Success and Failure in USO Founding. Analyzing individual factors that can facilitate the allocation of funds to University spin-offs

Author: Calin Lazar
University of Twente
P.O. Box 217, 7500AE Enschede
The Netherlands

ABSTRACT

This research study responds to increasing attention to the importance of academic entrepreneurship and university spin-offs (USOs) in particular. Receiving funding for a USO is one of the most important steps in overcoming the threshold of credibility in order to foster further scaling and successful development. It is past this stage where the firm has the opportunity of reorganizing itself to reach more than just the local markets, but the national or international ones, and therefore create a substantial impact. Yet, despite the existing knowledge and available support mechanisms, this remains a challenging task. Thus, this study addresses the impact of individual competencies on successful funding allocation. To address this challenge, this study benefits from interviews with prominent figures in the industry to create novel and in-depth insights into the early stages of academic venturing. The results indicate that certain competencies have a greater impact than others and are worthwhile developing as they can drastically increase the likelihood of success. This research study contributes to the academic entrepreneurship research field by bringing light to the importance of individual competencies regarding funding acquisition and also entrepreneurs by raising awareness on the matter.

Graduation Committee members:

First supervisor: **dr. Igors Skute**
Second supervisor: **dr. Maximilian Goethner**

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1. INTRODUCTION

University spin-offs (USOs) can greatly impact society and contribute significantly to existing businesses by aiding in technology transfer (Mathisen & Rasmussen, 2019). They can have great potential in discovering and bringing to the public attention disruptive technologies that can greatly improve the industries they operate in. Major tech innovations can help improve the lives of others and, in some cases, help protect the environment (if the innovation, for example, presents a greener way of doing something). The literature examining them is expanding at an exponential rate with more academics embarking on this journey. Currently, 3288 articles are available on the web of science, which stands to show the increasing attention this topic is getting from the academic world, as seen in figure 1, where the articles are divided per industry. This helps illustrate how multidisciplinary the topic really is, with applications in management, business overall, economics, engineering, environmental sciences, and so on. Since the applications of this topic are so diverse, progress done in the field can have a positive impact on many industries by creating jobs in such a wide array of industries. This can significantly aid the economy.

Many USOs struggle to survive, and unfortunately, the number of USOs that manage to become profitable and thrive is very small compared to the ones who fail. This results in a tremendous waste of resources and takes away from society the benefits that new emerging technologies can bring forth.

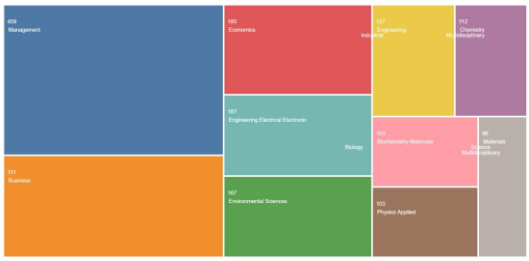

Figure 1. Web of Science search result map

The accumulating scientific evidence shows not only the academic interest in USOs but also the relevance of the topic in modern times. Over time the academic world witnessed an increased interest in how USOs work, and why certain practices are better than others (Mathisen & Rasmussen, 2019). This increase in interest is most likely directly caused by the difficulties that arise when trying to turn a concept or a technology into a viable business idea. Difficulties such as struggling to pay wages to employees in the early stages, not having sufficient resources to allocate to R&D, and improper use of individual competencies due to lack of knowledge on the matter, or simply due to inexperience. The goal of all this research is to facilitate the already difficult process and give a better chance at success to entrepreneurs. This comes with great benefits for the economy and society, by bringing forth these disruptive technologies, creating jobs and overall stimulating the economy. Society has to benefit from sustainable USO projects, but can only do so if they reach a certain stage in their development.

Despite the alarmingly high number of failed USO projects, there exists also a good number of successful USOs, who manage to thrive, even in harsh situations, such as the ones created by the recent COVID-19 pandemic. This is the case of Cape Bio Pharms, which received millions of euros in funding from the European Union, to facilitate the development of COVID-19 rapid tests (DAVIDS, 2020). This stands to prove, that even in harsh conditions, some manage to succeed and help society through the spin-offs. Failure is complex and generally includes a broader context that can only be fully understood through adequate and sufficient investigation. Through research and development, we have the potential to empower more and more start-ups, by giving them the necessary information to succeed. A clear recipe for success doesn't exist or most likely won't be developed any time soon, but research in the field has the potential of significantly facilitating entrepreneurs by offering them vital information and solving issues that systematically hinder early USO development. University spin-offs have the potential to save and improve lives, as seen in the Cape Bio Pharms example and are worth investigating.

There have been numerous studies on the factors that contribute to USO commercial success in the later stages and successful funding allocation. Despite this, there is still a lack of knowledge about factors that contribute to success during the early stages of development and the interaction between these factors. USO success research is overwhelmingly based on quantitative data analysis methods, despite increased scholarly attention. The study by Hossinger, Block, Chen, and Werner (2021) investigated which characteristics increase the likelihood of completing venture creation activities. In a similar study, Prokop et al. (2019) investigate key determinants of USO survival. Nevertheless, this research seeks to contribute novel insights about underlying mechanisms of USO development during the early stages by focusing on the importance of funding, expanding previously conducted research. The opinions of multiple experts who may be able to shed light on the findings and the relevance of certain factors discovered earlier through quantitative analysis may be very useful to uncover new truths or erroneous information that would otherwise be difficult to discover through quantitative research.

Receiving funding for a USO is one of the most important steps in overcoming the threshold of credibility because funding allows the firm to further develop and scale up its projects. It is past this stage where, the firm has the opportunity of reorganizing itself and hoping to one day reach more than just the local markets, but the national or international ones. After all, capital is crucial for the development of a business, since without funding, no further research can be conducted, no salaries can be paid, no new equipment can be acquired, etc., and even though it does not serve an end in itself it is a crucial means that can make the difference between being able to change the lives of hundreds of people or the ones of millions. Often enough it happens that great ideas are not brought forth by inventors but, by innovators, those who know the right time and place for innovation. Receiving funding can help attain that.

University spin-offs can have a great environmental impact because new technologies help society in getting problems solved, often reduce consumption, and improve daily life. Sustainable and impactful solutions aimed in the right direction can reduce CO2 emissions or minimize wastage of resources. These are all reasons why it is not only financially viable to invest time and money in USO development, but also ethical to do so.

The problem with existing studies is that there is a lack of understanding when it comes to the effect of individual competencies on the attraction of venture capital and funding in the context of university spin-offs. Marketing competencies, R&D competencies, technological competencies, and customer

competencies have been previously used in surveys to assess how executives (CEO, COO, presidents, vice-presidents, etc.) rate their firm in comparison to others (Danneels, 2016). Can these market competencies also reflect at an individual level and can be a good metric for predicting success in raising venture capital? Hence, the following research question will be addressed:

How do individual competencies of a university spin-off leader affect the USO's capacity to raise funding in the early stages?

This paper will examine factors that haven't previously been explored concerning receiving founding for a university spin-off. It is important to explore these factors because, without proper documentation, many USOs fail or never manage to scale up, resulting in the whole impact not being generated anymore. Without funding, this impact may never be attained, since funding helps the firm survive before it reaches the threshold of credibility. This often happens with young firms, that possess no capital, don't have an extensive network and therefore don't manage to scale up. The above-stated research question aims to bring novel insights into the underlying conditions and the interplay between them.

Previous literature makes it almost uncontestable that resource allocation to USO projects has a great impact on the success rate. Specifically, this paper explores the effect of some less researched variables upon funding allocation, with the goal of determining their influence on the success of USOs (Sørheim et al., 2011).

Through interviews with prominent figures in the industry, it is possible to discover if some individuals are having a higher likelihood of success in the USO world, due to certain characteristics. Because if so, and these characteristics can be trained, this could potentially increase the success rate of USOs by bringing to the attention of their founders how self-development and acquiring new competencies can help attract funding. Individual competencies do not generally require large investments and offer a great return on investment to USO founders. This means that with little effort and not much financing required, more and more USO founders can succeed, allowing great technologies to reach a larger audience, and not end up in obscurity.

2. THEORETICAL FRAMEWORK & HYPOTHESES/PROPOSITIONS

2.1 General overview of academic entrepreneurship and USO development

Among the USO-related research that has been conducted in the past decades on the topic of University Spin-Offs, the paper "Critical junctures" by Vohora et al stands out by the introduction of its critical junctures framework, as seen in Figure 1. According to Vohora's framework, a USO goes through the following stages: research phase, opportunity framing phase, pre-organization phase, re-orientation phase, and sustainable returns phase. This framework shall serve as a guideline, used to help identify successful USOs. A great way to segregate them from other USOs, is by their ability to cross the threshold of credibility. Crossing the threshold of credibility means the firm is subject to an increasing skepticism from financiers, customers, and suppliers and its transition from "concept" to "business" may be abruptly stopped (Vohora et al., 2004). Later on, it would be considered that a business is successful if it managed to cross this threshold since it is a significant step in the life of a USO. The main focus of this study is funding attraction, but keeping in mind success factors is also relevant.

For this particular reason, it will be also considered the definition provided by Vohora et al ("A venture founded by employees of the university around a core technological innovation which had initially been developed at the university"), as a reference point in the formulation of the following USO definition (Vohora et al., 2004).

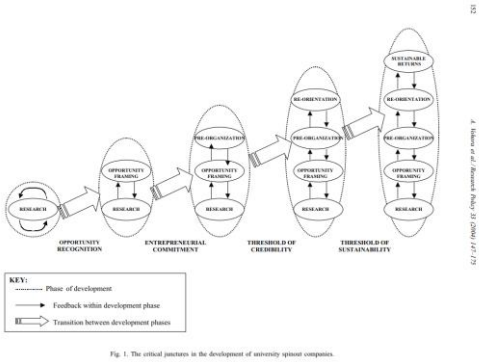

Fig. 1. The critical junctures in the development of university spinout companies.

Figure 2. Vohora et al Framework (2004)

To define university spin-offs for the purpose of this paper: A venture business that originated from an emerging technology financed by a university that received support from it with the prospect of potential commercial applications.

Vast amounts of capital, time, ground-breaking technologies, and skilled labor from trained experts are at risk of going to waste every time a USO fails to cross the threshold of credibility and falls into obscurity (De Cleyn et al., 2013). All these resources are scarce and vital for the prosperity of our society. Through the investigation of the following five proposals, the academic world moves one step closer to reducing this massive waste of resources and potential. The public has been deprived of great innovations in many cases simply due to poor resource management. There is a big difference between regional success and international success, as reaching more people can have a greater impact on the world.

The logic behind the structure of the propositions is as follows:

1) When founding a USO, it is crucial that you can analyze the market potential and can easily assess how feasible a new technology is. This helps with opportunity framing and pre-organization (Vohora et al., 2004); (Danneels, 2016). This paper will analyze if these factors can indeed help attract funding.

2) Another relevant individual factor that has the potential to be a driving force within a USO, is the level of motivation the leading entrepreneur disposes of. USO success rates are razor-thin (Prokop et al., 2019), and many entrepreneurs, don't get the opportunity to make use of their individual competencies. High levels of motivation, aid an entrepreneur in acquiring funding and getting the chance to later on make use of the other individual competencies they possess.

3) Once these competencies have been assessed, as it is assumed that now a good basis for the framework had

been formed, this paper will analyze how assigning an experienced TTO to a USO can affect the motivation of the entrepreneur. This leads us to the next point. In the past, it was discovered that the presence of an experienced TTO can help increase the number of start-ups at a university. The study is inconclusive about the motivational effect the presence of an experienced TTO may have (Sørheim et al., 2011) and this paper will further investigate this effect.

4) Funding can come from different sources, and not all have the same impact on the firm. It is important on what conditions funding is being offered, by who, and at what cost. Individual competencies of an entrepreneur, alongside past experiences, could have a great impact on decision-making. Once funding was received, it can be debated whether or not it was a good decision. This paper aims to bring more light upon the matter and potentially serve as a guide for those interested in the impact entrepreneurial competencies have on funding. In the eventuality that the funding was not what expected, will this have a negative impact on the next round of financing or the opposite scenario: great initial investment can help predict a second favorable investment round.

This builds upon the belief that knowing when to turn down a bad deal or when to accept a great one is a competence/ characteristic that can be born but also self-taught, pretty much just like staying motivated, assessing the market or new tech.

The factors mentioned in the following sections are not only based on founding attraction, but also on re-attraction and effectiveness, in order to meet the expectations of investors (looking for a return on investment), entrepreneurs (looking to attract investors), and universities (looking into which USOs to support).

2.2 The role of market potential assessment on successful funding allocation

A study by Danneels (2016) suggested four constructs to assess USO competencies: marketing competence, R&D competence, technological competence, and finally customer competence (Danneels, 2016). In the paper, they are referred to as collective qualities, that are found within an organization's set of competencies, and therefore they are not considered at an individual level. This paper aims to analyze the effects of having some of these competencies on an individual level on funding allocation. Since USOs are often small in size (Rodeiro-Pazos et al., 2021), it may be that it is sufficient for the head of the USO to possess such competencies.

Quickly assessing the potential of new markets can aid a firm in knowing where to invest its resources. Since resources are limited and timely using the resources can result in strategic success, (Powers et McDougall, 2005) quickly analyzing the market potential can give a great benefit to USOs in the early stages, by trying to apply timely enough for property rights protection on patents for example, which was found to be one of the most valuable possessions a USO can have in its early stages (Lockett et al., 2003).

If an entrepreneur realizes the importance (or lack of importance) he/she may be more inclined to make a better decision when it comes to time allocation. This could help save time and get better access to capital. Assessing the market will result in the delivery of a better-quality product, and this has the potential to raise the interest of investors who would otherwise not be considering the USO as a viable investment option. On the other hand, it may not be sufficient to possess this competence solely on an individual level, and indeed it is required for it to be more widely available throughout the firm. This consolidates the relevance of this construct in relation to how the individual competencies of a university spin-off leader affect the USO's capacity to raise funding in the early stages.

P_1: Academic entrepreneurs with market potential assessment skills have a higher chance to receive funding for their university spin-off

2.3 The role of new technology feasibility assessment on successful funding allocation

Once the market potential was assessed, it is logical to follow up by assessing the feasibility of the technology at hand on the current market situation. This construct will discover how the competence in assessing the feasibility of new technologies can help USO leaders in attracting funding (Danneels, 2016). University spin-offs are all built around new technologies and for this reason, this competence may indeed be very relevant as a success factor.

As mentioned in section 2.2, acquiring patents is crucial for USOs in the early stages. Patenting does not come cheap, as it can come with relatively big costs, such as the cost to develop the tech, the patent itself, etc. It is Important for USO survival to have a great sense of what tech is feasible and which is not, and a leader who has such competence can prove to be of great benefit to the whole project. If non-feasible technologies get scrapped early on, this can leave more resources available for those technologies that are feasible.

Assessing the feasibility of new technologies may facilitate the initial spread of the product or service derived from the affiliated research. This can help bring attention to the project and ultimately attract investors. When searching for potential investments, it is common to not only assess the worth of a firm through its assets and liabilities but also by taking a critical look at the practicality of the project itself. For example, assume a given USO's past quarter performance has not been very flattering on paper, a skilled investor may look past it and decide to give it a chance regardless, due to the trust generated by the high feasibility and novelty of the idea.

P2: Academic entrepreneurs with new technology feasibility assessment skills have a higher chance to receive funding for their university spin-off

2.4 The role of entrepreneur motivation on successful funding allocation

Although the founding was well received and the short-term capital objectives of the organization have been met, the question rumbles: Where did the money go, and was it a wise investment? For certain, not all organizations choose to spend their hard-earned funds in the same way, due to factors such as industry, market conditions, product nature, or simply different business strategies. Effective use of these funds is directly

corelated to high levels of motivation, since hard labor is required in order to attain the goal of a firm. Investors are aware of this, and the motivation levels of an entrepreneur can significantly tilt the direction of a pitch. This paper aims to investigate to what degree is entrepreneur motivation relevant in funding allocation.

After collecting data from USOs and interviewing prominent figures on the topic of funding allocation, a few categories should most likely arise. In order to keep an unbiased point of view, and to avoid the risk of the pre-construction of these variables influencing the interviewees, a structure shall not be built until after the collection of data. It is intended to conduct the analysis in a manner that would help investigate whether or not there might be a correlation between entrepreneur motivation and the success rates of a USO in terms of passing the threshold of credibility and potentially approaching or surpassing the sustainability threshold. This is relevant because it can guide future entrepreneurs when deciding on founding allocation in their own USO or when considering funding offers.

When considering whether or not to allocate funds to a USO, it is often encountered that investors invest not only in the idea but also in the individual behind the project. It is expected that not all things will go according to plan, but it is reassuring to know that this individual is willing to go far and beyond the call of duty, driven by high levels of motivation and determination. When motivated, whatever lacks the individual may have in other competencies, may be compensated through hard work.

P_3: USOs who have a motivated entrepreneur leading them to have higher chances to attract funding.

2.5 The role of having an experienced TTO on effective use of individual competencies

Research has been conducted by Joshua B. Powers, Patricia P. McDougall in 2005 analyzing the effects of an experienced TTO on USO success. This paper builds on their findings and tries to further bring light to the matter, by associating the presence of an assigned individual (TTO, advisors, mentors, etc.) with a university spin-off's leader motivation and ability to effectively make use of the individual competencies they already posses, and their effectiveness on funding allocation (Powers et McDougall, 2005).

Entrepreneurs often fail, due to emerging inhibitors, such as relational inhibitors. This refers to the individual incapacity (due to lack of experience) of an entrepreneur to identify the "right people" (Gümüsaya et Bohnéc, 2018). With the support of a skilled TTO, it may be that entrepreneurs feel more confident and motivated, resulting in a better use of individual competencies. Better use of individual competencies can potentially increase the likelihood of receiving funding in the early stages.

Entrepreneurship is a process and having someone experienced to oversee the process and get engaged in how certain things change over time, can offer a significant boost of morale to the entrepreneur at hand (McMullen et Demov,). By doing so, the entrepreneur may turn out to be more proficient in using his/her other competencies and could indeed benefit from the affiliation beyond the standard benefits commonly associated with TTO involvement.

The reasoning behind this construct is to discover how the presence of a TTO can help entrepreneurs make better use of their individual competencies. It is known from the work of Powers and McDougall that a TTO can greatly increase the likelihood of funding attraction and success of a USO, but what percentage of that improvement is simply a "placebo"?

P_4: The affiliation of a quality TTO has a positive effect on entrepreneur competency use.

2.6 The impact entrepreneurial competence has on the assessment of funding allocation

When receiving funding, capital is not the only criteria to assess. Who offers the money and under what conditions, are highly important aspects of funding attraction. Some investors may bring more benefits to the table, such as personal experience, networking opportunities, industry insight, and constructive advice or criticism while others are simply looking to make a return. Both can offer valuable capital to the USO, but an interested and engaged investor can bring higher value to the firm. Other investments may come with conditions that could potentially, later on, hinder the USO's development.

All previous competencies, to some extend build up to this proposition, since this one is not only focused on funding allocation but also on assessment of funding opportunities, in relation to the before mentioned entrepreneurial competencies.

Could industry knowledge and personal competencies aid an entrepreneur in making a better choice in such a situation? If so, one could know what to expect from investors or decide to develop such skills, in hopes of acquiring a smarter investment.

P_5: Entrepreneurial competence can aid entrepreneurs in acquiring better investment opportunities.

3. RESEARCH METHODOLOGY

3.1 Research Context: USO projects

The center of this paper will be university spin-offs and will specifically focus on the funding allocation and funds management by USOs. It is aimed at Dutch Universities and Dutch-based spin-offs. The Netherlands was rated as one of the best countries in the world for opening a business. Its legislation and policy make it easy to set up a business, therefore offering plenty of material for the purpose of this research. Even though it's a relatively small country in size, it has great economic power, and the results of this research can be considered relevant on a larger scale. (Nehra, 2020)

This paper's topic goes in line with the 10-year strategy implemented by the University of Twente (Shaping 2030) by addressing the entrepreneurial goal, of courage over comfort (University Of Twente, 2020). By making such information available to the public, students and members of the university may be more inclined to take a courageous move over a comfortable one and decide to start their own USO.

One of the goals of the Dutch research council is to bring forth and support innovations that have both scientific and societal relevance (NWO, 2019). A study on USO funding acquisition is both relevant to the scientific world, as mentioned

in the introduction, where the wide interest in the topic is presented, and to society, by bringing ground-breaking technologies into the hands of the public.

3.2 Definitions of constructs

This study derives several propositions based on state-of-art scholarly literature on academic entrepreneurship. To conduct a comprehensive analysis, it is necessary to define the main theoretical constructs:

Proposition$_1$ - The interviewees will be asked to share their experiences in relation to market potential assessment, and about the importance of this competence in the field (in relation to attracting funding) through some predefined interview questions, but they will be allowed to speak freely as well.

IV: In this study, market potential assessment competence is defined as the ability to conduct a comprehensive analysis of the current market conditions and main players involved, based on the study by Danneels (2016). It is expected that this competence will positively contribute to the amount of funding received.

Outcome: The amount of funding received.

It is assumed that market potential has a positive effect on the amount of funding received or on the potential to receive anything at all. As a variable, we will investigate whether or not, experts believe that an entrepreneur who possesses this competence has a clear advantage over another in a similar situation. No exact value of an investment will actually be investigated, and the interview questions will not be aimed at a specific USO, but rather be addressed in general terms. This is valid for all the other variables. There is indeed the possibility that interviewees will make reference to a specific USO (most likely the one they dealt with) which is totally fine since, at the same time, they have the option to address other USOs they observed or interacted with. The choice will be in the hands of the interviewee.

Proposition$_2$ - The interviewees will be asked to share their experiences in relation to new technology feasibility assessment, and about their importance of this competence in the field (in relation to attracting funding) through some predefined interview questions, but they will be allowed to speak freely as well.

IV: In this study, new technology feasibility assessment competence is defined as the ability to determine whether or not new technologies are able to bring added value to customer lives without otherwise disrupting them, and by performing according to specifications, based on the study by Danneels (2016). It is expected that this competence will positively contribute to the amount of funding received.

Outcome: The amount of funding received

By new technology feasibility assessment, it is referred to the entrepreneur's capacity to estimate whether or not a certain technology, discovery, or concept has the potential of having an impact on the market. It is investigated whether or not it can aid in attracting funding. This is relevant to early-stage success because it can influence the go/no-go decision of an entrepreneur, resulting in either a good idea being brought to life or a bad one not being pursued, resulting in a waste of valuable resources.

Technology can be considered feasible when it doesn't cause any problems to the user, those who make use of the technology do not directly suffer from it, and ultimately that it works as described and that it performs up to the national and international standards that may apply in the said industry.

Proposition$_3$ - Characteristics of entrepreneur motivation: willingness to take risks, passion for the business and the concept behind it, willingness to work hours beyond the normal requirements of the position, etc.

The interviewees will be asked about the importance of entrepreneur motivation in funding allocation, with the help of some predefined questions, while still being allowed to speak freely.

IV: In this study, entrepreneur motivation is defined as a state of mind or a feeling that drives an individual to perform at the best of their capacity all for the sake of attaining the desired outcome. It is expected that this competence will positively contribute to the amount of funding received.

Outcome: The amount of funding received.

Different entrepreneurs may be equally motivated and proceed on taking different actions, as some would see motivation as putting in as many hours as possible, while others would consider motivation, willingness to take risks, and giving up on safety nets, such as 9 to 5 jobs or not by putting their own capital at risk, all for the sake of the firm. To define entrepreneur motivation, we must consider both sides of the calculation, as equal and not mutually exclusive. Motivation is a state of mind or a feeling that drives an individual to perform at the best of their capacity all for the sake of attaining the desired outcome.

Proposition$_4$ - The interviewees will be asked a dichotomous filtering question, clarifying if they ever received support from a TTO if they received any degree of mentoring at all (or if they have ever witnessed it). Those answering negatively will be asked if they believe the association with an experienced TTO would have offered them a boost in motivation, or if they observed an impact on other USO founders. If they answer with a positive answer, they will be asked to share their opinion on how their levels of motivation were influenced by the IV.

IV: Presence of a quality TTO (or similar counterpart)

Outcome: Entrepreneur competencies

This metric will not directly investigate the impact competencies have on funding allocation, but rather the impact a TTO can have on the performance of entrepreneurs. Intriguing about this metric is the fact that it is not the job of a TTO to ensure

adequate use of entrepreneur competencies but has the potential to do so, increasing the morale of the entrepreneur and serving as a champion figure. The study "How can universities facilitate academic spin-offs? An entrepreneurial competency perspective" by Rasmussen in 2015 it is emphasized the important role a championing individual plays in USO success (Rasmussen & Wright, 2015). There is potential for a quality TTO to fulfill this in part or in full (based on the circumstances and the quality of the TTO) this duty. By doing so, the entrepreneur will be more confident and therefore more inclined to make full use of their already existing competencies, resulting in a better quality of funding opportunities.

Propositions: Entrepreneurial competencies can aid in acquiring better quality investment opportunities.

Characteristics of Quality Investment Opportunities: better cost of capital, investors bringing to the table more than only capital (skills, network, expertise, etc), and fewer shortcomings as a result of contractual deals.

Interviewees will be asked about the impact individual competencies have on assessing investment opportunities, through a set of predefined questions while still being allowed to speak freely.

IV: In this study, entrepreneurial competencies are defined as any individual abilities that can help a USO funder, such as industry knowledge, experience and so on. It is expected that this competence will positively contribute to the amount of funding received and more precisely on the quality of opportunity. A higher level of opportunity quality can be understood by anything that is more beneficial to the USO, such as better interest rate, affiliation with an experienced investor who brings to the table much more than just capital and so on.

Outcome: Quality of investment opportunities.

Entrepreneurial competencies are defined for the purpose of this paper as any competency that has brought an obvious benefit to the organization that is being managed by the one in possession of the said competence. It is more or less up to the interpretation of the interviewee what is considered an individual competence, with the only restriction being made is not to refer to financial competencies, due to the obvious and undauntable benefit such competence brings. Having financial knowledge is helpful in assessing investment opportunities, but this sort of competence does not go in line with what this research is trying to investigate.

The interview sentences will be rated as "0" (no effect or negative effect on outcome) or "1" (positive effect on outcome).

3.3 Data collection

The data for this paper will be collected in the form of interviews with experts in the field, and individuals who have experienced forming and operating a USO. Due to the delicate nature of the topic, qualitative data was preferred over quantitative information, since an expert's opinion was far more valuable than that of a large group of inexperienced individuals and therefore can help to develop a comprehensive understanding.

Qualitative data typically studies the very few high-performing firms because of the great quality of information that can be derived from these firms (Mathisen & Rasmussen, 2019).

Ideally, the selection of interviews will be conducted with individuals from a range of industries and different cultures. Variety and diversity are key to collecting a representative set of information and attaining relevant results. The people being interviewed can be involved in USOs directly or indirectly, meaning that not every person that will be interviewed will be a founder of a USO, but also potentially a TTO, affiliated professor, or another expert in the field.

The data collected from the conducted interviews will be received in the form of a video or audio recording (considering the preference of the person being interviewed). This will need to be coded into the framework of the provided independent variables and dependent variables mentioned in section 3.2. The audio will be transcribed, and the resulting text will be interpreted, with the goal of quantifying the experiences and emotions of those being interviewed.

3.4 Analysis

The analysis of the collected interview data will be conducted through content analysis. This research tool can be used to quantify and analyze the meaning of certain concepts. When looking at content analysis, we can divide it into 3 types: basic, interpretive, and qualitative (Drisko and Maschi, 2015). In this paper, a mixture of interpretive and qualitative content analysis will be used to extract information from the interview data. To examine the role of key success determinants, the content analysis was conducted using a proposed theoretical framework. The analysis also focused on inductively deriving additional USO development process constructs in order to enrich the understanding of the USO development process.

4. Results

This section has the goal of presenting the main findings of this research and elaborating on the decoding of the interviews. Initially, approximately 30 companies were contacted via e-mail or via direct approach where possible. In total, 6 individuals responded positively to the interview offer and agreed to take part in the study. The 6 individuals who were willing to take part in the research, were all experts in the field and possessed extensive experience in the matter, and therefore, 6 are sufficient for the research. In the table from figure 3, the results are displayed, with "I" on the left (representing the respective interviewee) and "V" on the top (representing the corresponding variable). The subjects managed to agree only upon two of the proposed variables, more precisely market potential assessment and entrepreneur motivation, with the unanimous decision that these factors indeed have a positive effect on funding allocation. With regard to the other aspects, the opinions were divided, with the most controversial being the impact the presence of an experienced TTO has on the efficient use of entrepreneur competencies. The interviewees all agreed about the importance of the role a TTO plays within a USO, but some argued that it is not the role of a technology transfer officer to help bring out or support the individual competencies of an entrepreneur.

While the remaining two variables were partially contested, the overall view on the impact those factors play on USO development and funding attraction was not as divided, and are potentially influenced by subjective factors, such as industry or individual experiences. When assessing the impact of entrepreneur competencies on the quality of investment opportunities and better attraction of funding, I5 and I6 argued that even if such skill may be useful, in many cases it can be neglected due to the lack of opportunity entrepreneurs have access to in the early stages of USO existence, quote: "it is important to consider an offer, but most of the time they will have to accept it when receiving one". On one side, this statement is logical and relevant, but on the other side, this does not mean that individual competencies do not have an impact on the quality of investment opportunities, but rather that it is not relevant if these competencies are helpful or not, since in this stage – crossing the threshold of credibility (Vohora et al., 2004) – an entrepreneur doesn't have much of a choice since the survival of the firm may depend on this investment.

Interviewee	V1	V2	V3	V4	V5
I1	1	1	1	0	1
I2	1	1	1	1	1
I3	1	1	1	0	1
I4	1	1	1	0	1
I5	1	1	1	1	0
I6	1	0	1	1	0
% AGREED	100.00%	83.33%	100.00%	50.00%	66.67%

Figure 3. Overview of results

4.1 THE ROLE OF MARKET POTENTIAL ASSEMSENT

According to our research, market potential assessment is a crucial competence that has great potential in aiding entrepreneurs to acquire funding. The overall feedback was positive on the matter.

It was repeatedly emphasized by the interviewees how important market potential assessment is in order for a firm to generate a turnover: "Well, it (market potential assessment) is crucial because, without any market potential, there is no turnover".

I6 expressed concern over the matter, but overall the general feeling about the importance of this competence was positive: "It will help with gaining income but not necessarily with funding since the assessment doesn't really attract investors" Followed by " However, showing investors that there is a good market potential could help with funding".

4.2 THE ROLE OF NEW TECHNOLOGY FEASIBILITY ASSESSMENT COMPETENCE

With five out of six interviewees recognizing the impact of new technology feasibility assessment, this variable has a strong basis and appears to play an important role in funding acquisition. Interviewee 6 considered that new technology feasibility assessment is indeed a very important competence to have, and it can be beneficial in many situations, but not when it comes to acquiring funding in the early stages. Interviewee 6 claims that other competencies, such as "explaining how the company will generate income" are far more important for an entrepreneur.

With an overall positive response rate, this construct supports what previous research discovered about team competencies (Danneels, 2016) and proves that it is also applicable on an individual level. The weight of the counter argument is more contextual, meaning, it is probably more department/industry specific for the particular role the interviewee played in the USO. Overall the relatively negative response from one of the participants is no reason to deny the premise, and it is still safe to assume that it indeed can play a vital role in acquiring funding.

4.3 THE ROLE OF ENTREPRENEUR MOTIVATION

Entrepreneur motivation is another construct upon which the interviewees unanimously agreed upon. It appears that motivation is a key trait of an entrepreneur that can most certainly correlate to easier access to funding.

The interviewees stated that not only motivation is crucial for the job to be done, but, most of the time, investors are looking for commitment, since this can provide a better guarantee over the safety of their capital. Commitment is a great driver for motivation (Tasnim et al., 2013), also as stated by interviewee I4: "Entrepreneur commitment is important for investor's trust in start-up".

In the harsh world of university spin-offs, it often enough happens that entrepreneurs face lots of denial and skepticism from those around them. This can significantly deter the drive of an individual, and more than often it comes down to pure motivation to be the main driving force that convinces entrepreneurs not to quit.

4.4 THE ROLE OF THE PRESENCE OF AN EXPERIENCE TTO

This variable is the most debated one, with half of the participants recognizing its importance when considering the effective use of entrepreneur competencies. Even though some argued that a TTOs presence can be beneficial, most interviewees considered that it's not the role nor the purpose of a TTO to aid entrepreneurs in developing their personal competencies, but rather to oversee the transfer of technology, "I am not telling you that it is not important, but I don't think it is part of the TTO's role."

A potential reason why opinions on the effectiveness of a TTO on competency use are divided, may also originate from the fact that most entrepreneurs are not awake of the availability of help coming from a TTO, as a study from 2016 suggests (Lee, S. M., & Lee, B. , 2015). This may result in the effects of TTOs not always being acknowledged due to not widespread use among less experienced entrepreneurs. On the other hand, the subjects were having extensive experience when it comes to working with USOs, except for one of them who was a relatively new figure in the academic entrepreneurial scene, to be more precise, I2, whose opinion on the matter of TTO effect on individual competences was positive.

4.5 THE ROLE OF ENTREPRENEURIAL COMPETENCIES

In the case of entrepreneurial competence, opinions were also quite divided. The main argument against this construct was that even if relevant, in most cases individual competencies would not be of much use, considering that most USOs don't have the luxury of turning down offers. This was one of the most surprising discoveries, as it provided a different perspective on the matter, not considered prior to conducting the research.

Prior research testified to the importance of such competencies within a team (Danneels, 2016), and apparently, we are prone to believe that it is not sufficient for the entrepreneur to be the sole possessor of such skills. The experts expressed their concerns about whether or not it is sufficient for only the leader of a USO to possess these individual competencies.

5. DISCUSSION

The findings from the previous section require a fair bit of explanation and interpretation. The different competencies have different levels of impact based on where the company finds itself on Vohora's Framework.

Past research emphasizes the importance of team-spread competencies such as market potential assessment and new technology feasibility and the role such skills play in USO success (Danneels, 2016). The analysis of the interview data revealed that in most cases, it is sufficient for one individual, leading the firm to possess these skills, most likely due to the generally small size USOs have in the early stages of their development. From these findings, entrepreneurs looking to start a USO, may get a better understanding of the importance of these competencies and choose to further develop them before embarking on their entrepreneurial journey.

Technology Transfer Officers play a significant role in the early stages of USO development and are great at helping businesses take off, by ensuring a quality transfer of technology (Powers et McDougall, 2005). Unfortunately, when it comes to improving the effective use of individual competencies, TTO does not provide a significant benefit. This makes sense, considering this is not the task they are assigned to do.

Entrepreneur motivation appears to be one of the biggest drivers when it comes to individual competencies that can air in acquiring funding. It appears that often investors invest not only in great ideas but also in great individuals. In order for potential entrepreneurs to avoid future disappointments and to reduce the risk of wasting valuable time and resources, it would be recommended not to embark on such a journey without first ensuring that their motivation levels are not high enough. A high level of individual motivation has the potential of increasing team morale as well, which is known of increasing success rates among USOs (Hossinger et al., 2021).

Possessing entrepreneurial competencies can help assess these funding offers in the early stages, and according to the experts we interviewed, sometimes market knowledge can make up for financial knowledge. It also appears that most experienced USO founders find this trait valuable, so it is recommended for those just starting up, to sharpen their entrepreneurial competencies as they have a better chance of making the right decisions and attracting investors.

5.1. Theoretical Implications

The findings of this paper confirm the results of previous studies in the context of Dutch universities with a relatively high affinity for entrepreneurship and build upon the existing fin dings by bringing further light upon the underlying conditions and the interplay between them. In particular, brings light upon few of the parameters involved in crossing the threshold of credibility, in Vohora's framework. It also brings novel insight upon the effectiveness of Danneel's competencies on an individual level and how they can help acquire funding in the early stages.

In the direction of entrepreneur motivation, this paper further explores what previous scholars confirmed to be a vital team competency, but from the perspective of individual competencies (Powers et McDougall, 2005). Additionally this paper also explores the importance of entrepreneurial competencies in general in the context of USO funding allocation.

5.2. Practical Implications

This study presents also several important practical implications for academic entrepreneurs, managers of high-tech ventures and policy-makers. Specifically, this research study identifies the importance of market assessment and keeping a high level of motivation and that it is necessary to rise awareness upon these competencies. Previous literature stated its importance and this paper confirmed it through qualitative research. Entrepreneur motivation is an essential trait, that new USO funders must not underestimate, considering the high amounts of labor required in the early stages of a firm.

Funding programs treat all USOs equally, meaning they have the same approach to all businesses. It would be advisable to take into account the different needs of various entrepreneurs since it is more about the individual abilities of entrepreneurs. This research proves that certain competencies are more relevant than others, and this is something policymakers should keep in mind.

Finally, the findings indicate that in order to create new sustainable and impactful business solution, USO needs to make sure the technology they are trying to bring to the market is feasible. This is extremely relevant, because otherwise they run the risk of bringing forth a technology that is not in as much demand as it was initially forecasted, resulting in wastage of valuable resources.

6. LIMITATIONS AND FURTHER RESEARCH

This study was conducted with USOs affiliated with the University of Twente, which happens to be one of the most entrepreneurial universities in the Netherlands and in the world. The university is hosting every year the " University of Twente Entrepreneurial Challenge" an event where various prizes are being offered for different categories with the goal of motivating student entrepreneurs. The university is also providing an array

of support programmers, all aimed at easing the entrepreneurial journey. One potential drawback of this study may be that it was conducted on an institution that is most likely more entrepreneurial than the average Dutch or European university. A study conducted at a different university where entrepreneurship is not regarded as such an important topic may yield different results.

Due to the nature of this study, a causal statistical test cannot be conducted. For further research, it may be interesting to check the results in a more empirical way, that would allow for regression analysis. This may potentially support or contest the findings of this paper.

In this study, student entrepreneurship is assessed at Dutch technical universities with strong entrepreneurial ecosystems. As a result, this study suggests future research to analyze the impact of student-USOs' entrepreneurial competencies on regional economic and societal outcomes.

In this paper, five competencies have been investigated, leaving out a sum of other competencies that may potentially have a great influence on the success rates of USOs, such as technological competence or customer competence (Danneels, 2016).

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Appendix: Interview Questions

Can you please explain why market potential assessment is important and how it helps in venturing activities (or how it helps to attract funding)?

Can it help attract funding later on?

Can you please explain why new technology feasibility is important and how it helps in venturing activities (or how it helps to attract funding)?

Can it help attract funding later on?

What role does entrepreneur motivation play in attracting funding in the early stages of a USOs existence?

What impact can an experienced TTO have on the effective use of individual competencies, like the ones mentioned before?

How important is it to assess funding offers? (Knowing when to accept an offer and knowing when to turn one down)

Results of Interviews:

	IV	Effect	DV
Results:	Market potential assessment competence	Has a positive effect on	Amount of funding received
	New technology feasibility assessment competence	Has a positive effect on	Amount of funding received
	Entrepreneur motivation	Has a positive effect on	Amount of funding received
	Presence of a quality TTO	Doesn't have a significant effect on	Entrepreneur competencies
	Entrepreneurial competencies	Have a positive effect on	Quality of investment oportunities

Figure 4. Results of Interviewee 1

	IV	Effect	DV
Results:	Market potential assessment competence	Has a positive effect on	Amount of funding received
	New technology feasibility assessment competence	Has a positive effect on	Amount of funding received
	Entrepreneur motivation	Has a positive effect on	Amount of funding received
	Presence of a quality TTO	has a positive effect on	Entrepreneur competencies
	Entrepreneurial competencies	Have a positive effect on	Quality of investment oportunities

Figure 5. Results of Interviewee 2

	IV	Effect	DV
Results:	Market potential assessment competence	Has a positive effect on	Amount of funding received
	New technology feasibility assessment competence	Has a positive effect on	Amount of funding received
	Entrepreneur motivation	Has a positive effect on	Amount of funding received
	Presence of a quality TTO	Doesn't have a significant effect on	Entrepreneur competencies
	Entrepreneurial competencies	Have a positive effect on	Quality of investment oportunities

Figure 6. Results of Interviewee 3

	IV	Effect	DV
Results:	Market potential assessment competence	Has a positive effect on	Amount of funding received
	New technology feasibility assessment competence	Has a positive effect on	Amount of funding received
	Entrepreneur motivation	Has a positive effect on	Amount of funding received
	Presence of a quality TTO	Doesn't have a significant effect on	Entrepreneur competencies
	Entrepreneurial competencies	Have a positive effect on	Quality of investment oportunities

Figure 7. Results of Interviewee 4

	IV	Effect	DV
Results:	Market potential assessment competence	Has a positive effect on	Amount of funding received
	New technology feasibility assessment competence	Has a positive effect on	Amount of funding received
	Entrepreneur motivation	Has a positive effect on	Amount of funding received
	Presence of a quality TTO	Has a positive effect on	Entrepreneur competencies
	Entrepreneurial competencies	Don't have a significant effect on	Quality of investment oportunities

Figure 8. Results of Interviewee 5

	IV	Effect	DV
Results:	Market potential assessment competence	Has a positive effect on	Amount of funding received
	New technology feasibility assessment competence	Doesn't have a significant effect on	Amount of funding received
	Entrepreneur motivation	Has a positive effect on	Amount of funding received
	Presence of a quality TTO	Has a positive effect on	Entrepreneur competencies
	Entrepreneurial competencies	Doesn't have a significant effect on	Quality of investment oportunities

Figure 9. Results of Interviewee 6