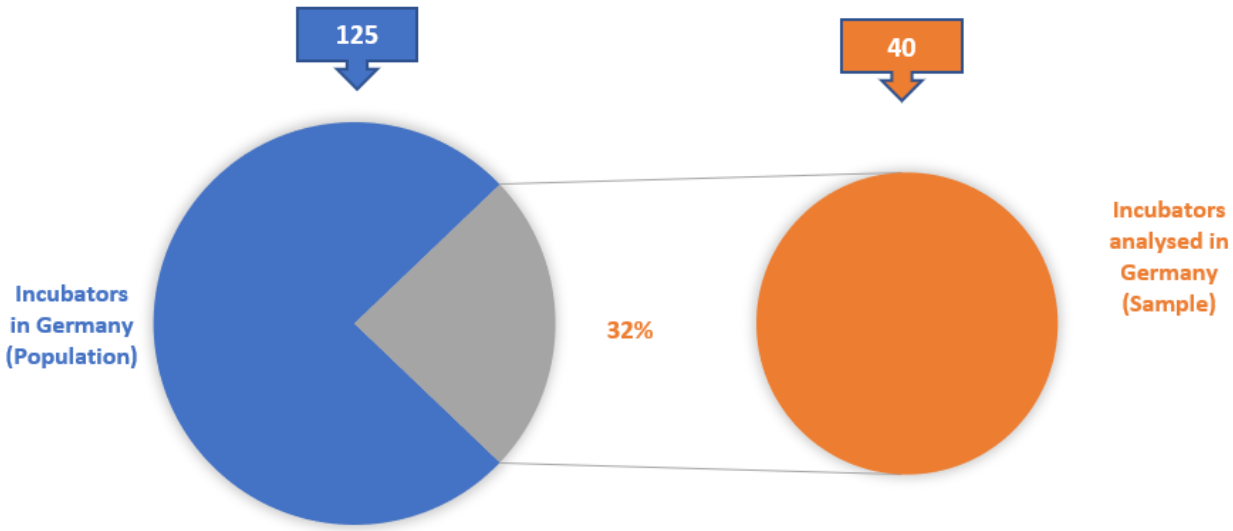

Figure 3: Population and sample of health incubators in Germany

4.2.2. United Kingdom

In the same way, for UK also we started the database with a total of 269 incubators and then filtered them according to the sector in which they work to find out that the total population of healthcare incubators is 140. Again, using financial data, number of employees etc., we took 40 out of the total population in order to do more detailed analysis.

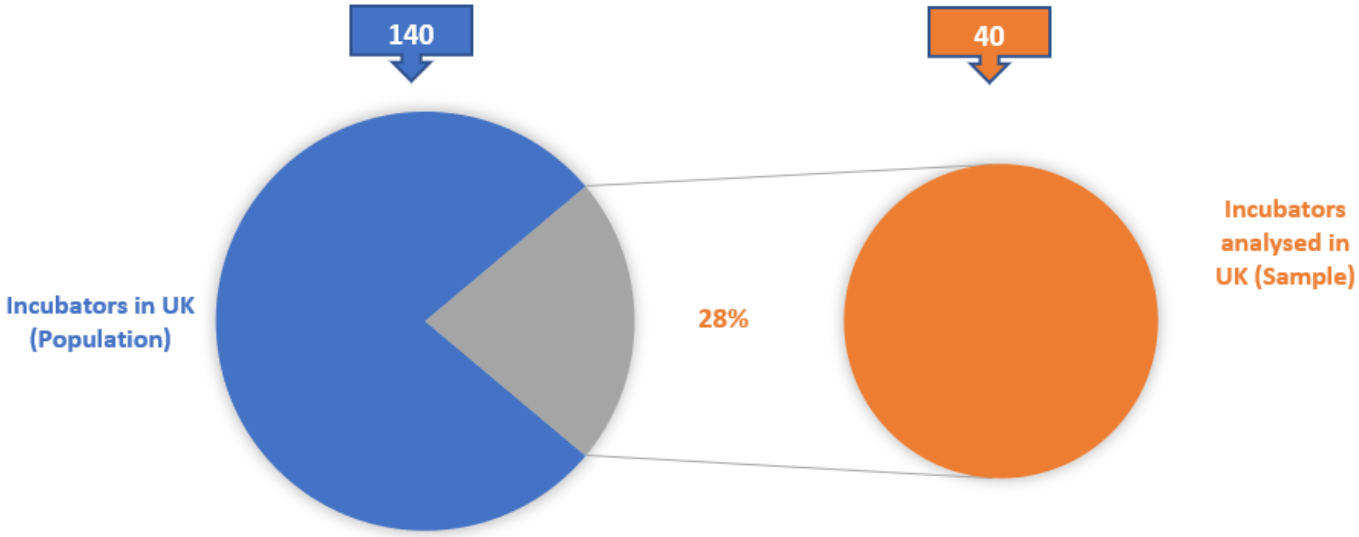

Figure 4: Population and sample of health incubators in United Kingdom

4.2.3. Comparison

In this section, we have selected the same number of samples (40) for both countries by using exactly the same criterion and methods. These are used in order to collect some extra information for more analysis

4.3. Geographical distribution of incubators

4.3.1. Germany

In Germany, there are around 125 incubators/accelerators working in the healthcare sector. From the geographical distribution illustrated below, it is clear that the zone with highest number of incubation programs is Berlin, followed by Bavaria and North Rhine-Westphalia. On the other hand, the incubation activities are fewest in regions of Bremen, Saarland and Mecklenburg-Vorpommern.

Berlin, the capital and largest city of Germany is also the innovation hub with 30 incubators and accelerators that work in healthcare industry. The sample also explains the geographical distribution of Germany's incubators/accelerators.

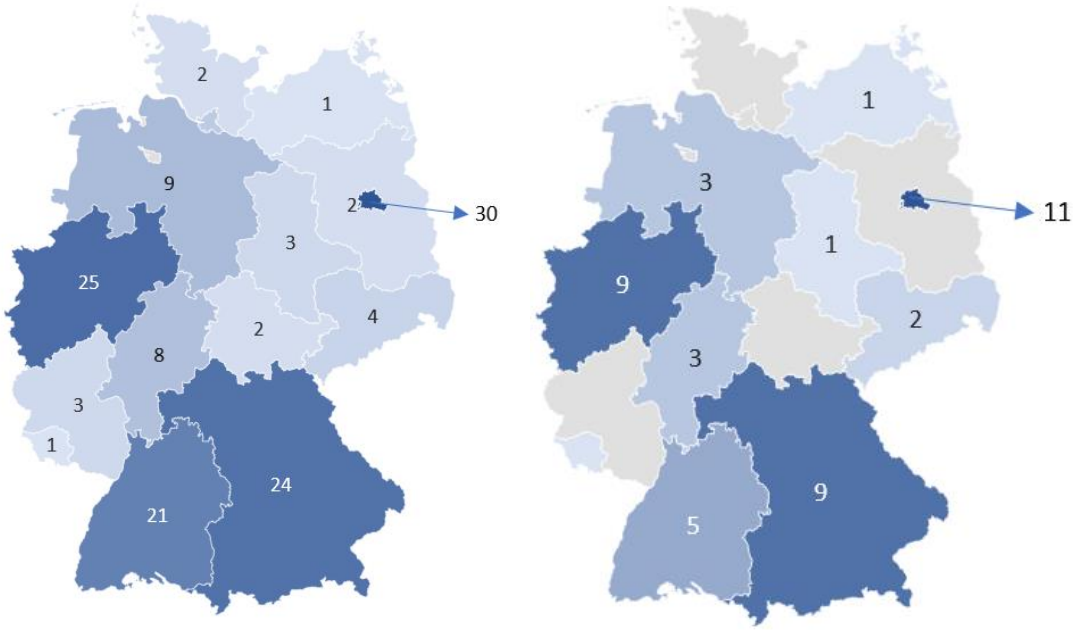

Figure 5: Population of incubators in each area (left) and the sample from each area (right) on the map of Germany.

Area (NUTS 1)	Population	Sample
Bavaria	16.9%	19.57%
Berlin	21.1%	23.91%
Baden-Württemberg	14.8%	10.87%
Hesse	5.6%	6.52%
Lower Saxony	6.3%	6.52%
Mecklenburg-Vorpommern	0.7%	2.17%
North Rhine-Westphalia	17.6%	19.57%
Saarland	0.7%	2.17%
Saxony	2.8%	4.35%
Saxony-Anhalt	2.1%	2.17%
Brandenburg	1.4%	0.0%
Hamburg	4.2%	0.0%
Rhineland-Palatinate	2.1%	0.0%
Schleswig-Holstein	1.4%	0.0%
Thüringia	1.4%	0.0%
Bremen	0.7%	2.2%

Table 3: Distribution of Healthcare Incubators in Germany

From the map and the table, it is clear that around 70% of healthcare incubators in Germany are situated in Berlin, Bavaria, North Rhine-Westphalia and Baden-Württemberg. The clear reason is that these are the states with strongest economies in the entire country and also hosts most of the industries and companies. Hence, they are also home to most of the innovation happening in almost all sectors including healthcare. Also, another reason could be the presence of some of the best academic and medical institutions that also fosters innovative activities.

4.3.2. United Kingdom

UK has a total population of 140 healthcare incubators working in healthcare. London, which is the capital and financial Hub of UK hosts the highest number of incubation programmes in healthcare, which is followed by South East and East of England. The least incubation zones are marked in Northern Ireland and north East England. Here also, the sample represents the distribution of healthcare incubation activities using the 40 organizations that were selected.

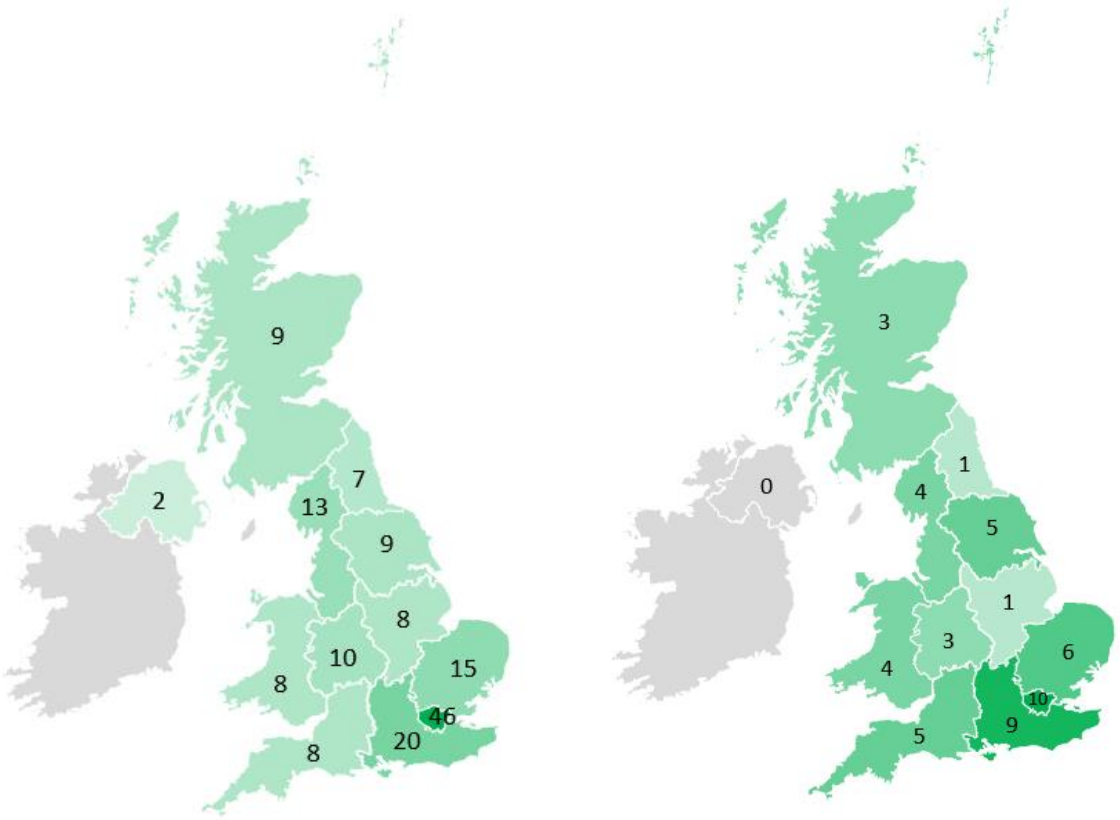

Figure 6: Population of incubators in each area (left) and the sample from each area (right) on the map of United Kingdom

Area (NUTS 1)	Population	Sample
East Midlands	5.2%	2.5%
Eastern Region	9.7%	15.0%
London	29.7%	17.5%
North East	4.5%	2.5%
North West	8.4%	5.0%
Northern Ireland	1.3%	0.0%
Scotland	5.8%	5.0%
South East	12.9%	17.5%
South West	5.2%	12.5%
Wales	5.2%	5.0%
West Midlands	6.5%	5.0%
Yorkshire & the Humbert	5.8%	12.5%

Table 4: Distribution of Healthcare Incubators in United Kingdom

London, which is the financial capital of UK and also one of the World's financial hub has around 46 healthcare incubators working in healthcare which is almost 30% of the total population. The South eastern part including London, South East and Eastern London in total comprises of around 53% of total incubator facilities.

4.3.3. Comparison

While analysing the geographical distribution of healthcare incubators in UK and Germany, it can be noticed that one main factor is common in both the countries. In both cases, the greatest number of incubators are located in the countries' capital cities that is Berlin and London. Also, it is clear that in both countries, healthcare incubators population is higher in the regions with more academic, economical and industrial dynamics.

4.4. Incubators per square kilometre

The concentration of healthcare incubators per square kilometres is calculated as the ratio of area of regions/states in square kilometres to the number of healthcare incubators in that particular area.

4.4.1. Germany

For Germany, in every 2514.74 km^2 there exists one healthcare incubator. Like in geographical distribution, in this scenario also we are considering incubators with multiple centres in multiple regions within Germany and so the total number considered is 142. Berlin has the highest concentration of healthcare incubators with existence of one incubator every 29.73 km^2. Brandenburg region have the lowest concentration with one healthcare incubator every 14, 739.50 km^2.

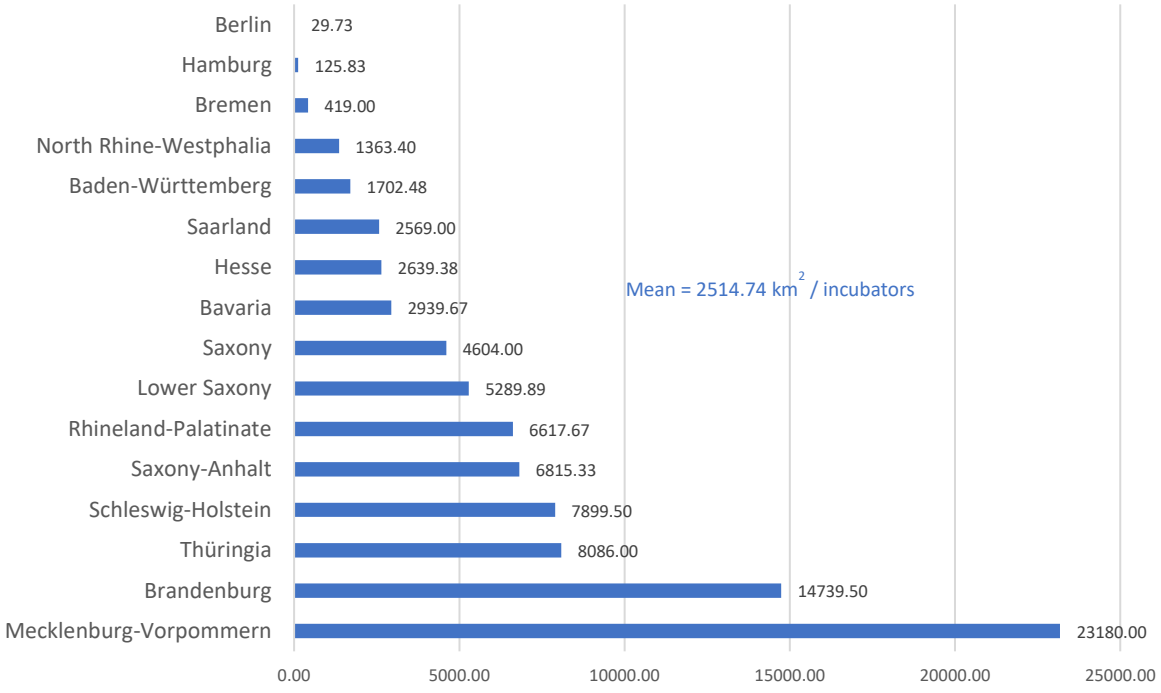

Figure 7: Concentration of healthcare incubators per km² in Germany

4.4.2. United Kingdom

In the case of UK, there exists a healthcare incubator every 1587.23 km^2. Here, we are considering 155 incubators taking into account the centres with multiple sites within the country. The highest concentration of healthcare incubators is in London with an incubator every 34.17 km^2. The state of Scotland has the lowest concentration with one healthcare incubator every 8915.44 km^2.

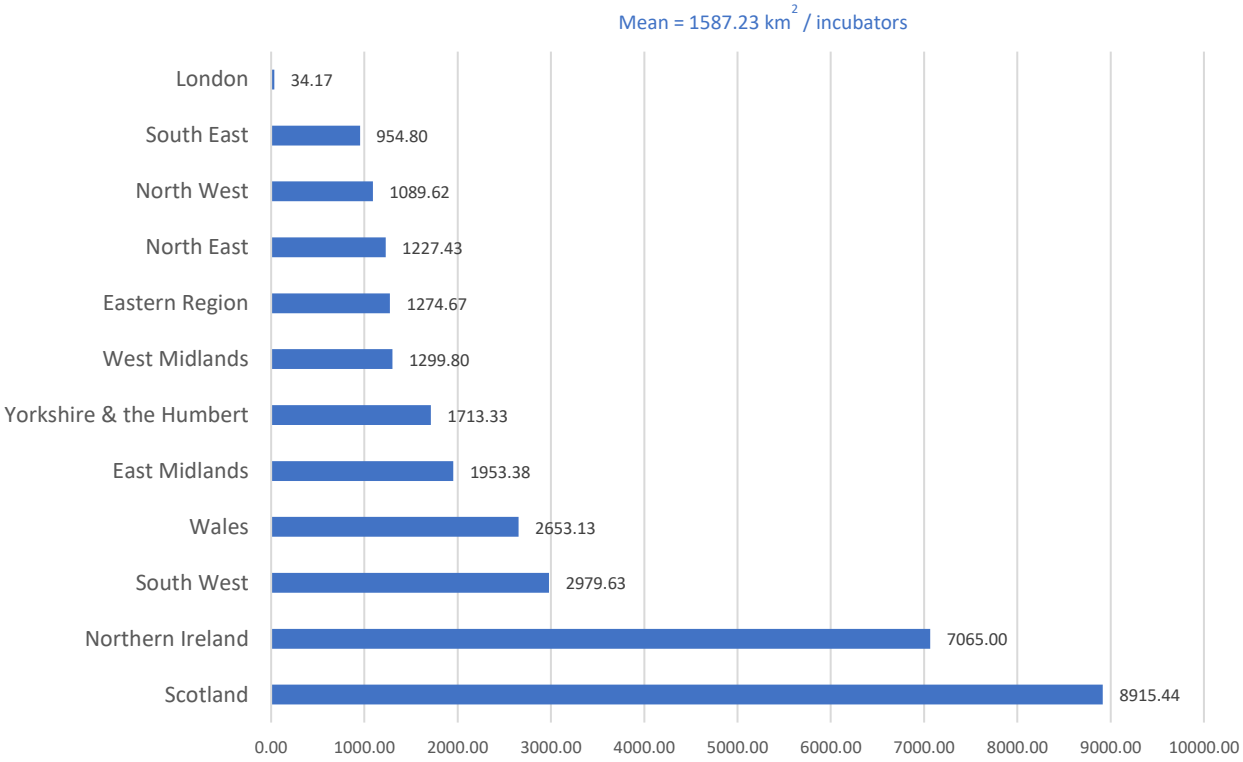

Figure 8: Concentration of healthcare incubators per km² in United Kingdom

4.4.3. Comparison

In the case of concentration of health incubators per square kilometre, UK have a better concentration compared to Germany. This can be due to the lower number of incubators and larger area of Germany with respect to UK.

4.5. Incubator concentration per population

Concentration of healthcare incubators in relation to population is calculated as the ratio of population of the area (region/state) to the total number of healthcare incubators in that area. This analysis is done based on the population of 2020 in both UK & Germany.

4.5.1. Germany

For Germany, there is one healthcare incubator for every 5,85,599 inhabitants. The number of healthcare incubators considered is 142 like the previous sections. The region with the highest number of incubators in relation to number of inhabitants is Berlin with a concentration of one healthcare incubator for every 1,22,136 inhabitants. Mecklenburg-Vorpommern shows the lowest concentration with one healthcare incubator for every 16,10,774 inhabitants.

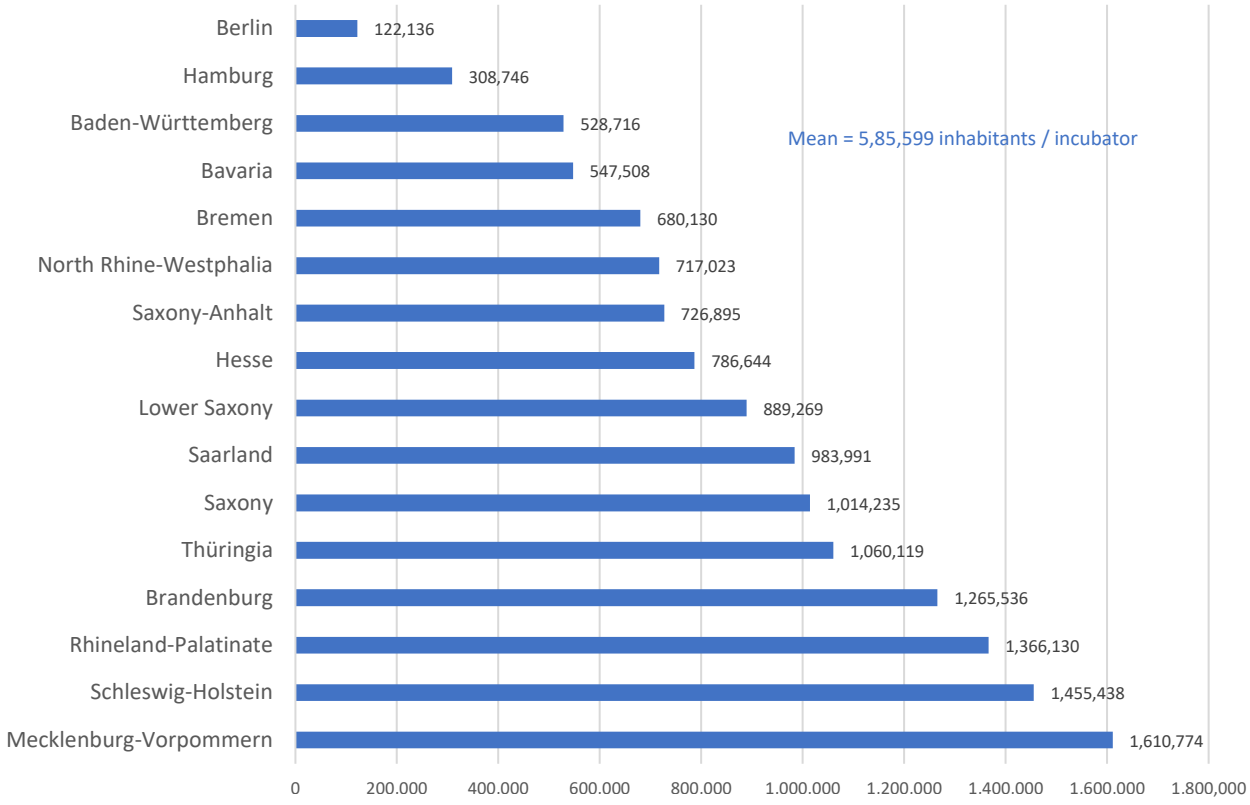

Figure 9: Concentration of healthcare incubators per population in Germany

4.5.2. United Kingdom

In the case of UK, there is one health incubator for every 4,32,782 inhabitants which is not bad considering that when it comes to concentration of total incubators (all sectors) is 2,43,921 inhabitants per incubator. This shows that there is a good amount of incubation activities for healthcare sector in UK. Here we consider again 155 incubators considering the ones with multiple sites

.

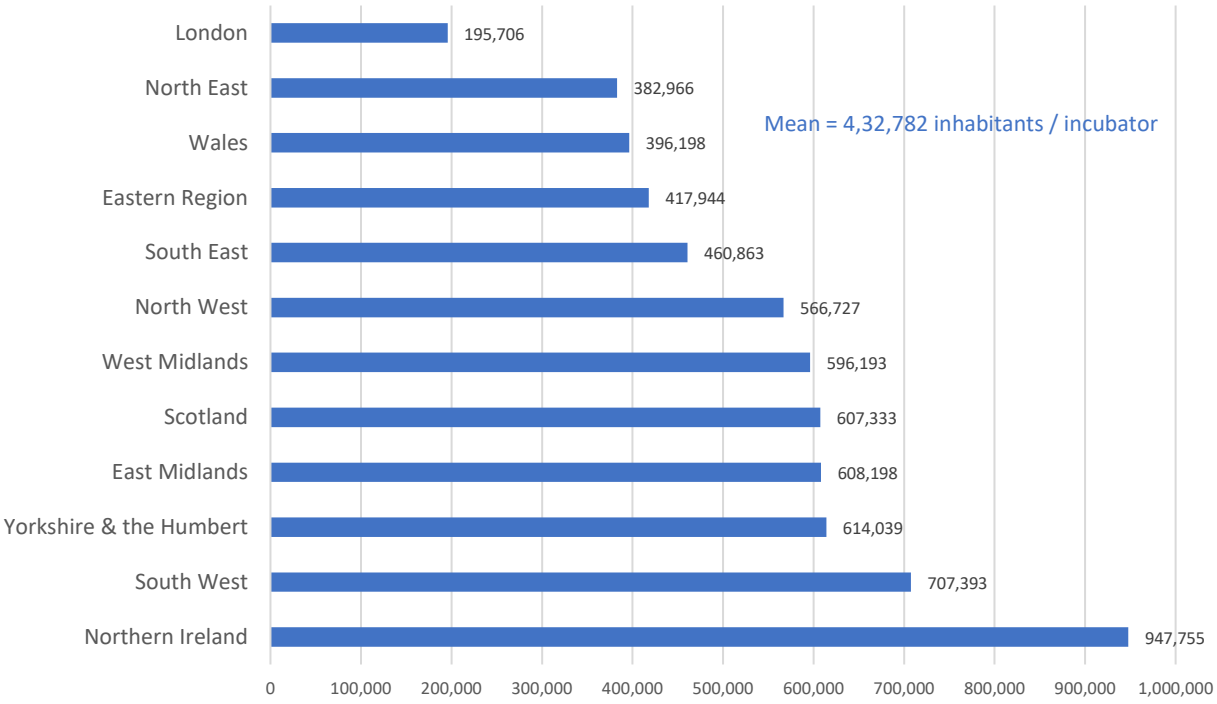

Figure 10: Concentration of healthcare incubators per population in United Kingdom

4.5.3. Comparison

Concentration of health incubators related to population of the countries is also higher for UK and lower for Germany. In UK it is found to have incubators supporting healthcare to be more common with respect to the country's population. Again, this might be due to the fact that UK have more number of incubators in healthcare (or same incubator with many sites within the country) and less population in comparison with Germany.

4.6. Foundation year of incubators

4.6.1. Germany

For Germany, the foundation year analysis is done using 89 health incubators. This data was obtained either from the respective websites or from the Orbis database. As it can be seen from the graph, the highest number of health incubators were formed in 2016 which is 12 new incubators. Almost 40% of new health incubators were formed between 2011 and 2016.

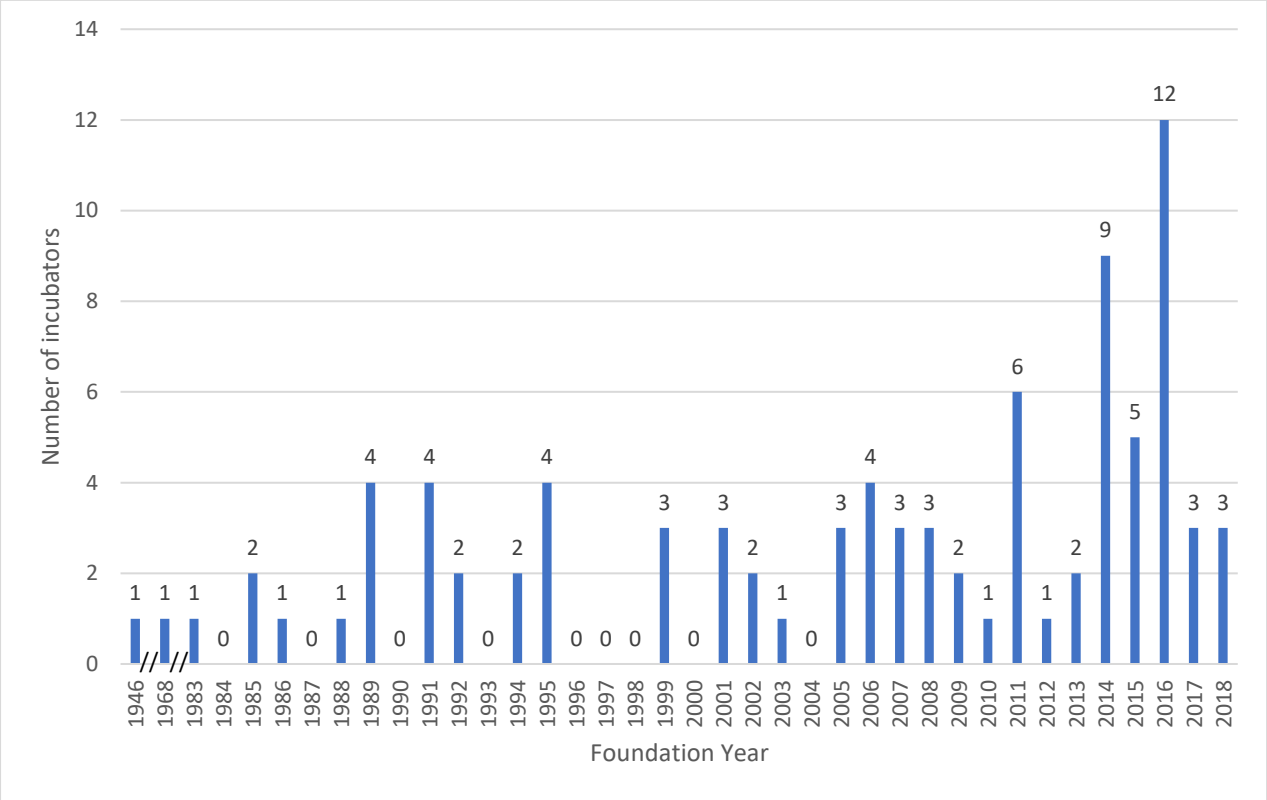

Figure 11: Foundation year of healthcare incubators in Germany

4.6.2. United Kingdom

In the case of UK, 128 health incubators were used to analysis the year of foundation. Like in the case of Germany, here also most data were collected from websites of incubators and Orbis database. In UK also, the highest number of health incubators were formed in 2016 which is

18. Around 90 new health incubators were formed between 2011 and 2018, which is 70% of the total health incubators that are analysed in this section.

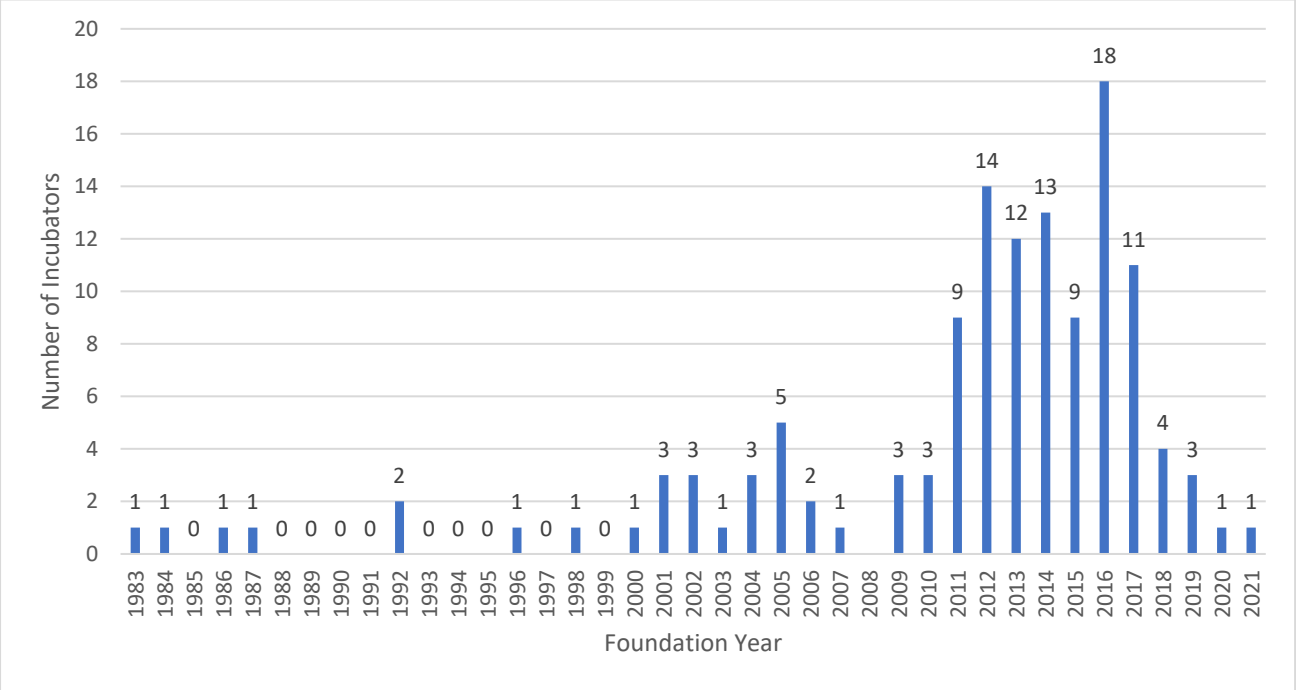

Figure 12: Foundation year of healthcare incubators in United Kingdom

4.6.3. Comparison

While analysing the year of foundation of healthcare incubators in both the countries, it is clear that for both UK and Germany, the greatest number of new incubators were formed in the year 2016. Also in both countries, a higher fraction of incubators was founded after 2011. There is a decline in the number of new incubators in the recent years in both countries.

4.7. Number of employees

The data on number of employees for incubators were obtained from Orbis database. This information was not available for few of them, so the considered healthcare incubator population is a bit less in this case compared to the total.

4.7.1. Germany

For Germany, we have considered a total of 86 health incubators to analyse the workforce size. The total workforce size is 1075 as of 2020 for the overall population considered. From the analysis it is clear that in Germany, most of the incubators in healthcare sector are small or medium sized with more than 50% of them having staff size of less than 10. Only 3 out of 86 have more than 100 employees and 32 out of 86 have employed less than 5. The organisations with more than 100 are either large innovation centres with multiple incubation programs or those with multiple sites in multiple locations.

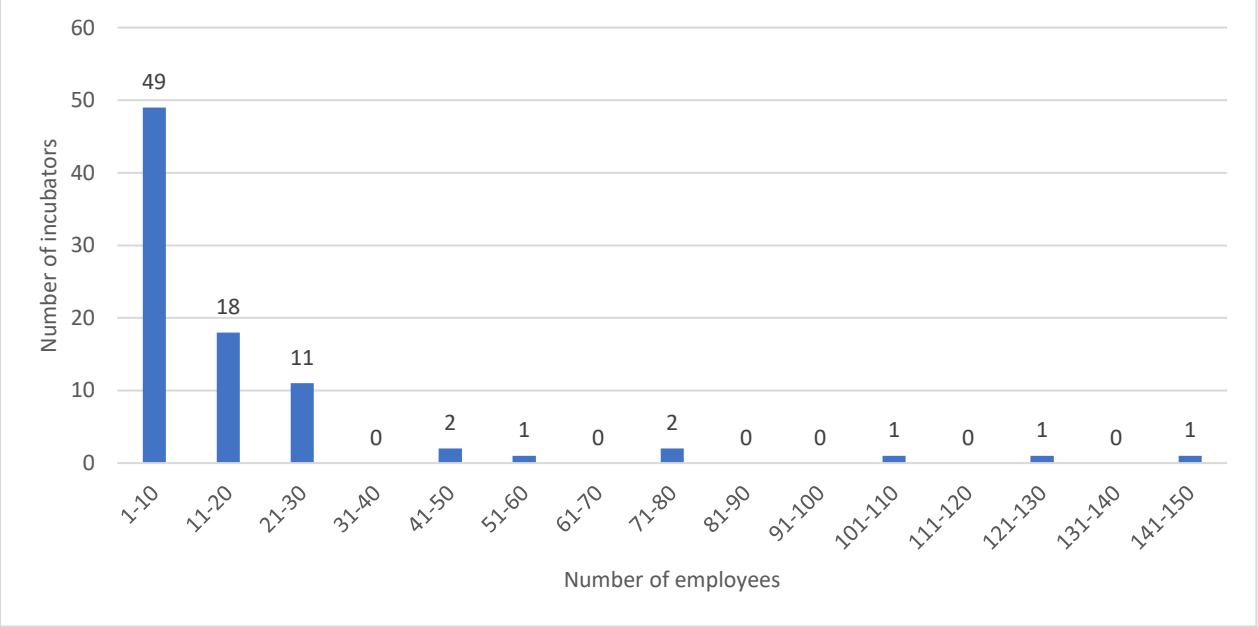

Figure 13: Number of employees in healthcare incubators in Germany

4.7.2. United Kingdom

In the case of UK, we have taken a total of 43 incubators in healthcare sector with a total workforce of 558 as of 2020. As the usual case, in UK also, most of health incubators are small or medium size. 27 out of 43 have less than 10 employees which is more than 60%. Only one incubator has more than 100 employees, precisely 164. This might be a huge centre with multiple incubator facilities or have centres in multiple locations.

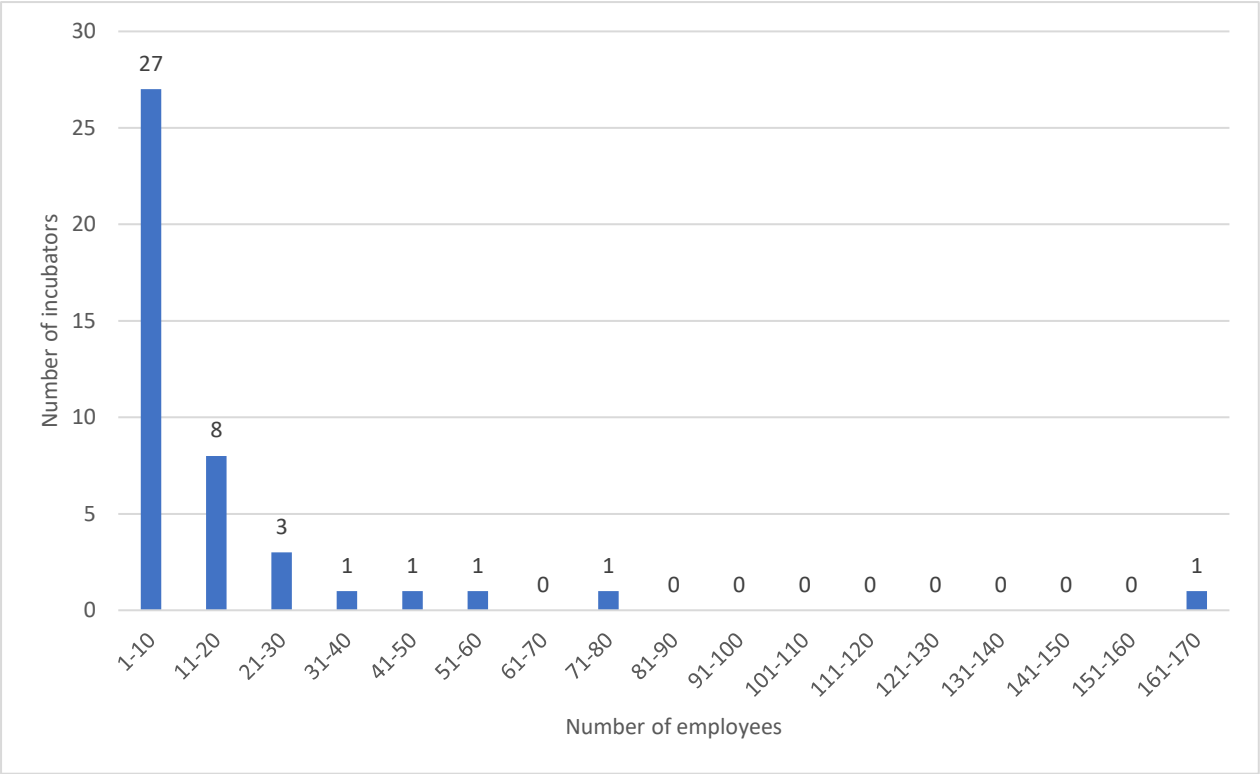

Figure 14: Number of employees in healthcare incubators in United Kingdom

4.7.3. Comparison

The total work force size cannot be compared here since the sample taken for Germany is double that of UK. When considering staff size in each incubator, the highest is marked by one in UK with 164 employees. In both countries, more than 50% of the heath incubators considered have a staff size of less than 10 which shows that most of them are small and medium size companies. This data also represents the jobs created by these organizations which is also an important factor considering the fact that many of them are regional or community-based incubators whose one of the main aims is job creation.

4.8. Number of organizations supported

The analysis of incubated organizations is done using a total sample of 24 for Germany and 25 for United Kingdom.

4.8.1. Germany

For Germany, total number of organizations supported as of now by the considered 24 healthcare incubators are 7492. This includes the ones that were supported in the past and the ones that are currently being facilitated in each of the centres. Almost 62% of incubators have supported less than 200 organizations each. Only 3 of them have facilitated support for more than 1000 organizations which is only 12.5%.

The mean number of supported organizations for Germany is around 500 whereas the median is around 156.

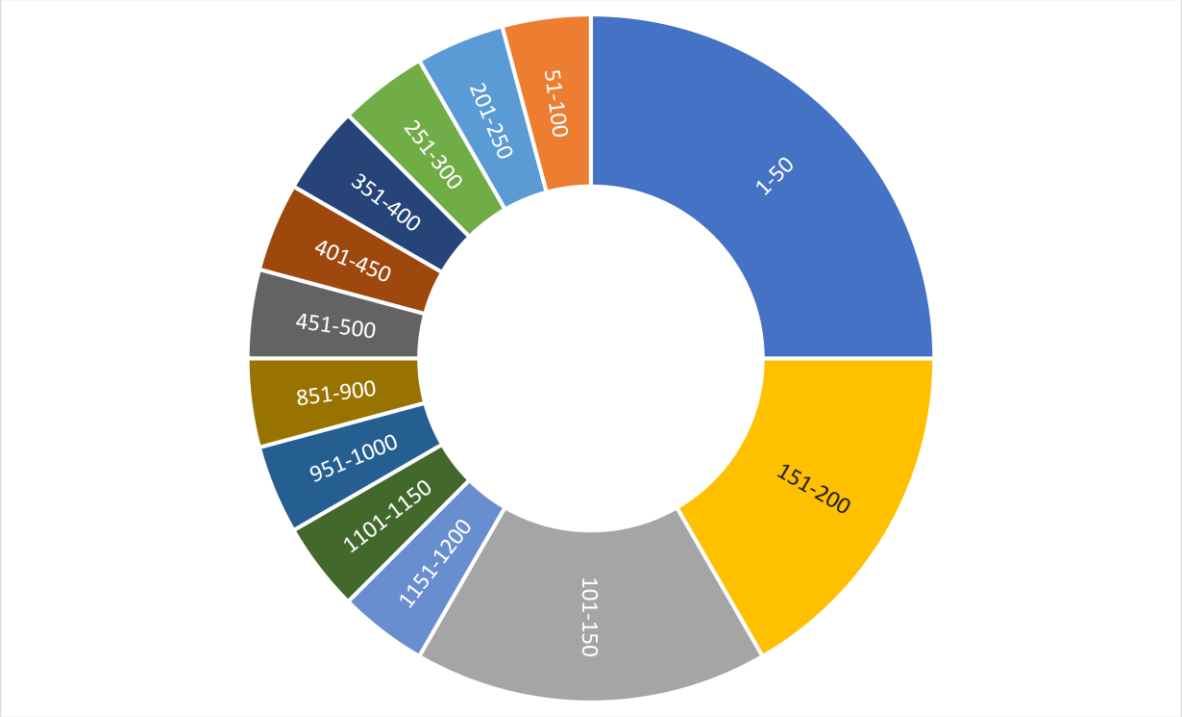

Figure 15: Number of supported organizations by healthcare incubators in Germany

4.8.2. United Kingdom

For UK, the analysis has considered 43792 organizations that are supported by the 25 incubators in healthcare sector. This also include the organizations supported in the past and current.

Here, almost 72% of total considered incubators have supported less than 500 organizations till now. There are 2 incubators that availed support for more than 10000 organizations till now.

The mean supported organizations by health incubators for UK is 1751 whereas the median value for the same is 120.

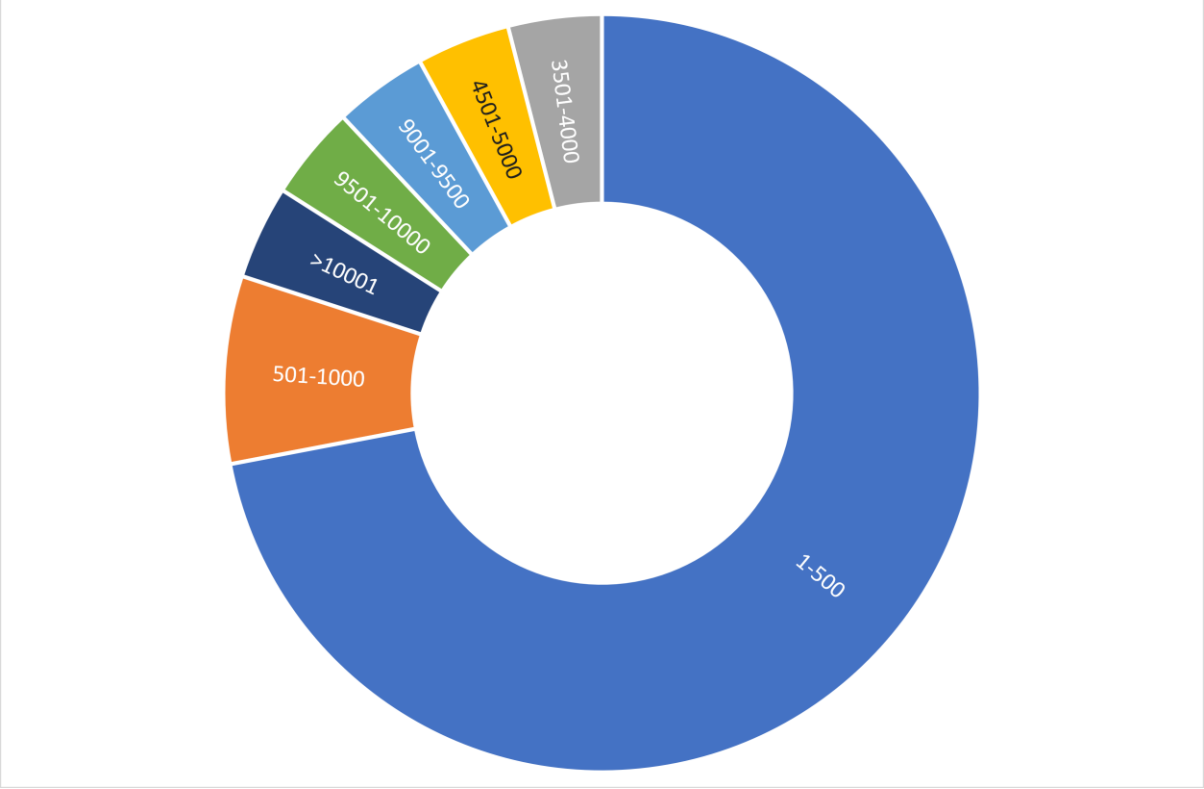

Figure 16: Number of supported organizations by healthcare incubators in United Kingdom

4.8.3. Comparison

The number of organizations incubated in the healthcare sector is much higher for UK compared to Germany. UK incubators supported almost 6 times more companies than by German ones. This might be due to the presence of few big incubator centres in UK which had supported more than 10000 organizations each.

In any case, the highest percentage of healthcare incubators in both countries had supported less than 500 companies each. In case of Germany, a good number of incubators had supported less than 50 companies.

4.9. Types of incubators

For this section, we are using the data collected for 40 healthcare incubators each in Germany and United Kingdom.

4.9.1. Germany

In Germany, out of the 40 organizations considered, 7 are university-based healthcare incubators, 6 are regional incubators, 3 are community based and rest 24 belongs to other categories. The distinguishment is done based on the definition of each category presented at the end of this chapter. This is in line with the information obtained about incubators in Germany from literature analysis, which mention the high involvement of regional and other socio-economic bodies and academic institutions in supporting and funding these incubators.

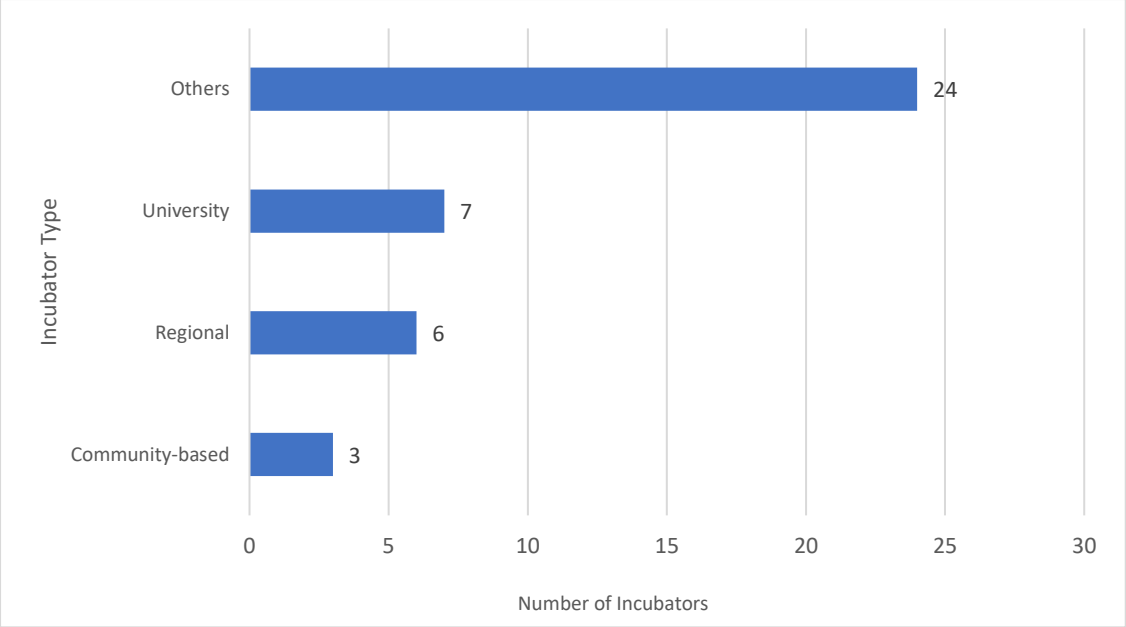

Figure 17: Types of healthcare incubators in Germany

4.9.2. United Kingdom

In the case of UK, out of the 40 organizations considered, 21 are university-based incubators, which is more than 50%. The rest incudes 3 community-based incubators, 2 regional incubators and remaining 14 belongs to other categories.

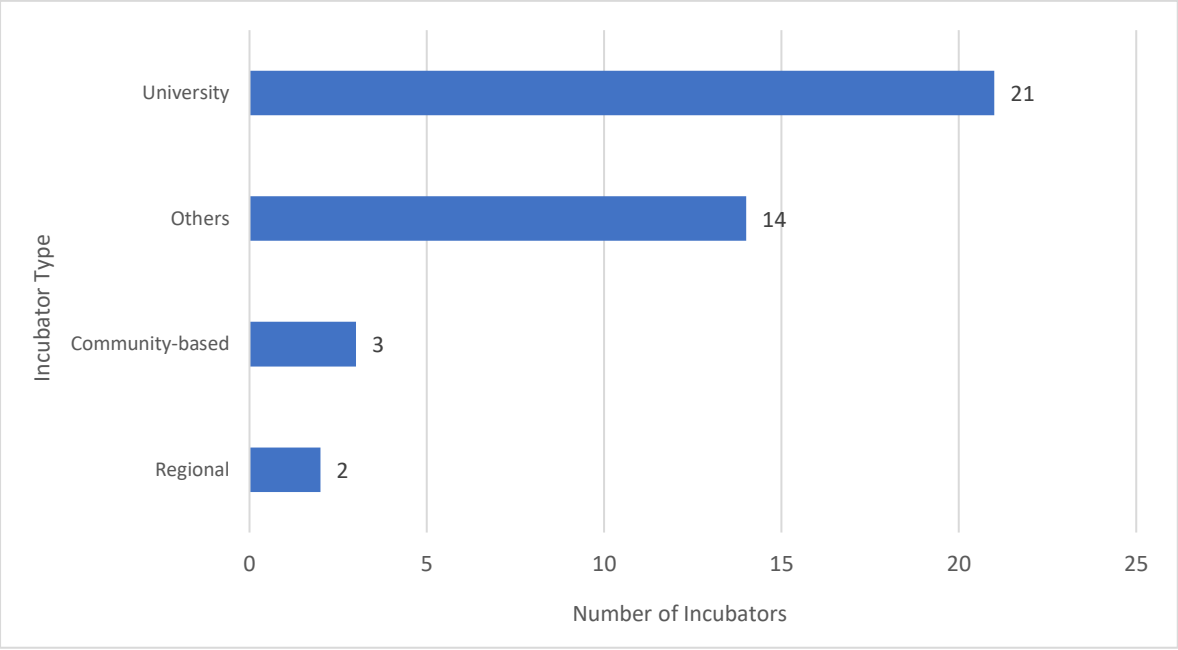

Figure 18: Types of healthcare incubators in United Kingdom

Community-based incubator: the main objective of such incubators is development of local economy, creating job opportunities, impacting life of people in the local community etc.

University incubator: This incubator type is used in order to support the innovation and entrepreneurship activities in the university. They act as a connection between industry and academia.

Regional incubator: These are incubators that aims in supporting early-stage start-ups and SMEs within a particular region, thus helping in the betterment of that region.

Other: Corporate incubators, not-for-profit and charity incubators etc.

4.9.3. Comparison

In the case of incubator types supporting healthcare sector in each country, University incubator tops in the case of UK whereas in Germany, the number is dominated more by other types including corporate, non-for-profit etc. Germany has more regional healthcare incubators compared to UK. Community-based incubators have almost the same majority in both countries.

4.10. Total Revenue

All financial data including revenue, net income and EBITDA were collected from the Orbis database using BvD ID and name of incubators. But very few incubators have made this kind of data published.

4.10.1. Germany

In the case of Germany, the information about revenue was obtained for 25 incubators in healthcare sector out of a total population of 125. Here, 8 out of 25 which is 32% of the population considered have a revenue of less than one million USD. 6 out of 25 which is above

24% have a total revenue of more than 10 million USD. The incubator with the highest revenue has a total value of 52 million USD and the lowest revenue incubator marks a value just above 3000 USD.

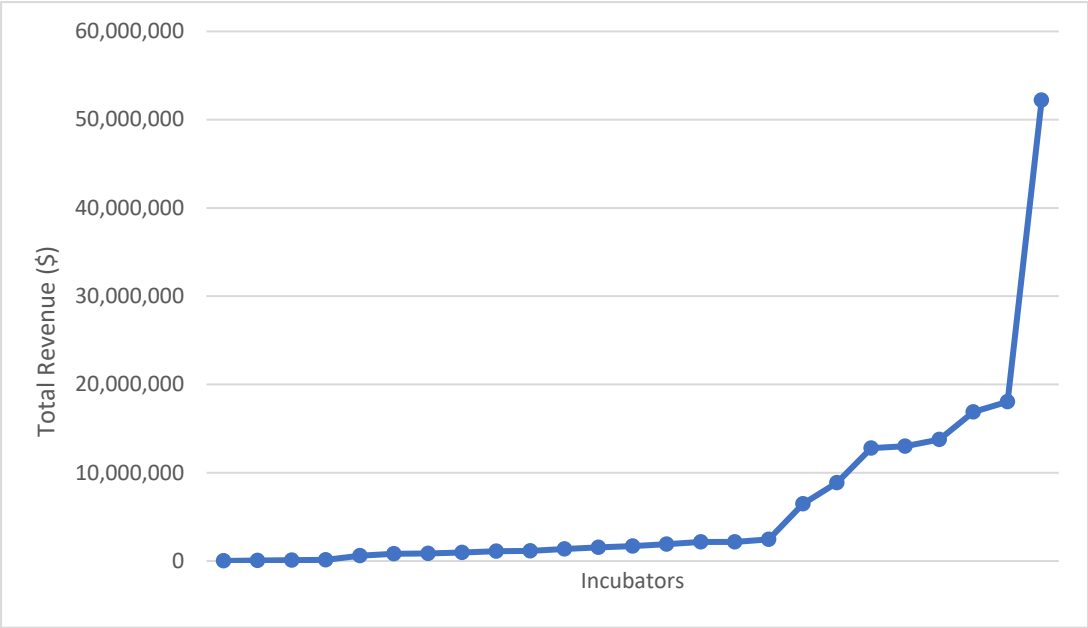

Figure 19: Revenue of healthcare incubators in Germany

4.10.2. United Kingdom

For United Kingdom, we were able to collect the data on total revenues for 24 incubators in healthcare sector. 9 out of 24 which is around 37% have total revenue less than 1 million USD. 4 out of 24 which is just above 16% have a revenue that is more than 10 million USD. The highest revenue marked for an incubator in health sector is 35 million USD and the lowest is 153 USD.

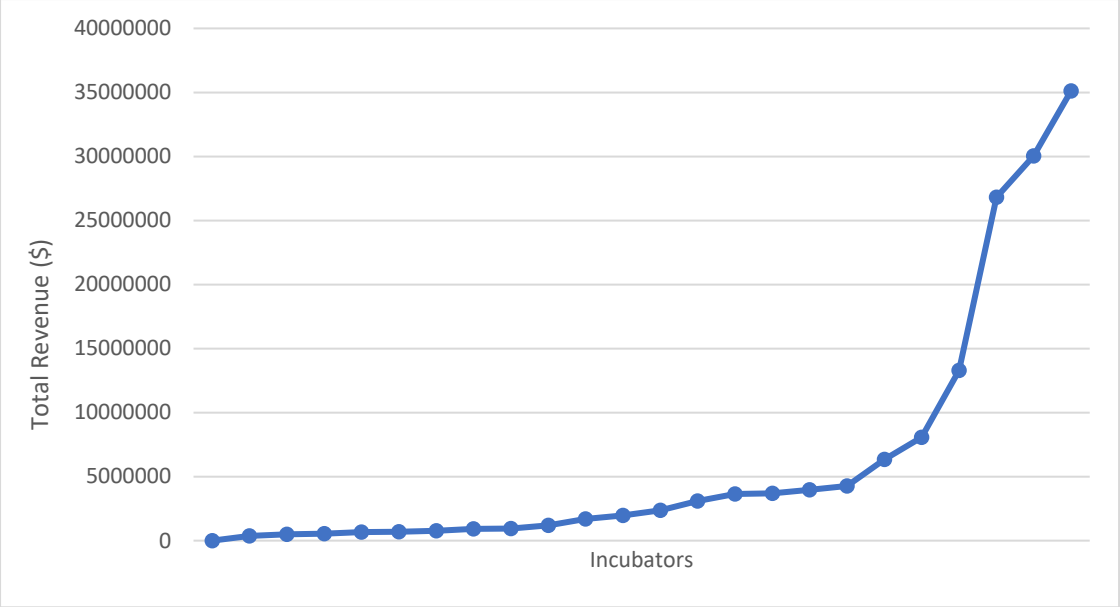

Figure 20: Revenue of healthcare incubators in United Kingdom

4.10.3. Comparison

Considering the revenue of healthcare incubators, the highest is earned by an incubator in Germany and the lowest revenue is earned by one in UK. Considering that the sample number considered in both countries here is fairly the same, the total revenue is higher for Germany which is around 170 million USD and UK has a little lower revenue of around 160 million USD. But in both countries, most of the incubators supporting healthcare earned a revenue of less than 10 million USD.

4.11. Net Income

Similar to revenue, the information on net income was also available only for a few incubators in healthcare sector.

4.11.1. Germany

For Germany, the net income of 12 health incubators were found from Orbis database in order to do this analysis. More than 50% of them had a negative net income, the lowest of them being

around -13 million USD. Only 1 out of 12 had net income greater than 1 million USD, which was 1.27 million USD.

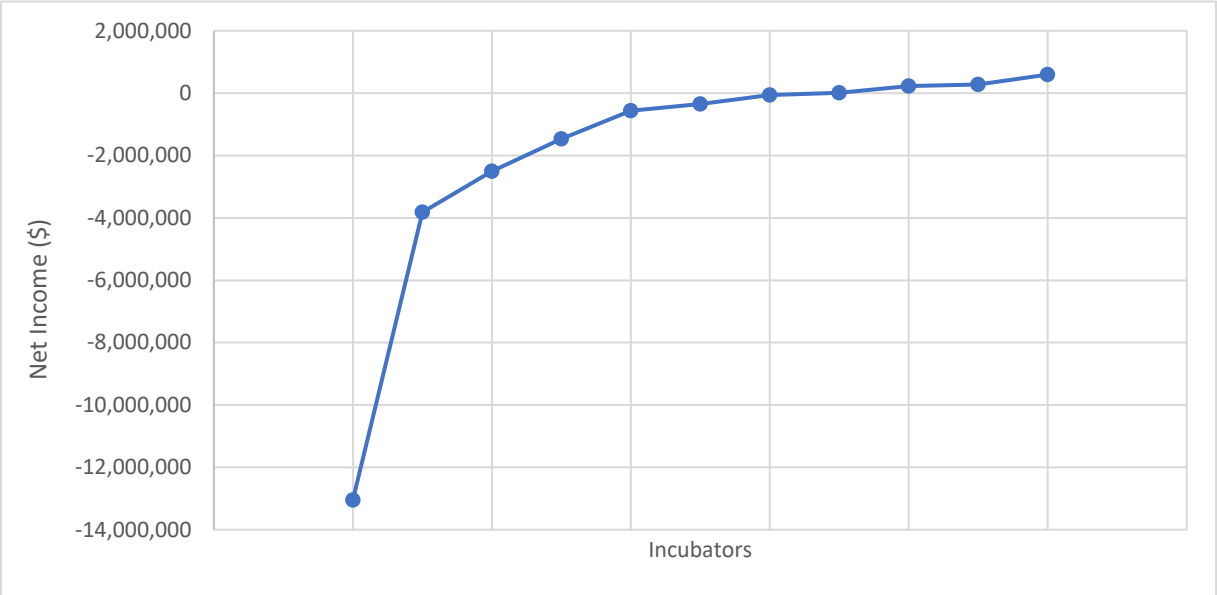

Figure 21: Net income of healthcare incubators in Germany

4.11.2. United Kingdom

For United Kingdom, we got information on net income of 17 incubators in healthcare sector from Orbis. Here also, more than 50% of them had net income less than 0, with the lowest value marked at -28.48 million USD. 4 out of 17 which is around 23% had net income more than 1 million USD. The highest net income reported from the health incubators considered was 3.27 million USD.

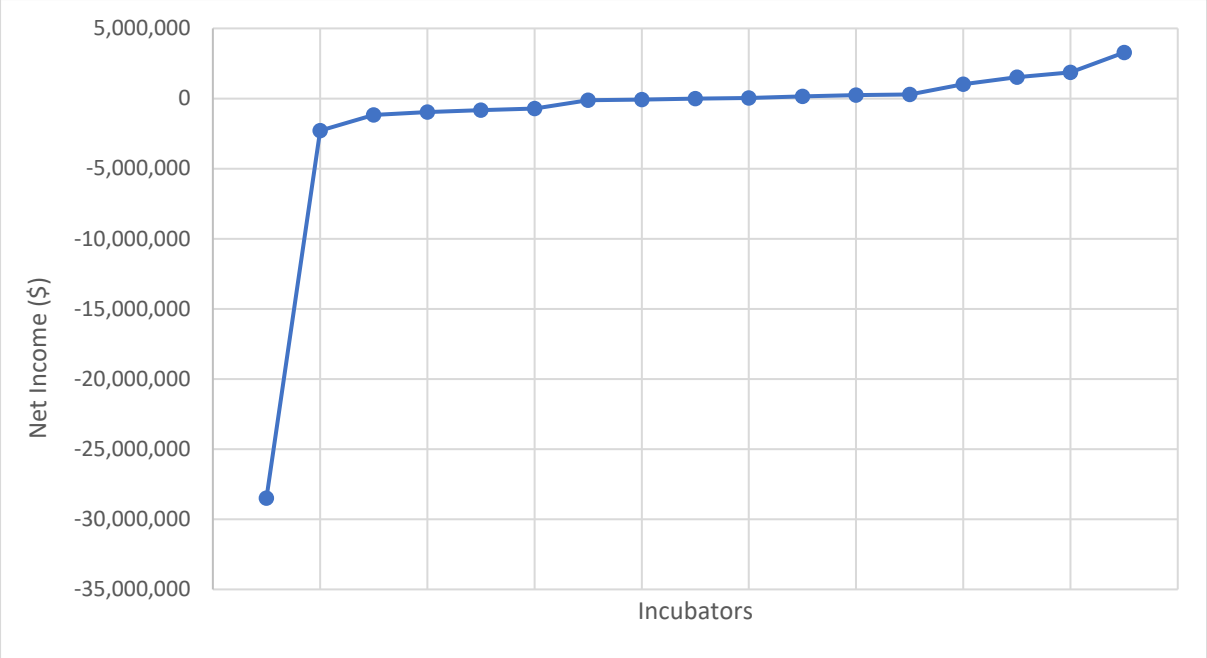

Figure 22: Net income of healthcare incubators in United Kingdom

4.11.3. Comparison

In the case of net income, the highest among both countries is achieved by a health incubator in UK. In both countries, more than half of the considered organizations had a net income value which was less than zero. This might be due to the fact that in both countries there are a fair amount of university, community and regional incubators whose goals could be a little different from merely making profit.

4.12. EBITDA

Similar to revenue and net income, data about EBITDA for incubators in healthcare sector was made available in Orbis platform only by very few of them.

4.12.1. Germany

In the case of Germany, we were able to find EBITDA of 10 health incubators from the Orbis database. 4 out of 10 which is 40% of incubators considered have a negative EBITDA, lowest

value being around -10 million USD. The health incubator with highest value for EBITDA mark around 14 million USD.

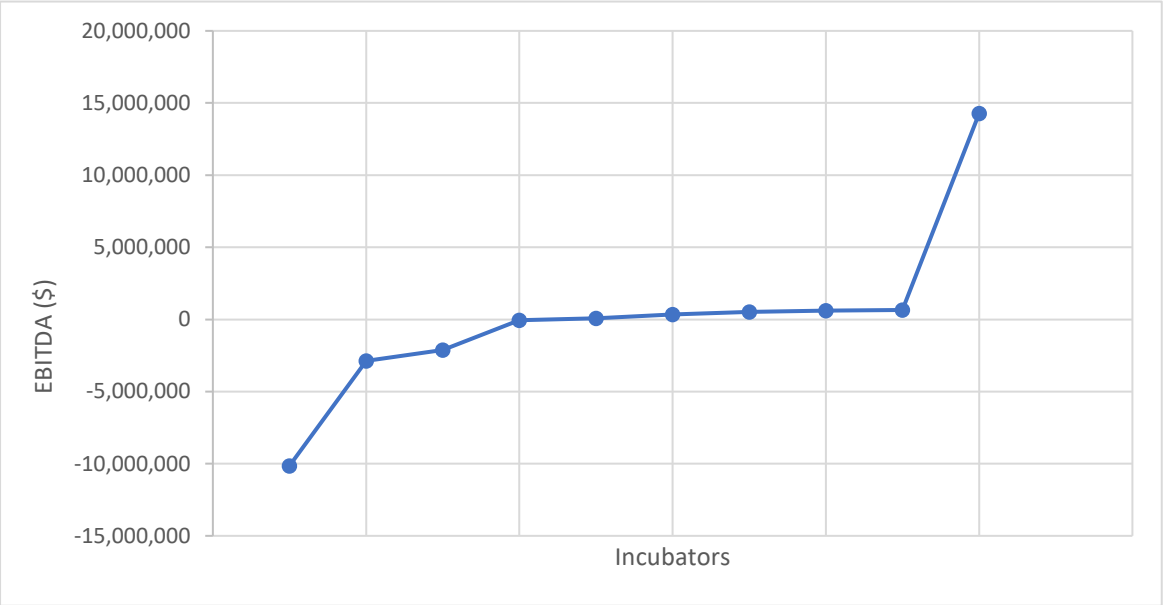

Figure 23: EBITDA of healthcare incubators in Germany

4.12.2. United Kingdom

For United Kingdom, EBITDA value was obtained for 16 incubators in healthcare sector from Orbis database. 5 out of this which is above 31% had EBITDA value that was negative, with lowest value marked at almost -34 million USD. Around 44% of considered incubators have EBITDA value greater than 1 million USD. The health incubator with highest EBITDA had a value of around 4.5 million USD.

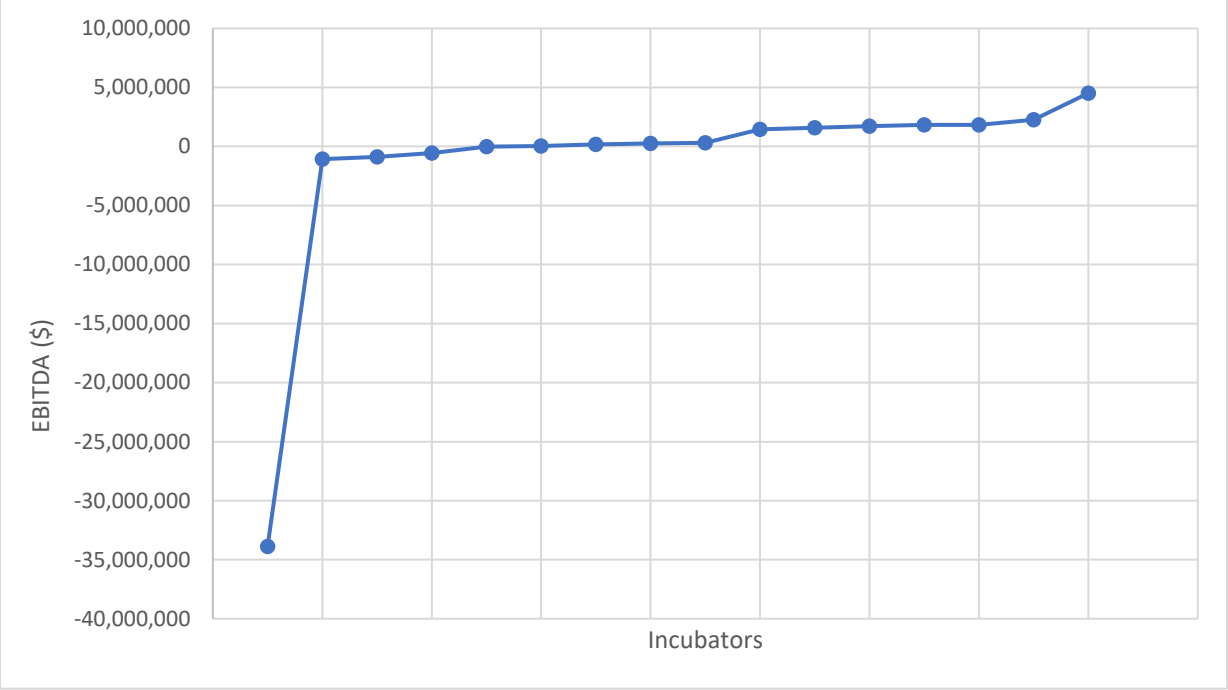

Figure 24: EBITDA of healthcare incubators in United Kingdom

4.12.3. Comparison

Considering the EBITDA of healthcare incubators, German incubator tops compared to those in UK. Anyway, here also around 30-40% of incubators in both countries do have a negative value similar to the case on net income. The lowest value of EBITDA among both countries is earned by an incubator in UK.

4.13. Sectors in healthcare

When the incubators were chosen in order to form the data base for incubators in healthcare sector, we considered the ones that operated in various subjects that contribute to healthcare. These subsectors were Life science, Biotechnology, Medicine/MedTech, Health (also digital health) and General ones (that operates in all sectors). This chapter is an analysis of incubators operating in these subsections that add to healthcare in general.

4.13.1. Germany

In the case of Germany, 65% of the incubators operating in healthcare are general incubators that do not focus on particular sectors, but work on all in general. 16% of them declared to work in healthcare or digital health, 9% are focussed in life science, 6% contribute more to biotechnology and rest 4% work mainly for advancement in medicine and medical technology.

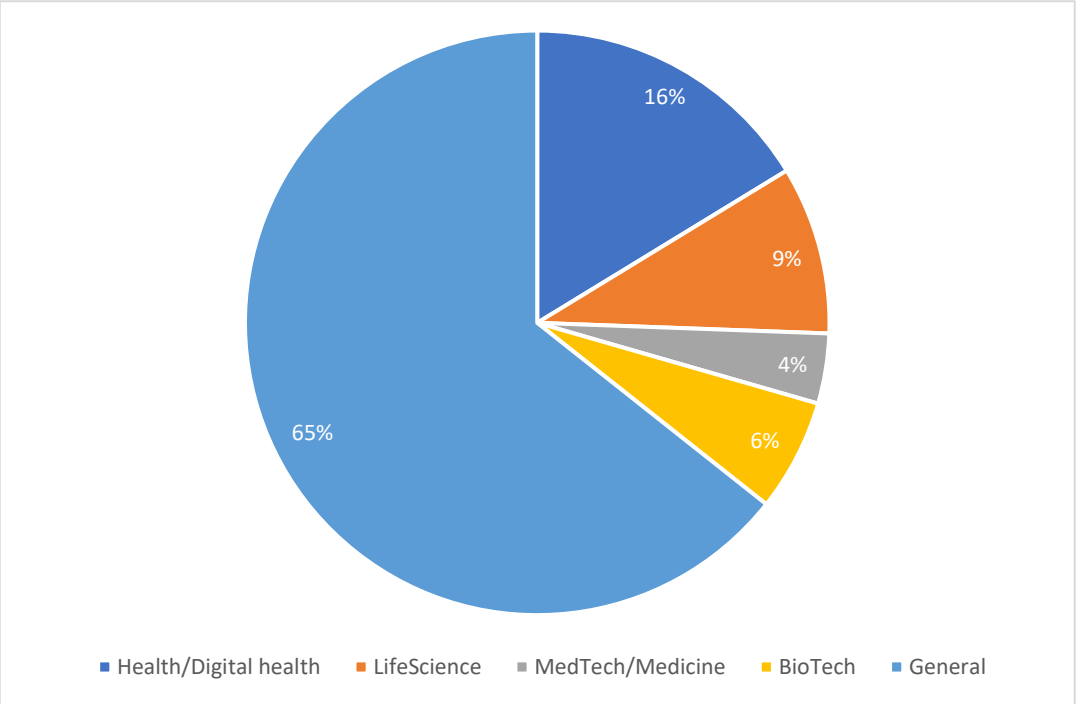

Figure 25: Healthcare sector in Germany

4.13.2. United Kingdom

For United Kingdom, 64% of the healthcare incubators considered in the analysis are general ones. 18% are working for health and digital health, 10% contributes mainly to innovations in life science sector, 5% of them concentrates in incubation programs for biotechnology companies and rest 3% focus on medicine and medical technology.

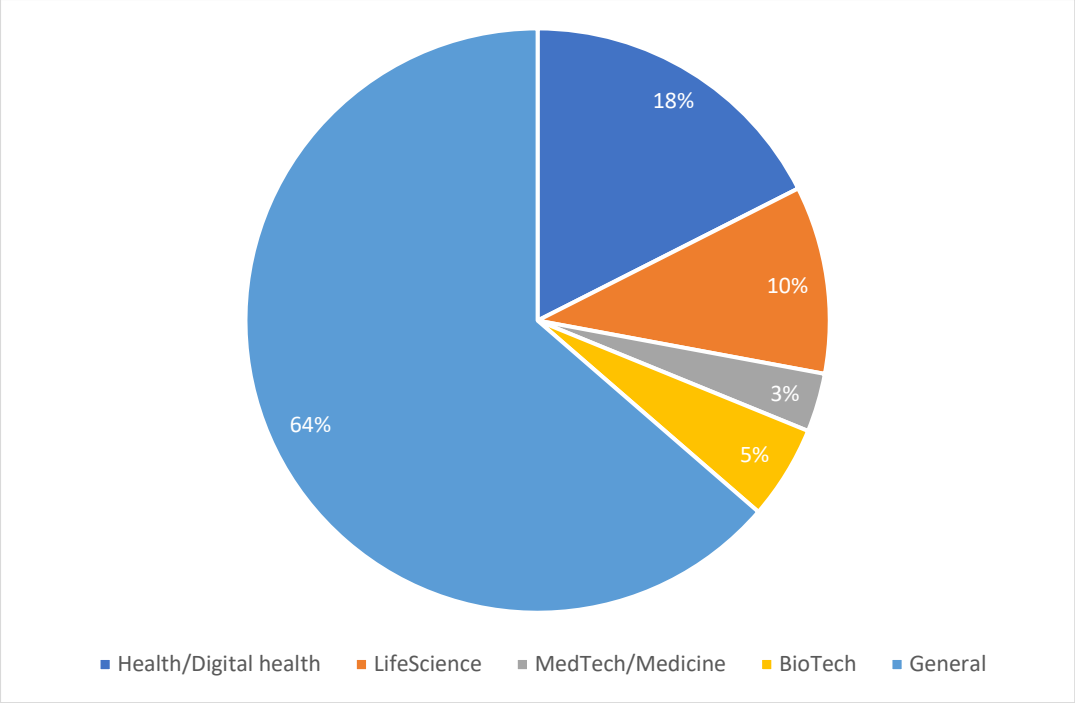

Figure 26: Healthcare sector in United Kingdom

4.13.3. Comparison

While comparing the various sectors that contribute to healthcare in which the incubators are operating in both UK and Germany, around 65% of organizations in both countries are general. That means more than half of incubators do not focus on a particular field. This is completely in line with the literature analysis which states that in both countries most of the incubators are non-sectoral. The trend is exactly same in UK and Germany with more of them being general, followed by health/digital health, life science and biotechnology and fewer of them concentrating in medicine and medical technologies.

4.14. Declaration of healthcare by incubators

This section is used to analyse the incubators that declared to work in healthcare. For this, we are considering a sample of 40 health incubators each from Germany and United Kingdom. The websites of these organizations were used in order to know whether they have declared to

work in healthcare sector or not. Most of them focus on healthcare alone and there are others who also promotes multiple sectors.

4.14.1. Germany

In the case of Germany, 17 out of 40 health incubators considered which is just above 42% do declare that they focus on healthcare in their respective websites. The rest 23 do not have any declaration, but have supported healthcare companies according to their portfolio.

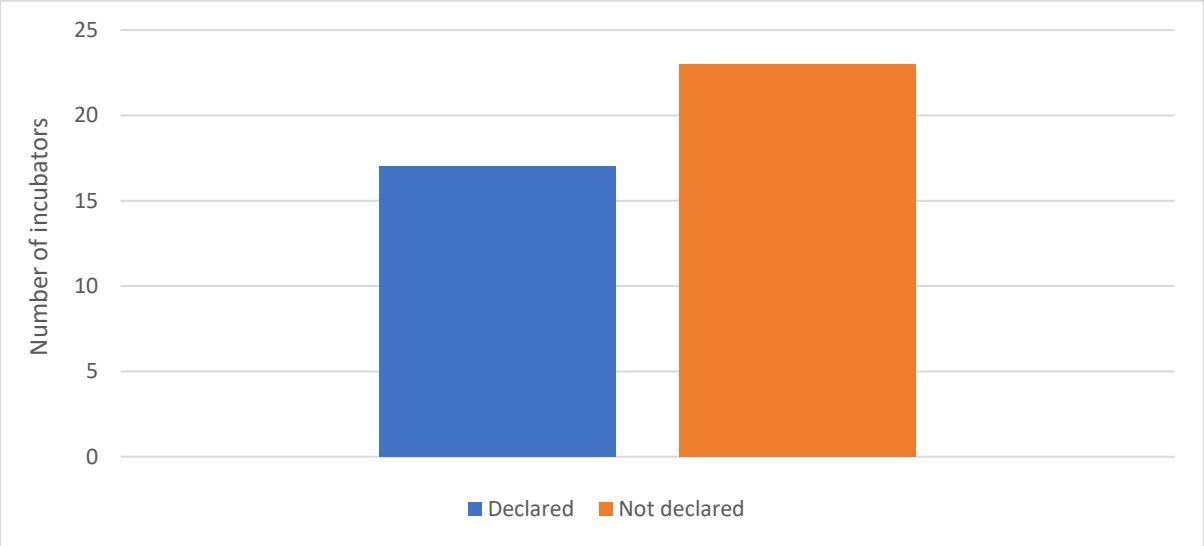

Figure 27: Number of incubators who declared to support healthcare in Germany

Out of the 17 that declared to work in healthcare, 6 of them which is 35% of the declared population, have stated that they work only in healthcare, whereas the rest 65% have declared to work not only in healthcare but also in other sectors.

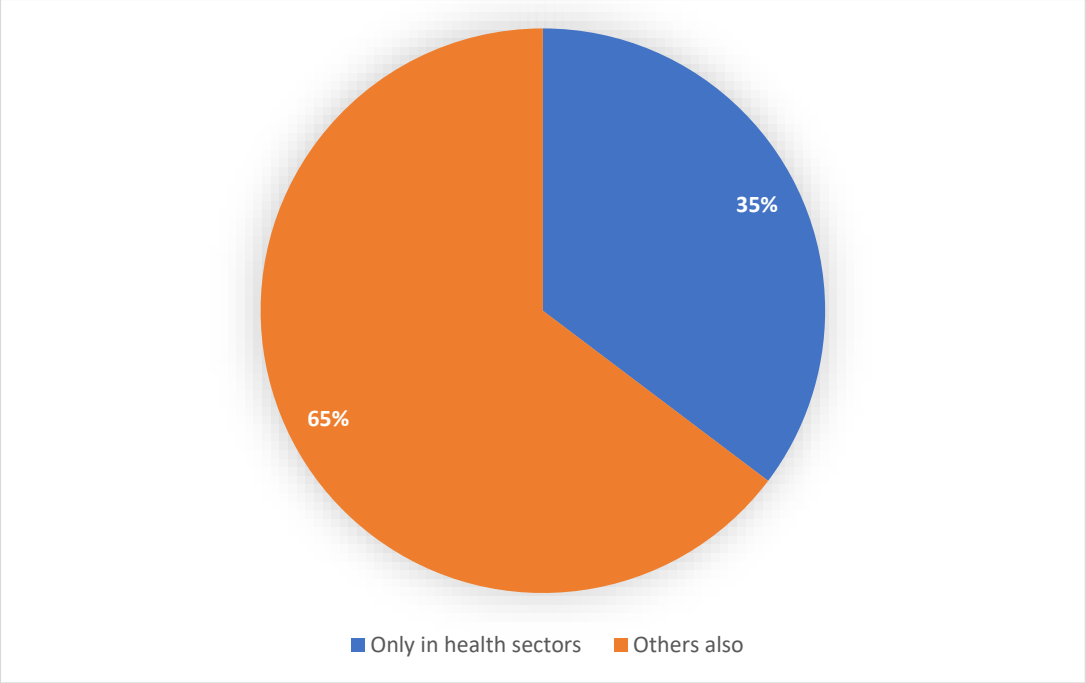

Figure 28: Number of incubators declared to work only in healthcare in Germany

4.14.2. United Kingdom

For United Kingdom, only 10 out of 40 incubators considered have declared to focus in healthcare, which is just 25%. The remaining 75% have not stated focus on healthcare in their websites, but do work on them according to their incubation portfolio.

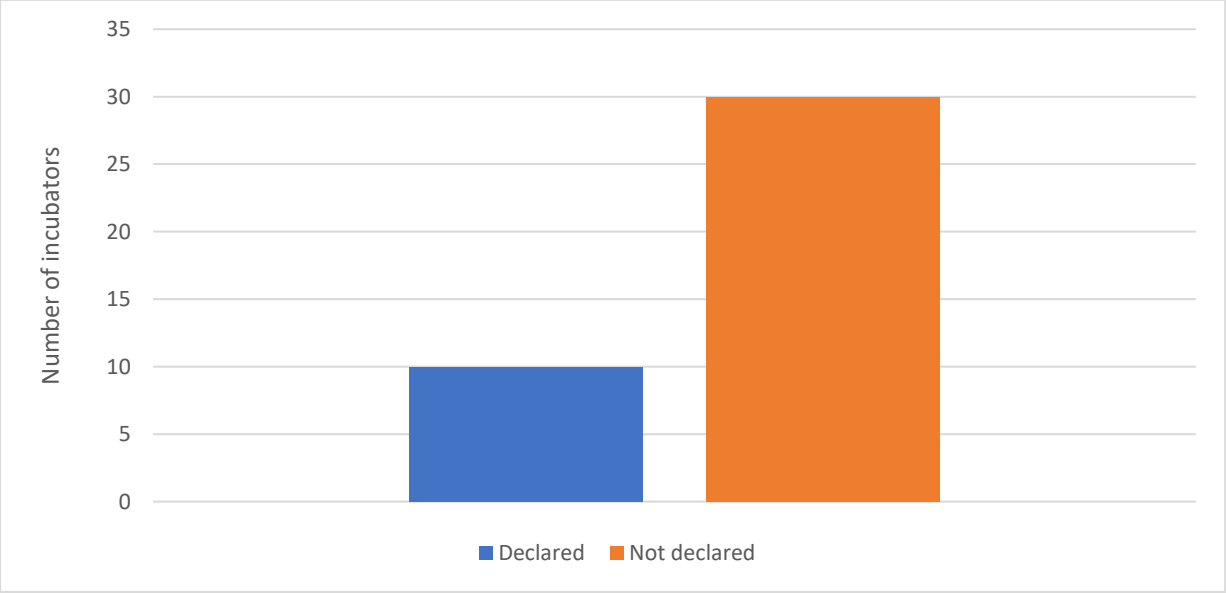

Figure 29: : Number of incubators who declared to support healthcare in United Kingdom

But, among the 10 declared to concentrate in healthcare, 8 of them that is 80% are supporting only companies in healthcare, whereas only 2 of them have stated about their focus also on other sectors.

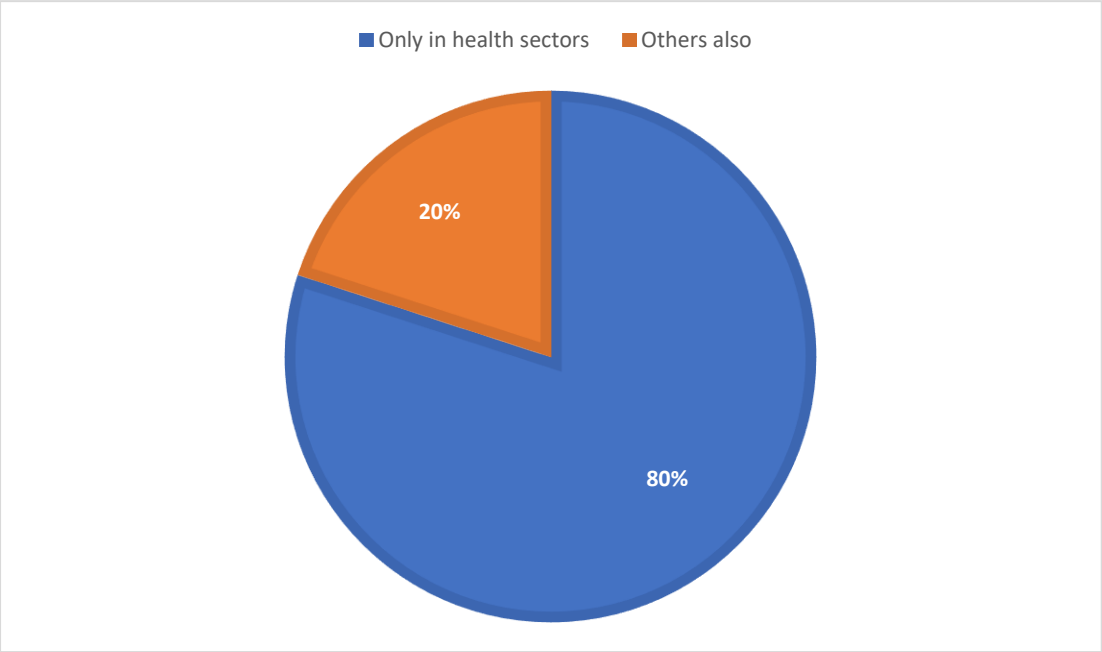

Figure 30: Number of incubators declared to work only in healthcare in United Kingdom

4.14.3. Comparison

In the sample of 40 healthcare incubators considered for both countries in this section, a higher number of organizations in Germany have declared to work in healthcare compared to that in UK. But the number of incubators working in healthcare sectors alone is higher in UK. So, the ones that have not declared, but still work in health are mostly general ones without any specific field.

4.15. Other sectors supported by incubators

In this section also we consider the sample of 40 health incubators. As already seen in the previous analysis, not all of the 40 works in healthcare alone. Most of them also support companies from other sectors. This section is presenting a high-level understanding of these other sectors supported by incubators working in healthcare in both countries.

4.15.1. Germany

For Germany, the main sectors supported by these incubators are Energy, Mobility, FinTech and AI. There are other sectors also like Blockchain, Cleantech, IT etc., but the incubators operating in these sectors in the considered sample is very less. Also, few of the incubators do work in multiple sectors that are mentioned here.

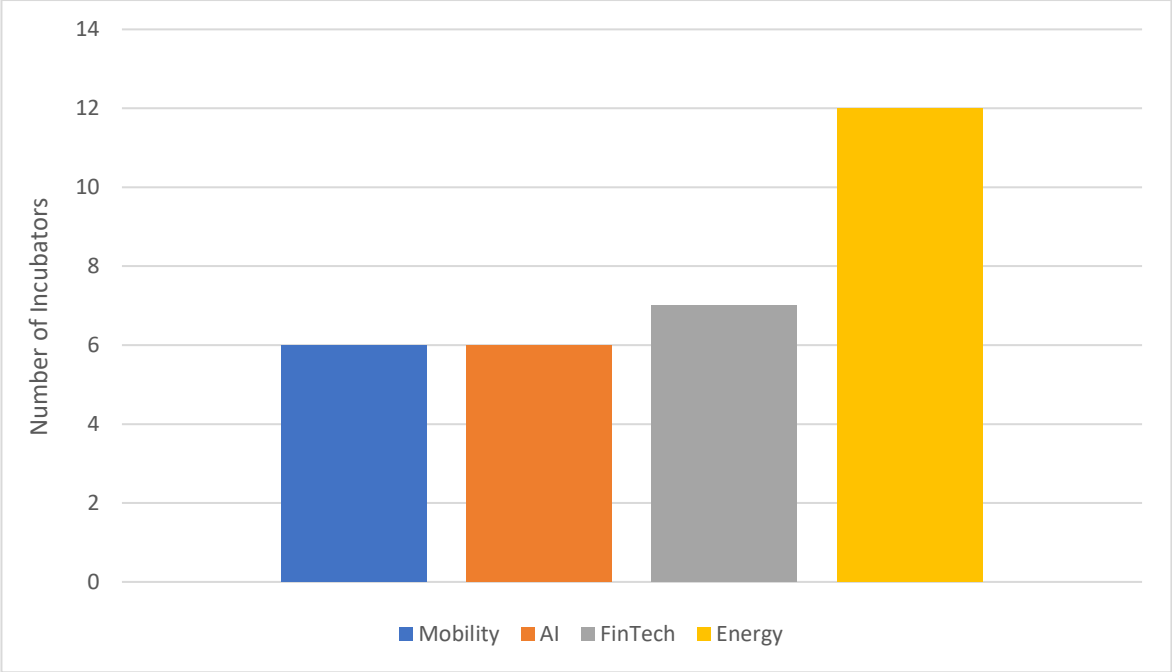

Figure 31: Other sectors supported by healthcare incubators in Germany

Energy is the sector which many of these incubators focus on other than healthcare. Almost 30% of the considered sample do facilitate incubation programs for companies that concentrates on Energy and related subjects. This is followed by FinTech which is supported

by 17.5% incubators and then there are AI and Mobility which is supported by 15% of the organizations considered.

4.15.2. United Kingdom

In the case of United Kingdom, the sectors supported other than healthcare by the considered sample are Energy, Digital, Engineering and AI. Here also there are incubators working for other sectors like Manufacturing, Aerospace, Cybersecurity etc., but the number is very less. As can be seen in the analysis, Energy and Digital are the other sectors that are highly promoted by incubators working in healthcare. Around 27% of health incubators work in Energy and Digital each. This is followed by Engineering which is supported by 7 out of 40 which is around 17% and then AI supported by 6 of them which is 15% of incubators considered.

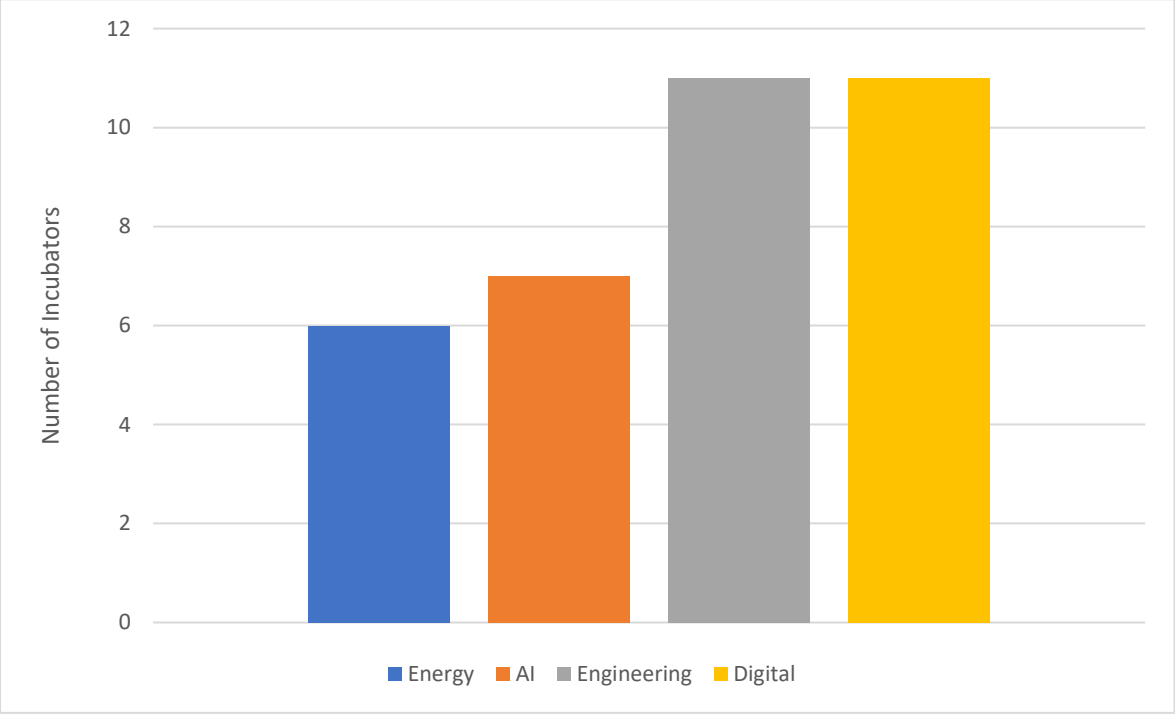

Figure 32: Other sectors supported by healthcare incubators in United Kingdom

This findings about sectors other than healthcare that is supported by incubators is similar to the analysis in past literature. Digital, engineering and energy are sectors that a good number of UK incubators focus according to this.

4.15.3. Comparison

Since we are considering the incubators supporting not only healthcare sector but also other sectors and also general ones, this analysis gives a high-level representation of areas of interest of these organizations other than healthcare. In both countries, the area which has gained more interest for these incubators apart from health is energy. Around 30% of considered incubators do support companies in energy sector. While in Germany, the next highlight is given for fintech and mobility, in UK the focus is more to engineering and digital sector. AI is also a common sector where health incubators in both countries have interest on.

5. Conclusion

The main objective of this thesis research was to get a detailed idea about the incubation activities in the healthcare sector in United Kingdom and Germany. This investigation was mainly done using quantitative and graphical analysis of various data and factors related to the topic.

From this study it is clear that the incubation programs in healthcare sector does contribute a lot to the entrepreneurial ecosystem in both the countries. More than half of total incubator population does support companies and early-stage start-ups working on healthcare related sectors. So just like the research activities conducted in general about incubators, it is important and necessary to do further investigation and study on specific sectors.

5.1. Healthcare incubators in UK & Germany

The study includes a detailed analysis on various data collected about the healthcare incubators from their respective websites, Orbis and other sources and also a high-level comparison of the healthcare incubation activities in both countries using the findings in each section.

The countries we included in this study – UK & Germany, do have a good start up culture irrespective of the sector they operate on. The main understanding is that innovation and entrepreneurial activities in healthcare sector is widely promoted in both countries with a large number of incubators working on supporting them.

While looking at the geographical distribution, we can clearly understand where the hubs or hotspots of innovation in healthcare are located in each country. Since these are located in the main industrial, economical and academic centres of the countries, it shows the importance of the presence of these institutions in fostering and supporting incubation activities. As already mentioned in the respective section, London and Berlin tops in the case of maximum number of healthcare incubators in each country.

Adding to the above point, while analysing the different types of incubators that were part of the healthcare sector, in both countries there was a domination of university and corporate incubators (a major part of the 'Others' category). This is in line with the result of geographical distribution analysis that shows the effect of these institutions in innovations and research. By investigating the types of incubators in healthcare, the analysis found that a good number of them are regional or community based. A similar result was obtained even during literature analysis about incubators in UK and Germany that mentioned the role of these socio-economic bodies in supporting the incubation programs.

Also, considering the fact that most of the sectors within healthcare that were analysed including life science, biotechnology etc are more sided to applied science and research, university incubators are a big part of innovations in this field in acting as a bridge between academia and industry.

While analysing the concentration of health incubators in both countries, even though UK and Germany vary in their area in square metre and population and hence the result in this section can have a little bias to UK due to the lower values of the above-mentioned parameters, UK does have an upper hand with a greater number of incubators in healthcare sector compared to Germany.

The analysis shows that there is an increase in new healthcare incubators from 2011 till around 2018 in both countries. So, it is clear that this is the time where the innovation in healthcare gained more importance.

The number of employees and incubated organizations in both countries is a proof that more than half of the incubators in the considered population are small to medium sized. The financial data analysis is also in line with this inference, since most of the organizations do have a negative income. This analysis is also raising a concern about the job creation done by the incubators which is important since many of them function with the aid of public bodies whose one of the main objectives is to increase employment in the particular community or region.

As mentioned in the findings section regarding the other sectors focussed by healthcare incubators, in both countries, the main focus was on energy. The reason is not clear in this research activity. Maybe it is a random coincidence or there can be a link. However, the number of incubators concentrating on healthcare alone is less in both countries. This kind of focus on single sector is mostly done by sector specific research institutions and corporations that are completely look at healthcare alone.

As a final understanding, healthcare incubation programs have been promoted in both countries on a good scale by local and regional governments and research institutions and corporations. Still while analysing the financial data many of them do not have a good outcome. It might be due to their locations (if not in a site with more institutions working in healthcare) which might affect the ecosystem where they are thriving, thus having a negative impact.

5.2. Limitations and future research

This section covers a prospective future research activity that can be done to have more clarity on the discussed topic. Prior to that it is necessary to have a clear understanding of the limitations of this thesis study.

Primarily, the entire research was based on the data found from online sources. The database of incubators was built from the past SIM databases. The list of incubators was updated using the current data. The filtering of this database based on sector supported by the incubators was done purely using the details that were given in the organizations' respective websites. So, no direct contact was done with any of these firms in order to confirm the data collected. So obviously there can be the limitations related to how updated were these websites and pages of incubators. Obviously, most of them are run by efficient teams and so the details should have been up to date. Still there is a limitation of not having a direct confirmation.

Another major limitation is in the collection of financial data. The data collected from Orbis database is surely reliable, but the problem is regarding availability of this data. A good percentage of the healthcare incubators considered did not have their financial data published

in Orbis. So, the analysis done on this topic in completely depended on the very few organizations that actually made their financial data available to public.

Also, the analysis on the financial aspects would have been better if it was possible to get more disintegrated data like different sources of revenue, areas where more costs were incurred, actual returns from the incubated organizations etc. This could have led to more detailed analysis of this topic.

Another important gap in this research activity is that we have not included data about the businesses that were supported by these incubators. More information about their survival rate, profitability and sustainability would have been helpful in investigating the performance and impact of incubators in healthcare.

By considering the above limitations, some ideas can be proposed for future research to have a better understanding of each section discussed in this report. It is recommended to collect at least few data directly from the incubators or accelerators to have a breakdown of their financial aspects. This way we can analyse what are the problems that healthcare incubators face that lead many of them to have negative incomes. Along with this further research can be done on the incubated companies in order to analyse the impact these incubators had on them.

Another suggestion is to compare the incubation programs in healthcare before and after the COVID pandemic. This way it will be possible to understand more about the advancement that was done in health innovation as a result of the impact caused by the pandemic. Similar to the study in this thesis report, this suggested research can also be done in multiple countries to know how post pandemic conditions affect the incubators in various locations. This kind of study can help in assessing the role of incubators in times of need and emergency.

Bibliography

1. Williamson, O.E., 1975. Markets and Hierarchies: Analysis and Antitrust Implications. The Free Press, New York.
2. Williamson, O.E., 1979. Transaction-Cost economics: the governance of contractual relations. J. Law Econ. 22 (2), 233–261.
3. Bailey, E.E., Friedlander, A.F., 1982. Market structure and multiproduct industries. Journal of Economic Literature 20 (3), 1024–1048.
4. Granovetter, M., 1985. Economic action and social structure: the problem of embeddedness. Am. J. Sociol. 91 (3), 481–510.
5. Granovetter, M., 1992. Problems of explanation in economic sociology. In: Networks and Organizations: Structure, Form, and Action. Harvard Business School Press, Boston.
6. Mason, Colin & Harrison, Richard. (1996). Why 'Business Angels' Say No: A Case Study of Opportunities Rejected by an Informal Investor Syndicate. International Small Business Journal - INT SMALL BUS J. 14. 35-51. 10.1177/0266242696142003.
7. C. M. Christensen, “The innovator’s dilemma – When new technologies cause great firms to fail”, Harvard Business School Press, 1997.
8. Gross, B. (1997). Technology centers and business incubators in Germany. OCDE/GD (97), 202, 75-90.
9. OECD (1997). “Technology Incubators: Nurturing Small Firms”. Organisation for Economic Co-Operation and Development, Paris.
10. Ford, D., Gadde, L., Hakansson, H., Lundgren, A., Turnbull, P., Wilson, D., Snehota, I., 1998. In: Ford, D. (Ed.), Managing Business Relationships. Wiley, Chichester.
11. Henderson R, Jaffe AB, Trajtenberg M. 1998. Universities as a source of commercial technology: a detailed analysis of university patenting, 1965–1988. Review of Eco nomics and Statistics 80(1): 119–127.
12. Zaheer, A., McEvily, B., Perrone, V., 1998. Does trust matter? Exploring the effects of interorganizational and interpersonal trust on performance. Organ. Sci. 9 (2), 141–159.
13. Lorenzoni, G., Lipparini, A., 1999. The leveraging of interfirm relationships as a distinctive organizational capability: a longitudinal study. Strategic Management Journal 20 (4), 317–338.

14. R. Aernoudt, European policy towards Business Angels, in Venture capital, An International Journal of Entrepreneurial Finance, 1999.
15. Best practises for support for the creation of an enterprise, European Commission, 2000.
16. Gompers, P., & Lerner, J. 2000. Money chasing deals? The impact of fund inflows on private equity valuation.Journal of Financial Economics, 55: 281-325.
17. Hansen, M.T., Chesbrough, H.W., Nohria, N., Sull, D.N., 2000. Networked incubators: hothouses of the new economy. Harvard Business Review 78 (5), 74–84.
18. Singh, R.P., 2000. Entrepreneurial Opportunity Recognition Through Social Networks. Garland Publishing, New York.
19. P. Reynolds and R. Hay, Global Entrepreneurship monitoring, Babson College, 2001
20. Chesbrough, H. W. (2003). Open innovation: The new imperative for creating and profiting from technology. Harvard Business Press.
21. Dyer, J.H., Chu, W., 2003. The role of trustworthiness in reducing transaction costs and improving performance: empirical evidence from the United States, Japan, and korea. Organ. Sci. 14 (1), 57–68.
22. Freel, M.S., 2003. Sectoral patterns of small firm innovation, networking and proximity. Research Policy 32 (5), 751–770.
23. Lambert, R. (2003). Lambert review of business-university collaboration. University of Illinois at Urbana-Champaign's Academy for Entrepreneurial Leadership Historical Research Reference in Entrepreneurship.
24. McEvily, B., Perrone, V., & Zaheer, A. (2003). Introduction to the special issue on trust in an organizational context. Organization Science, 14(1), 1-4.
25. Aernoudt, R. Incubators: Tool for Entrepreneurship? *Small Business Economics* **23**, 127–135 (2004). https://doi.org/10.1023/B:SBEJ.0000027665.54173.23
26. Hackett, S.M. and Dilts, D.M. (2004). “A systematic review of business incubation research”. The Journal of Technology Transfer, Vol. 29 No. 1, pp. 55-82.
27. Lazzarini, S.G., Miller, G.J., Zenger, T.R., 2004. Order with some law: complementarity versus substitution of formal and informal arrangements. J. Law Econ. Organ. 20 (2), 261–298.
28. Aernoudt, R. (2005) Executive forum: seven ways to stimulate business angels’ investments. Venture Capital7(4):359–371.

29. O. Gassmann, B. Becker, “Towards a resource-based view on corporate incubators”, International Journal of Innovation Management, vol. 1, pp. 19-45, 2006.
30. Aerts, K., Matthyssens, P., & Vandenbempt, K. (2007). Critical role and screening practices of European business incubators. Technovation, 27(5), 254-267.
31. Laredo, P. Revisiting the Third Mission of Universities: Toward a Renewed Categorization of University Activities? High Educ. Policy 20, 441–456 (2007). https://doi.org/10.1057/palgrave.hep.8300169
32. Baron, R. A. (2008). The role of affect in the entrepreneurial process. Academy of management Review, 33(2), 328-340.
33. C. A. O’Reilly III, M. L. Tushman, “Ambidexterity as a dynamic capability: Resolving the innovator’s dilemma”, Research in Organizational Behaviour, vol. 28, pp. 185-206, 2008.
34. Dollinger, M. J. (2008). Entrepreneurship. Marsh Publications.
35. Gulati, R., Nickerson, J.A., 2008. Interorganizational trust, governance choice, and exchange performance. Organ. Sci. 19 (5), 688–708.
36. H.-J. Bullinger, D. Spath, H.-J. Warnecke, E. Westkämper, “Handbuch Unternehmensorganisation – Strategien, Planung, Umsetzung”, Springer Verlag, 2008.
37. Poppo, L., Zhou, K. Z., & Ryu, S. (2008). Alternative origins to interorganizational trust: An interdependence perspective on the shadow of the past and the shadow of the future. Organization Science, 19(1), 39-55.
38. Bulut H, Moschini GC. 2009. U.S. universities’ net returns from patenting and licensing: a quantile regression analysis. Economics of Innovation and New Technology 18(2): 123–137.
39. Antoncic, Jasna & Antoncic, Bostjan. (2011). Employee satisfaction, intrapreneurship and firm growth: A model. Industrial Management and Data Systems. 111. 10.1108/02635571111133560.
40. Bound, K., & Miller, P. (2011). The Startup Factories: The rise of accelerator programmes to support new technology ventures. NESTA, London.
41. Zomer, A., & Benneworth, P. (2011). The rise of the university’s third mission. In Reform of higher education in Europe (pp. 81-101). Brill Sense.
42. Bruneel, J., Ratinho, T., Clarysse, B., & Groen, A. (2012). The Evolution of Business Incubators: Comparing demand and supply of business incubation services across different incubator generations. Technovation, 32(2), 110-121.

43. Frank R. Gunter (2012) A Simple Model of Entrepreneurship for Principles of Economics Courses, The Journal of Economic Education, 43:4, 386-396, DOI: 10.1080/00220485.2012.714314
44. Lina Sonne, Innovative initiatives supporting inclusive innovation in India: Social business incubation and micro venture capital, Technological Forecasting and Social Change, Volume 79, Issue 4, 2012, Pages 638-647, ISSN 0040-1625, https://doi.org/10.1016/j.techfore.2011.06.008.
45. Santos, F.M., 2012. A positive theory of social entrepreneurship. J. Bus. Ethics 111, 335–351.
46. Y.-C. Chang, H.-T. Chang, H.-R. Chi, M.-H. Chen, L.-L. Deng, "How do established firms improve radical innovation performance? The organizational capabilities view", Technovation, vol. 7-8, pp. 441-451, 2012.
47. Casasnovas, G., & Bruno, A. V. (2013). SCALING SOCIAL VENTURES. Journal of Management for Global Sustainability, 1(2).
48. Jones, T.M., Felps, W., 2013. Shareholder wealth maximization and social welfare: a utilitarian critique. Bus. Ethics Q. 23, 207–238.
49. Lerner & Tag (2013). "Institutions and venture capital". Industrial and Corporate Change
50. Barbero, J. L., Casillas, J. C., Wright, M., & Ramos Garcia, A. (2014). Do different types of incubators produce different types of innovations? The Journal of Technology Transfer, 39(2), 151-168.
51. Cohen, S., & Hochberg, Y. V. (2014). Accelerating startups: The seed accelerator phenomenon.
52. Entrepreneur (2014), "Business incubator", available at: www.entrepreneur.com/encyclopedia/business-incubator (accessed on October 20, 2022)
53. S. A. Hill, J. Birkinshaw, "Ambidexterity and Survival in Corporate Venture Units", Journal of Management, vol. 7, pp. 1899-1931, 2014.
54. Theodorakopoulos, N., Kakabadse, N. K., & McGowan, C. (2014). What matters in business incubation? A literature review and a suggestion for situated theorising. Journal of small business and enterprise development.
55. Allen, K. R. (2015). Launching new ventures: An entrepreneurial approach. Cengage Learning.

56. Bertoni, F., Colombo, M. G., & Quas, A. (2015). The patterns of venture capital investment in Europe. Small business economics, 45(3), 543-560.
57. Wright, Mike. (2015). Academic Entrepreneurship: Time for a Rethink?. British Journal of Management. 26. 10.1111/1467-8551.12116.
58. Samaeemofrad, N., van den Herik, J., & Verburg, R. (2016, June). A New Perspective on Business Incubators. In 2016 International Conference on Engineering, Technology and Innovation/IEEE lnternational Technology Management Conference (ICE/ITMC) (pp. 1-11). IEEE.
59. Argerich, J., & Cruz-Cázares, C. (2017). Definition, sampling and results in business angels' research: toward a consensus. Management Decision.
60. Bone, J., Allen, O., & Haley, C. (2017). Business incubators and accelerators: The national picture. BEIS Research paper, 7(1).
61. Drover, W., Busenitz, L., Matusik, S., Townsend, D., Anglin, A., & Dushnitsky, G. (2017). A review and road map of entrepreneurial equity financing research: venture capital, corporate venture capital, angel investment, crowdfunding, and accelerators. Journal of management, 43(6), 1820-1853.
62. Hausberg, Johann Piet and Korreck, Sabrina, Business Incubators and Accelerators: A Co-Citation Analysis-Based, Systematic Literature Review (February 3, 2017). Journal of Technology Transfer, Forthcoming, Available at SSRN: https://ssrn.com/abstract=2919340 or http://dx.doi.org/10.2139/ssrn.2919340
63. Hausberg, J., & Korreck, S. (2017). Mapping the social business incubator landscape. In Paper to be presented at the 1st IESE-LUISS Conference on Responsibility, Sustainability and Social Entrepreneurship, Rome.
64. Hirte, R., Münch, J., & Drost, L. (2017, June). Incubators in multinational corporations development of a corporate incubator operator model. In 2017 International Conference on Engineering, Technology and Innovation (ICE/ITMC) (pp. 195-202). IEEE.
65. Kolympiris, C., & Klein, P. G. (2017). The effects of academic incubators on university innovation. Strategic Entrepreneurship Journal, 11(2), 145-170.
66. Schuh, G., Vogt, F., Lau, F., & Bickendorf, P. (2017, July). Concept of innovation transfer from corporate incubators. In 2017 Portland International Conference on Management of Engineering and Technology (PICMET) (pp. 1-11). IEEE.

67. Secundo, G., Perez, S. E., Martinaitis, Ž., & Leitner, K. H. (2017). An Intellectual Capital framework to measure universities' third mission activities. Technological Forecasting and Social Change, 123, 229-239.
68. Tsaplin, E., & Pozdeeva, Y. (2017). International strategies of business incubation: the USA, Germany, and Russia. International Journal of Innovation, 5(1), 32-45. Doi: http://dx.doi.org/10.5585/iji.v5i1.130
69. Wry, T., York, J.G., 2017. An identity-based approach to social enterprise. Acad. Manag. Rev. 42, 437–460.
70. Tenca, Croce & Ughetto (2018). "Business Angels Research in Entrepreneurial Finance: A Literature Review and a Research Agenda". Journal of Economic Surveys
71. Wilden, R., Garbuio, M., Angeli, F., & Mascia, D. (2018). Healthcare Entrepreneurship (1st ed.). Routledge. https://doi.org/10.4324/9781315157993
72. Levillain, K., Segrestin, B., 2019. From primacy to purpose commitment: how emerging profit-with-purpose corporations open new corporate governance avenues. Eur. Manag. J. 37, 637–647.
73. Lukosiute, K., Jensen, S., & Tanev, S. (2019). Is joining a business incubator or accelerator always a good thing?. Technology Innovation Management Review, 9(7), 5-15.
74. Saebi, T., Foss, N.J., Linder, S., 2019. Social entrepreneurship research: past achievements and future promises. J. Manag. 45, 70–95.
75. Sansone, G., Andreotti, P., Colombelli, A., & Landoni, P. (2020). Are social incubators different from other incubators? Evidence from Italy. Technological Forecasting and Social Change, 158, 120132.
76. Viglialoro, Sansone, Ughetto & Landoni (2020). "The Venture Builder as A New Incubation Model: An Exploratory Analysis".
77. Ramadi, K. B., & Srinivasan, S. S. (2021). Pre-emptive Innovation Infrastructure for Medical Emergencies: Accelerating Healthcare Innovation in the Wake of a Global Pandemic. Frontiers in Digital Health, 3, 648520.
78. Chan, Yolande & Krishnamurthy, Rashmi & Sadreddin, Arman. (2022). Digitally-enabled university incubation processes. Technovation. 102560. 10.1016/j.technovation.2022.102560.

79. Han, S., Su, J., Lyu, Y., & Liu, Q. (2022). How do business incubators govern incubation relationships with different new ventures?. Technovation, 116, 102486.
80. Serres, C., Hudon, M., & Maon, F. (2022). Social corporations under the spotlight: A governance perspective. Journal of Business Venturing, 37(3), 106192.