MASTER THESIS

The university business incubators' value-creating activities on enhancing new product development

A systematic literature review

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ABSTRACT

This master thesis explores the role of university business incubators (UBIs) and the performing activities on enhancing new product development among their tenants. To realize this, recent literature on the topic will be systematically reviewed based on the guidelines and items of the PRISMA-statement. 27 articles from academic journals ranging from 2004 till 2020 were used to determine those specific activities in incubation programs that enhance the ability of tenants to survive and grow in business. It has been determined and justified by entrepreneurship theories that UBI activities that fall under the dimensions infrastructure, business support and networking activities have an impact on the NPD process of UBI tenants. However, the results suggest that the entrepreneurial ecosystem, in turn, has a considerable impact on these UBI dimensions. In other words, the quality and thus impact of UBI activities heavily depends on the demographic characteristics of that UBI and the available resources and facilities in that environment. The field of research on this topic is still underexplored and dispersed. As a result, this literature review emphasizes the need for further explorative research on the relationship between UBI activities and NPD processes of tenants. This is necessary to develop a more comprehensive framework from the theoretical perspective. From a practical perspective this review can contribute to better find critical success factors for UBI performance and start-up growth.

Keywords

University Business Incubator, Business Incubation, Technology Entrepreneurship, Innovation, New Product Development, Technology commercialization

TABLES AND FIGURES

ABBREVIATIONS

UBI	University Business Incubator
NTBF	New Technology-Based Firm
NPD	New Product Development

CONTENTS

1 INTRODUCTION

Success stories from nascent entrepreneurs of start-ups are inspiring for ambitious students with novel innovative inspirations to start converting their ideas into business models. However, the road to an entrepreneurial success story is not always plain sailing; the nascent entrepreneur will face several challenges and complex issues before he or she will start writing that success story. The novelty of the venture, lack of network relations, and inexperience of the entrepreneur are barriers that constrain the ability of start-ups during the early stages of growth to become an established firm in the market (Shane, 2004; Vohora, Wright, & Lockett, 2004).Therefore, decent guidance during those early stages seems to be a necessary factor to convert the process of idea generation into a successful start-up. It is still under-explored to what extent guidance has influence on the choices a nascent entrepreneur has to make in the early stages of new venture creation. According to van Gelderen, Thurik and Bosma (2005) indeed not many empirical researches are conducted on the early stages of nascent entrepreneurship. Ten years later, the scientific research on the topic is still underexplored (George, Parida, Lahti, & Wincent, 2016).

Over the years, we have seen many initiatives that tried to contribute to the nascent entrepreneurial dream of an individual or group. One of those initiatives are business incubators. A business incubator can be described as a workspace created to offer start-ups and new ventures access to tangible and intangible resources they do not possess (Hausberg & Korreck, 2020; S. A. Mian, 1997; Smilor, Gibson, & Dietrich, 1990). Within the start-up eco-system, business incubators play a major role (Lasrado, Sivo, Ford, O'Neal, & Garibay, 2016; Spigel, 2017a; Wright, Siegel, & Mustar, 2017). As a result of the triple-helix, academic incubators are established to remain competitive and relevant; "*to attract and retain entrepreneurial students, faculty and researchers; and to forge connections between industry and academia. Incubators are now a vital part of the higher education landscape"* according to *Gensler Research and Insight* (2019). The main goal for the individual incubatee is to increase the firm's sales turnover, future revenue streams, growth and graduation to independent trading (Voisey, Gornall, Jones, & Thomas, 2006). The UBI plays the supporting role in this. In practice, the somewhat holistic definition from Wright et al. (2017) and Smilor, Gibson and Dietrich (1990) shows that the explicit services of a university-based incubator (UBI) are supporting the start-up with a variety of tangible and intangible services.

This master thesis will systematically review studies that intended to find factors from university business incubators that enhance the new product development process of their tenants. Several (non-)empirical researches were conducted in the past years to measure the impact of incubator activities and tenant outcomes (Barbero, Casillas, Wright, & Ramos Garcia, 2014; Cornelius & Bhabra-Remedios, 2003; Rothaermel & Thursby, 2005), but the range of differences in methods of measurement makes it difficult to develop one leading framework (S. A. Mian, 1997). For this systematic literature review, the following research question has been chosen:

What activities from UBI's are creating value for incubatees on their new product development process?

By going more in-depth (read: having a specific focus on the new product development process) it is more likely to figure out what the factors are that have a value-creating impact on university incubators' tenants, and, incubator performance. The intention of this master thesis is to contribute to the field of literature of university business incubation. One can believe that a specific, micro-level approach can help to better understand how questionable phenomena are explained within this topic. A systematic literature review will find the value-creating factors in the existing literature. The eligibility of used literature will be systematically analysed based on using several criteria.

1.1 RELEVANCE

The introduction concluded that there is a lack of research and understanding in the field of the early stages of new product development among nascent entrepreneurs. As a result, the research on business incubators, and UBI's in particular, is also underrepresented in scholarly journals (Hausberg & Korreck, 2020; S. Mian, Lamine, & Fayolle, 2016; Rizvi, Salman, & Qureshi, 2015). Because businesses incubation remains in an early stage of theory; the literature is disparate, fragmented, and isolated (Albort-Morant & Ribeiro-Soriano, 2016; Phan, Siegel, & Wright, 2005). As an example, Albort-Morant & Ribeiro-Soriano (2016) found in their bibliometric analysis on business incubators differences in productivity rates and survival growth due to different theory constructions that are used among authors. There is no straight framework or theory that can explain the work and outcomes of UBIs and UBI tenants (Hackett & Dilts, 2008) But fundamental entrepreneurship theories can explain possible relationships. Despite the growth and popularity of incubators, there are few articles about incubators in academic journals; moreover, the findings of these articles have been inconsistent with respect to determining value-creating success factors (S. Mian et al., 2016; Padrão, Andreassi, & Brito, 2019). This literature review documents those inconsistencies and can contribute to the determination of success factors of incubators by reviewing the existing literature which focuses specifically on this topic from university business incubation. On the other hand, it gives the current field of literature insight in the position where we are now and where the literature can contribute to in future research.

The (new) product development process (NPD) of the incubated tenant will form the research variable for this review. Also NPD in nascent entrepreneurial firms, specifically incubated NTBFs is not yet clearly understood (Brito, Andreassi, & Padrao, 2019). It is important to gain knowledge about the NPD process of new firms to indirectly predict their survival success. Successful development of new products is a key driver for many start-up companies (Crowne, 2002). Looking at nascent spin-offs and start-ups, the product development, production, engineering and industrialization efforts are all neglected in which leads to failure (Toole & Turvey, 2009). To prevent this, supporting efforts and instances are rising (S. A. Mian, 2011). An UBI can support these firms by offering activities that give guidance in this important process. In particular, to set up proficient technology commercialization processes, it appears beneficial for firms to integrate knowledge that is gained through the ordinary activities of developing and commercializing products (Frishammar, Lichtenthaler, & Rundquist, 2012). So, gaining an insight in the activities that UBI's offer can help these UBI's better measure their own performances. From the theoretical side, this literature review can contribute to the current theory that is striving to develop a comprehensive performance evaluation model for incubators (Cornelius & Bhabra-Remedios, 2003; S. Mian et al., 2016). By knowing the value-creating activities the UBI is adding to the NPD process, the current literature receives a valuable addition which it can use for further research avenues.

1.2 OUTLINE AND OBJECTIVES

This thesis is organized as follows; First, as an introduction, the current field of literature on university business incubation will be summarized. It is necessary to know the characteristics of these type of incubators before any research can be conducted. Moher, Liberati, Tetzlaff and Altman (2009) describe this part as the rationale for the review. They state that "*This rationale is needed to build a scientific basis for the research question that have to be answered*" (Moher et al., 2009). This systematic literature review will focus on the following research question: *What activities from UBI's are creating value for incubatees on their new product development process?* The definition of value addition is that this "involves those specific activities in incubation programs that enhance the ability of tenants to survive and grow in business" (Allen & Bezan, 1990). The

answer of this question will, for organizing reasons and assessing a potential risk of bias, be structured by splitting it into three dimensions. These three dimensions are infrastructural activities, business support activities and networking services and will be further explained in the following sections. By dividing it into dimensions, the activities will be categorized. By categorizing the activities, a more profound and precise conclusion can be given after analysing the results of the literature review. The main findings of the review will be given after describing the results. Also, the limitations, conclusions and avenues for further research will be based on these main findings. Determining the activities of UBIs that create value of the tenants' product development process is the main objective of this systematic literature review. The goal is to develop a framework that gives insight in what activities and support types are necessary and value. The relevance of such a framework was already explained in the previous section.

2 UNIVERSITY BUSINESS INCUBATORS, WHAT IS KNOWN?

University business incubators (UBIs) do offer many activities to its tenants to realize commercialisation of their business ideas. In the introduction section above business incubators are already defined as a workspace that offers services for its tenants (or incubates). This typology is somewhat holistic and needs to be further conceptualized to know what is meant with the topic. Therefore, a brief description based on existing literature on UBIs will be given in this section. Beside of that, the theoretical backgrounds at work when incubation influences NPD will be discussed to appoint the relationship between UBI activities and NPD.

2.1 BUSINESS INCUBATORS AND UNIVERSITY BUSINESS INCUBATORS

UBIs are embracing a distinctive position in the field of incubation. Therefore, understanding the difference between a 'normal' business incubator and an UBI is noteworthy in this phase of examining what is already known in the literature on the topic. To explain this distinctive position, Grimaldi and Grandi (2005) created a framework including four types of business incubators that are divided among two models; public incubators and private incubators. Taking previous attempts on categorizing incubators into account, the research pointed out the following incubator types: Business Innovation Centres, UBIs, Independent Private Incubators and Corporate Private Incubators. The differences in terms of services provided by incubators are justified by the variety of companies' demands. UBI's are located between both models of Grimaldi and Grandi (2005). In other words, an UBI can offer activities from both types of incubator. An UBI can, among others, offer a network of relationships, visibility gained by affiliation, access to specialized facilities, and access to academic knowledge. The rationale behind UBI's lies in their capacity to reduce start-up costs for promising knowledge-based and high-tech entrepreneurial initiatives, according to the authors. This approach is unique to the incubators in the other models; the traditional perspective and private perspective do not embrace this rationale. On the other hand, UBIs can take advantage of the fact that they have access to a constantly renewing talent-pool (Todorovic & Suntornpithug, 2008) which increases the likelihood to connect new tenants to their programmes. Other types of incubators should do more efforts on recruiting processes than UBIs have to.

As is in the name, UBI's are involved by universities (Mian, 1997). This characteristic is also unique in comparison with the other types of incubators. Despite the controversy concerning the degree of involvement of an UBI, one can agree that universities play a central role in advanced technology development, and most commentators found consensus that the presence of a parent university

is needed at least for the formation of a concentration of technology-oriented start-ups (Allen & Levine, 1986; S. A. Mian, 1997). UBI's are mostly settled at university terrains or at science parks (Audretsch, Lehmann, & Warning, 2004; Lendner, 2007) and, therefore, the development of technology-oriented enterprises is more encouraged (S. Mian et al., 2016). The UBI's at university areas and business parks also enhance the relationship between a university and firms; Prior research of Rothaermel and Thursby (2005) demonstrates that knowledge flows from universities tend to be mitigated by geographic distance, but with the help from business incubators firms still gain access to university knowledge. Literature on UBIs is still underexplored (Barbero et al., 2014; S. Mian et al., 2016).

2.2 DIMENSIONS OF UBI ACTIVITIES

"*Product development comprises the transformation of a product idea into a new product through the allocation of resources"* (Gartner, 1985). The range of resources UBI's are offering to their tenants is wide. It has to be taken into account that not all UBI's are offering the same services and resources (S. A. Mian, 2011; Williams & Tsiteladze, 2019). According to Ratinho, Harms and Groen (2010), UBI's can be closely characterized as technology incubators; they support technology based ventures based on three fundamental dimensions. These dimensions are infrastructure, business support and networking facilities (Ratinho et al., 2010; Smilor, 1986). The allocated resources can therefore be divided. To gain a better understanding of these dimensions, and so the incubators, they will be conceptualized in the following sections.

Infrastructure

Within *infrastructure* the office space and shared tangible resources that UBI's can offer are associated. Also communication facilities are offered to incubates to enhance the working circumstances. Looking from the angle of approach from this thesis, it is known that the literature is dispersed when it comes to finding evidence regarding to the use of shared incubator communication facilities. "*It depends on the context specific informal institutional variables such as trust or attitude*" (Dahms & Kingkaew, 2016). Although, the basic infrastructure is provided by the vast majority of UBI's and has been found to be one of the most important value added features (Chan & Lau, 2005). Of course, no recent literature is available what value it can add to product development, but what is known is that more specialized resources, such as laboratories and research equipment, are also part of the infrastructure of an UBI (Grimaldi & Grandi, 2005). UBI's can also distinct in giving tenants access to workshops, pilot production plants and other specially equipped facilities (Somsuk & Laosirihongthong, 2014). This fact gives perspective to uncover a potential value adding nature and shall therefore be analysed during the systematic literature review. Because especially a university-based incubator can offer these facilities makes it interesting to dig deeper into it.

Business support services

The in-depth *Business support* services focus on the operational activities of incubator tenants (Vanderstraeten & Matthyssens, 2012). In practice, these services can be divided into coaching, training, business plan support and direct subsidies (Ratinho et al., 2010). 'Coaching' refers to one-to-one support initiatives geared to accelerate tenants' learning and skill development processes, generally involving tenant firms being assigned coaches or mentors (Bruneel, Ratinho, Clarysse, &

Groen, 2012). Training activities do have a more educational nature then the coaching activities. The existing literature describes that the teaching of business planning, leadership and marketing and sales can be seen as incubator training activities (Bergek & Norrman, 2008). This approach of Bergek and Norrman (2008) is based on a traditional business incubator. In the case of an UBI, the university is more involved in coaching and training activities (e.g. Lendner, 2007; Thérin, 2007). UBI´s can gain knowledge and means from universities were traditional business incubators cannot. With ´means´ also the business plan support and direct subsidies are involved (Lendner, 2007). In the context of this master thesis, it can be stated that business support services are a value-adding factor to the future firm performance of new ventures; it is known that incubated tenants are able to make better and faster decisions which will lead to performance optimization (Eisenhardt, 1989).

Networking services

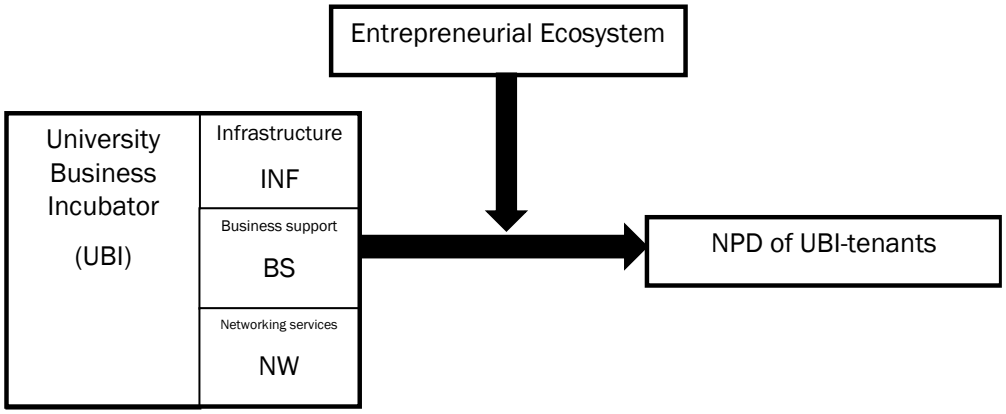
The *networking facilities* UBI's offer can also be subdivided into several divisions. The incubator can offer access to different networks such as clients, suppliers or investors (Chan & Lau, 2005). Within the incubator, it is also possible that tenants are networking internally or with incubator graduates. Networking both among tenants, and graduates and tenants is crucial for the value of social capital (Ratinho, Harms, & Groen, 2013). An UBI can show up as a broker between the tenant and a third-party person or organisation. This means that the tenant can be strengthened with the incubator's knowledge and expertise while it seeks for any kind of collaboration from outside the venture. Also when the tenant is negotiating with these parties an UBI can play a role (McAdam & McAdam, 2006). It was already mentioned in the introduction of this master thesis that novel start-up firms generally do not possess a sophisticated network (Shane, 2004; Vohora et al., 2004). This implies that the networking services can embrace a value-creating addition to the product development process of a tenant. Also sessions with business professionals or possible investors are covered by the networking facilities (Aliaga-Isla, 2014). Connections with business angel networks and venture capital firms are important means of providing financial resources during early stages of tenants' development (Ratinho et al., 2013). It is known that UBI's do not always possess capital that covers the costs of investments that are occasionally required by tenants, that is why external investors such as business angels and other capital funding firms are connected within the network.

Entrepreneurial ecosystem

In practice, there are moderating variables that can have impact on enhancing NPD. These variables are not covered by one of the three dimensions. The three-dimensional approach of Ratinho et al. (2010) is based on a micro-level approach which covers the activities on an operational basis. It has to be taken into account that attributes in the whole start-up or entrepreneurial ecosystem can have impact on how the enhancement of NPD processes (Spigel, 2017a). Also, ecosystems in different areas across the globe show that there are distinctive discrepancies and turbulences. It is important to keep this in mind because environmental turbulence does have impact on NPD (L. Lee, Wong, Foo, & Leung, 2011). The conceptual framework presented in Figure 1 gives a holistic overview of how UBI's can have impact on the NPD process of its tenants. There is a strong relationship between the characteristics of each region's ecosystem and the ways in which firms derive resources from their environment (Spigel, 2017). This means that the infrastructure, business support and network services differ. This forms a limitation for the review because not all samples in the articles are based on the same entrepreneurial environment which can lead to imbalances (Stangler & Bell-Masterson, 2015). On the other hand this makes it more interesting to gain a better understanding how an ecosystem

can work out on an UBI and indirectly on the tenant's product development process. Therefore, it is chosen to implement this 'fourth' and possible moderating variable into this literature review. The provided framework is based on the findings of this section. The systematic literature review should focus on the additional content of this framework and provide additional characteristics and elaborate further implications.

Figure 1 Conceptual Framework



2.3 THE NPD PROCESS AND INCUBATION

When analysing the activities of UBIs, one can assume that these activities are intended to enhance the NPD process of NTBFs and other start-ups. The new product development (NPD) process exists of eight stages according to Kotler and Armstrong (2010); new product strategy, idea generation, idea screening, business analysis, development, test marketing, commercialisation and new product launch (Dudic & Mirkovic, 2016; Kotler & Armstrong, 2010). The incubator can have influence from the first stage until the final stage, depending on the characteristics of the individual incubator tenant and environmental circumstances (Scherer & McDonald, 1988). This can be suggested when analysing the UBI activities in the previous section 2.2. For example, for the development stage there is a need for resources, facilities and other equipment for realising any type of development, then the incubator can play the role of provider which does fall under the infrastructure dimension. At the same moment, the UBI can act as a supervisor which is in line with the business support dimension. The elaborations and findings in the review section in Chapter 4 will further give an insight on these UBI roles and the relating activities. The effects will be justified by using entrepreneurial theories. As a conclusion, the NPD process is influenced when in incubation, it depends on the UBI activities to what extent this process will be influenced.

Going one step further, there is evidence that there are several critical success factors to realize a successful NPD project. It was already suggested in a previous section that the UBI is positioning a distinctive position regarding to other types of incubators (Grimaldi & Grandi, 2005), but regarding to NPD it remains somewhat underexplored. What is known is that an innovative culture, entrepreneurial climate and organization support are the three critical success factors (Fang & Ou, 2007). It can be suggested that an UBI meets these success factors. For example, the involvement of the university leads to a more innovative and entrepreneurial environment (Audretsch et al., 2004; S. A. Mian, 1997). Organization support can be offered by the UBI activities in three dimensions, as stated in the previous sections. So, the NPD process will be influenced by an incubator that meets the critical success factors to realize successful NPD. This guides the systematic literature review by its aim when analysing the NPD-enhancing UBI activities.

3 METHODS

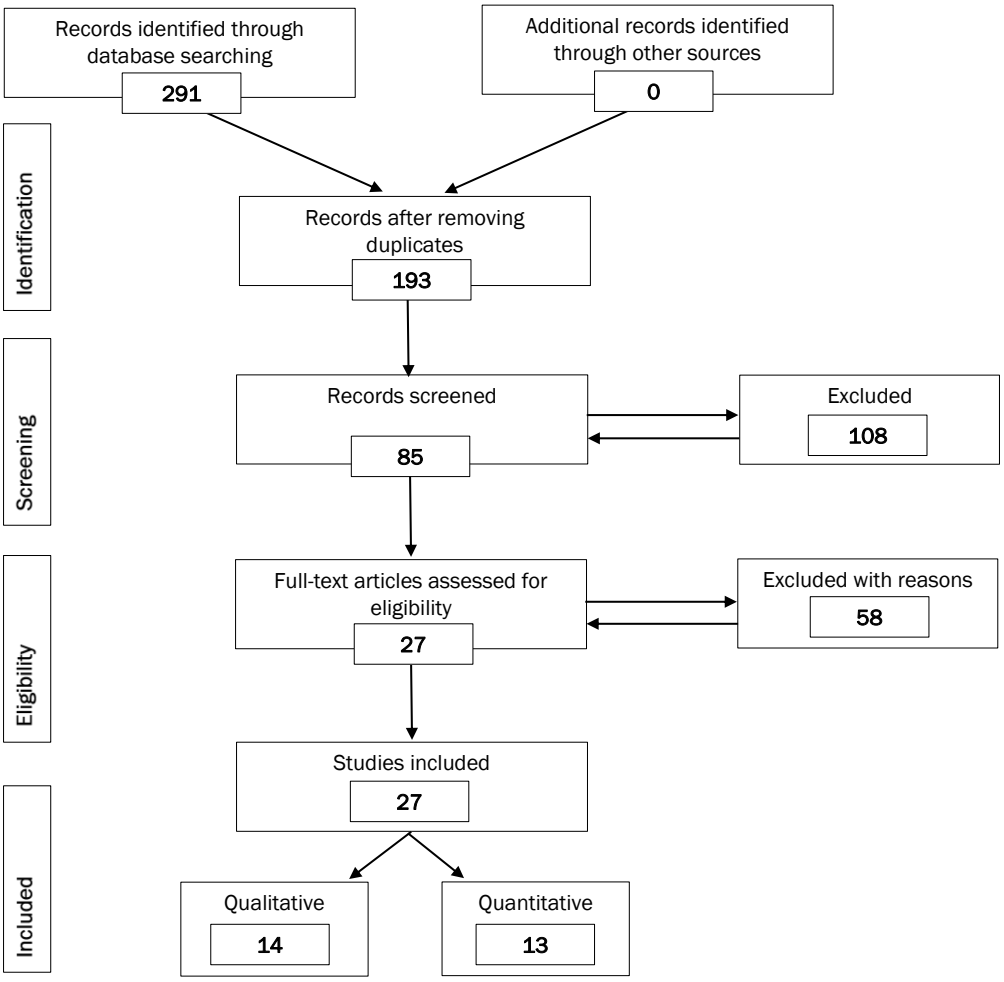
The PRISMA Statement of Moher, Liberati, Tetzlaff, and Altman (2009) will be used as the reporting format for this systematic literature review. The aim of the PRISMA Statement is to help authors improve the reporting of systematic reviews and meta-analysis (Moher et al., 2009). It is necessary to use a review protocol such as this statement. Without review protocols, decisions made during the research process cannot be assured as arbitrary (Samsheer, 2015). The PRISMA Statement is characterized by a checklist of 27 sections that have to be included when reporting a systematic literature review. This literature review will follow the sections and will make its deviations if the perspective of the research requires this. The PRISMA Statement of Moher et al. (2009) is encouraged by journals because of its transparent selection process which increases the chance to avoid publication bias (Knobloch, Yoon, & Vogt, 2011). It is scientifically tested that the endorsement of the PRISMA Statement is a reliable tool for literature reviewing and meta-analyses; it increases the methodological quality and quality of reporting (Panic, Leoncini, de Belvis, Ricciardi, & Boccia, 2013), and it is demonstrated as suitable to display integrative factors (Minatogawa, Franco, Pinto, & Batocchio, 2018) which is also the main goal of this literature review; finding value-creating factors. This methods section will briefly explain the author's choices that were made during the reviewing-stage of this master thesis.

3.1 SEARCH STRATEGY

"*In searching, the more exhaustive a search is, the more of the elements of a complex request have been included in the search formulation"* (Bates, 1979). Therefore, a title-based Boolean search strategy was conducted. A search query is defined using keywords related to the key concepts of this systematic literature review. The operators used in the Boolean search strategy are 'AND' and 'OR'. By using these operators a researcher is able to find more relevant articles and less filtering labour is required to find the right articles. The articles that are used for this systematic literature review are found in the databases that are accessible by the *LISA* of the University of Twente[1] and Google Scholar. The same Boolean approach can be used in both databases. Authors of articles that weren't accessible in first instance were requested to grant access to the articles involved. As a result, most of the authors agreed by giving access to their articles. Inaccessible articles were filtered from the search flow diagram, which can be found in Figure 2**.** As an addition, For the *records identified through database searching*, the databases from the LISA and Google Scholar are meant. The data items, as named by Moher et al. (2009), are the variables for which data were sought. These data items are based on the current field of literature that is available. It is believed that UBIs can have impact on a tenant's product development process based on the three dimensions that were mentioned before. The infrastructure, business support and networking facilities can be seen as the three dimensions.

[1] University of Twente Library, ICT-Services and Archives; https://www.utwente.nl/nl/lisa/bibliotheek/

Figure 2 PRISMA Flow Diagram



As mentioned, the use of keywords in combination with the Boolean operators summarizes roughly the search strategy for this systematic literature review. Keywords are related to the key concepts that were found during the analysis of what was already known about UBI's. The author's personal choices also had a role in the process of picking the right keywords. The most important and even first keyword, regarding to the UBI, is standard determined. For the first keyword "*University business incubator"* also synonyms are used during the search process. Due to the lack of articles available, it is chosen to include start-ups and new technology ventures as keywords. The keyword 'University' is also included then to find articles of start-up NPD which do relate to universities. On the other hand, there is a possibility to find moderating variables above infrastructure, business support and networking activities. The keywords search is limited to the keywords in article titles and abstracts. During the search strategy, the Boolean way is used to also include synonyms by using the term 'OR'. The following alternative terminologies are used:

- University business incubation
- UBI
- University incubator(-s)
- University incubation
- University technology incubator
- University technology incubation
- University spin-offs
- University AND
    - Start-ups
    - NTBF(s)
    - New ventures

The first keyword was followed by a second keyword. The Boolean operator 'AND' is used between both keywords. Due to the lack of articles available, this keyword did not need to be in the title of the article, but may appear in the abstract or whole text. This resulted in many search results. These results are, based on eligibility criteria (chapter 3.2), filtered to find the most valuable articles for this master thesis. The following second keywords are used during the search:

- Product development
- New product development
- NPD
- Product commercialisation
- Technology commercialisation
- Product assistance
- Product conceptualization
- Product design
- Value creation
- Impact
- Infrastructure
- Business support
- Networking(services)
- Ecosystem

3.2 ELIGIBILITY CRITERIA

This section will describe the screening process more in-depth. The eligibility criteria are predetermined criteria by the author which the articles must comply before being included. The eligibility criteria used are captured in the next sections and rationales are given to explain why specific choices are made.

Sample characteristics and research designs

An article is eligible if it contains a sample of at least one examined UBI or incubated firm by an UBI. This does not imply that articles had to embrace any empirical grounds; a reviewing article that reviews other empirical articles relating to UBIs or UBI tenants can also be eligible. It is known that samples can differ based on their characteristics due to environmental circumstances. This restriction will be discussed in section 3.3 risk of bias. Relating to the research design, it is chosen to mention each design particularly into the overviewing table in Appendix 1 by appointing the sample specifically. It is also chosen to highlight de geographical characteristic to prevent the review to a certain extent from bias. An overview of the geographical characteristics can be found in paragraph 3.4.

Beside sample characteristics, the research designs of all the individual articles need to meet the eligibility criteria. This can imply that specific research designs may be excluded from the review. But, it is chosen to be not very strict on focussing on research designs. There was, however, no specific research design in the analysed literature that was not suitable for this review. As a prerequisite, that the majority of the articles needed to be empirical studies. The author decided that at least 80% of the included articles must meet this criterion. The reason why is that the thesis' topic requires impact measurements to conclude anything about the impact of UBIs on tenants. Peer reviewing literature reviews is possible, but due to the novelty of the topic not many literature reviews are conducted yet. Researches can be qualitative or quantitative; measuring impact can be conducted by qualitative as quantitative studies, while quantitative studies are generally more precise than the qualitative studies. This mixed-method approach (Venkatesh, Brown, & Bala, 2013) is necessary to wrote this master thesis due to the novelty of the topic, lack of current knowledge in this field of study and the number of articles available.

Year of publication

Due to the lack of research that has been conducted on this topic, it is chosen not to focus particularly on recent literature or articles published after a specific year. This research prefers recent literature, but has to deal with the minority of relevant articles available. A specific landmark year for research on UBIs could not be emphasized. However, since the paper from Mian (1997) the number of articles has increased on this topic. On the other hand, "the phenomenon of incubators was very recent and hence the research field only embryonic. Consequently, there was need for the review to be very systematic; it succeeded to provide an in-depth summary of the few books and articles available" (Hausberg & Korreck, 2020). Fortunately, the novelty of the research topic lead to a majority of literature that has been published earlier than ten years ago from this thesis. The current field of literature on the topic offers sufficient sources to conduct a systematic review.

Number of citations

It is known that articles differ in the total number of citations. For this master thesis it is chosen to not particularly look at the number of citations of the articles. It is assumed that articles published in (international) academic journals are sufficiently scientific and reliable for a systematic literature review. It is even not possible to include yet-cited articles because of the novelty of some articles. For example, articles written in 2019 cannot have any citations yet, but this will not imply that the article is not suitable for the literature review.

General article characteristics

Beside of all the eligibility criteria that are yet mentioned, the included articles must also meet conditions that embrace a more generic nature. These additional eligibility criteria for inclusion were:

- Article must be published in an academic journal
- Article must be written (or translated) in English
- Article must be legally accessible or accessibility must be granted by the publisher
- Article must not contain overlapping or already considered information, nor be written by the same author(s) with other included articles
- Subjective finding if there is a 'fit' of the article and the review of the author plays a minor role

3.3 RISK OF BIAS

For each study that has been included in the systematic literature review a risk of bias is assessed. Methods to reduce the risk of bias will be discussed in this section. It is known by the author that any form of bias cannot be completely filtered out. It is attempted to reduce any type of bias in the review to remain a sufficient level of objectiveness. In some cases in the literature review, syntheses are drawn up that can contain biases from the included individual studies. Therefore, a risk of biased for each individual study will be assessed to restrict this to a minimum level. In the limitations section the residual chance of biases of this literature review will be explained.

An 'outcome-level' assessment will occasionally be required during the scrutiny process of the articles. This assessment involves evaluating the reliability and validity of the data for each important outcome by determining the methods used to assess them in each individual study (Moher et al., 2009). Not each individual article uses the same measurement tools for determining the impact of UBI activities. Also risks of bias can occur in journal-published articles. Therefore, two actions will be taken during the review. The first action is to map the risk of bias in the outcome assessment by considering how subjective or objective an outcome is. This action will be based of the consideration of the author. The second action is determining who or what is assessing the outcome of a specific result. An UBI is also linked with external factors which can possibly influence a relationship. These types of bias can harm the validity of research results. After the approval to include an article in the review, this action will be assessed. In practice, the author will go through the research limitations to examine to what extent there is any risk of bias in the article results. Both actions together will improve the overall quality of a systematic literature review (Turner, Boutron, Hróbjartsson, Altman, & Moher, 2013) and therefore more reliable conclusions will derive.

As stated in the theory in section 2.2, the section about the moderating variables within the ecosystem, Spigel (2017) suggested that there are different ecosystems across the world. To prevent the systematic review from an equivalent selection bias, the researcher tried to include research papers from as many different ecosystems across all regions around the world. It is known that differences between papers will arise. These differences can distort the picture of activities and their impact on the product development processes of UBI tenants. All the data from different ecosystems will however be used to examine the enhancing activities of UBIs on NPD. By doing this, the publication bias is assessed to a certain extent. However, even when the possibility of publication bias is assessed, there is no guarantee that systematic reviewers have assessed or interpreted it appropriately (Moher et al., 2009), it can be seen as a marker of thoroughness of the conduct of the systematic review. To perform this in practice, the samples that are used in the included articles are appointed in the literature review list (Appendix 1). The countries, or universities, or other factors that relate to the attributes in the sample are mentioned.

To justify causality, this paper will make use of entrepreneurship theories. The majority of the included empirical and non-empirical articles have a similar grounded approach. Some of the papers embrace the resource-based view approach from Barney (2001) in their published articles. This approach is based on the resources firms can exploit to achieve advantages that keep firms competitive, sustainable and viable (Barney, 2001). From that perspective one can state that this review is also based on this approach. Because the resources in the terminology of Barney (2001) can be seen as the activities that UBIs are performing that create value for the incubated firms. The articles that do not embrace this approach can still be eligible for the systematic review and it is demonstrated that this approach does not occur any biases when syntheses are drawn up. There is no other leading approach found among the other articles.

3.4 SUMMARY OF THE INCLUDED LITERATURE

After the application of the eligibility criteria and assessing the bias risks that are described in the previous sections a brief summary of all the included literature will be given now. It is attempted to realize an equal distribution of the dimensions discussed over the papers. In practice, the vast majority of articles were multiple-dimension studies, which implies that more than one dimension (infrastructure, business support or networking) is included in that specific article. Of all the dimensions mentioned over all the articles, 15 studied infrastructure (27,8%), 21 business support activities (38,9%) and 18 studied the networking services (33,3%). Regarding to the ecosystem dimension, it was chosen to not specifically focus articles that compromise this dimension to

remain the focus on the thesis' topic which is based on the activities of UBIs and not particularly on its entrepreneurial environment. A selection of the included articles contain however this possibly moderating variable so any conclusions can still be drawn up for this variable.

All of the included articles are published in (international) academic journals. An overview of the journals where the articles are published in can be found in Table 1. The journals that embrace a technological approach are main suppliers of articles for this review. For example, the journals *Technology Transfer* and *Technovation* are both responsible for a delivery of 8 articles for the review; therefore, they cover approximately 30% of all included articles. Second, the entrepreneurial journals provided most of the articles. In total, 17 different journals are contributing to this literature review. It was assumed that using articles from scientific journals are sufficiently qualitative for a systematic literature review. To further elaborate this, a measurement tool is used. Namely, the AJG ratings[2] per journal are added to demonstrate the quality of that journal. The ratings are ranging from 4 (excellent) to 1 (modest). A couple of journals were introduced after the publication of the AJG (2015) and are therefore not ranked in the table. A more recent dataset from the AJG could unfortunately not be accessed by the author.

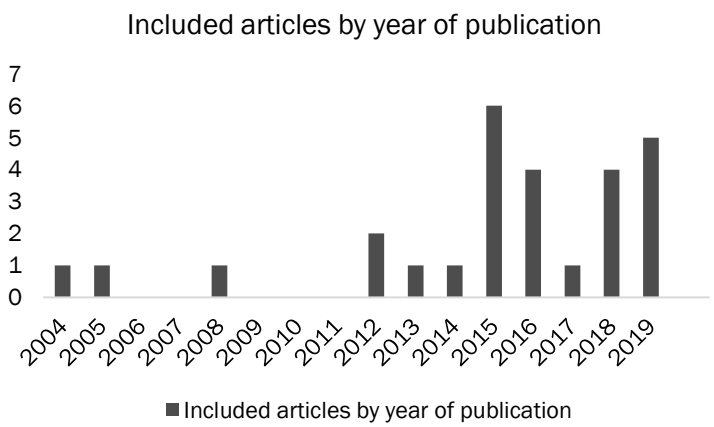
Table 1 Number of articles from academic journals

Name of journal	# articles included	AJG Rating (2015)
Technology Transfer	4	2
Technovation	4	3
Entrepreneurial Behaviour & Research	2	2
Entrepreneurship and Innovation	2	2
International Entrepreneurship	2	3
Technological Forecasting & Social Change	2	3
Business and Management Research	1	-
Business and Social Science	1	3
Economics and Sustainable Development	1	-
Entrepreneurial Business and Economics Review	1	-
Innovation Management	1	4
Innovation and Policy	1	-
Management Science	1	4
Scienometrics	1	-
Small Business Management	1	3
Technology Management	1	2
Technopreneurship	1	-

[2] Retrieved from: Cremer, R. D., Laing, A., Galliers, B., & Kiem, A. (2015). Academic journal guide 2015. *Association of Business Schools, London*.

As mentioned in section 3.2, this literature review prefers recent literature, but has to deal with a lack of relevant articles available. Despite of that, the aim was to use as many recent papers as possible. Over the years, the literature on this topic increased and this is reflected in the included articles of this literature review. The majority of the articles (74%) has been published within a period of five years from the publication of this systematic literature review. This does not imply that less-recent articles are not representative for a systematic literature review. On the contrary, these articles can be seen as the founders of specific findings on this topic. For example, the articles of Lee and Osteryoung (2004), Chan and Lau (2005) and McAdam and Marlow (2008) contain many findings that gave guidance to better understand how UBIs affect tenants. It is often seen that one of these three articles are recurring in the literature sections of the more current articles. For this systematic literature review these articles are useful in the sense of understanding the phenomena because of their comprehensiveness with regards to this master thesis' topic.

Figure 3 Included articles by year of publication



It was already investigated in the pre-research that there are differences between UBIs from different ecosystems (Spigel, 2017a; Stangler & Bell-Masterson, 2015). To study if this hypothesis can be true or not, it is chosen rather to not focus on a specific region but include articles from all regions available. It was attempted to collect an equally-representable collection of included articles regarding to their demographical characteristics. In the field of business incubation, this is quite difficult. Not all world regions did implement UBIs at the same time; it appeared in waves and so the literature did (Dalmarco, Hulsink, & Blois, 2018). Dalmarco et al. (2018) state that the "first wave occurred at pioneering universities in the United States", the second occurred in Western Europe and the newly emerging economies make up the third wave whereby the promotion of academic entrepreneurship is high on their political agendas. For a part, the theory of Dalmarco et al. (2018) is referred in the included articles of this systematic literature review. As figured in Table 2, it is observed that most of the included studies contain samples of UBIs, UBI tenants or other parties relating to an UBI from the European region (10) which belongs to the *second wave region* according to Dalmarco et al. (2018). Articles belonging to the third wave are also well-presented in the systematic literature review; a number of 13 articles are belonging to the third wave and thus come from regions with upcoming academic entrepreneurial ecosystems. A possible explanation for this could be that the request for measuring the impact of UBI activities on tenants is higher in these regions for making any adjustments. The purpose of this section is to emphasize that the variable 'ecosystem' has been taken into account by including an even-distributed set of articles from several environments.

Table 2 Included articles by sample region

Sample region	Number of included articles
Africa	3
Asia	6
North America	3
Central and Latin America	2
Europe	10
Oceania	2
Unknown	1

4 SYSTEMATIC LITERATURE REVIEW

The 27 included articles will be reviewed in this section. With the help of tables the findings among the different authors will be compared and contrasted. Per dimension, a brief introduction will be given from the pre-research in chapter 2. Subsequently, a table with findings from the authors of the included articles will be presented to show the values on NPD that derived from this articles. Then, the findings and differences in the literature will be discussed and concluding remarks will be drawn up. To establish causality, fundamental management theories will be used as an explanation how these findings are related to the NPD process. Therefore, the leading entrepreneurial theories in the included papers will be highlighted in the tables in order to establish the link that there is causality. The discussion of the whole section, including final conclusions, the framework and implications can be found in the chapters behind this chapter.

4.1 INFRASTRUCTURE AND NPD

As mentioned in section 2 about what is generally known from UBIs, the article of Fukugawa (2013) already investigated the resources that fall under an UBI's infrastructure. The author stated that the "furnished offices, internet connection, and shared facilities like reception, meeting rooms, and copy machines" (Fukugawa, 2013) are all allocated to an UBI's infrastructure. Beside of that, the academic laboratories and the technology transfer centres belong to an UBI's infrastructure (Dalmarco et al., 2018). So, an UBI can offer a set of tangible and intangible resources that can help incubator tenants to enhance an incubator's NPD process. How an UBI can realise this and to what extent it is needed will be further justified in Table 3, in which the authors of the included articles describe their theories on an UBI's infrastructure and the merits for incubator tenants during their NPD process.

Table 3 Findings allocated to the relationship between an UBI's infrastructure and the NPD of incubator tenants

Article	Findings allocated to the relationship between an UBI's infrastructure and the NPD process of incubator tenants	Theories
Chan and Lau (2005)	The basic resources as office equipment, administrative support and other structural means are generally applied to all technology firms within the UBI. They are forming a necessary core for any kind of product development. However, technology-related resources vary from to tenant to tenant. Therefore, the main theme of the science park and resources available at the parent university are determining factors in the process of product development.	Resource-based view and Social network theory
Somsuk and Laosirihongthong (2014)	*"A supportive or complementary infrastructure allows fledgling firms to develop innovations and operate their businesses more successfully (…) and is a prerequisite for successful innovations and sustainable business success"* The authors recommend UBIs to build strong collaborative relationships with university research units and the involved faculties. This is necessary to provide tenants with the right	Resource-based view

	resources and facilities and to offer more specialized services to tenants. By doing this, the NPD process will be more enhanced.	
Paradkar, Knight and Hansen (2015)	*"Successful commercialization of innovations depends on the availability of complementary assets"* The portfolio of provided infrastructural resources for commercialization must be adequate. An inadequate portfolio can result in partial commercialization and subsequently into firm failure. It is not necessary for incubator tenants to own the whole set of resources and facilities; parts can be outsourced to perform better and commercialize more rapidly. Thereby, the potential to expand will increase.	Resource-based view and Knowledge-based view
Dahms and Kingkaew (2016)	*"The use of shared incubator facilities and the impact on NPD has found only mixed evidence in the literature, dependent on context specific informal institutional variables such as trust or attitude (…) This hints towards differing needs among potential entrepreneurs depending on the formal and informal institutional setting in which they are located"* Sharing resources and facilities does not directly lead to an enhancement of NPD. However, sharing ideas seems to be more a core principle which affects the NPD process of incubator tenants. It depends on the trust and attitude of individuals in which direction then the infrastructure affects the NPD process.	Resource-based view, Knowledge spillover theory and Social Network Theory
Lasrado et al. (2016)	*"The more comprehensive set of infrastructural resources of university incubators typically provide greater connectivity and legitimacy with respect to important contingencies associated with key industry and community stakeholders"* It can be determined that UBIs are possessing particularly rich infrastructural resources. This will foster the NPD process by making tenants more competitive in their environment. In practice, the comprehensiveness of the resources and facilities that can be provided is decisive in to what extent the product development process can be influenced. How more comprehensive, how higher the success rate of firms. The key industry and community stakeholders are there to support this process.	Resource-based view and Social Network Theory
Prencipe (2016)	Basic and critical infrastructural support resources are an important element that affects the growth pattern of university spin-offs in terms of innovate activities and performance. Incubation facilities within the university may potentially act as an effective mechanism for providing infrastructure in order to stimulate growth and innovate. So, infrastructure plays a motivative role in the direction of NPD besides the indisputable function it has.	Resource-based view

Dalmarco, Hulsink and Blois (2018)	*"The complementary infrastructure of the university may speed up a company's product development"* The access to laboratories and equipment for testing and prototyping is necessary for technology-driven incubator tenants to realise any kind of product development. This access is an example of the complementary infrastructure an UBI can offer. Tenants are able to test concepts or ideas even before setting up a new venture. When the testing procedure has positive results, the expectation is that a tenant firm will quicker reach the final stages of the NPD process.	Resource-based view and Evolutionary Economics

Based on the allocated resources and typologies mentioned by the authors in Table 3 above the suggestion can be made that the resources belonging to an UBI's infrastructure are forming a fundamental core for product development. Chan and Lau (2005) underscore this by stating that firms need these resources to gain any kind of foothold. The infrastructure has a multi-dimensional role for incubator tenants, as well tangible as intangible. From the tangible perspective, the infrastructure serves resources, assets and facilities that must foster the NPD process of incubator tenants. From the intangible perspective, the infrastructure serves as a motivator to stimulate tenant firms to take actions within the NPD process (Prencipe, 2016). Overall, these are the two functions of an UBI's infrastructure. Several types of infrastructure derive when comparing the findings of the authors. Together with the authors´ findings the infrastructure of the UBI can be subdivided into three categories: basic infrastructure, complementary infrastructure, and shared infrastructure. There is evidence that each category of infrastructure has a different impact on incubator tenants' NPD process. Therefore, each category of infrastructure will be highlighted by discussing the impact on NPD in the upcoming sections.

First, the basic infrastructure and the impact on NPD must be highlighted. This basic infrastructure is provided by the vast majority of physical incubators and has been found to be one of the most important value adding features by incubators (Chan & Lau, 2005; Dahms & Kingkaew, 2016). Hence, the basic infrastructure of an UBI is an essential element in new product development and to realize any other kind of venture development (Dahms & Kingkaew, 2016). On the other hand, there are authors who claim that there is a deeper understanding needed to state that a ´basic infrastructure´ is essential. As an example, Cravo and Marques (2018) think that a right allocation of the basic infrastructural resources is necessary for any kind of innovation, including product innovation and development. The needs among tenants vary, therefore the right allocation is important. Without the right allocation, the NPD process will end up into a failure (Somsuk & Laosirihongthong, 2014). The theme of the science park where the UBI is located, or the parent university wherein the UBI is established are determining factors for the allocation of resources and facilities. For example, if the main theme of the science park is software-based, an incubator tenant will take the merits of the software-based infrastructure but will face problems when it has to use more comprehensive infrastructure like laboratory assets. If the parent university can offer laboratory facilities for testing and prototyping e.g., and if there is a need among the tenant for this, only then the NPD process can be enhanced (Chan & Lau, 2005). As a conclusion, right allocation of basic infrastructure seems to be prerequisite for NPD process enhancement. UBIs normally have access to a rich portfolio of resources and facilities (Paradkar, Knight, & Hansen, 2015), arising

difficulties on basic infrastructure are thus not foreseen yet. UBIs should keep in mind that, to promote processes, organisational- and market innovation, resources should not only focus on the NPD process (Cravo & Marques, 2018). The firm survival rate can be jeopardised when the basic infrastructure of an UBI has a too narrow focus on only the product development process (Cravo & Marques, 2018; Minguillo & Thelwall, 2015).

A basic infrastructure forms the core of an UBI for creating any kind of value to new ventures. To corroborate, Somsuk and Laosirihongthong (2014) state that an infrastructure is a prerequisite for successful innovation and sustainable business success. From the infrastructural angle of approach, an UBI can also offer a distinctive set of complementary resources than other incubators do, which is the second infrastructure category. Lasrado et al. (2016) theorized that amongst incubators, university incubators provide firms with the most comprehensive set of resources. By digging deeper into the available literature on this complementary infrastructure that an UBI can offer and the impact on NPD, it can be assumed that a complementary infrastructure can indeed create values for UBI tenants during their NPD process. It may speed up the process (Dalmarco et al., 2018) and operations based on product development and innovation will go more fluent (Lasrado et al., 2016; Somsuk & Laosirihongthong, 2014). The theoretical background of speeding up the NPD process relies on the fact that individuals can take actions before setting up a firm. For example, university students can make use of the shared facilities of the university and UBI to share ideas (Chan & Lau, 2005), test product concepts, develop prototypes or outsource product development support (Dalmarco et al., 2018) which places them ahead of other start-up firms in the NPD process. In general, tenant firms of an UBI are often trying to convert their academic knowledge skills into commercial activities. So, access to the complementary infrastructure next to the basic infrastructure will foster this. It applies also for the complementary infrastructure that university affiliation is an important contingency that affects the relationship between firms' participation in incubators and their subsequent NPD performance (Lasrado et al., 2016).

At a certain point in their NPD process UBI ventures will require technical resources for testing, prototyping and hardware development, which many times is available at the university-owned laboratories. In other words, complementary infrastructure. To access this asset, the managers of the UBI are responsible for investigating the needs among UBI tenants and provide them with the tailored laboratory resources (Dalmarco et al., 2018). The UBI manager decides whether the tenants are eligible for specific resources or facilities (Oppong-Tawiah & Chan, 2016). To be able to decide whether UBI tenants are sufficiently eligible, strong ties with the tenant are necessary. This is essential for incubator tenants to succeed in their NPD processes. Because of the intervention of the UBI manager, the infrastructure is tailored and complementary at the same time. More on the interorganizational networks in UBIs can be found in the networking section (4.3). The UBI manager can also play a role in maintaining the quality of the complementary infrastructure of an UBI (Gozali et al., 2018). It is known among several UBI managers that a good system and well-maintained infrastructure showed a strong relationship with incubator success factors (Gozali et al., 2018). It is particularly for their interest that they meet the requirements of the tenants to drive on the success factors. Thus, the role of the UBI manager in this process of providing complementary infrastructure is essential to create any value.

Thirdly, the shared infrastructure can add value to an tenant's NPD process. An UBIs' infrastructure must be accessible for each tenant firm within that UBI. This means that tenant firms have to share their resources and facilities with other tenant firms. As mentioned in the paragraph above, the UBI manager should manage the infrastructure and the use of the infrastructure among his or her tenants (Gozali et al., 2018). Also complementary infrastructure can, or have to, be shared within an UBI. Several authors did research to the values of joint sharing and the results are unilaterally. Within an UBI environment, the tenants or start-ups are daily confronted with each other and other´s activities. Start-up firms can take advantages from other start-ups in learning, sharing experiences and sharing resources. However, the literature is dispersed when it comes to the

impact of sharing infrastructure and NPD on tenants (Dahms & Kingkaew, 2016). Authors state that it can lead to higher productivity rates (Stayton & Mangematin, 2016), new ideas (Chan & Lau, 2005; Dalmarco et al., 2018) and more technology knowledge (Rubin, Aas, & Stead, 2015). On the other hand, there are authors that do not directly support these findings. For example, Paradkar, Knight and Hansen (2015) have found out that the sharing of facilities and resources can possibly lead to hijacking ideas or can create an environment that is not sufficiently protected for start-ups to make their ideas more complementary. It is, of course, not the intention of a shared UBI-environment to create any kind of competition or an unsafe development area. Therefore, Gozali et al. (2018) think that the manager of the UBI has to maintain the quality and safety of the shared UBI facilities. So, besides providing the complementary infrastructure, an UBI manager should also maintain the quality and safety of the basic, complementary and shared infrastructure. This is substantially necessary for succeeding NPD processes.

Digging deeper into the relationship between shared infrastructure and the impact on NPD, the sharing of infrastructure can also lead to sharing ideas and exchanging technological knowledge. It is known that incubatees can learn from each other while sharing ideas (Dahms & Kingkaew, 2016) which is also the first stage of the NPD process as stated by the theory of Kotler and Armstrong (2009). In the past, Chan and Lau (2005) already investigated this increase of internal sharing. This internal process of sharing leads to an interesting value for incubator tenants NPD processes. As a corroboration, it is scientifically proved that "shared technological knowledge between incubatees generates collaborations that create new products and services in some incubators, and in others enriches the know-how of incubatees, helping them to overcome technological obstacles" (Rubin et al., 2015). So, in the early stages of NPD the joint use of an UBI´s infrastructure has a positive impact on that development. It was already investigated that the quality of the shared infrastructure facilities and resources of an UBI was decent and helpful for start-ups (Dalmarco et al., 2018; Prencipe, 2016). Together with the value of sharing this statement synergy during the NPD process can occur. As a conclusion, the environment that is created by the UBI, based on the infrastructure, is nutritious for tenants in their NPD process to learn from each other, develop new products and realize firm growth.

To establish that there is a link between the infrastructural activities of UBIs and a tenant's NPD process, there is an underlying dominant theory. The resource-based theory of Barney (2001) can justify the relationship between an UBI's infrastructure and the NPD process of incubator tenants. Most of the included papers that are analysing an UBI's infrastructure are built upon this theory. The resource-based theory parts from the principle that possessed resources that are valuable, rare, in-imitable and non-substitutable can lead to the creation of competitive advantage (Barney, 2001; Qadeer, 2013). The complementary infrastructure, strengthened by the sharing of infrastructure, is an example that justifies this theory. UBIs are able to offer a distinctive set of resources than other incubators do (Lasrado et al., 2016; S. Mian et al., 2016) which enables incubator tenants to accomplish competitive advantages during their NPD process and on the outcomes of that NPD process. This distinctiveness is also one prerequisite of Barney´s (2001) theory that ensures competitive advantage. The fact that the allocation of infrastructural resources must be customized per tenant to achieve successful NPD (Somsuk & Laosirihongthong, 2014) could also lead to unique and distinctive resources for that individual tenant. As a corroboration, Barney (2001) states that a 'valuable resource is controlled by only one firm, it could be a source of competitive advantage'. In this case, the allocation of that specific mean can lead to the valuable resource that is controlled by only one firm. An UBI has the possibility to facilitate each tenant from customized infrastructural resources, but, as an implication, the extent is not infinite. The resource-based theory thus explains that the infrastructural endeavours of UBIs are value-creating for incubator tenants. However, this dominant theory does not include institutional variables as trust or attitude (Dahms & Kingkaew, 2016) that are, in analysing UBI theories, co-responsible for the final values on NPD. It has been found in the literature that these variables are influencing the early

start-up stages. The UBI-manager should therefore monitor and keep track of the safety of the environment that has been created by the UBI (Gozali et al., 2018) as a necessity to keep the infrastructural resources valuable for incubator tenants. The proposition that can be made serves as a common assumption on infrastructural activities and its impact which may support further speculation.

Proposition 1: Infrastructural UBI activities are enhancing a tenant's NPD process while customized complementary and shared infrastructure can even lead to sustainable competitiveness.

4.2 BUSINESS SUPPORT AND NPD

The specific business support activities an UBI can offer need to be conceptualized to gain an understanding of what types of business support activities an UBI can offer. It is known that not all UBIs over the world offer the same type of business support and that the business support activities can differ on the base of practical realisations (Lasrado et al., 2016). Based on the reviewed articles, a list of activities can be found in Table 4 below. The reviewed articles can be found in chronological time order on the vertical axis and the specific business support activity is mentioned on the horizontal left side. The crosses in the table give an insight in which article mentions that specific activity. Not all reviewed articles are mentioned in this table, these articles were not considered as sufficiently obvious for this section. This means that they did not embrace a relevant entrepreneurship theory for this section or did not discuss any of the business support categories that will be determined.

Table 4 below is divided into four categories where the specific business support categories fall under; as indicated by the horizontal lines in the table. These categories are divided by the author. There is no existing framework available in the current literature that describes or categorizes the business support activities. These categories do not imply any underlying theories, it is done to better structure the review section. For now, the categories are:

- Firm and task support
- Educational services
- Funding and access to capital
- Competitions

This review section has its implications; the current field of literature did not study a specific business support activity on its own. Despite of that, it is good to specify of what is known about that specific topic to determine where we are and create avenues for possible further research. Also, the impact on enhancing the NPD(-process) of incubator tenants is not specifically studied among the current literature. It can be assumed that each business support activity has any kind of impact, but to what extent and in what direction is unknown and needs to be studied empirically before drawing up any conclusion. Based on what is known now, a decent and possible promising fundament can be built for further research. For now, each individual business support activity will be clarified and possible impact directions on NPD will be given.

Table 4 Range of business support activities

UBI BS activities	Lee & Osteryoung (2004)	Chan & Lau (2005)	Hess & Siegwart (2013)	Jamil et al. (2015)	Dahms & Kingkaew (2016)	Stayton & Mangematin (2016)	Passaro et al. (2017)	Bock et al. (2018)	van Stijn et al. (2018)	Ko & An (2019)	Padrão et al. (2019)	Yu (2019)	# total
Accounting and finance support	X	X			X		X						4
HR / Recruiting services					X								1
Legal services	X	X	X	X	X	X		X					7
Technical advice and R&D support	X	X	X			X							4
Management support	X	X			X	X		X		X			6
Marketing support					X	X			X	X			4
Entrepreneurial courses	X			X	X		X	X	X		X		7
Marketing courses				X			X		X	X	X		5
Mentoring/Coaching services					X		X		X		X	X	5
Funding or access to capital		X	X					X		X		X	5
Competitions							X		X				2

Firm and task support

An UBI is able to offer support in many ways. Firms in an UBI do have a choice to outsource firm tasks that they do not master sufficiently. Or, on the other side, do lack time for it. This type of business support is about relieving tasks. It can be subdivided into relieving and supporting financial, recruiting, marketing, human resource, management and R&D business tasks. To what extent this firm and task support can lead to values on the new product development process of an incubator tenant can be found in Table 5 below.

All of the supporting factors mentioned (financial, recruiting, marketing, human resource, management and R&D) are necessary for UBI tenants to grow their businesses and develop product and venture successes (Chan & Lau, 2005; Dahms & Kingkaew, 2016). But to what extent it has a valuing impact on that product development remains unclear. The R&D activities enhance the product innovation during the NPD stages (Cravo & Marques, 2018) but, on the other hand, it has to be taken into account that not all UBI´s can offer these services (Gozali et al., 2018; Ko & An, 2019) nor provide the same quality of these services (Hess & Siegwart, 2013; Lasrado et al., 2016). This difficulty illustrates the lack of research that has been conducted over the past years on this topic. What is known is that the NPD process of incubator tenants will be fostered by relieving them from business tasks that they do not have experience in (S. Lee & Osteryoung, 2004). By providing this type of support, incubator tenants have more time to focus on the processes they are specialized in. Practical examples can be the mentioned recruiting activities of Dahms and Kingkaew (2016) in Table 5; They state that the HR services of the UBI are appointed as most important activity to keep up the business tasks to realize new product development. NTBFs require occasionally specialized individuals that can help realizing the technology product by contributing with their experiences or specializations (Dahms & Kingkaew, 2016). UBIs can, due to their university connections and public business networks, quickly find the right individuals and connect them with the tenant firms that need them the most to foster the NPD process.

In the previous section, about infrastructure, it was necessary to offer tailored infrastructure to incubator tenants to realize a successful NPD process. From the business support approach, not all authors agree on the fact that firm and task support services need to be tailored or timed in a proper way. For example, Hess and Siegwart (2013) state that the tenant firm needs to be mapped and categorized first before any type of firm and task support can be provided while Stayton and Mangematin (2016) think that a firm's strategy is leading to what extent they want to outsource or get support for their firm tasks. There is an argument for both, but in the end the tenant decides to what extent they want or require firm and task support. So, customizing firm and task support can work in favour for the NPD process, but the strategy and choices made within the customization requires further research to draw up any conclusions.

Table 5 Educational support activities and the values for incubator tenants' NPD process

Article	Firm and task support activities and the values for incubator tenants' NPD process	Theories
Lee and Osteryoung (2004)	*"(…) Done by offering critical support services. Financial support, consulting services and comprehensive R&D support are allocated as the critical success factors of an UBI to offer that developing environment for tenants"* UBIs can support a tenant's NPD process by relieving them from business tasks. By doing this, together with the provision of the critical success factors, the NPD process will be fostered.	Goal-setting Theory and Knowledge spillover theory
Chan and Lau (2005)	*"In the NPD process, it is not surprising that tenants derive maximum benefit from the technical support of research and testing facilities. The incubator´s consulting services are generally considered as an important part of human support for technology firms".*	Resource-based view and Social Network Theory

	"(…)To keep up product development, advices on how to draft legal contract with clients and how to deal with accountant matters during the process is necessary".	
Hess and Siegwart (2013)	Focussing on the incubation process is more important than rather the incubator facility. This means that business support activities can be better tailored after explaining phenomena like new venture formation, venture development, new product development and business assistance. For example, in R&D assistance, in the build-up phase there is material needed. Subsequently, in the business model phase, more process engineering assistance need to be provided. At last, the UBI can seek for suppliers/tech material partners.	Knowledge spillover theory
Dahms and Kingkaew (2016)	There is a demand among UBI tenants for business support services. The possibility to have access to specialist faculty within the university and business law consulting are the most frequently mentioned factors. Secondly, the HR services of the UBI are appointed as most important activity to keep up the business tasks to realize new product development. In practice, recruiting and subsequently allocating the right people to the right start-ups will help that start-up in their NPD process.	Resource-based view, Knowledge spillover and Social Network Theory
Stayton and Mangematin (2016)	*"At some point in developing a product, at least one pivot in product strategy is usually required to develop a product that is marketable. This requires a professionalism of the management whereby an UBI can give guidance".* *"(…)UBIs can provide support for venture organizational development helping to formalize agreements and professionalize management while minimally distracting the start-up team from their product development activities"* The professionalism of the UBI managers can occur as a distinctive factor in fostering the NPD of incubator tenants.	Knowledge spillover theory and Social Network Theory
Ko and An (2019)	When start-up sales picked up in related markets, successful start-ups shift their business model to these markets if their original business model did not meet demand. An UBI can give marketing support to prevent it's tenants from these mistakes and thus enhance the choices made during the NPD process of tenants.	Resource-based view and Knowledge spillover theory

Educational services

An UBI is located in a university environment whereby the university plays a major role within the UBI (S. Lee & Osteryoung, 2004; Rubin et al., 2015). This university can foster the educational services by providing those educational services directly or offer educational (human) resources to

the UBI (Jamil, Ismail, & Mahmood, 2015). The ties with the university are thus upmost important for an UBI. This institutional development would also help to enhance the incubator's performance level on enhancing the NPD of their tenants (Jamil et al., 2015). This thesis focuses on the impact on the tenant product development, the findings of the authors in the reviewed literature on this topic can be found in Table 6.

Table 6 Educational support activities and the values for incubator tenants' NPD process

Article	Educational support activities and the values for incubator tenants' NPD process	Theories
Bock, Huber & Jarchow (2018)	*"During the early stages of product development, a homogeneous founding team providing a knowledge base for deepened discussions seems to be beneficial for the commercialization of a customer-suited product or service".* An UBI can add value to a tenant's social capital by providing additional knowledge. Mostly, UBI tenants are NTBFs containing a homogeneous founding team that has a technology-based background. This fosters the later commercialization stages of the NPD process of the NTBF.	Resource-based view
van Stijn, van Rijnsoever & van Veelen (2018)	*"Product development courses are courses with a strong engineering emphasis that aim to solve real-life problems and bring students from different disciplines together by building a functional and marketable product in class".* *"(…)These courses are provided together with entrepreneurship courses. These courses are University taught courses on developing a business through classes, often combined with action-based learning. This differs from the practice of Entrepreneurship case studies as the students in class take the active role of entrepreneur".* *"(…)Students receive course credits while working on a business plan. Both types of courses are fostering the development of the individual entrepreneur as the new product"*	Knowledge spillover theory
Padrão, Andreassi and Brito (2019)	*"Marketing support and education involves the development of entrepreneurial skills related to forming relationships with clients and managing commercial activities. With specific reference to incubated firms, the importance of UBI's in assisting entrepreneurs to learn about their clients' preferences is high".* *"(…)The UBI can be considered a valuable resource for the development of an entrepreneur's skills related to the identification of market opportunities and the implementation of commercial activities"*	Knowledge-based view

The quality and approach of the educational support activities plays a major role when talking about the impact on the NPD processes of UBI tenants. Most of the literature assumes that start-up teams exist of a homogeneous and technological academic background (Bock, Huber, & Jarchow, 2018; Jamil et al., 2015; van Stijn et al., 2018) and often lack marketing and management knowledge rather than technological knowledge (Padrão et al., 2019). The literature describes that a business-oriented market type of education is needed to add any value to the product development process rather than technological education. For example, Ko and An (2019) found that market and customer understanding is more necessary to teach than technical product development. In practice, an UBI can, according to Padrão et al. (2019), include marketing training to improve an entrepreneur's marketing skills, establishing informal contact between an entrepreneur and the incubator's, assisting entrepreneurs in developing a business plan, assisting entrepreneurs to begin selling a product through external consultants and facilitating entrepreneurs' participation in events and their presence on the incubator's website. This statement of Padrão et al. (2019) is supported by Soetanto and Jack (2016), they found out that marketing support activities such as mentoring, internationalisation, and regulation may complement a spin-off's capabilities in developing technology-based products. This means not that product development courses have minor importance; van Stijn, van Rijnsoever and van Veelen (2018) suggest that several UBIs nowadays implement market and customer-based elements in their product development courses to further support the NPD process of incubator tenants.

The role of a mentor is valuable for UBI tenants during the NPD process. However, the mentor assigned needs to be sufficiently experienced (Chan & Lau, 2005) and a professional in starting up new businesses (Gozali et al., 2018) to succeed. Mentoring during the NPD processes is important for the result of that NPD process. Therefore, a decent mentor selection and mentoring contents are necessary because mentor ability addresses the problems associated with the setting up and operation of start-up business model and start-up resources of university student start-up founders (Ko & An, 2019). This relates directly to the NPD process of incubator tenants. Some UBIs can share mentoring- and investor networks to support more NTBFs while other UBIs cannot. This depends on the main theme of the science park where the UBI is established or on the connected parent university. But, if the mentoring opportunities are limited in a certain region, the overall quality of the UBI mentoring will decrease as the amount of UBIs increases (Yu, 2019). Beside of that, it can be assumed that decent mentoring support services can be seen as a injection in human capital and therefore will increase the success rate of NPD and speed up the NPD process.

A possible moderating variable in this business support activity is important to mention; team composition and academic backgrounds. The team members of an UBI tenant often share a similar educational backgrounds and former careers. In-depth technological knowledge is mostly based on an academic career in a more technological-based field like engineering or natural sciences. As a consequence, "if academics decide to become entrepreneurs by transferring their technology in the form of an NTBF, the founders are likely to be homogeneous regarding their academic career" (Bock et al., 2018). When digging deeper in the theory of homogeneous and heterogeneity among team members' educational backgrounds, the literature is dispersed when it comes to the influence on a venture's development and the NPD process (Bock et al., 2018; Stayton & Mangematin, 2016). So, before concluding anything of the impact of educational services on NPD one should have some background information about the team composition and the academic backgrounds of the team members.

Funding and access to capital

Liquid assets or financial resources are essential for each firm to realize any development. UBIs can provide these assets by helping the tenants to get in contact with funding instances, venture capitalists, business angels, kick-start platforms, investors or are having an internal funding programme. Funding support plays also a role in the critical success factors for an UBI (Gozali et al., 2018), but to what extent it does have impact on a tenant's NPD stages can be found in Table 7 below in which authors describe the relationship between UBI funding and access to capital and the NPD process of incubator tenants.

Table 7 Funding activities and the values for incubator tenants' NPD process

Article	Funding activities and the values for incubator tenants' NPD process	Theories
Hess and Siegwart (2013)	A funding instrument is necessary to realize NPD at incubator tenants. This instrument needs already to be there in the pre-incubation phase to foster the new product development process.	Knowledge spillover theory
Bock, Huber and Jarchow (2018)	*"Since start-up founders are hardly capable of funding all the research and development of their product or service by themselves, the financing of the technology transfer process is another crucial part in the development of an UBI start-up".* In the early stages of NPD, NTBFs need capital to develop first prototypes and to fund the right equipment for testing products. This capital is necessary in the process of NPD. Funding need to be structured in a way that makes it possible to invest higher amounts along with venture capitalists in later stages. Depending on the commercialization of the firm.	Resource-based view
Ko and An (2019)	University start-up support funds do not always guarantee success. However, in previous researches, the start-up promotion policy of the government, start-up support funds, and university start-up support activities are suggested as success factors in the process of NPD.	Resource-based view and Knowledge spillover theory
Yu (2019)	*"How better an UBI´s provision of signals of a start-up´s idea quality, how more efficient the funding will be"* A higher funding ratio does not directly lead to a positive impact on a firm's NPD process. The results of this study show insignificant discrepancies. Therefore, it is concluded that the quality of the idea is decisive together with the support in other business areas provided by the UBI	Goal-setting theory

It can be assumed that the literature is dispersed when it comes to the impact of funding on incubator tenants' NPD process. "The approach and assistance around funding seem to be the distinctive variables in this phenomenon. University start-ups in early development stages need capital to develop first prototypes, fund laboratory equipment, or conduct product testing" (Bock et al., 2018). On the contrary, since most UBI tenants are starting organisations, and their product ideas are quite inconclusive, one can argue that if funding support is only provided in the direction

of high tech product development there would be a too limited scope and it will be too biased in practice. “Suggestions are thus made to include funding of other areas, e.g. marketing and human resources” (Chan & Lau, 2005). UBI’s rely on a mixture of funding from public and private sources (Dahms & Kingkaew, 2016) and it is questionable to what extent these resources have a voice in the purpose of the provided capital. The example of venture capitalist-backed start-up firms can be used to describe the theoretical background of this; to disentangle the value-adding effect of an investment of a venture capitalist on NPD, one can measure it by two ways. One way is to analyse what actions the individual firm takes in order to make steps in their NPD process after the investment (Ko & An, 2019). Another way is evaluating the role of the venture capitalist as a ‘scout’ or ‘coach’ in the NPD process (Bock et al., 2018). Studies suggest that an investor provides mentoring support which may lead to superior performances on several business areas (Bock et al., 2018). Unfortunately, there is insufficient evidence in the included literature that can strengthen this theory. To conclude, funding does not directly lead to a positive or negative impact on the NPD process of incubator tenants. The additional support that is offered from inside the UBI or from external third parties such as venture capitalists is decisive in this theory (Bock et al., 2018; Ko & An, 2019).

To definitely foster the incubator tenant’s NPD process by speeding it up, funding activities can be undertaken before the NPD process has even started. The underlying theory of Hess and Siegwart (2013) describes that UBIs can identify potential start-up firms with respective technology absorptive capacity in the early formation phases. By doing this, UBIs are able to manage the placement of investors’ technological expertises among their tenants which increases the speed of the NPD process. The likelihood for that specific tenant firm to cooperate or form an alliance with the industry is then higher (Hess & Siegwart, 2013). However, the focus of the incubation process should be not overlooked. This is important because speeding up the NPD process does not directly justify the chance of NPD success (Hackett & Dilts, 2008). So, endeavours in the pre-NPD phases can work in favour of the speed of the NPD process, but in the end the total portfolio of incubator support activities is decisive.

Competitions

This business support activity seems the odd one out. But, in the context of enhancing product development, this activity is considerably valuable. In the context of this master thesis the term competitions intends start-up competitions or business plan competitions. Mostly, these competitions are proposed by an organizing committee that encourages a competition among business ideas (Passaro, Quinto, & Thomas, 2017). This committee is often formed by network connections of an UBI; for example experts from the business world. Even the learning and product development process features that occur in start-up competitions are most of the time provided by incubators, business angels, venture capitalists and science parks (Passaro et al., 2017). Table 8 provides an insight in what authors found of business plan competitions provided by UBIs and their relationship with the tenants’ NPD process.

Table 8 Start-up competitions provided by UBIs and the values

Article	Start-up competitions and the values for incubator tenants´ NPD process	Theories
Dahms and Kingkaew (2016)	Business plan competitions can add significant values to the development of an UBI tenant. They have been pointed out as the most important factor by UBI tenants for firm growth and NPD success. The business plan competitions are intertwined with values captured from the networking services. That possibly	Resource-based view, Knowledge spillover and Social

	makes this business support activity valuable for the NPD process.	Network Theory
Passaro, Quinto and Thomas (2017)	*"What is known is that in order to enhance the NPD processes, start-up competitions should be part of an effective start-up friendly ecosystem where the coordination among different actors like incubators is a crucial resource for NPD success".* *"Universities play a pivotal role in succeeding these competitions. They demonstrate a greater leading role in supporting entrepreneurial development"*	Knowledge spillover theory and Knowledge-based view
van Stijn, van Rijnsoever and van Veelen (2018)	*"With competitions, universities allocate mentors to the competing start-ups that coach the teams. These mentors often have experience in business and are therefore considered a valuable resource for transferring business knowledge. This is an important aid to start-ups in business concept development and product development".* *"(…)Furthermore, working with mentors may give access to a network, which has been shown to be helpful for later fundraising and speeding up product development. Finally, competitions elect winners and finalists that are compensated financially and announced publicly. This gives start-ups financial capital and credibility that aids with raising more funds".* *(…) Through competitions, universities gain social capital and credibility as they connect with start-up teams that reflect the technological and entrepreneurial abilities of the university"*	Knowledge spillover theory

The chance of NPD success is higher when incubator tenants are found eligible for business plan competitions. As stated by Passaro et al. (2017), the organizing committee of the business plan competition is composed by specialists from the field of business development. The submission of business ideas by the incubator tenants will be revised by this committee of specialists. This committee will check whether the proposed idea may have potential to be commercially successful. That is a requirement which is necessary to participate for incubator tenants. Passaro et al. (2017) specify that "an appropriate team of proponents is crucial for the success of the business idea" (Passaro et al., 2017). Theories on NPD success confirm that the business idea in the early stages of the NPD process must have potential for the firm to grow and survive in the mature stages (Scherer & McDonald, 1988). The business ideas are thus screened through a planned selective grid and only the best proposals are selected as participants for the competition. The presence of this evaluation process by the committee will reduce the failure rate of the NPD process of potential innovative start-ups (Passaro et al., 2017; van Stijn et al., 2018). To speed up the NPD process, mentors can be announced and connected to the participants by the committee. Mentors can give access to a broader network of specialists in the field (Yu, 2019) and can be helpful for later fundraising (van Stijn et al., 2018) to create development opportunities in later NPD stages. In practice, participating tenants can make use of external and more professional production facilities to produce the innovative product on larger scale and consequently increase revenue growth.

From the learning perspective; start-up competitions are intended to improve the entrepreneurial knowledge of individuals to enhance the business plans of their new ventures (Passaro et al., 2017; van Stijn et al., 2018). There is a tendency for students to lack preparation for start-up business model; they emphasize too much the starting phase. It is impossible to ignore the

importance of start-up business model and preparation for it. This may be the reason for the low sales of student start-ups (Ko & An, 2019). Many factors of a firm's business plan are involved or do have a connection with the NPD process (Passaro et al., 2017). As a corroboration, the findings of the paper of Dahms and Kingkaew (2016) also state that start-ups require business plan support to develop any form of advancement. This factor have been most pronounced throughout their sample. As stated by Passaro et al. (2017) and van Stijn et al. (2018) universities do add value to the development of business plans during the competitions. Together with the cooperating UBI, these competitions seem to be a value-creating activity for tenants. However, limitations occur when we are discussing the ecosystems (Passaro et al., 2017) and robustness of ties with the university and business professionals (van Stijn et al., 2018). This offers opportunities for further research. Also, the exact services that are offered for competition participants and that do have a significant impact on those participants are interesting to analyse.

The dominant theory that summarizes the business support activities and the impact on NPD is the knowledge spillover theory of entrepreneurship from Acs, Braunerhjelm, Audretsch and Carlsson (2009) and has later been highlighted on the individual start-up level by Guerrero and Urbano (2014). This theory implies that the creation of new knowledge expands the set of technological opportunities (Acs et al., 2009). This creation of new knowledge is provided by the business support activities of the UBI. According to the main principles of the knowledge spillover theory, the start-up of a new venture provides the conduit for the spillover of knowledge from the source organization, in this case the UBI, to the new, entrepreneurial organization actually exploiting and commercializing that knowledge. The proposition of this theory is that rich knowledge should generate more entrepreneurship and more extensive opportunities than impoverished knowledge (Acs et al., 2009; Audretsch & Keilbach, 2007). Relating it to the findings from the articles that are found in this section, it can be suggested that this theory can be used in the field of studying UBIs and justifies the impact of UBI activities on a tenant´s NPD process. For example, it has been proved that the provided R&D support activities enhance the product innovation during the NPD stages (Cravo & Marques, 2018). However, it has to be taken into account that not all UBIs can offer these services (Gozali et al., 2018; Ko & An, 2019) nor provide the same quality of these services (Hess & Siegwart, 2013; Lasrado et al., 2016) which can thus lead to less values to the NPD process due to the impoverished knowledge offered. From the educational activities-view, the homogeneous composited teams of incubator tenant firms often need opportunity perspectives to exploit those opportunities. These perspectives and educational resources needed to exploit those opportunities are not technology-based, but do embrace a marketing-based approach. UBIs are able to help tenants exploiting those opportunities by offering mentoring services and marketing-based education (Padrão et al., 2019; Soetanto & Jack, 2016) because technological knowledge was already on a sufficient level within the tenant's team. The knowledge spillover theory states that academic entrepreneurs do not exploit all opportunities because they do not feel confident about the skills that they have. The (marketing-based) educational services from an UBI do have an additional value in this by accomplishing those skills to their tenants. Therefore, this theory can be seen as explaining for the business support activities and NPD.

There is a similar grounded theoretical explanation for the funding activities and business plan competitions; According to the knowledge spillover theory, "an increase in the stock of knowledge has a positive effect on the level of entrepreneurship" (Acs et al., 2009). The main findings from the included literature to justify that these business support activities add new knowledge to the incubator tenants which leads to an increase in speeding up the NPD process or add more quality to it. As an example, funding from third parties goes along with mentoring activities from that third party which may lead to superior performances on several business areas (Bock et al., 2018). While the theory is limited on this topic, one can say that the knowledge spillover theory can partly explain this. The third party can also be seen as the provider of new knowledge which expands the set of technological opportunities (Acs et al., 2009). Same applies for the business plan competitions;

start-up participants will be packed with new knowledge from several sources (Passaro et al., 2017) and will be helped to exploit those new knowledge into commercialization opportunities by the parent university (van Stijn et al., 2018). As an implication, the work of Acs et al. (2009) does not include particularly the NPD as a variable in their research, but it does establish how business support activities are adding values to incubator tenants. Therefore, Barney's resource-based view (2001) can further support the relationship between business support activities and the NPD process. The principles of this theory were already mentioned in section 4.1. Funds or capital and mentoring during the competitions can be seen as resources to achieve sustainable competitiveness. The following proposition can thus be made:

Proposition 2: Customized business support activities provided by the UBI enhance an incubator tenant's NPD process while the role of mentoring, educating marketing capability and business plan competitions are decisive factors for the extent of enhancement.

4.3 NETWORKING SERVICES

As was mentioned in section 2 about what was already known on UBIs, the networking services could possibly have an additional value for the NPD process of incubator tenants. Business start-ups often suffer from a lack of legitimacy in the market place (Chan & Lau, 2005; Dahms & Kingkaew, 2016; S. A. Mian, 1997). Therefore, a decent and valuable network can help these business start-ups to build that legitimacy (Dahms & Kingkaew, 2016) and can offer other values relating to their NPD process (Chan & Lau, 2005). With the topic of this master thesis in mind, it is chosen to structure this section in the following way; it is known that the university plays a major role in adding value for UBI networking services (McAdam & Marlow, 2008). Thus, to dig deeper into this statement of McAdam and Marlow (2008), it is chosen to explore the activities that UBIs, in collaboration with the university, offer to enhance NPD among their tenants. The authors below in Table 9 did some investigations on the networking services of UBIs and the impact on a tenant's NPD process.

Table 9 Networking services and the values for a tenant's NPD process

Article	Networking services and the values on NPD	Theories
Chan and Lau (2005)	*"The university-technology start-ups relationship is found more useful than the science park-technology start-ups relationship with regards to the product development process".* This quote can be explained due to the fact that universities provide technology start-ups with both software support as consulting advices on the product, and hardware support such as the facilities for testing and laboratory equipment. Science park technology start-ups often lack one of the provided support types.	Resource-based view and Social Network Theory
McAdam and Marlow (2008)	*"Co-operation with university staff may provide access to the latest knowledge in the area of interest thus resulting in the development of more innovative products".* Internal networking with the parent university leads to more successful NPD. The university link also leads to a reduction of	Social Network Theory

	development costs. As an addition, the customer will be provided with a guarantee that the product or service is based on the most novel knowledge available.	
Cooper, Hamel and Connaughton (2012)	The resident companies that are involved in an UBI are also having impact on the firm and product development of the incubated firms. It is predominant to have decent interorganizational networks and have an understanding of which stages of development the individual incubate is settled to provide the best possible networking activities.	Social Network Theory
Kitigawa and Robertson (2012)	*"An incubator can be seen as a site for learning and connecting resources, nascent entrepreneurs can work ideas out as forms of capital and knowledge that will be most valuable to their self-development as entrepreneurs an growing their businesses"*. Critical success factors for start-up NPD in UBIs are interacting with others' ideas for technological development and attracting financial resources. These technological development and the financial resources will run the NPD process more smoothly.	Resource-based theory and Social Network theory
Paradkar, Knight and Hansen (2015)	The management of relationships with partner firms is a critical capability for entrepreneurs of tenant firms. The firms that successfully master this task will save a crucial amount of financial resources and time to increase their chances of NPD success. The role of the UBI is decisive in the process of successfully managing relationships with these partner firms; Together with the provision of business support activities. The available resources to attract potential alliance partners will be leveraged by successful start-ups in order to access necessary complementary resources which will enhance the final stages of the NPD process.	Resource-based view and Knowledge based view
Dalmarco, Hulsink and Blois (2018)	With the networking services an UBI can offer, UBI tenants are able to measure market potential for their product. Validation from outside the university area, for example from possible future customers, is necessary for the survival rate of the product. Obtaining feedback or screening the market potential have to be conducted before the product launch.	Resource-based view and Evolutionary economics

After exploration, it can be suggested that support-offering third parties (Chan & Lau, 2005) such as investors and business angels (Kitagawa & Robertson, 2012), university staff (McAdam & Marlow, 2008), resident firms (Cooper, Hamel, & Connaughton, 2012) and market intermediaries (Dalmarco et al., 2018) together form the core of the networking services of an UBI. It was already investigated in the business support section that funding and capital granting must contain a certain approach to add any value to the NPD process of UBI tenants. Now, from the networking perspective, it is known that UBIs may be expected to play significant roles in territorial development through the spin-off process, as they support networking opportunities by bringing in venture capital investors from outside the area (Kitagawa & Robertson, 2012). This leads to increased credibility for the firm, which in turn reduces search costs for the firm and hence reduces the overall costs of transaction (Dahms & Kingkaew, 2016). Another value that UBIs can offer to

the NPD process of the tenant is that, due to the link with the university, besides reduction in development costs, future customers are guaranteed with products or services that are based on the most novel knowledge available (McAdam & Marlow, 2008). It is believed that the reduction of development costs and university involved both are value-adding factors in the NPD process of UBI tenants. It may speed up the NPD process and can make sure that the process will run more smoothly.

When a start-up product or service is ready for commercialization depends on the quality of that specific product or service but also on the market. Measuring market demand and, subsequently, develop a marketing plan can also be conducted by the UBI (Dalmarco et al., 2018; Padrão et al., 2019). This part of the NPD process is similar to the description of Kotler and Armstrong (2010) regarding to the test marketing and commercialisation stages of their NPD process theory. It often occurs that the market potential of a start-up innovation have influence on the survival rate in the UBI. Studies suggest that, when a new product will be launched in the market, the timing must be considered as a critical decision – an entry too early may risk an underdeveloped product which sacrifices future sales growth (Oppong-Tawiah & Chan, 2016). A UBI tenant can rely upon the UBIs' connections with market research firms to measure the market demand and potential for their product or service to adjust their NPD (Dalmarco et al., 2018). On the other hand, Padrão et al. (2019) suggest that entrepreneurs, including high-tech entrepreneurs, should focus on marketing skills to increase their sales instead of focusing mainly on the technological issues related to NPD. Therefore, these networking activities can offer a two-tailed solution; UBI tenants are better able to adjust their NPD process by making use of this service on one hand. On the other hand, it gives them, together with marketing education services (van Stijn et al., 2018), the consideration that to realize successful results after the NPD process the tenant should have its focus on more than the technological side of NPD.

The networking activities of UBIs do not only work in favour for the incubator tenants. The included literature mentions some elephants in the room. The proximity between firms can be interpreted as a threat to intellectual property rights of incubator tenants. Also, "the complexity and tensions of the relationship between the academic and the business community can occur a negative impact on the outcomes of a tenant's NPD process" (McAdam & Marlow, 2008; Paradkar et al., 2015). Start-ups often lack sufficient experience before undertaking alliances which can lead to NPD failures (Paradkar et al., 2015). As a solution to prevent this, UBIs can connect with (interorganizational) firms that can help them on legal grounds and to protect them from risky alliances, investors or on intellectual property grounds (Cooper et al., 2012). It is proved by Cooper et al. (2012) that these resident firms really enhance the entrepreneurial, and therefore NPD-, processes of UBI tenants. Unfortunately, to what extent this is necessarily for UBI tenants to enhance their NPD remains uncommon and insufficiently substantiated.

To justify causality that networking services add value and therefore have impact on the NPD process of incubator tenants, the social network theory of Granovetter (1983) can be seen as the dominant theory. Most of the included papers for this section are also embracing Granovetter's (1983) theory, together with, again, Barney's resource-based view (2001). This theory has been revised over the years by several authors and for this master thesis the paper of Witt (2004) is most suitable to use as the justifying theory. This theory is based on Granovetter's (1983) weak and strong ties theory and has its focus on clarifying entrepreneurial network activities and the indicators that result in start-up success. Witt (2004) found significant evidence to accept the hypothesis that entrepreneurial networking leads to start-up success. In this case, the networking can be seen as the networking activities and facilities offered by UBIs, and the start-up success can be seen as the exploited values from UBI tenants in their NPD process. This theory explains that the networking services indeed add value to a tenant's NPD process; practical examples are given in Table 9 and the section above.

Witt (2004) sees that strong ties are very reliable but also "characterized by a large degree of redundancy in terms of the information being exchanged". Weak ties, conversely, are less reliable but offer more comprehensive access to new information. Relating to the UBI and its networking activities, it can be stated that support-offering third parties (Chan & Lau, 2005) such as investors and business angels (Kitagawa & Robertson, 2012), university staff (McAdam & Marlow, 2008), resident firms (Cooper et al., 2012) and market intermediaries (Dalmarco et al., 2018) are weak ties because they are, presumably, no direct family or friends from the incubator tenant. As postulated by Granovetter (1983) and later confirmed by Uzzi (1997), a balanced, heterogeneous network can be seen as favourable to the founder's entrepreneurial success. In other words, a mixture between strong and weak ties forms the most nutritious basis for entrepreneurial success. In the case of UBI networking activities, most network ties are weak. Weak ties are less reliable (Granovetter, 1983), this theory explains the findings of the included article of McAdam and Marlow (2008) wherein they state that "the complexity and tensions of the relationship between the academic and the business community can occur a negative impact on the outcomes of a tenant's NPD process". But, on the other hand, weak ties can offer more new information to the incubator tenant. This can be confirmed by the fact that the networking activities lead to less development costs (Dahms & Kingkaew, 2016) and future customers are guaranteed with products or services that are based on the most novel knowledge available (McAdam & Marlow, 2008) which are favourable factors for the tenant's NPD. This puts them in a distinctive position towards other start-up firms. This statement can be justified by the resource-based view (Barney, 2001) again. The following proposition on UBI networking services can be made:

Proposition 3: UBI networking services can enhance an incubator tenant's NPD process by providing tenants well-customized, weak-tied connections with resident firms and third(-funding) parties.

4.4 ECOSYSTEMS AND NPD

As mentioned in section 2, beside the three-dimension approach of Ratinho et al. (2010) that embraces that infrastructure, business support and networking activities are together categorizing the UBI activities that can possibly have an impact of a tenant's NPD process, there occurred a fourth and more moderating variable. With regards to the pre-research, it is already known that an entrepreneurial ecosystem has an impact on an UBI's resources and knowledge which is intertwined with the NPD process of their tenants (Spigel, 2017b). Incubator is a tool for entrepreneurial support, as well as a key element of sustainable entrepreneurial ecosystems. More specifically, an UBI is an essential component of university-based entrepreneurial ecosystems (Lasrado et al., 2016). In the context of entrepreneurial ecosystems, UBI has the aim of promoting the interests of academic entrepreneurs, through the elimination of barriers, both inside and outside the university (Redondo & Camarero, 2019). A total of five of the included articles implemented or discussed this variable in their researches which led to interesting views on the three dimensions of Ratinho et al. (2010) and the consequences for the NPD process of UBI tenants. These possible impacts can be found in Table 10.

Table 10 *Findings on the entrepreneurial ecosystem as moderating variable on the relationship between UBI activities and tenants' NPD*

Article	Findings on the entrepreneurial ecosystem as moderating variable on the relationship between UBI activities and tenants' NPD	Dimension(s) involved	Theories
Lasrado et al. (2015)	*"Regional endowments vary. This has a substantially adverse effect on access to capital and UBI infrastructure".* UBIs cannot control the factors involved with the eco-system. Having insight in how regional endowments interact is important for incubator tenant's development strategies. UBI tenants in regions with high economic prosperity will easier making use of funds.	*Business support (Funding) Infrastructure*	Resource-based view and Social Network Theory
Oppong-Tawiah and Chan (2016)	UBIs can be seen as a tools for spurring innovation and entrepreneurial competitiveness. However, there is little doubt that entrepreneurial ecosystems play a role in how this businesses will operate. The ecosystem can have impact on the outcomes of the NPD process of incubator tenants.	*Business support*	Resource-dependence theory
Passaro et al. (2017)	*"Start-up competitions should be part of a start-up friendly ecosystem where actors (start-up members, incubators, venture capitalists) are effectively coordinated with each other"* The ecosystem may form a limitation for participants in business plan competitions for the product development outcomes. In practice, it can have impact on the ability to attract potential investors which, as a consequence, may slow down the NPD process.	*Business support (Competitions)*	Knowledge spillover theory and Knowledge-based view
Redondo and Camarero (2019)	*"The ecosystem and relational climate among incubatees allows beneficial links to be forged between incubatees and other external networks, all of which proves advantageous for entrepreneurs' management efficiency".* *"(…)It helps to shape the incubatees' social capital which leads to facing up to the challenge of business and prevention of engaging opportunism"*	*Networking services*	Resource-dependence theory and Social Network theory

Yu (2019)	*"One explanation is that more UBI are beneficial because they can share mentor resources and investor networks and encourage more start-ups".* Mentor resources can be limited in given regions which means that the sharing of mentor resources cannot be realized. Sharing mentor resources is valuable for a tenant to invest in their social capital and subsequently grow in their development.	*Business support (Mentoring)*	Goal-setting theory

It seems that Lee et al. (2011) were right with their statement that ecosystems in different areas across the globe show distinctive discrepancies and turbulences that do have impact on NPD. The more recent literature shows implications from different perspectives and dimensions that the ecosystem where the UBI and its tenants are involved is having an indirect impact on NPD. It affects the infrastructure (Lasrado et al., 2016), business support activities (Oppong-Tawiah & Chan, 2016; Passaro et al., 2017; Yu, 2019) and networking services (Redondo & Camarero, 2019). Also in the later stages of the NPD-theory of Kotler and Armstrong (2009), the entrepreneurial ecosystem will have its impact; primarily in the test marketing until the product launch stages. For example, in high environmental turbulence conditions related to uncertainty about technology and customer demands, start-ups with innovations will benefit from its unique offering, although customers will ask for more time to evaluate that innovation. However, in low environmental turbulence conditions, the specific technology becomes the main target and clients' requests for new product versions are more apparent (Padrão et al., 2019). This requires also another approach from the UBI side, looking to the activities that are offered from the different dimensions.

UBI tenants in regions with high economic prosperity will easier making use of funds. Relating to NPD, it was already investigated that funding will speed up the NPD process of incubator tenants (Bock et al., 2018; Hess & Siegwart, 2013). This means that the economic environment has a moderating impact on the relationship between the funding activities of an UBI and an UBI-tenant's NPD process. As a corroboration, this is ascertained by the business plan competitions; the speed and quality of the NPD process during these competitions depends on the allocated mentors and, optionally, the connected network of investors. When both types of resources are limited due to the demographic characteristics of the UBI, there is evidence that the NPD outcomes will be less successful than in regions that are richer provided with these resources (Passaro et al., 2017). Same applies for customized mentoring resources that are not related to business plan competitions, these are limited in given regions which, as a consequence, will lead to less development growth (Yu, 2019). As a conclusion, the ecosystem leaves it mark on all the dimensions and both the early stages as later stages of the NPD process of UBI tenants. However, more research is required to investigate to what extent this moderating variable has an impact on UBI tenants NPD processes.

The resource dependence theory of Pfeffer and Salancik (1978) is the dominant theory in the topic of affecting ecosystems. This study emphasizes the effect of external resources on the behaviour of an organization. The study adheres on the fact that organizations depend on resources. Which is similar to Barney's resource based view (2001). However, the resource dependence theory suggests that resources ultimately originate from a firm's environment (Pfeffer & Salancik, 1978; Qadeer, 2013) and that firm survival depends on the resources available. It is found among the included articles that UBI tenants are heavily dependent of the available resources to realize NPD. Examples are the lack of entrepreneurial knowledge (Grimaldi & Grandi, 2005), required access to

facilities for testing and prototyping (Dalmarco et al., 2018), capital (Lasrado et al., 2016) and third parties (Chan & Lau, 2005) to even start the NPD process. When the environment, in this case ecosystem, lacks resources it will negatively impact the effect on NPD. This is also quoted by Pfeffer and Salancik (1978): "dependence negatively affects the performance". Start-ups must develop ways to exploit resources that ensure their own survival. Therefore, the UBI plays a major role in adding values to the NPD process for incubator tenants to ensure firm survival. It is found that an UBI can provide scarce resources and therefore help tenants to exploit NPD opportunities. However, the findings among the articles in Table 10 suggest that also an UBI can suffer from a less-prosperous ecosystem. Therefore, the ecosystem can be seen as the moderating variable from the impact. The fourth proposition offers this statement and simultaneously the possibility for further research.

Proposition 4: The ecosystem wherein the UBI has to act affects the relationship between the provided activities and the NPD process of incubator tenants.

5 DISCUSSION

The main goal of this systematic literature review was to identify the activities of UBIs that create value for tenant firms during their NPD process. To determine the factors that embrace a value-creating nature for these firms, the following research question '*What activities from UBI's are creating value for incubatees on their new product development process?'* was developed. Value addition involves those specific activities in incubation programs that enhance the ability of tenants to survive and grow in business (Allen & Bezan, 1990). The method for answering this research question was based on systematically reviewing literature. The 27 articles that are included for the review were derived after the application of the PRISMA statement of Moher et al. (2009). This chapter will also follow the guidelines from the PRISMA statement (Moher et al., 2009) and will provide a summary of evidence, the limitations and a general interpretation of the results in the conclusions section.

5.1 SUMMARY OF EVIDENCE

The field of research on university business incubation is dispersed and remains sometimes unclear. As a matter of fact, this research field is still underexplored. However, since the past years, it can be observed that the number of articles on UBIS have been increased. This can be reflected by this systematic literature review; a majority of the included articles has been drawn up in the past five years from writing this review. With that in mind, it can be concluded that this systematic literature review contributes to the new wave of knowledge on university business incubation. Although this literature review does not research any new or yet non-existing findings, it gives an overview of where the current field of literature is positioned and uncovers potential avenues for further research. In the pre-research, described in chapter 2, it was already investigated that the activities of UBIs can be categorized into three dimensions. For structuring reasons and because of the clarity it is chosen to follow this approach. These dimensions are infrastructure, business support and networking services. It was attempted to include articles that equally represent one or multiple dimensions. For each of the three dimensions multiple value-creating activities are found that enhance the NPD process of an individual UBI tenant, strengthened by entrepreneurial theories. However, there is a moderating variable (the entrepreneurial ecosystem) that is affecting the three dimensions and so the NPD process of UBI tenants.

The endeavours that UBIs do to create an infrastructure can be subdivided into three categories: basic, complementary and shared. The basic infrastructure is necessary and forms the fundament and core for any UBI to provide tenants from a decent working area, resources and facilities. Without this factor it will be impossible for an UBI tenant to start an NPD process at all. The basic infrastructure needs to follow the conditions that resources are allocated correctly to incubator tenants according to their development stage and firm strategy. Also, the provision of basic infrastructure must be based on the tenant processes, the organisational innovation and the market innovation. Too narrow scoping on NPD when providing basic infrastructure facilities can lead to firm failures which is the opposite from value creation. About value creation, there is strong evidence that the complementary infrastructure an UBI can offer can make a distinctive difference in the NPD process of UBI tenants. This complementary infrastructure can be offered in collaboration with the parent university. One can think of laboratories for testing, engineering spaces for testing or prototyping and tailored firm and task support. To further enhance the NPD process of incubator tenants by speeding it up or add more quality to it, the infrastructure can be used as a shared environment whereby ideas can be shared among tenants. This leads to higher productivity rates, new ideas and more technology knowledge. On the other hand, there are authors that do not directly support these findings. For example, the sharing of facilities and resources can possibly lead to hijacking ideas or can create an environment that is not sufficiently protected for start-ups to make their ideas more complementary. It is, of course, not the intention of a shared UBI-environment to create any kind of competition or an unsafe development zone. Therefore the manager of the UBI has to maintain the quality and safety of the shared UBI facilities. To justify the causality between infrastructure and a tenant's NPD process, the resource based view theory can establish this.

The second dimension, UBI activities based on business support, has been broadly analysed by the included literature. Based on the knowledge spillover theory, it can be established that business support activities also affect the NPD of incubator tenants. For structural and clarity reasons it is also chosen to subdivide this dimension into four categories. Firm and task support, educational services, funding and access to capital, and dimensions are forming the four categories. Firm and task support activities are meant to relieve UBIs from their daily business tasks which they do not get around to or are lacking experience or knowledge in. This support can be offered in the fields of finance, HR, recruiting, marketing, management and R&D. There is strong evidence that it is more valuable for a tenant's NPD process if these firm and task support activities are tailored to a tenant's needs. In other words, the firm and task support needs to be accurately sophisticated to be valuable. The educational services are often offered together with the partner university. There is strong evidence that the university should maintain a market-oriented approach rather than a technological approach during the educational services to be more valuable on the tenant's NPD process. UBI firms are often sufficiently educated on technological grounds. Mainly the enhancement of the marketing capability will help tenants in their NPD process. A personal mentor or coach who is experienced and a professional in starting up new business can help guiding the tenant firms in gaining more marketing capabilities. With the encouragement of business plan competitions there is strong evidence that this process will be fostered. These competitions are organised by UBIs together with universities to encourage business ideas and the NPD of start-ups.

Thirdly, the networking services, contain activities whereby the UBI is building and managing relationships with internal and external partners such as market intermediaries, university staff, internal resident firms and funding instances. The networking services do have many connections with the business support activities and are often aligned or combined in practice. Networking activities are having a valuable impact on the success of start-ups and thus NPD, according to the social network theory. In the papers, there is strong evidence that the quality proposition of the university enhances the ability of tenants to survive and grow in business. In other words, an UBI firm can use the university guarantee during networking with potential investors e.g. that the firm

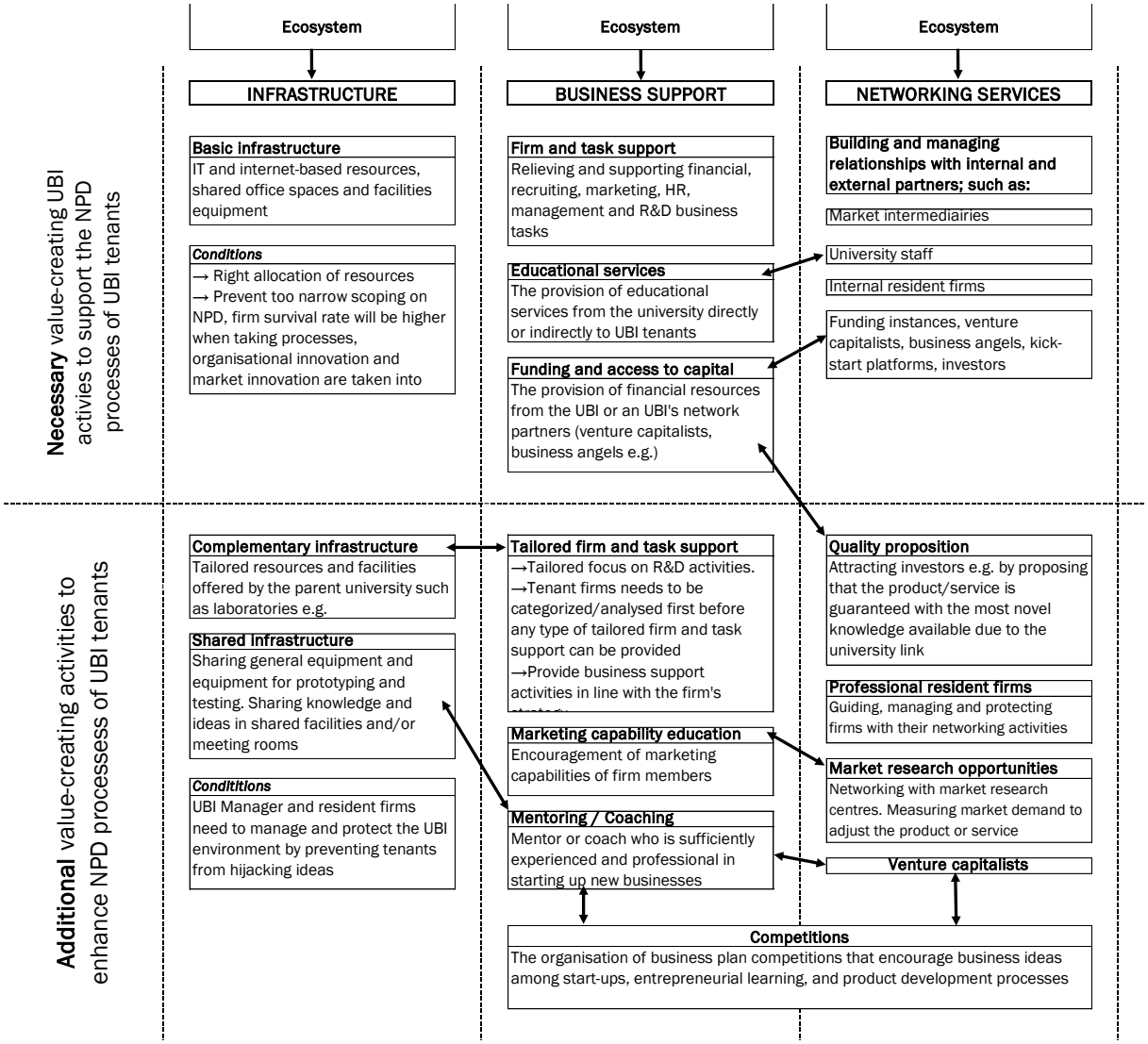
is assured with the most novel knowledge available. This can make investors more likely to invest in the NPD process of incubator tenants. Together with the opportunity to gain more marketing capability, an UBI tenant can also get strong ties with market research firms to measure possible market demand for their innovations or to make any adjustments. This is necessary, and therefore valuable, during the NPD process; otherwise the possibility of product failure increases. Evidence showed that the networking services can really help tenant firms, but, the internal resident firms of the UBI should prevent tenants from risky alliances, help them with seeking for the right investors or can give guidance on intellectual property grounds.

As a moderator, the entrepreneurial ecosystem is affecting the multiple dimensions. It remains underexplored to what extent it is affecting, but there is strong evidence that the ecosystem plays a moderating role between the relationship of the UBIs activities on infrastructure, business support, networking services and, on the other side, the NPD process of incubator tenants. It is known that start-ups are heavily dependent on the resources infrastructure, business support and networking, according to the resource dependence theory. Therefore, the differences in NPD outcomes can be explained when the different UBI environments cannot guarantee the same resources. Ecosystems in different areas across the world show distinctive discrepancies and turbulences that do have impact on NPD. The more recent literature shows implications from different perspectives and dimensions that the ecosystem where the UBI and their tenants are involved is having an indirect impact on NPD. Fostering the NPD process can only happen if the ecosystem is friendly and all the actors are well-connected with each other. Ecosystems that contain richer resources are more likely to accelerate NPD processes than less prosperous areas. This can imply that a further developed ecosystem contains more successful UBI tenants than less developed ecosystems whereby universities are still acting as ivory towers instead of encouraging entrepreneurial academics. The university thus is dependent on the ecosystem. The suggested framework which summarizes this section and gives an answer to the research question can be found in Figure 4 on the following page. The four propositions are processed in the table and the arrows show the connections between activities from different dimensions that enhance NPD.

5.2 IMPLICATIONS FOR THEORY AND PRACTICE

This research has met the need for further theory development on university business incubators and the possible influences on the new product development processes of incubator tenants. Based on the founding theories on UBIs by S. Mian (1997), this review attempted to further explore the activities of UBIs to contribute to the road to a leading framework which ensures future researchers from a more comprehensive understanding regarding to the topic of university business incubation. However, it is questionable if there can be one leading framework for this novel research topic because of the current stage of research. The fact that the literature is underexplored was often claimed by former authors who did research on this topic. For example, included theories suggest possible relationship directions between a specific UBI activity and the NPD process of incubator tenants; but the exact effect or the possible strength of that effect is often missing. Most of the time, more variables are having impact in this relationship that were not uncovered yet. This systematic literature review corroborates this claim by uncovering avenues for further research (section 5.4) as a result of the lack of research. On the other hand, this review contributes to the theory by giving insights were the current field of research is positioned. It can be concluded that the field of research is making progress but lacks more thorough investigations to develop a leading framework for understanding UBIs. Moreover, the theoretical findings from this review are implications that can be strengthened by further research. More on this can be found in section 5.4 whereby the avenues for further research are discussed.

Figure 4 Framework UBI activities and the impact on a tenant´s NPD process



From a more practical perspective, the author remains tentative. As mentioned, the theory remains underexplored and need to be strengthened by further research. The theory is striving to develop a comprehensive performance evaluation model for incubators (Cornelius & Bhabra-Remedios, 2003) which can also be applied in practice. UBIs can, beside focussing for the critical success factors, now better know what the is necessary to offer to their tenants for realising any kind of NPD. Next to the necessaries, the additional services are given to UBIs which they can use to remain or be more distinctive in the area of incubation centres. UBIs can use the framework provided in Figure 4 as a kind of checklist for this. The theory provided sufficient evidence that the activities mentioned in this framework result in a decent guidance in NPD. Anyway, a firm that realised successful results in sales, growth or other business areas as a result of successful NPD support is an advert for the UBI.

5.3 LIMITATIONS

Most systematic literature reviews come with limitations. Limitations have also occurred in this review. This section will discuss the limitations at study and outcome level (risk of bias), and at review level (incomplete retrieval of identified research, reporting bias) according to the guidelines from the PRISMA statement of Moher et al. (2009). It was intended in first instance to conduct fieldwork for this thesis. The current COVID-19 situation impeded this and that is why it was chosen to use current literature and systematically review it instead of conducting interviews to answer the research question.

Study and outcome level

It was already mentioned in the methods section that the risk of bias is assessed in this systematic literature review. Not each included article uses the same measurement tools, contain the same sample nor conducted at the same time. The included articles are based on qualitative, quantitative or a mixed method approach. The samples that are used in the articles are from all world regions. The time span of each article differs also from the beginning 2000's until today. This all means that this systematic literature review thus gains less generalizability. The included articles even pointed out that there are distinctive differences between UBIs from demographical different ecosystems. Even in the same ecosystem UBIs can differ; This review should take into account that the performances and outcomes of various incubators can differ. "The literature on types of incubator is based on the premise that not all incubators are equal and that there are different types with significant differences" (Barbero et al., 2014). Additionally, the effectiveness of the assistance offered by business incubators is still under-explored since today (Williams & Tsiteladze, 2019). All the data from different ecosystems are however used to examine the enhancing activities of UBIs on NPD. By doing this, the publication bias is assessed to a certain extent. However, even when the possibility of publication bias is assessed, there is no guarantee that systematic reviewers have assessed or interpreted it appropriately (Moher et al., 2009), it can be seen as a marker of thoroughness of the conduct of the systematic review. As an addition, all of the included studies were published in academic journals which ensures to a certain extent the quality of the included articles.

Review level

It is known that, since the selection procedure for inclusion based on the eligibility criteria, it can have a determinative impact on the outcome of the study. There is a possibility that due to the determined search strategy, keywords, databases or subjective selection useful articles were not found nor included in the review. Revision of the included articles was conducted by a supervisor. Regarding to the reporting bias, it was intended to cover most of the information provided by the articles in the review section. However, some adjustments had to be made for review purposes. These adjustments were carefully made and would not harm the research findings of the original authors.

5.4 CONCLUSION AND AVENUES FOR FURTHER RESEARCH

It can be concluded that UBIs provide numerous activities for tenants to support their NPD processes and enhance the ability of those tenants to survive and grow in business. Depending on the entrepreneurial ecosystem, an UBI is able to offer infrastructural, business support and networking activities. The university plays a major role in the provision and assistance of those activities. It is proven that start-ups from UBIs gain distinctive advantages because of the university ties. Looking at the NPD process of tenants, the university can add value on multiple dimensions which ensures start-up firms from tailored support to foster their NPD process. The goal of this systematic literature review was to develop a framework that provides a visual image of the research question. Thus, based on the founding theories of Mian (1997) on university business incubation, a next step has been made to develop an overviewing framework that describes and analyses UBIs. However, this framework focuses on NPD, it can be seen as an addition to the current field of literature on this topic. The framework with concluding evidence can be found in Figure 4. As common in most literature reviews, there are still gaps found in the current field of literature. These gaps have to be uncovered to gain a better understanding of UBIs and to be better able to measure their impact on start-up firms.

Discussing about avenues for further research, this literature review found insufficient evidence for the safety of start-ups within an UBI environment. The sharing of resources and facilities can lead to hijacking ideas or copying prototypes e.g. This relates to the NPD process of tenants and a possible impact can be considered. It has been discovered that sharing infrastructural facilities and resources have a positive impact on fostering the NPD process. However, it remains unclear to what extent a possible negative impact can be. Too much proximity can be seen as a sort of hazard to intellectual property rights and, besides of that, the relationship between the business community and the academic can be threatened. The impact of third-party funding can also cause a two-sided effect. It remains unclear to what extent the third-party have a voice during the NPD stages comparing with the university or UBI. The same obscurity occurs when analysing the impact of activities during the business plan competitions. Comparable studies to measure the impact of residential firms are also required to further determine the impact of them on UBI tenants.

While doing future research on incubator tenants, it is necessary to keep the composition and educational background of the start-up team in mind. The literature is dispersed and under-explored when it comes to impact of UBIs and team composition. Also the entrepreneurial motivations of academics/team members are not included in this research. The literature found that this variable can also have a possible impact on justifying causality between UBI activities and NPD outcomes. Beside this, the entrepreneurial ecosystem and its impact need to be studied first. In the literature review, there where samples whereby UBI tenants were compared to each other (Chan & Lau, 2005; Dahms & Kingkaew, 2016; Ko & An, 2019; S. Lee & Osteryoung, 2004; Rubin et al., 2015) without analysing the development of the ecosystem. More research should be conducted on entrepreneurial ecosystems and the ability of an UBI's quality of resources. It is suggested, as a confirmation of the framework in Figure 4, to conduct quantitative studies to measure more profound the specific impact of incubation. For example, structural equation modelling can be applied to determine whether there are significances and to measure the strength between specific activities and their impact on NPD outcomes. In the end, it can also be suggested that it is essential to follow firms that have left the UBI to measure their development in those later stages. By doing this, a more profound impact of the UBI activities on that graduated tenant can be analysed.

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APPENDIX – OVERVIEW OF INCLUDED ARTICLES

Table description: **Authors –** Text – "Quotations"

#	Authors, title and year of publication (Chronological order)	Journal	Sample	Measurement instrument(s) and level	Support dimensions involved	Quotes of Article findings / Abstract	Text citations of Value creating activities on enhancing NPD of tenants	Theories
1	**Lee and Osteryoung (2004)** A Comparison of Critical Success Factors for Effective Operations of University Business Incubators in the United States and Korea	Small Business Management	34 Korean UBIs, 125 tenant firms and 51 graduate firms	Surveys Quantitative	Infrastructure Business support Networking services	A comparable research between critical success factors (CSF) of UBIs in the United States and Korea. US and Korean UBIs do significantly differ on the 14 items that are measured	"UBIs are contributing effectually toward realizing their goals through systematic and comprehensive R&D among each university institute. This creates an optimal research environment" "(…)UBIs play a critical role in nurturing the IT and internet-based venture business by sharing office space, facilities, equipment, technical information, financing, patents, management skills and many more. These services do have impact on the NPD process"	Goal-setting theory Knowledge spillover Theory
2	**Chan and Lau (2005)** Assessing technology incubator programs in the science park: the good, the bad and the ugly	Technovation	6 technology start-ups from a Chinese science park/ university campus	Case studies Qualitative	Infrastructure Business support Networking services	"Cost advantages, pooling resources together, sharing basic structural resources, consulting advices on product development, the good image of science parks are fostering the process of technology start-up development"	Consulting advices on product development is not the main concern of technology start-ups, because: - Technology founders are usually the experts in their own field - Anxiety among tenants that product technology will be stolen "(…)The university-technology start-ups relationship is found more useful than the science park-technology start-ups relationship with regards to the product development process. The reason is obviously due to the fact that university can provide technology start-ups with both software support, i.e. consulting advices on product, and hardware support, i.e. laboratory equipment and facilities"	Resource-based view
3	**McAdam and Marlow (2008)** A preliminary investigation into networking activities within the university incubator	Entrepreneurial Behaviour & Research	6 incubated firms from an UBI in the United Kingdom	Case studies and Interviews Qualitative	Networking	The development of particular types of networks within the business incubator is influenced by the university. Disadvantages of university incubator placement are "the threat of proximity between firms to intellectual property rights and how the	"The university is critical in terms of facilitating and developing networks with other third parties. In fact, the university association proved useful in terms of making contacts at seminars and conferences as well as gaining access to customers and suppliers" "All of the entrepreneurs used their links to the university to employ students and recent graduates; this was deemed to be an invaluable opportunity to identify new talent" (…) Ecosystem varies: "a tenant stated: I would rather spend an hour on the phone to America than an hour talking to	Social Network Theory

						image of the academic might be seen as a disadvantage within the business community“.	someone here, there is a lot of pressure to run one of these firms here” “Social action within the infrastructure appeared to be critical for the networking activities in terms of knowing who they could trust and whom they could share ideas”	
4	**Cooper, Hamel and Connaughton (2012)** Motivations and obstacles to networking in a university business incubator	Technology Transfer	42 start-up firms from the same UBI	Case study Qualitative	Networking	“Face to face interaction in the incubator is predominant. The physical proximity of resident companies at the incubator influences who they talk to the most, suggesting incubator site design is important in creating an entrepreneurial environment“	“(…) The resident companies that are involved in an UBI are also having impact on the development of the incubated firms. It is predominant to have decent interorganizational networks and have an understanding of which stages of development the individual incubate is settled to provide the best possible networking activities”	Social Network Theory
5	**Kitigawa and Robertson (2012)** High-tech entrepreneurial firms in a university-based business incubator	Entrepreneur ship and Innovation	24 start-up firms from an UBI in England	Case study Qualitative	Networking	“It is possible to identify heterogeneous resources as different forms of capital at work in the incubation process. UBIs help high-tech start-up firms to build capabilities through network formation and a variety of types of resource mobilization”.	“The variety of capital and network formation make the incubator a productive techno-social space. An incubator can be seen as a site for learning and connecting resources, nascent entrepreneurs can work ideas out as forms of capital and knowledge that will be most valuable to their self-development as entrepreneurs an growing their businesses” “Critical success factors for start-up NPD in UBIs are interacting with others’ ideas for technological development and attracting financial resources”	Resource-based View Social Network Theory
6	**Hess and Siegwart (2013)** University Technology Incubator: Technology transfer of early stage technologies in cross-border collaboration with industry	Business and Management Research	5 UBI spinoffs from Zürich (Switzerland)	Case study Qualitative	Business support Networking	“Technology alliances between academic spin-offs and the established industry are a natural way to develop technologies efficiently, which is confirmed by the literature”	An UTI can build upon the following university characteristics: 1. Overview of ongoing research activities 2. Unique and early access to research teams 3. wide cross-industrial research networks “A funding instrument is necessary to realize NPD in new UTI spinoffs” “Focussing on incubator processing explain phenomena like new venture formation, venture development, new product development and business assistance”	Knowledge Spillover Theory

7	**Somsuk and Laosirihongthong (2014)** A fuzzy AHP to prioritize enabling factors for strategic management of university business incubators: Resource-based view	Technological Forecasting & Social Change	4 UBIs in Thailand and # of UBI-stakeholders	Questionnaires Interviews Quantitative	Infrastructure Business support	The enabling factor categories organizational, technological, financial and human resources are subheadings for 14 enabling factors that are necessary for UBIs to realize competitive advantage	"UBIs need to build strong collaborative relationships with faculties and departments (or other research units in the university). Building strong relationships with the university is a means of supplementing and complementing internal resources and support. These resources relate to infrastructural means and business support sources"	Resource-based view
8	**Jamil, Ismail and Mahmood (2015)** University Incubators: A Gateway to an Entrepreneurial Society	Economics and Sustainable Development	-	Literature review Qualitative	Infrastructure Business support Networking	"University incubators provide a facilitative environment for revenue generation by ensuring a cloud with financial, legal and technical support for a win-win interaction.""(...) In an entrepreneurial society, universities move one step ahead by structuring the mechanisms to facilitate entrepreneurial culture and, creating institutes and leaders".	"UBIs help and facilitate to achieve the idea of an individual entrepreneur to an implementation phase and functionalize it in a true spirit with a strong leadership commitment" "(...)UBIs are better able to facilitate human expertise, provide funding sources, innovation and commercialization enhancement whereas involvement of industry incubators is deficient"	Resource-based view
9	**Lasrado, Sivo, Ford, O'Neal and Garibay (2015)** Do graduated university incubator firms benefit from their relationship with university incubators?	Technology Transfer	653 firms from UBIs in the United States	Longitudinal study – Surveys Quantitative	Infrastructure Business support	"In contrast to prior studies, this study shows that university incubated firms performance continually improves above and beyond the incubation period, i.e., the number of jobs and sales grew over time". "(...)This study also shows that university incubated firms performance is superior to non-incubated firms above and beyond the incubation period. University incubated	"University resources do make a difference in how well firms are likely to perform. UBIs provide firms with the most comprehensive set of resources. Firms in UBIs perform significantly better in sales growth and employment than non-UBI firms. The resources an UBI can offer are distinctive to give an explanation how this phenomenon can happen" "The notion of 'growing your own companies' is complicated in terms of what elements are necessary for an overall effective eco-system. Regional endowments vary, entrepreneurial talent is not created equal, and other factors such as access to capital play roles that are difficult to quantify. Controlling for these factors is also difficult when trying to understand how best to spur an innovation based economy. A better understanding of how regional endowments interact is important when putting together overall economic development strategies, especially in tough	Resource-based View and Social Network theory

						firms have greater employment and sales than then non-incubated firms".	economic times with reduced financial resources available to stimulate economic growth"	
10	**Minguillo and Thelwall (2015)** Which are the best innovation support infrastructures for universities? Evidence from R&D output and commercial activities	Scientometrics	92 university spin-offs from the United Kingdom	Case study and literature review Qualitative	Infrastructure	"In response to the first research question, SPs on average promote tangible research outputs 3 years after their inception. In response to the second aspect analysed in this study, HEI formal ties with different support infrastructures, namely science parks, on-campus incubators, or other incubators in the locality, do not associate with higher levels of patents and publications output or U–I collaboration".	"The multivariate analysis finds that among five predictors, only the typology of the infrastructures affect the R&D activities, while the typology and age of the infrastructures affect the U–I collaboration. The most research active parks are research parks and campuses, followed by science parks. (…) The first group of parks, along with incubators, are more likely to need less time to become research active and promote U–I cross-fertilisation processes in comparison with other types of intermediary infrastructures. The age of a park also significantly associates with the faster establishment of U–I partnerships, with the newcomers having a higher probability to promote a more effective processes of open innovation among their tenants"	Resource-based View and Resource Dependence theory
11	**Paradkar, Knight and Hansen (2015)** Innovation in start-ups: Ideas filing the void or ideas devoid of resources and capabilities?	Technovation	12 start-ups from New Zealand	Case studies Qualitative	Business support Networking	"To successfully commercialize innovations, entrepreneurial start-ups at early stages of development require key resources comprising several different types of assets"	"Clearly, successfully managing relationships with partner firms is a critical capability for entrepreneurs. Start-ups that master this task save a significant amount of time and financial resources and increase their chances of npd success"	Resource-based View and Knowledge-based view
12	**Rubin, Aas and Stead (2015)** Knowledge flow in Technological Business Incubators: Evidence from Australia and Israel	Technovation	8 technological BI's in Israel and 3 technological BI's in Australia	Case studies Qualitative	Business support Networking	Collaborations between incubatees increase the knowledge of technology and market. Universites play a modest role as a source in the stages of the NPD process of incubates	"The findings suggest that technological knowledge is critical for an individual incubatee and for the incubator. In the article's cases technological knowledge was needed to search for ideas, and to carry out the new product development (NPD) and new service development (NSD) processes. In this knowledge bearer, two knowledge sources were identified: university knowledge sources and know-how knowledge sources" "(…)Shared technological knowledge between incubatees generates collaborations that create new products and services"	Knowledge spillover Theory

							"Product development with the help of universities does not rely on technology transfer, but rather on the use of the universities´ resources"	
13	**Soetano and Jack (2015)** The impact of university-based incubation support on the innovation strategy of academic spin-offs	Technovation	141 UBI spin-offs from the UK, The Netherlands and Norway	Surveys Quantitative	Business support Networking services	"A technology and market exploitation strategy has a stronger and more positive effect on the performance of spin-offs than a technology and market exploration strategy".	"Support provided by university-based incubators in the form of networking support strengthens the relationship between a tenant's innovation strategy and performance.(…) A better innovation strategy is essential for a tenant's product development process" "Marketing support activities such as mentoring, internationalisation, and regulation may complement a spin-off's capabilities in developing technology-based products"	Goal-setting theory
14	**Dahms and Kingkaew (2016)** University Business Incubators: An Institutional Demand Side Perspective on Value Adding Features	Entrepreneurial Business and Economics review	114 UBI tenants from the UAE and 100 UBI tenants from Thailand	Questionnaires Quantitative	Infrastructure Business support Networking services	The investigation for differing value adding features for UBIs lead to differences in infrastructure and networking services between UAE and Thailand	"There is a lack of human capital in business start-ups. So, the business support services among UBIs in different countries does not vary significantly. On the other hand, the infrastructure and networking services do differ" "The infrastructure among countries differs. UBIs located in more expensive metropolitan areas will take advantages of more infrastructural means than UBIs that are located in more sparsely populated areas. (…) This is due to the lack of supply of appropriate facilities. This same approach is also applicable on the networking services"	Resource-based View, Knowledge Spillover theory and Social Network Theory
15	**Oppong-Tawiah and Chan (2016)** The influence of IT and knowledge capabilities on the survival of university IT start-ups	Techno-entrepreneurship	Literature review	Literature review Qualitative	Infrastructure Business support	A framework that suggest that start-up's survival rates increase when they use dynamic IT knowledge capabilities to pursue innovations with emerging technology capabilities in rapidly evolving IT markets	"UBIs are well resourced. Tenant start-ups can focus on matching capabilities and innovations to market conditions" "Policy makers advocate the funnelling of research findings into UBI knowledge infrastructures to boost knowledge resources available for startups" "An UBI provides access to university research, technologies, laboratory facilites, industry contacts, technology transfer processes and intellectual property protection"	Resource-Dependence theory
16	**Prencipe (2016)** Do University Incubators Stimulate Innovation of University Spin-offs? An analysis of Italian firms	Business and Social Science	621 university spin-offs from Italy	Database search Quantitative	Infrastructure Business support	Incubation services of universities have an effective and pivotal role in stimulating the innovative activities of university ventures	The paper is highlighting that the infrastructural support and the business accelerating role of parent university is a critical base for the full development of the innovation trajectories in the university spin-off Providing the right business facilities for incubator tenants is essential in the process of venture growth. A decent collaboration between university, administrative departments and the industry is herein necessary.	Resource-based view

17	**Stayton and Mangematin (2016)** Startup time, innovation and organizational emergence: A study of USA-based international technology ventures	International Entrepreneurship	4 NTBFs from the United States	Case studies Qualitative	Infrastructure Business support Networking	"The dynamic tensions between time, financial resources, and human capital impact the success of product emergence and the success of organizational emergence in very different ways". "(…)The ideas and frameworks developed in this paper will contribute to the study of time and entrepreneurship, and the speed of venture emergence".	"Many incubators are primarily interested in admitting ventures that have already achieved a signal of market traction, UBIs are well positioned to support entrepreneurial teams during the earlier stages" At some point in developing a product, at least one pivot in product strategy is usually required to develop a product that is marketable. This requires a professionalism of the management whereby an UBI can give guidance. Start-up technology firms with strong university ties, utilizing student assistance, faculty expertise, and university facilities and networks have higher productivity rates. UBIs can provide support for venture organizational development helping to formalize agreements and professionalize management while minimally distracting the start-up team from their product development activities.	Knowledge Spillove Theory and Social Network theory
18	**Passaro, Quinto and Thomas (2017)** Start-up competitions as learning environment to foster the entrepreneurial process	Entrepre-neurial Behaviour and Research	Unknown number of start-ups in SUCs in Italy	Interviews and meta-analysis Quantitative	Business support	"The recent increase in the number of SUCs has been mainly fuelled by private actors. Moreover, Italian SUCs show some features that make them rich learning environments. Private and public actors play different roles, as confirmed by statistical tests performed"."(…) Privately organized SUCs follow mainly a market-oriented approach, while publicly organized ones are more education oriented".	Learning process features occur in SUCs and are oftenly provided by incubators, business angels, venture capitalists and science parks. Money-prizes provided by incubators are an important incentive and driver for start-ups to participate in such a competition. "In order to enhance entrepreneurial processes, SUCs should be part of an effective start-up friendly ecosystem where the coordination among different actors like incubators is a crucial resource for success"	Knowledge Spillove Theory and Knowledge-based Theory
19	**Bock, Huber and Jarchow (2018)** Growth factors of research-based spin-offs and the role of venture capital investing	Technology Transfer	98 university spin-offs in Germany	Questionnaires Quantitative	Business support	Homogenous educational backgrounds is positively associated with firm growth. Venture capital-backed spin-offs show a superior employment and revenue growth	"A homogeneous founding team can be beneficial in the complex high-tech environment in which RBSOs operate so that a technological understanding is crucial considering successful product development" "A homogenous founding team providing a knowledge base for deepened discussions seems to be beneficial for the commercialization of a customer-suited product or service"	Resource-based view

						compared to the non-ventured.	"In the early development stages, spin-offs need capital to develop first prototypes, fund laboratory equipment, or conduct product testing. (…) this is essential"	
20	**Dalmarco, Hulsink and Blois (2018)** Creating entrepreneurial universities in an emerging economy: Evidence from Brazil	Technological Forecasting & Social Change	14 UBI tenants and 4 UBI managers from Brazil	Interviews Case study Qualitative	Infrastructure Networking	"One of the main objectives of the entrepreneurial university is to foster the creation of start-ups and transferring results of scientific results to the market". In Brazil, they have learned from the US and Western Europe to realize this	University policies and support can provide new ideas and opportunities to students who want to start their own businesses. The importance of technical professors in developing the technology or validating the idea based on a tenant's experience is high. Networking; Also validation from outside the university area, for example from possible clients, is necessary. For example, obtaining feedback or screening market potential. Close relations with post-graduate courses and research labs result in more innovative products Infrastructure; some entrepreneurs do not use university resources due to their development stages	Resource-based View and Evolutionary Economics
21	**Gozali, Masrom, Zagloel, Haron, Dahlan, Daywin, Saryatmo, Saraswati, Syamas and Susanto (2018)** Critical success and moderating factors effect in Indonesian public Universities' business incubators	International Journal of Technology	31 UBI managers from Indonesian public universities	Interviews Qualitative and Quantitative	Infrastructure Business support Networking	"Good system and infrastructure show a strong direct relationship with success factors. Mentoring and networking showed a strong relationship with the moderating factor infastructure".	"A good system and infrastructure showed a strong relationship with incubator success factors, and information technology showed a strong relationship with the moderating factors, especially age and the quality of the facilities" (infrastructure) As a moderator, the mentoring and networking activities are mentioned. These activities partly decide the quality of the infrastructure of an UBI. Funding support plays also a role in UBI success factors (business support)	Resource-based view
22	**van Stijn, van Rijnsoever and van Veelen (2018)** Exploring the motives and practices of university start-up interaction: evidence from Route 128	Technology Transfer	13 UBI start-up entrepreneurs, 9 university reps and 14 stakeholders from the United States	Interviews Qualitative	Infrastructure Business support Networking	"University start-up interaction is largely based on intangible resources. The resources that universities transfer to start-ups mostly relates to organization and product development, but little to market development. Universities can strengthen their	"Start-ups with a product that does not benefit from the technical or scientific knowledge or credibility of universities should carefully consider the added value of being involved in start-up support programs originating from a university". "(…) Support programs that originate from corporations or independent programs might better fit their need" Science-based startups are more likely to benefit from USUI, whereas start-ups close to market might be better off with other support programs	Knowledge Spillover theory

						education programs and knowledge utilization through start-up interaction".		
23	**Cravo and Marques (2019)** Development of innovation in companies in incubation: the case of Portugal	Innovation management	243 Portuguese incubator tenants with links to universities	Questionnaires Quantitative	Infrastructure Business support Networking	"Product innovation is most significant in an incubation environment, and also that the origin of businesses and the development of R&D activities determine the type of innovation generated".	"University spin-offs can be created to explore recently developed technology, with the results indicating that new products are the outcome" R&D activities enhance the product innovation during the NPD stages	Transaction-costs economics
24	**Ko and An (2019)** Succes Factors of Student Startups in Korea: From Employment Measures to Market Succes	Innovation and Policy	1 UBI start-up from Korea and 1 from the United States	Case studies Qualitative	Infrastructure Business support	This study outlines the success factors of students startups. Many types of research on startups are focused on specific fields such as entrepreneurship and performance. The success facros of a venture startup are similar to those of a startup where sustainable management is possible	Mentoring during the development processes is important. Mentor selection and mentoring contents are also important because mentor ability addresses the problems associated with the setting up and operation of startup business model and startup resources of university student startup founders. Funding; university startup support funds do not guarantee success. In the previous research, the startup promotion policy of the government, startup support funds, and university startup support activities are suggested as success factors. There is a tendency for students to lack preparation for startup business model; they emphasize too much the starting phase. It is impossible to ignore the importance of startup business model and preparation for it. This may be the reason for the low sales of student startups.	Resource-based View and Knowledge Spillover theory
25	**Padrão, Andreassi and Brito (2019)** Marketing capability, technical capability or degree of product innovation: what really matters in leveraging the sales of technology-based start-ups?	Entrepreneurship and Innovation Management	250 incubated NTBFs from Brazil	SEM analysis Quantitative	Business support	Incubator marketing support has a significant influence on entrepreneurial orientation of NTBFs which leads to an increase in the tenant's marketing capability and degree of product innovation	Incubator marketing support activities positively influence the marketing capabilities of a firm. "Marketing support activities include training to improve an entrepreneur´s marketing skills, establishing informal contact between the entrepreneur and incubator´s manager, assisting entrepreneurs in developing a business plan, assisting entrepreneurs to begin selling a product through external consultants and facilitating entrepreneurs' participation in events and their presence on the incubator's website Thus, these activities can be considered a valuable resource for the development of an entrepreneur's skills related to the identification of market opportunities, npd, and the implementation of commercial activities"	Knowledge-based view

26	**Redondo and Camarero (2019)** Social Capital in University Business Incubators: dimensions, antecedents and outcomes	International Entrepreneurship Management	66 Spanish and 35 Dutch university incubatees	Surveys Quantitative	Networking	"The entrepreneurial profile of the university and the incubator manager proactivity are critical to build a collective social capital amongst the entrepreneurs. The collective social capital foster the individual social capital".	Beneficial links between incubatees and other external networks proves an increasement in entrepreneurs' management efficiency. The UBIs' relational social capital help to shape the incubatees' social capital which leads to facing up to the challenge of business, prevention of engaging opportunism. The UBI manager plays a distinctive role in bridging the tenants to the external social capital, also internal.	Social Network Theory
27	**Yu (2019)** How do accelerators impact the performance of high-technology ventures?	Management Science	13 accelerators and 900 matched non-accelerator companies	Data search Quantitative	Business support Networking	"Accelerator companies close down earlier and more often, realise less money conditional on closing, and appear to be more effictient investments compared with non-accelerator companies".	"The presence of mentors and cohort-mates that provide feedback can encourage faster iteration of ideas, prototyping, and consumer testing. Consistent with the spirit of the Lean Startup method, participating in an accelerator can help founders learn when and how to fail. In addition, it demonstrates that there is value in experimentation to produce optimal outcomes even when that outcome is to shut down the company. Moreover, based on the higher funding ratio of accelerator companies, the implication is that there are efficiency gains from investing in accelerator companies because the quality of the companies is observed sooner and the risk of investment is mitigated. Although accelerator participation has various performance implications, on an aggregate level" "(...) One explanation is that more accelerators are beneficial because they can share mentor resources and investor networks and encourage more start-ups. An alternative explanation is that mentor resources are limited in a given region, so the average quality of accelerators decreases as the number of accelerators increases"	Goal-setting theory

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