

# **The impact of TTO on institutional entrepreneurial culture formation**

*A case study of KU Leuven Research & Development*

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The impact of TTO on institutional entrepreneurial culture formation - A case study of

KU Leuven Research & Development

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## **Abstract**

This master thesis looks into the impact of the establishment and development of the TTO on the institutional entrepreneurial culture formation. By applying a qualitative single-case design, this thesis examines the relevant documents and conducts semi-structured interviews to study the issue of entrepreneurial culture formation. Furthermore, this thesis also addresses the questions of the roles of the TTO, and the obstacles the TTO faces regarding entrepreneurship and institutional culture. The analytical framework employed is a combination of Schein's (1984, 2004) three levels of culture and the entrepreneurial orientation proposed by Lumpkin and Dess (1996). The findings indicate that a well-established and proactive TTO does not only facilitate the entrepreneurship at the operational level; it also becomes an indispensable unit embedded in a larger entrepreneurial ecosystem that has considerable impact on entrepreneurial culture of the institution. The TTO has multiple roles to play, and transforming the mainstream culture at a more rapid pace is a great challenge.

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# Table of Contents

<b>Abstract</b> .....	<b>V</b>
<b>Acknowledgements</b> .....	<b>VI</b>
<b>Table of Contents</b> .....	<b>VII</b>
<b>List of abbreviations</b> .....	<b>IX</b>
<b>Tables</b> .....	<b>X</b>
<b>Figures</b> .....	<b>XI</b>
<b>1 Introduction</b> .....	<b>1</b>
<b>1.1 Background</b> .....	<b>1</b>
<b>1.2 Research problem</b> .....	<b>1</b>
<b>1.3 Research question</b> .....	<b>2</b>
<b>1.4 Research design</b> .....	<b>2</b>
<b>1.5 Thesis structure</b> .....	<b>3</b>
<b>2 Theoretical and analytical framework</b> .....	<b>4</b>
<b>2.1 Literature review and theoretical framework</b> .....	<b>4</b>
2.1.1 Universities and changing environment.....	<b>4</b>
2.1.2 Universities and organizational change .....	<b>5</b>
2.1.3 Organizational change - technology transfer office.....	<b>6</b>
2.1.4 Entrepreneurial universities and institutional culture .....	<b>9</b>
<b>2.2 Conceptual and analytical framework</b> .....	<b>12</b>
2.2.1 Entrepreneurship.....	<b>12</b>
2.2.2 Culture.....	<b>17</b>
2.2.3 Analytical framework.....	<b>20</b>
<b>3 Methodology</b> .....	<b>23</b>
<b>3.1 Research design</b> .....	<b>23</b>
<b>3.2 Case Selection</b> .....	<b>24</b>
<b>3.3 Data collection and analysis</b> .....	<b>25</b>

3.3.1 Documents.....	25
3.3.2 Interviews.....	27
<b>3.4 Criteria for interpretation of the findings .....</b>	<b>29</b>
3.4.1 Validity .....	30
3.4.2 Reliability .....	30
3.4.3 Ethical considerations.....	31
<b>4 Empirical setting .....</b>	<b>32</b>
4.1 KU Leuven .....	32
4.2 KU Leuven Research & Development (LRD) .....	34
4.3 Leuven Community for Innovation Driven Entrepreneurship (Lcie).....	41
<b>5 Findings and Discussion .....</b>	<b>43</b>
5.1 Autonomy.....	43
5.2 Innovativeness.....	44
5.3 Risk taking.....	46
5.4 Proactiveness .....	49
5.5 Competitive aggressiveness .....	51
5.6 Entrepreneurial ecosystem .....	52
<b>6 Conclusion .....</b>	<b>54</b>
<b>References .....</b>	<b>59</b>
Documents and websites used for analysis.....	59
General references.....	59
<b>Appendix .....</b>	<b>65</b>



## List of abbreviations

TTO	Technology transfer office
KU Leuven	Leuven Katholieke Universiteit Leuven
LRD	KU Leuven Research & Development
PiP	Product Innovation Project

## Tables

<b>Table 1</b> Entrepreneurial orientation of higher education institutions.....	<b>17</b>
<b>Table 2</b> Source of evidence .....	<b>26</b>
<b>Table 3</b> Interview respondents.....	<b>28</b>
<b>Table 4</b> Case study tactics for four design tests.....	<b>29</b>
<b>Table 5</b> Employment in KU Leuven.....	<b>33</b>
<b>Table 6</b> Student degree population.....	<b>33</b>
<b>Table 7</b> KU Leuven 2014 operating revenue.....	<b>33</b>

## Figures

<b>Figure 1</b> How a technology is transferred from a university to a firm or entrepreneur .....	7
<b>Figure 2</b> Levels of culture.....	19
<b>Figure 3</b> Illustrated framework to study entrepreneurial culture .....	21
<b>Figure 4</b> LRD central staff structure .....	35
<b>Figure 5</b> Research collaboration agreements (not accumulated) .....	36
<b>Figure 6</b> LRD patents 2004-2014 .....	37
<b>Figure 7</b> LRD licensing income 2004-2014 .....	37
<b>Figure 8</b> Accumulated total spin-offs 2004-2014 with KU Leuven investment .....	38
<b>Figure 9</b> Total investments in spin-offs 2005-2016.....	39
<b>Figure 10</b> LRD total revenues 2004-2014.....	39



# **1 Introduction**

## **1.1 Background**

Clark Kerr remarked on the concept of multiversity at his Godkin Lectures at Howard University back in 1963. Growing with the rapid changing environment, the transformation of the university took place continuously from a single community of masters and students with a single vision to a multiversity that “the university is so many things to so many different people that it must, of necessity, be partially at war with itself” (Kerr, 2001, p.7). Addressing the growing imbalance of environment-university relationship (less money, more missions), Burton Clark (1998) brought up the concept of entrepreneurial university to offer a formula for universities to control their own destinies. The ever-increasing demands from the society can easily outrun universities’ capacity to respond. Entrepreneurial universities take on substantial organizational change and build up their capacities in their own context to interact with the environment.

## **1.2 Research problem**

In Clark’s 1998 study about entrepreneurial university, he commented that the most difficult part of the analysis was to “grasp organizational ideas and beliefs and relate them to structures that support processes of change” (p.143). New institutional ideas and beliefs must be tested and proven to be valuable to become realistic. The realistic ideas then reflect universities’ capabilities. Many studies on entrepreneurial university are inline with Clark and claim that a unified entrepreneurial culture is crucial to develop an entrepreneurial university; at the same time scholars also raise concern that this aspect remains somewhat under-researched (Clark, 1998; Etzkowitz, 2008; Nelles & Vorley, 2010; Foss & Gibson, 2015). Departing from the point of entrepreneurial culture being a crucial element for entrepreneurial transformation of the university, this thesis wishes to explore the entrepreneurial culture formation during the organizational change process of the university.

### **1.3 Research question**

Organizational changes towards entrepreneurial universities can be seen in leadership, management, strategic planning and at the periphery of universities (Clark, 1988; Nelles & Vorley, 2010). Among the changes and the lately developed structures, entrepreneurial activities are most noticeable in areas of research commercialization, technology patenting, spin-off formation, and contract-program provision (Foss & Gibson, 2015). The technology transfer offices (TTOs) sprouted around 1980s are the centers for research commercialization. The TTO is created to protect the university's intellectual properties, and serves as an intermediary between the university and the industry for the potential financial gains (Siegel, Waldma, Atwater & Link, 2003; Siegel, Veugelers & Wright, 2007; Sadek, Kleiman & Loutfy, 2015). With the TTO being a facilitator of fostering entrepreneurship in the university, the institutional culture could be influenced or changed over time. Thus, this thesis focuses on the organizational development of the TTO and its possible impact on the formation of institutional entrepreneurial culture within the university. A core research question and two sub-questions are formulated as following:

- *What is the impact of the TTO on institutional entrepreneurial culture formation?*
  - What role does the TTO play in shaping institutional entrepreneurial culture?
  - What are the obstacles to achieve a unified institutional entrepreneurial culture?

### **1.4 Research design**

This thesis employed a single-case study design, and selected the TTO of Katholieke Universiteit Leuven (KU Leuven) as a study object. The TTO established in 1972 in KU Leuven is an information-rich case on entrepreneurship. According to Thomson Reuters ranking, KU Leuven has won the title of being the most innovative university in Europe in 2016 and 2017 consecutively. The major indicators used for assessing the universities are research paper citations and patent filings. Researchers in KU Leuven have filed more patents than other European universities, and their research papers are frequently cited by

other researchers (Ewalt, 2017a). To answer the proposed research questions, this thesis adapted the entrepreneurial orientation developed by Lumpkin and Dess (1996) and used it as a guideline to depict the processes and practices of entrepreneurship at individual and organizational level in the university; combining with the three levels of culture proposed by Schein (1984) to explore the existence of entrepreneurial culture in levels of artifacts, espoused beliefs and values, and basic assumptions. This thesis wished to study the underlying institutional-culture aspects that lead to entrepreneurial performance. In so doing, analyzing relevant documents and conducting interviews both with staff of the TTO as well as academics with entrepreneurial experience were the two major approaches.

### **1.5 Thesis structure**

Following is the organization of this thesis: Chapter two is divided into two major sections. A literature review and conceptual framework on the recent studies of entrepreneurial university and technology transfer office are provided in the first section. A conceptual and analytical framework on entrepreneurship and culture are presented in the second section. The methodological approaches employ for this thesis is described in detail in the third chapter. Chapter four provides facts and figures of the study object – KU Leuven and its TTO. Chapter five discusses the findings and analysis of the selected documents and interview content. A conclusion is summarized in the last chapter.

## **2 Theoretical and analytical framework**

In this chapter, two sections are covered: literature review and theoretical framework, and conceptual and analytical framework. In the first section, recent studies on the concept of entrepreneurial university, organizational change of the university, and the development of the TTO are reviewed. In the second section, the concepts of entrepreneurship and culture are addressed individually to develop a suitable analytical framework for this research.

### **2.1 Literature review and theoretical framework**

#### **2.1.1 Universities and changing environment**

Universities have long institutional history, and the changing environment has always been a push factor for universities to adopt adjustments. In the era of knowledge economy, the boundary of knowledge production becomes vague between the industry and the university. When the production shifts from tangible goods to intangible and information goods; when the market demands highly skilled labors; it is logical for the universities to involve in the new knowledge economic regime (Powell & Snellman, 2004) since knowledge has long being the building blocks of the universities (Clark, 1983).

However, for conventional universities to participate in the knowledge economy, a substantial organizational change is unavoidable. The concept of entrepreneurial university hence provides an alternative formula for universities to sustain. By going through substantial organizational changes, the entrepreneurial universities can build up their capacities in their own context to interact with the environment (Clark, 1998). In higher education, entrepreneurship is often labeled with university's engagement in the so-called third mission. Third mission of university refers to academic activities (teaching and research) that contribute to economic development of the society. The third mission



activities are carried out in a new form of institutional arrangement – a triple helix model of relationships between university, government and industry (Etzkowitz & Leydesdorff, 2000; Etzkowitz, Webster, Gebhardt & Terra, 2000). Entrepreneurial activities or third mission activities are often heard in the following forms: patents invention, spin-offs formation (knowledge transfer through entrepreneurship), cooperative researches with industry or public bodies, provision of training courses for companies, participation in policy-making (providing expertise), engagement in societal and cultural life of a region by providing campus facilities and holding events, etc. (Laredo, 2007). To precisely delineate the scope of the third mission is not simple, largely due to the overlaps of the mission content. The missions are essentially rooted in educational (first mission) and research (second mission) forms (Jongbloed, Enders & Salerno, 2008); the add-on economic value for the universities taking on third mission has become attractive in the era of massification of student enrollment and decreasing financial support from the state.

Most of the universities to a certain degree have participated in the third mission activities; nevertheless, how are some labeled as entrepreneurial universities and some not? Bertrams (2007) expressed that the label of entrepreneurial university appeared when universities formalized and institutionalized the economic activities and imposed those practices to the university as a whole. Being stamped as entrepreneurial universities might not be appreciated when the commercialization aspect is negatively link to the identity of the university. The negative conception generally is associated with the culture of the society, and how the general public conceives the identity of the university.

### **2.1.2 Universities and organizational change**

In a constant changing environment, universities have gone through continual organizational changes and created various identities. Olsen (2007) stylized four visions of universities illustrating different functions, organizations, and governance. Universities could be a rule-governed community of scholars, an instrument for national political agendas, a representative democracy, or a service enterprise embedded in competitive markets. It is frequent that universities portray combinations of different visions.

Traditionally, Universities as organizations are internally controlled by professoriate and externally relied on government. The organization processes are of minor importance, thus the universities are regarded as specific organizations (Musselin, 2006; Krücken & Meier, 2006). The organizational change can be seen from the shifting positions of autonomy, the constitutive logics of identity, the assessment processes, and the reasons for changes (Olsen, 2007).

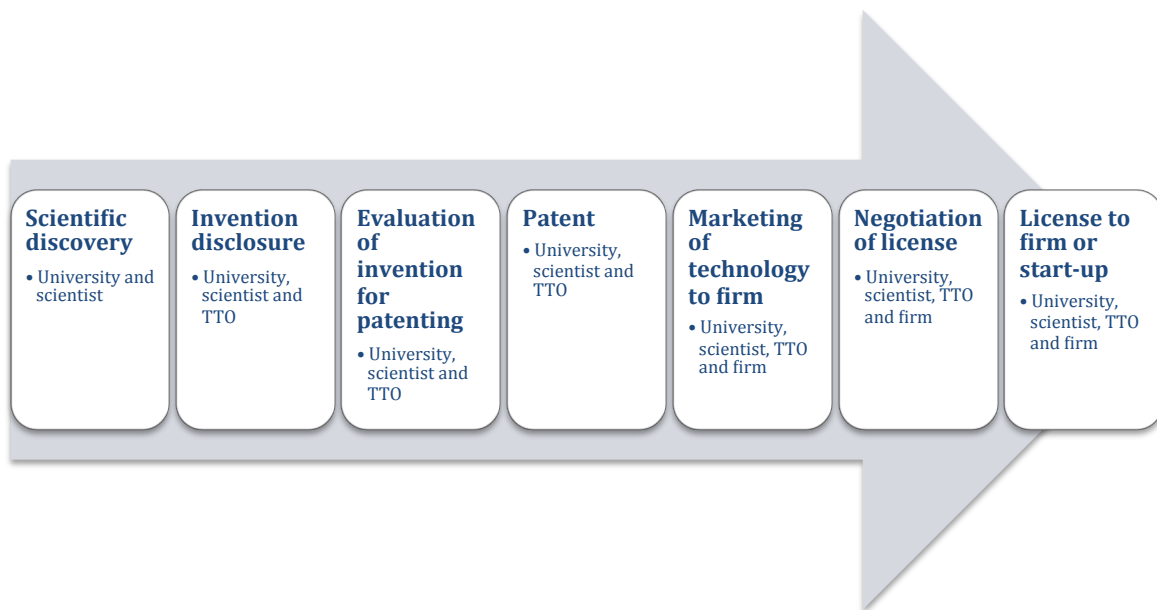
Since the second half of the 20<sup>th</sup> century, regions and nations have been experiencing the rising competitiveness for economic growth in the global context. Universities as centers for knowledge creation have been pressured to take on the role as drivers in the knowledge economy (Olssen & Peters, 2005). Recent organizational changes include the emphasis on quality assurance, the articulation of missions and goals, the employment of management models, and the expansion of university structures to encompass wider missions (Krücken & Meier, 2006). It could be argued that universities are changing from being social institutions to universities as industries (Gumport, 2000). It could also be seen as a phenomenon of academic capitalism (Slaughter & Leslie, 1997) that universities involve in market-like behaviors. Entrepreneurial universities arise from a climate that continuous systematic change within the universities is crucial to cope with expansion of higher education institutions and conditions of financial constraints. Being distinct from the traditional research universities, entrepreneurial universities can be seen as a new organizational archetype of being more efficient, more effective and more competitive (Pinheiro & Stensaker, 2014).

### **2.1.3 Organizational change - technology transfer office**

One major organizational change in the entrepreneurial turn of the universities is the introduction of technology transfer office (TTO). Around 1980s, more and more universities established the TTOs to protect their intellectual properties. TTOs are created for the vision of potential financial gains for both universities and the industry. The TTO serves as an intermediary between the university and the industry. It is a facilitating unit for the technology transfer process that bridges the gap between the research and the

commercialization. The TTO as a business unit of the university has impact on the revenue of the university and the economic growth of the society (Siegel et al., 2007).

It is constructive to understand the process of technology transfer for the benefit of document analysis and interviews in the later stage of this research. A basic university-industry technology transfer process takes place in cooperation with the TTO can be illustrated as **Figure 1** (Siegel et al., 2003). It starts with a science discovery of a researcher or a team in the university. The researcher then files an invention disclosure with the TTO. The TTO then evaluate whether to patent the innovation or not. Once the decision is made, the university applies for either global patent protection or domestic patent protection. After the patent is granted, the TTO can license the technology. When there are private firms interested in the technology, the TTO then negotiate the licensing agreement for the intellectual property. With a successful negotiation, the innovation can eventually convert to a commercial product.



**Figure 1** How a technology is transferred from a university to a firm or entrepreneur.  
Source: Siegel et al., 2003, p.114

There are various ways of how universities house their TTOs. Three major structures are (Markman, Phan, Balkin & Gianiodis, 2005):

- (1) Traditional university structure: The TTO is a department within the university's administration structure. It usually reports to the office of Provost of research, and funded by the research office. The autonomy and decision making is usually limited by the university's administration.
- (2) Non-profit research foundation: The TTO is an independent unit outside of the university's administration structure. The TTO has their own board and their own budgetary system. The TTO enjoys greater autonomy in determining licensing strategy, holding equity in start-up companies.
- (3) For-profit research extension: The TTO can either be a part of the university's structure or a research foundation with a private venture extension. The TTO has a separate board and enjoys the greatest autonomy.

How the universities house their TTOs affects their autonomy and capability on technology transfer. The university's overall attitude has an impact on the performance of the TTOs.

Some growing trends of university technology transfer include the pressure for government's involvement in managing and investing in the intellectual property to create wealth for the university and the society; the strategies of the universities are shifting from licensing to create spin-off companies; and the culture and the attitude towards entrepreneurship activities in the university is changing more positively, etc. (Wright et al., 2004). Siegel et al. (2007) compiled a list of literature that shows correlation between the culture of the university, academics and the entrepreneurship activities such as spin-off formation. Some factors that influence the entrepreneurship activities are listed as following:

- Social norms and university's tacit approval on entrepreneurship (Roberts, 1991)
- Clear, well-defined strategy regarding entrepreneurship activities management (Lockett, Wright & Franklin, 2003)
- The organization and use of resources is critical for start-up creation and development. (Clarysee, Wright, Lockett, Van de Velde & Vohora, 2005)
- The history, experience and expertise of the TTOs have positive impact on entrepreneurship activities. (O'Shea, Allen, Chevalier & Roche, 2005)

- Financial incentives for academics are important. (Lockett et al., 2003)
- The academics' engagement in entrepreneurship activities is not necessarily in conflict with their publication productivity. (Lowe & Gonzalez-Brambila, 2007)

University's research is a great source of innovation. To translate the innovation to the commercial products, TTO plays a crucial role in the translation process. The success of the process depends on the research intensity of the university, the existence of entrepreneurial culture and a supportive entrepreneurial ecosystem (Sadek et al., 2015). Sadek et al. (2015) stressed that the effectiveness of TTOs is highly related to the existence of the entrepreneurial culture in the universities. To promote entrepreneurial culture requires both top-down and bottom-up initiatives. Göktepe-Hultén (2008) pointed out that the entrepreneurial activities are highly concentrated within a small number of individuals. However, these individuals can influence their immediate group members and spread the entrepreneurial spirit. The balance between top-down and bottom-up initiatives is critical. An empirical study (Philpott, Dooley, O'Reilly & Lupton, 2011) comments that top-down structure can be ineffective and sabotage the bottom-up academic entrepreneurial activities. Wrong incentives given from the management level and lack of communication can mislead the academic behavior. The study suggests that a balanced proportion on both hard (patenting/licensing, spin-off formation, and creation of technology park) and soft (contract research, industry training courses and consulting) entrepreneurial activities can alleviate the dichotomy of the academic community and decrease tensions between departments.

#### **2.1.4 Entrepreneurial universities and institutional culture**

The development of the TTO is an organizational change within the university in response to the entrepreneurial turn of the university. Reviewing the existing literature on entrepreneurial university in relation to institutional culture is also an important step to link the organizational change to the culture aspect.

Two terms appear frequently when searching for the literature of entrepreneurial university: innovative university and corporate university. These terms generally convey similar connotation to entrepreneurship. The word innovative is more appealing to the society due to the avoidance of the connection to profit generation (Clark, 1998). Corporate university often refers to universities that operate teaching and research activities based on financial judgments regardless the conventional value of academic freedom and autonomy, such as forming financial partnership with industry, performing contract research services, designing educational programs targeting the needs of the industry, adopting profit-oriented values, introducing corporate management styles, and promoting corporate culture, etc. (Nelson & Watt, 1999). Entrepreneurship encompasses both the dimension of innovation and corporatization. Entrepreneurial universities conducting commercialization of research can be viewed both as partners and competitors from the existing industry (Etzkowitz, 2008). Entrepreneurial universities take on substantial organizational changes and seek to position themselves to a more promising future; they are “significant actors on their own terms” (Clark, 1998, p.4).

Burton Clark (1998) back in 1990s investigated five European entrepreneurial universities and presented five “irreducible minimum” (p.5) that constructed the pathway to entrepreneurial transformation: strengthened steering core, expanded developmental periphery, diversified funding base, stimulated academic heartland, and integrated entrepreneurial culture. Entrepreneurial transformation requires universities undergoing substantial shift in organizational characters. The strengthened steering core refers to the need for a greater managerial capacity of the university in order to respond more rapidly and flexibly to the ever-expanding demand. The expanded developmental periphery refers to the new units that link the industry with academic departments, such as office of intellectual property, center of continuing education, and office of fundraising, etc. The features of these units are that they are mostly interdisciplinary and are easier to establish and diminish according to the needs of the mission. Risk-taking behavior is noted here due to the consequence of establishing nontraditional units are unknown. The diversified funding base refers to the second and third stream incomes. Second stream income is generated through competing contracts and grants from research councils. Third stream

income is earned from industrial firms, fundraising, or patents, etc. (Clark, 1988, 2004). Diversified income allows universities to move forward faster with less financial constraints (Clark, 1988). The stimulated academic heartland refers to the academic departments accepting a modified belief system and actively engaging in entrepreneurial activities. The integrated entrepreneurial culture refers to cultivating an entrepreneurial working culture diffused in all levels in the university. The five elements are equally important and must interact with each other to successfully form an entrepreneurial university.

Clark commented that for the entrepreneurial belief to become a shared culture, the belief, the piloting ideas, or the spirit must be tested, worked out and reformulated. Culture here is not seen as a separate element; instead, it is a shared belief that can be found at the leadership, the management, and the academic professionals in traditional departments or new outreach units. Etzkowitz (2008) proposed four pillars that constitute entrepreneurial university. Entrepreneurial culture is one of the key pillars, and the functions of the four pillars reflect the functions of the TTO. The four pillars are: enhancing academic leadership to execute strategic planning; having legal control over university properties and research results; increasing organizational capacity to manage patenting and licensing; and promoting an overall entrepreneurial ethos. Culture in Etzkowitz's term is addressed as "norms". The values that should be shared as norms in the entrepreneurial universities are: capitalization of knowledge is the basis for economic and social development; entrepreneurial universities are independent institutions, but also interdependent with the industry and the government, thus hybrid organizational formats are essential; and entrepreneurial universities should continuously renovate their internal structures as well as their relationships with the industry and the government (Etzkowitz, 2008).

Nelles and Vorley (2010) adapted Burns' (2005) concept of entrepreneurial architecture that was established in a corporate context, and conceptualized five elements that could be used to assess entrepreneurial response of the university. The five elements are structures, systems, strategies, leadership and culture. Such framework emphasizes the influence of institutional design on its internal function. Structures refer to the

entrepreneurial infrastructures, such as the formal offices that exercise knowledge exchange activities, incubators, technology park, and department of continuing education. Systems refer to the internal networks and relationships between structures, researchers, faculties and administrators. The invisible systems have to be embedded in the structures to support the visible infrastructures. Leadership refers to the key personnel in every level (institutional, departmental, and small group level) who have the vision for changes. Strategies refer to the elaborated institutional missions. The missions are sensitive to the institution's background, environment and conditions. Internal mechanisms that can motivate entrepreneurial behaviors are part of the strategies. Lastly, Culture refers to the entrepreneurial culture that is critical for third stream activities. The evolving behavior and shifting norms have significant impact on the entrepreneurial turn. Foss and Gibson (2015) who followed Nelles and Vorley's framework conducting research on entrepreneurial universities also raised the same concern on the limited exploration on institutional culture in relation to the entrepreneurial turn of the universities.

## **2.2 Conceptual and analytical framework**

To study entrepreneurial culture, the exploration of both the concept of entrepreneurship and culture are essential. In the first part, the definitions and elements of entrepreneurship are reviewed. A suitable framework for analyzing entrepreneurial actions in higher education setting is outlined. In the second part, the author looks into the culture dimension to understand culture in details. A combination of entrepreneurship elements and culture levels are constructed as an analytical framework to employ in this research.

### **2.2.1 Entrepreneurship**

#### **2.2.1.1 Entrepreneurship as concept**

The definitions of entrepreneurship vary among scholars. One reason for the diversified approaches and the lack of consensus on the definition is due to the interdisciplinary nature of the topic (Peneder, 2009). One definition of entrepreneurship is "new entry". "New entry can be accomplished by entering new or established markets with new or



existing goods or services” (Lumpkin & Dess, 1996, p.136). Some other definitions of entrepreneurship are: “a process by which individuals – either on their own or inside organizations – pursue opportunities without regard to the resources they currently control” (Stevenson & Jarillo, 1990, p. 23); or “the introduction of new economic activity that leads to change in the market place” (Davidsson, 2016, p.1).

Entrepreneurship has been studied in the field of economics, business and management, sociology and psychology (Peneder, 2009). Three main approaches identified in the literature are: individual approach, environmental approach, and organizational approach (Lumpkin & Dess, 1996; Lee & Peterson, 2000). For individual approach, entrepreneurship is used to describe individual characteristics that lead to become successful entrepreneurs. To name a few of such traits: risk-taking, self-control, aggressiveness, ambition, marginality, and high need for achievement (Aldrich & Zimmer, 1986). In addition to personal characteristics, entrepreneurship is also used to describe individual actions. The focus is on what entrepreneurs do, instead of what entrepreneurs are. For instance, Gibb (1999) depicted entrepreneurship as a “way of life” (p.28) involving: greater freedom in making decisions, greater control over what to be done, loneliness, greater responsibility, rewards link more directly to customers, dealing with risk, ego more widely exposed, interact with wider range of stakeholders, building networks by “know who”, longer and more irregular working hours, personal life and work life highly integrated, social status linked more to business status, and learning by doing. For environmental approach, environmental conditions and political climate are taken into account for entrepreneurship performance (Lee & Peterson, 2000). Corporate entrepreneurship activities are positively influenced by hospitable external environment (Zahra, 1993). For the organizational approach, Pettigrew (1979) commented that entrepreneurship should be viewed beyond personal traits and took its institutional context into account. It was the interactive process between entrepreneurs and their followers enabled the organization to function and sustain. In addition to the three approaches, Lee and Peterson (2000) proposed a fourth approach - cultural approach to study entrepreneurship. Combining cultural elements conceptualized by Hofstede (1984) and Trompenaars and Turner (1997) to delineate a culture that promotes entrepreneurship:

low power distance (low tolerance for unequal relationships), weak uncertainty avoidance (acceptance for uncertainty and risk), individualism (emphasis on individual accomplishment), masculinity (emphasis on materialism and wealth), achievement (power and status achieved through competition and hard work), and universalism (laws apply equally to everyone).

### **2.2.1.2 Elements of entrepreneurial orientation**

To study the institutional entrepreneurial culture in relation to organizational change, the process is the key. Taking the concept of culture from the view of anthropology theorists, the prevailing view is seeing culture as a component of the social system and that culture is manifested in behavior (Allaire & Firsirotu, 1984). Based on such view, the author proposes that the cultural elements of entrepreneurship are embedded in the process of entrepreneurial actions; the entrepreneurial culture is manifested in the process of entrepreneurial actions within a university system. Lumpkin and Dess (1996) identified five key dimensions that describe the “process” of entrepreneurship: **autonomy**, **innovativeness**, **risk taking**, **proactiveness**, and **competitive aggressiveness**. The five dimensions are called entrepreneurial orientation. The entrepreneurial orientation is processes and practices that lead to new entry at the organizational level. Autonomy refers to the freedom that is granted to individuals or teams who bring in ideas and carry them through to completion. Innovativeness refers to an organization embracing the creative processes that would result in new products and services. Risk taking refers to an organization with an entrepreneurial orientation often exhibits risk-taking behavior. Proactiveness refers to initiatives that are taken in a forward-looking manner to cope with anticipated future challenges and needs. Lastly, competitive aggressiveness refers to an organization aggressively challenges and confronts its rivals in the marketplace.

The author finds the five elements of entrepreneurial orientation that depict the process of entrepreneurship in an organizational level a suitable tool to apply in this research. The five salient dimensions of entrepreneurial orientation are what an entrepreneurial organization may exhibit, but they are independent elements that each organization may

exhibit various combinations in its given contexts (Lumpkin & Dess, 1996). That is to say, the five features might not all exhibit at once. The entrepreneurial orientation can be employed in this research as a guideline to develop interview guides and to analyze the documents. However, some adjustments are needed in order to fit in the higher education setting. Following are the adaptation and elaboration of the entrepreneurial orientation framework developed for this thesis:

### **Autonomy**

Autonomy refers to the freedom that is granted to individuals or teams who bring in ideas and carry them through to completion. Generally, the power delegation depends on the organization size. In smaller firms, autonomy commonly rests in central leadership. In large organizations, autonomy delegates down to individual members or teams (Lumpkin & Dess, 1996). Universities are very bottom heavy institutions (Clark, 1998); central managerial values might be in conflict with bottom academic values because of the institutions' historical trajectories. A potential tension exists between managerial autonomy and academic autonomy (Kwiek, 2016). The managerial value and academic value must reconcile and achieve a modified belief system (Clark, 1998). Academic heartlands are the foundations of universities; therefore, the author proposes that autonomy in higher education setting refers to individuals or teams being independent actors that have the will and freedom to be self-directed in the pursuit of opportunities.

### **Innovativeness**

Innovativeness refers to an organization embracing new ideas, experimentation, and creative processes that may result in new products and services (Lumpkin & Dess, 1996). Schumpeter (1943) points out that capitalism as a form of economic change is never stationary; it is the constant revolution (new goods, new methods of production, new markets) within the economic structure that keep the capitalist engine in motion. Such incessant revolutionary process is coined Creative Destruction. Lumpkin and Dess (1996) emphasizes that innovation (Creative Destruction) is a key role in entrepreneurial process. The measurable indicators of innovation in higher education setting mainly are research publications, patents filings, and spin-off formations. The author proposes that

innovativeness in higher education setting refers to producing and translating science and technology to have impact on the society and economy.

### **Risk taking**

Risk taking is a quality that often used to describe individual entrepreneurs who work for themselves and have to cope with the day to day uncertain and risky situations. The situations can involve unknown venturing results, large resource commitments, or heavy borrowing (Lumpkin & Dess, 1996). Risk taking in higher education setting commonly refers to universities exhibit financial risk-taking behaviors (Williams, 2008; Kwiek, 2016) while initiating new research projects, new educational programs, or any other third mission activities. The author proposes that risk taking in higher education setting refers to large financial risks that individuals, teams, or the university undertake while the outcomes of the new initiatives are unknown.

### **Proactiveness**

Proactiveness refers to initiatives that are taken in a forward-looking manner to pursue new opportunities and participate in emerging markets. Proactiveness refers to how an organization relates to the market opportunities; how an organization shape the market by new inventions instead of merely react to the market needs (Lumpkin & Dess, 1996). Entrepreneurial universities are to steer their own directions instead of drifting (Clark, 1998). The author proposes that proactiveness in higher education setting refers to individuals, teams or the university taking on the leading roles of knowledge production and translation in the pursuit of future breakthroughs.

### **Competitive aggressiveness**

Competitive aggressiveness refers to an organization aggressively challenges and outperforms its rivals in the marketplace, such as setting ambitious market share goals, or spending aggressively (Lumpkin & Dess, 1996). The author proposes that competitive aggressiveness in higher education setting refers to aggressive moves, strategies, and decisions that are taken by individuals, teams or the university to maintain their outstanding performances.

**Table 1** is a summary of the five entrepreneurial processes. It provides this thesis a practical guideline to further develop the interview guide and to conduct document analysis. In addition, a good understanding of how culture is formed helps the analyzing process. Therefore the levels of culture (artifacts, espoused beliefs and values, and basic assumptions) developed by Schein (1984, 2004) will be combined into the analytical framework. The next section explores the concepts of the culture dimension.

**Table 1** Entrepreneurial orientation of higher education institutions. Adapted from Lumpkin and Dess (1996).

Entrepreneurial orientation	Proposed indication for entrepreneurial universities
Autonomy	Individuals or teams being independent actors that have the will and freedom to be self-directed in the pursuit of opportunities.
Innovativeness	Producing and translating science and technology to have impact on the society and economy.
Risk taking	Large financial risks that individuals, teams, or the university undertake while the outcomes of the new initiatives are unknown.
Proactiveness	Individuals, teams or the university taking on the leading roles of knowledge production and translation in the pursuit of future breakthroughs.
Competitive aggressiveness	Aggressive moves, strategies, and decisions that are taken by individuals, teams or the university to maintain their outstanding performances.

## 2.2.2 Culture

### 2.2.2.1 Culture as concept

Two major distinctions of the concept of culture are (1) seeing culture and social system as two separate realms but interrelated, and (2) seeing culture as a component of the social system; culture is manifested in behavior and is product of behavior (Allaire &

Firsirotu, 1984). From sociological point of view, organizations “have” culture; from anthropological point of view, organizations “are” culture (Cameron & Quinn, 2011). The concept of culture has been borrowed from anthropology and used in organization theories (Smircich, 1983). The organizational culture is “shaped by ambient society, the history of the organization and the particular contingency factors impinging upon it” (Allaire & Firsirotu, 1984, p.213). The ambient society comprised cultural, social, political and judicial systems; the history of an organization comprises genesis, transformations, founder’s vision and values of past leaders; and the contingency factors are the technology, economics, competition and regulations (Allaire & Firsiroty, 1984). Organizational culture can also be seen in five ways (Smircich, 1983): (1) culture is a background factor that influences the development of beliefs; (2) organizations produce culture as by-products, such as rituals, legends, and ceremonies. (3~5) Organizations are cultures. Culture is a system of shared cognition, knowledge, and beliefs; culture is a system of shared symbols and meanings; and culture is an expression of unconscious psychological processes.

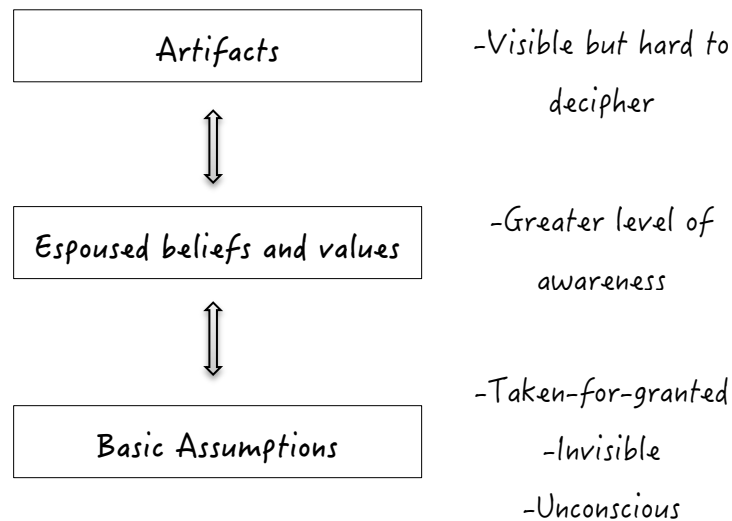
Departing from theories of organizational culture, one initial question to ask is - how is culture formed within an organization? According to Schein (2004), culture basically springs from: “(1) the beliefs, values, and assumptions of founders of organizations; (2) the learning experiences of group members as their organization evolves; and (3) new beliefs, values, and assumptions brought in by new members and leaders” (p.225). In other words, to have an initial idea, belief, value or assumption is a start. From an initiated belief to become a shared culture, the following definition of culture illustrates the transformation process:

A pattern of shared basic assumptions that was learned by a group as it solved its problems of external adaptation and internal integration, that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think and feel in relation to those problems. (Schein, 2004, p. 17)

In other words, the initial belief (or basic assumption) needs to be test out and prove valuable, so the members within the organization would accept such belief. When such believe is shared among all members, it becomes culture.

### 2.2.2.2 Levels of culture

So far the process of culture formation seems straightforward; however, the key of culture formation lies in the details. Schein (1984, 2004) proposed that culture existed in three different levels. The most visible level is the “artifacts”; the invisible level is the “basic or underlying assumptions”; and the level in between is the “espoused beliefs and values” (see **Figure 2**). Artifacts “includes all the phenomena that one sees, hears, and feels...” (Schein, 2004, p.25), such as architecture of physical environment, language, technology, products, clothing style, manners, myth, stories told about the organization, published list of values, organizational charts, and observable rituals. Artifacts are observable, but are not so easy to interpret. Seeing through the surface, one can find the beliefs and values.



**Figure 2** Levels of culture. Source: Schein, 2004, p.4.

The espoused beliefs and values are the second level of the culture. The set of beliefs and values are embedded in the organizational ideology and serve as ways of dealing with uncertain or difficult situations. These beliefs and values are first initiated by individuals who have visions or have new problem solving approaches. When these individual beliefs and values are tested and survived through multiple successful experiences, they then transform into beliefs and values that are shared among members of an organization. On the contrary, if individual's beliefs and values do not work out through experience, yet are still imposed as organizational values, then these beliefs and values would become merely guidelines; they become beliefs and values that group members talk about, but not what they actually do.

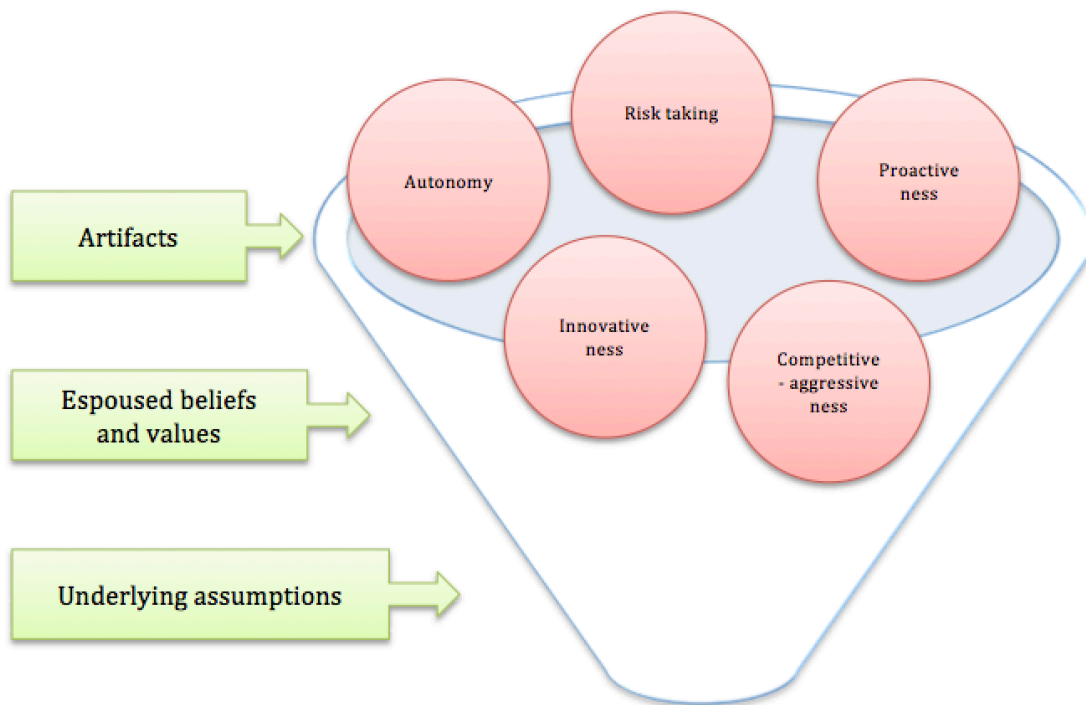
The bottom level of the culture is assumptions. Schein (2004) used "assumptions" to distinguish "the deepest level of values" from "values". Values and beliefs are to be tested, are challengeable and open to discussion among the group members. When the values and beliefs work successfully in repetition, those successful experiences then reinforce the members to become less and less conscious about the once created values and beliefs. These values and beliefs overtime become taken-for-granted and sink to the bottom of people's conscious and become basic or underlying assumptions. Culture finally is formed in a way that a group of people unconsciously treats certain beliefs and values as nonnegotiable assumptions. Since culture forms through such long process, vice versa it is enduring and extremely difficult to change.

### **2.2.3 Analytical framework**

To answer the core research question of "What is the impact of the TTO on institutional entrepreneurial culture formation", this thesis starts from having a proper defined entrepreneurship and a deeper understanding of the culture. The five entrepreneurial dimensions provide the scope and the breath, and Schein's three-level structure provides the depth on studying entrepreneurial culture. When investigating into the five entrepreneurial dimensions, being aware of the different levels of culture is a key process. Artifacts are the architecture of physical environment, language, technology, products,



clothing style, manners, myth, stories told about the organization, published list of values, organizational charts, and observable rituals. Espoused beliefs and values are a set of beliefs and values that are embedded in the organizational ideology and serve as ways of dealing with uncertain or difficult situations. Basic assumptions are the values and beliefs that people take for granted unconsciously. Culture formation undergoes the process of transforming the espoused beliefs and values into basic assumptions through multiple successful experiences that shared by the members of the university. **Figure 3** is developed by the author. It illustrates the parallel process of entrepreneurial dimensions and three levels of culture. It is to be used as a guideline to develop interview guides for the fieldwork, conduct document analysis and content analysis of the interview results.



**Figure 3** Illustrated framework to study entrepreneurial culture

By using this framework, this thesis investigate entrepreneurial culture from the five aspects of autonomy, innovativeness, risk taking, proactiveness, and competitive aggressiveness on the levels of artifacts, espoused beliefs and values, and basic assumptions. In chapter four, while introducing the background information of KU

Leuven and its TTO – KU Leuven Research and Development (LRD), the culture level of artifacts and exposed values can be disclosed to a certain degree. In chapter five, while discussing the findings of interview contents, some underlying assumptions about entrepreneurial culture in the university are pointed out.

## **3 Methodology**

### **3.1 Research design**

The case study is one of several ways of doing social science research. In general, “a case study is an empirical inquiry that investigates a contemporary phenomenon within its real-life context. Especially when the boundaries between phenomenon and context are not clearly evident” (Yin, 2003, p. 13). More specifically, “the case study method allows investigators to retain the holistic and meaningful characteristics of real-life events – such as individual life cycles, organizational and managerial processes, neighborhood change, international relations and the maturation of industries” (Yin, 2003, p.2)

There are two major case study designs – single-case design and multi-case design (Yin, 2003). Within single-case design, the single-case (embedded) design is a suitable research method for this thesis. The purpose of this thesis is to gain an in-depth understanding of the impact of the TTO on the entrepreneurial cultural formation of the university. Within the given time frame and available resources, a single-case (embedded) design allows this research to understand the real-life context of a TTO’s transformation and its compact on the institutional culture. More specifically, the embedded units - the individual professors, the individual TTO officers, and other individual participants serve the function of cross-unit analysis.

The strategies employed in this case study comprise “the logic of design, data collection techniques, and specific approaches to data analysis” (Yin, 2003, p. 14). The ultimate goal of such method and strategies is to use the logic and the design of the case study to answer the initial research questions and report a fair closure to the research. The TTO in KU Leuven, known as KU Leuven Research & Development (LRD) was selected as the case study object. For the data collection, document collection and semi-structured interview were employed. This thesis selected relevant documents on the entrepreneurship activities of KU Leuven and LRD for the preparation of interviews and

further analysis. Seven semi-structured interviews were conducted to observe and gather information on institutional entrepreneurial culture. The fieldwork has been registered with the Norwegian Centre for Research Data (NSD) for the purpose of data protection.

### **3.2 Case Selection**

Choosing LRD was not a random sampling process but a purposeful sampling process. Random sampling permits generalization to a wider population, and is a process mostly used in quantitative study (Patton, 2001). This research used a qualitative approach and focused on one case study. Qualitative study typically uses smaller sample sizes; sometimes even use one single case to study a particular phenomenon. Purposeful sampling used in qualitative inquiry may seem biased to quantitative study, but “the logic and power of purposeful sampling lie in selecting information-rich cases for study in depth” (Patton, 2001, p.230). During the process of purposeful sampling, LRD was selected as an information-rich case that can disclose much information relates to the phenomenon studied.

KU Leuven has been given the title of being the most innovative university in Europe in 2016 and 2017 consecutively according to Thomson Reuters annual ranking. It is also ranked number five on Reuters’ annual ranking of the world’s most innovative universities. The ranking identifies “the educational institutions doing the most to advance science, invent new technologies and power new markets and industries” (Ewalt, 2017b, p.1). The indicators used for assessing the universities are primarily based on patent filings and research paper citations. To be on the list of Reuters’ world ranking, institutions have to file 70 or more patents with the World Intellectual Property Organization during the five-year period examined by Thomson Reuters. Researchers in KU Leuven have filed more patents than other European universities, and their research papers are frequently cited by other researchers (Ewalt, 2017a).

LRD founded in 1972 was one of the first TTOs in Europe. LRD is an entity that is independent from the university and operates as a business unit with its own budgetary

and human resource system. LRD also is one of the most successful TTOs in Europe with over 80 full time experts covering the day-to-day operational work. LRD has made many achievements over the years, such as having more than 1,800 new contract- and collaborative research per year, the formation of more than 100 high-tech companies, and directly hiring more than 4000 employees, etc. (PROGRESS TT, 2016). Therefore, this thesis selected LRD as an information-rich case to conduct research on the formation of institutional entrepreneurial culture.

### **3.3 Data collection and analysis**

According to Yin (2003, p.68), there are three major steps for data collection:

- A) Names of sites to be visited, including contact persons
- B) Data collection plan (covers the calendar period for the site visits, the amount of time to be used for each visit, and the level of effort to do each case study)
- C) Expected preparation prior to site visits (identifies specific documents to be reviewed and where they can be accessed)

Since this research employed a single-case (embedded) design, there were two major categories of interview respondents: one category was the professor, the other was LRD officer. The actual site visit took place in February 2018, and seven semi-structured interviews were conducted. Prior to the site visit, several documents were reviewed in order to prepare the interview guides. Following were the sources of evidence used:

- (1) Official documents and information derived from KU Leuven's website
- (2) Official documents and information derived from LRD's website
- (3) Official videos and information derived from Lcie and PIP website
- (4) Semi-structured interviews

#### **3.3.1 Documents**

The two primary sources of the documents used in this analysis were: official documents derived from KU Leuven's website and LRD's website. While selecting the documents for analysis, the quality of the documents is crucial. J. Scott (as cited in Bryman, 2012) proposed four criteria of assessing the quality of documents: (1) authenticity – if the

evidence is genuine; (2) credibility – if the evidence is free from error; (3) representativeness – if the evidence is typical of its kind; and (4) meaning – if the evidence is comprehensible. It is essential to keep in mind of the quality criteria while searching for the valid documents. All the documents selected were from the official sources for the quality of authenticity and credibility. Each document represented the organizations been studied, and the texts were all in English, which was comprehensible for the author. **Table 2** is a summary of the documents selected for analysis for this thesis.

**Table 2** Source of evidence

Title of the document	Type of the document	Year
KU Leuven Research & Development – bridge between research and industry	Power Point	2018
KU Leuven Research & Development – a long tradition of fostering innovation and high-tech entrepreneurship	Report	2017
The Leuven community for innovation driven entrepreneurship (Lcie): A student-driven initiative to Foster Entrepreneurship and Entrepreneurial skills at a research intensive university	Article	2016
Creating a virtuous circle in technology transfer – the case of KU Leuven	Report	2015
KU Leuven Focus 2015-2016	Annual report	2015
Leuven, knowledge pearl – fostering high-tech entrepreneurship in the heart of Europe	Report	2013
Product Innovation Project Leuven	Video	

Although there is no fixed formula to transform qualitative data into findings, two principles are important to follow while analyzing the data. First is the research purpose should guide the analysis, and second is producing thick description for the benefit of the readers and for the advantage of the analysis (Patton, 2001). The selected document

constructed the overall description of KU Leuven and the thorough description of LRD in chapter four. The purpose was to present a thick description of the TTO, and to reveal the artifacts and espoused values of the institution.

### **3.3.2 Interviews**

The flexibility of qualitative interview (unstructured or semi-structured interview) makes such method the most popular one (Bryman, 2012). The sampling process of the interviews conducted for this thesis was a combination of purposeful sampling and snowball sampling. The author first looked for suitable candidates according to a brochure published in 2017 by LRD that presented examples of entrepreneurial professors and researchers in KU Leuven. Eight emails were sent out at the first round, and four candidates responded within one week. Semi-structured interviews were scheduled accordingly. During the first four interviews, the author inquired further reference of suitable candidates for interviews from the respondents. Three more candidates were contacted and a total of seven semi-structured interviews were conducted within one month. The seven semi-structured interviews were conducted mostly in person, and the length of each interview varied from 30 to 90 minutes. The two interviews that were not conducted in person were through Skype and telephone.

KU Leuven has multiple campuses; the author traveled to four different locations according to the working site of the interviewees in Flanders area. By having on-site visit, the author was able to immerse herself in the overall atmosphere of the university. The interviews in total had a good composition of respondents. The respondents were consisted of senior professors who have extensive experience on entrepreneurship, experienced officers in leading position in LRD, one coordinator of entrepreneurship programs, and one officer in leading position for student driven entrepreneurship programs. A list of respondents interviewed for this thesis is summarized in **Table 3**.

**Table 3** Interview respondents

Position	Level	Disciplinary field
Professor	Faculty	Engineering
Professor	Faculty / Center	Biology / Medicine
Professor	Faculty / Center	Food / Microbial
Coordinator	Faculty	Engineering
Leading position	Independent entity	LRD
Leading position	Independent entity	LRD / Lcie
Leading position	Independent entity	Lcie

Two sets of interview guides were prepared before the interviews (see **Appendix 1 & 2**) to ensure that the main inquiries of this research are consistent with every interviewee. However, the flexibility of semi-structured interviews allows the author to dive into different perspectives according to the responds from the interviewees. One set of interview questions was generated to gain insights from the perspective of the professors; the other set of questions was generated to gain insights from the angle of the officers. While producing the questions, it is practical to bear in mind that there are various types of questions to ask. Patton (2001, pp. 348-351) provided six categories of questions that can be asked during the interviews: experience and behavior questions, opinion and values questions, feeling questions, knowledge questions, sensory questions, and background or demographic questions. This thesis based on the proposed analytical framework to categorize questions into five main sections. The behavior, opinion, value, feeling, knowledge questions were also covered in the questions. Furthermore, the sequence of the questions, the wording of the questions, and asking truly open-ended questions (Patton, 2001) are also important techniques that were taken into consideration while producing the interview guides.

The interview contents were all recorded with informed consent from the participants in advance. The transcribing processes of the interviews were almost all taken immediately right after the interviews. The purpose was to grasp a better understanding of the findings and sometimes adjust questions and perspectives for the next interview. The



transcriptions were all stored anonymously in the author’s computer with password to protect the privacy of the participants. Coding of the interview content was applied based on the analytical framework. Bryman (2012, pp. 576-577) provides some steps and considerations for the coding process:

- Code as soon as possible
- Read through the initial transcripts, field notes and documents before coding, and then do it again to mark codes.
- Review the codes and consider more general theoretical ideas in relation to codes and data.
- Some other consideration: Any slice of data can be coded more than one way; do not worry about generating too many codes, and keep coding in perspective.

After the coding process, the codes and content were grouped into categories for the reporting. One principle to keep in mind during the interpreting process will be “...doing justice to each individual case. All else depends on that” (Patton, 2001, p. 449).

### 3.4 Criteria for interpretation of the findings

Two criteria most often used for judging the quality of research designs are validity and reliability. Triangulation is also an often-used method to cross check the research findings (Bryman, 2012). This thesis used official documents and interviews as two main sources of data to triangulate the findings. The criteria used in qualitative studies are not as black and white as used in quantitative studies; a table (see **Table 4**) that illustrates the tactics for using the criteria can be very handy while examining one’s work:

**Table 4** Case study tactics for four design tests. Source: COSMOS Corporation (as cited in Yin, 2003, p.34)

Tests	Case study tactic	Phase of research
Construct validity	- Use multiple sources of evidence - Establish chain of evidence - Have key informants review graft case study report	Data collection Data collection Composition
Internal validity	- Do pattern-matching	Data analysis

	- Do explanation-building - Address rival explanations - Use logic models	Data analysis Data analysis Data analysis
External validity	- Use theory in single-case studies	Research design
Reliability	- Use case study protocol - Develop case study databases	Data collection Data collection

### 3.4.1 Validity

Validity refers to if the propositions generated by researchers match the causal conditions (LeCompte & Goetz, 1982). There are issues of construct validity, internal validity and external validity. For construct validity, this thesis used multiple sources of evidence such as official documents, official website information and interview recordings. Some quotes had been sent to a participant for proof reading (as requested by the participant). Internal validity refers to if the scientific explanations actually match what have been observed and measured (LeCompte & Goetz, 1982). While the author was doing the content analysis, the codes from different interviews were cross-matched and underwent the explanation-building process. Rival explanations were also been pointed out and addressed. External validity refers to the degree of the scientific findings can be generalized to other groups (LeCompte & Goetz, 1982). For a single-case study, this thesis had developed a theory-based analytical framework to analyze the data in order to achieve the possibility of generalization.

### 3.4.2 Reliability

“Reliability refers to the extent to which studies can be replicated” (LeCompte & Goetz, 1982, p. 35). There are issues of external reliability and internal reliability. External reliability refers to what degree a study can be replicated, and internal reliability refers to if multiple researchers within a single study agree on the interpretation of their observation. The replication of a qualitative study is a difficult criterion to meet (Bryman, 2012), since every case is unique in it’s own timing and setting. However, external reliability can be approached by providing precise identification of the researcher and comprehensive description of the strategies and the data used (LeCompte & Goetz,

1982). For the document selection, the interview arrangements, and the analytical framework, this thesis provided detailed descriptions. The reference of the documents was clearly stated. The process of the interview arrangements was elaborated. The interview guide and analyzing process were constructed according to the analytical framework. Since this thesis is a one-person work, the internal reliability can be approached by “mechanically recorded data” (LeCompte & Goetz, 1982, pp. 42-43). Therefore, every interview conducted during this research process were recorded and transcribed anonymously to create a case study database, and the data is safely stored.

### **3.4.3 Ethical considerations**

Ethical principles can be broken down to four main areas (Diener & Crandall, cited in Bryman, 2012, p.135): whether there is harm to participants; whether there is a lack of informed consent; whether there is an invasion of privacy, and whether deception is involved. In avoidance of causing any harm to the participants and the organization that this thesis selected to study, the author made sure that the interpreting process of the interview content was just to each individual case, and the entire process remained anonymous. Due to the research topic of this thesis, the interview process did encounter the situation where the participants were required or encouraged to reveal their private issues. The research topic was clearly disclosed to the participants in advance of the interviews, and the necessity of audio recording was informed to each participant to obtain the consent. There was no deception involved in the entire research process. The fieldwork also has been registered with the Norwegian Centre for Research Data (NSD) for the purpose of data protection.

## 4 Empirical setting

LRD is the TTO of KU Leuven. To study the impact of organizational change on institutional culture, having an overall understanding of the university and its TTO is necessary. This chapter is divided into three sections. First, the overview of KU Leuven is provided with facts and figures. The structure, operation and features of LRD is presented in the second section; also with facts and figures inserted. Lastly, a student initiative organization of LRD is exclusively covered because it represents a bottom-up force for the institutional culture change.

### 4.1 KU Leuven <sup>1</sup>

KU Leuven is a research university located in Leuven in Flanders. It was founded in 1425 as Katholieke Universiteit Leuven. In 1968, Katholieke Universiteit Leuven split into two universities. One became the Dutch-language university - KU Leuven; the other became the French-language university - Université catholique de Louvain. KU Leuven is the largest university in Belgium. Since 2013, KU Leuven has 15 campuses in 11 Flemish cities. KU Leuven's faculties and departments are organized into three groups: Humanities and Social Sciences Group, Biomedical Sciences Group, and Sciences, Engineering and Technology Group. Each group has a doctoral school. To operate such an enormous organization, KU Leuven employs more than 11,000 people. **Table 5** is a summary of the employment situation in KU Leuven. In academic year 2013-2014, the 12 university colleges of KU Leuven Association integrated into KU Leuven. KU Leuven then hosts more than 50,000 students. In 2015, 14% of the students were "generation students" who enrolled at a Flemish higher education institution for the first time in their family. **Table 6** is a detailed student degree population in KU Leuven. KU Leuven is a heavily government funded research university (see **Table 7**). The usage of the government funds can be distributed to their three missions of education, research, and

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<sup>1</sup> The information about KU Leuven presented was summarized from KU Leuven's official website: <https://www.kuleuven.be/english/>, and the annual report of KU Leuven in 2015.

community services. The rationalization among the three missions could influence the legitimacy and prosperity of entrepreneurship activities carried out in the university.

**Table 5** Employment in KU Leuven

December 31th, 2014	
Administrative and technical staff	3,606
Junior academic staff	1,181
Senior academic staff	1,561
Teaching staff	385
Other Academic staff	4,957
Total (in persons)	11,538

Source: KU Leuven Focus 2014-2015

**Table 6** Student degree population

June 23rd, 2015	
Bachelor	39.4%
Initial Master	29.3%
Advanced Master	4.2%
Doctoral	8.2%
Academic Teacher Training	0.8%
Other	18.1%
Total (in persons)	57,284

Source: KU Leuven Focus 2014-2015

**Table 7** KU Leuven 2014 operating revenue

In Euros	2014	
Total revenue linked to education, research and services	855,751,915	91.7%
Government grants and subsidies – basic funding	382,045,110	40.9%
Government funding – fundamental research	127,435,016	13.7%
Government funding – applied research	118,544,547	12.7%

Contracted research with private sector and scientific services	145,797,803	15.6%
Other revenue linked to education, research and services	81,929,438	8.8%
Other operating revenue	77,572,076	8.3%
Total operating revenue - university	933,323,991	100%
Total operating revenue – University Hospitals Leuven	920,565,758	

Source: KU Leuven Focus 2014-2015

Previous rector Rik Torfs of KU Leuven once said: “The university is a place of constant change... but a lot has remained the same as well” (KU Leuven Focus 2014-2015, p. 1). From the mission statement of KU Leuven, we can see the traditional value of a university, and also identify the new emphases on cross-discipline, internationalization, and active participation in translating research knowledge into applied usage. Following is the summary of KU Leuven’s mission statement:

- A place for open discussion
- Provide education with high-level research
- Conduct international and multi-disciplinary basic and applied research
- Encourage personal initiative, cooperation and academic freedom
- Active participation in the advancement of a knowledge-based society

## 4.2 KU Leuven Research & Development (LRD)<sup>2</sup>

LRD was founded in 1972. It was one of the first TTOs in Europe. The mission of LRD is to fulfill the third task of the university besides teaching and research – service to the community. It is established to become a bridge between the university, the industry and

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<sup>2</sup> The information about LRD was gathered and composed from its official website and various documents:

LRD official website: <https://lrd.kuleuven.be/en>

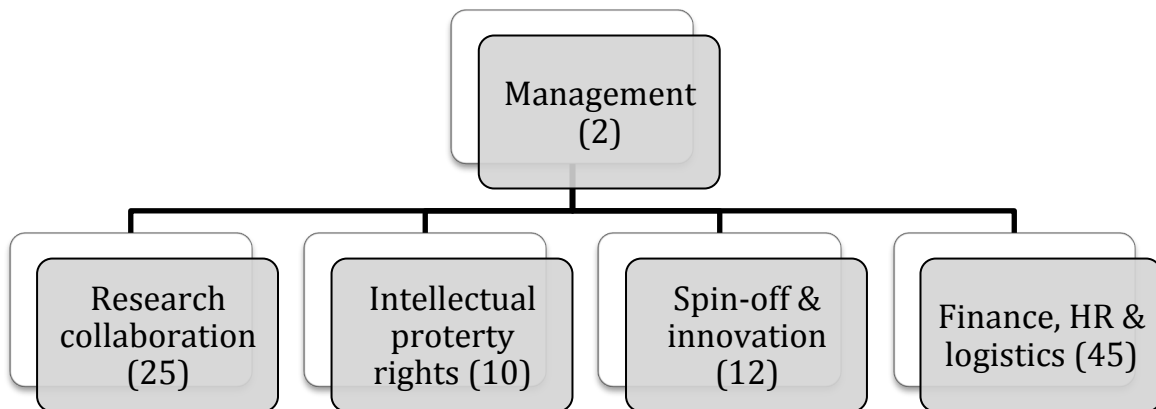
A) KU Leuven Research & Development – bridge between research and industry, 2018

B) KU Leuven Research & Development – a long tradition of fostering innovation and high-tech entrepreneurship, 2017

C) Creating a virtuous circle in technology transfer – the case of KU Leuven, 2015

D) Leuven, knowledge pearl – fostering high-tech entrepreneurship in the heart of Europe, 2013

the society by promoting and supporting technology transfer. LRD has more than 90 central staff and employs more than 2,000 researchers and staff in the research division. It is an extensive TTO compare to many others in Europe. The structure of LRD's central staff division is illustrated in **Figure 4**. Under the central management, there are four sectors that closely collaborate with each other. The sector of research collaboration is in charge of providing advice, managing contract R&D and projects that receive government support. The sector of intellectual property rights is in charge of IP applications and licensing. The sector of spin-off & innovation is in charge of spin-off creation and development, and networking and regional development. The sector of finance, HR & logistics is in charge of the financial and human resources administration.



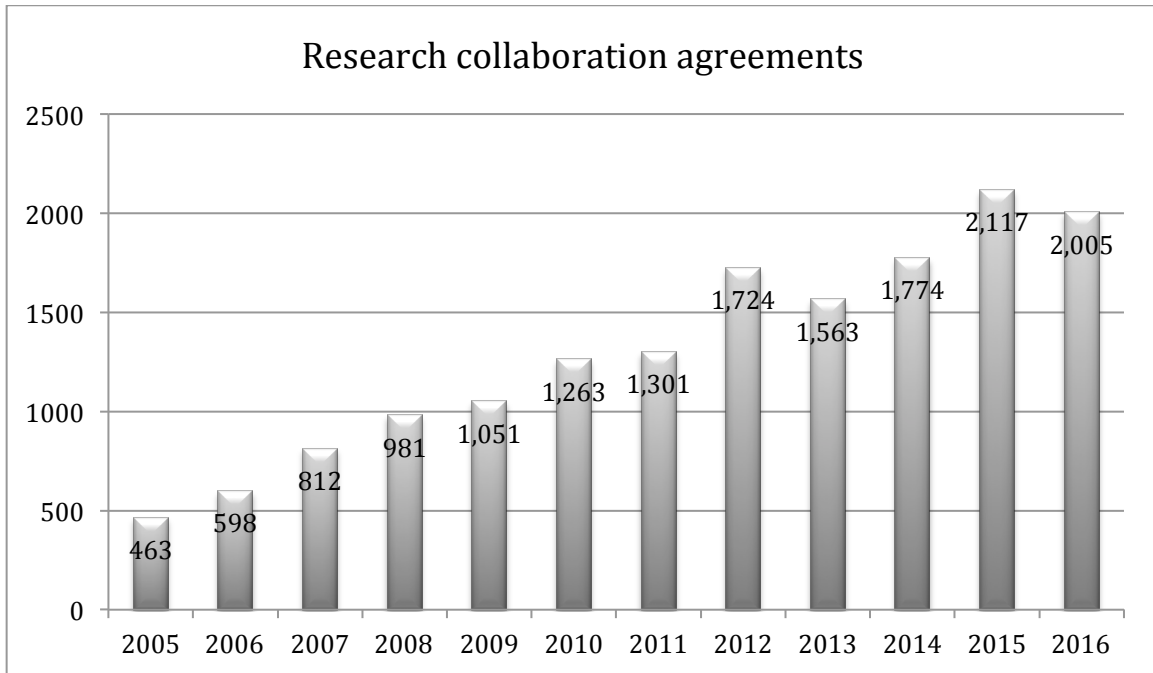
**Figure 4** LRD central staff structure. Source: KU Leuven Research & Development – bridge between research and industry, 2018

The core tasks of LRD are to manage research collaborations, protect intellectual property, set up spin-off companies, provide incubation and seed funds, and create a high-tech ecosystem.

- **Research collaboration**

For research collaboration, LRD takes on the role of promoting and raising awareness of knowledge transfer. They provide advice for the researchers, help researchers negotiate

and follow up contracts, manage research financial files, offer administrative support, and prepare legal documents. There has been a significant increase of research contracts since 2005. The rising numbers can be seen in **Figure 5**.

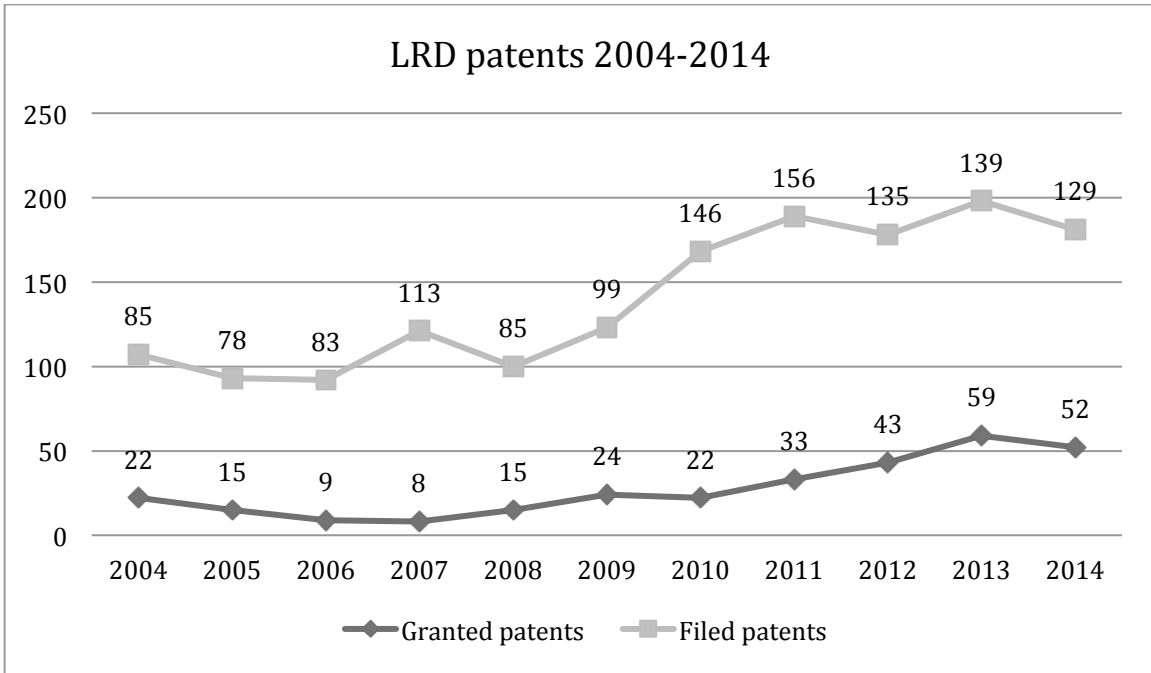


**Figure 5** Research collaboration agreements (not accumulated). Source: KU Leuven Research & Development – Bridge between research and industry, 2018

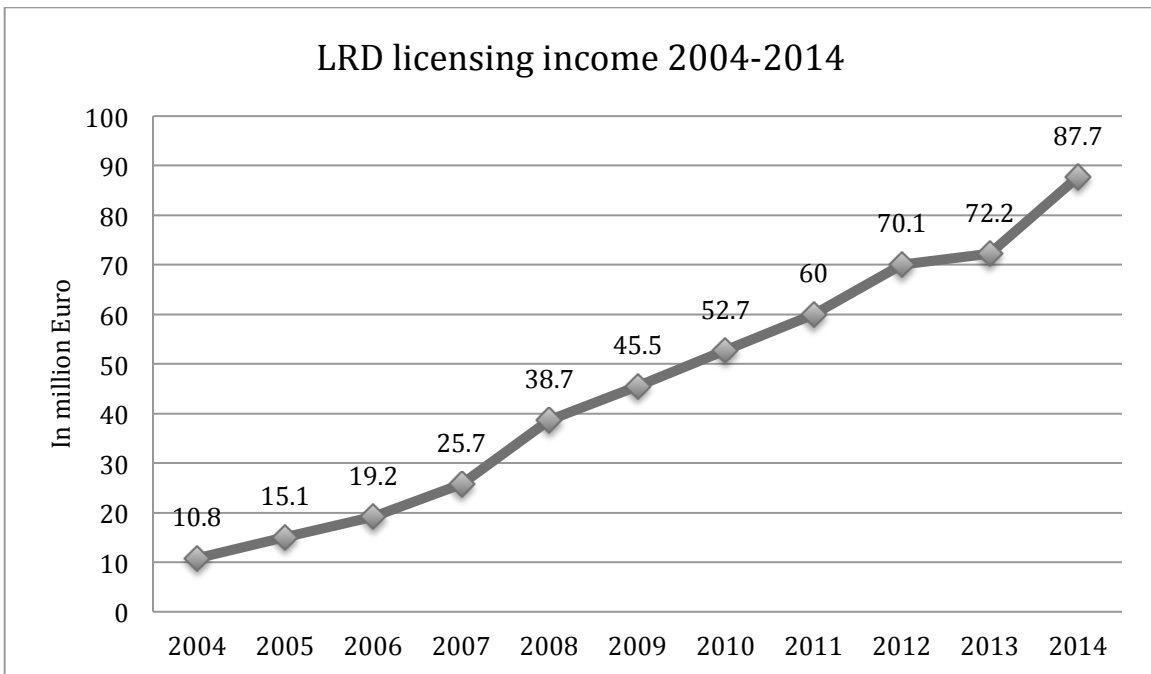
- **Intellectual property**

For applying and protecting intellectual property right, LRD takes on the role of assessing the feasibility, patentability and the market potential of the inventions. They determine protection strategies, draft, file, and follow up patent applications, negotiate license agreements, and assist finding industrial partners. LRD has a team of IP officers with a diverse technical background, and they collaborate with a network of European patent attorneys. LRD also provides patent fund to help researchers to cover their initial patenting expenses. **Figure 6** shows the increased amount of patents filed and granted through LRD from year 2004 to 2014.





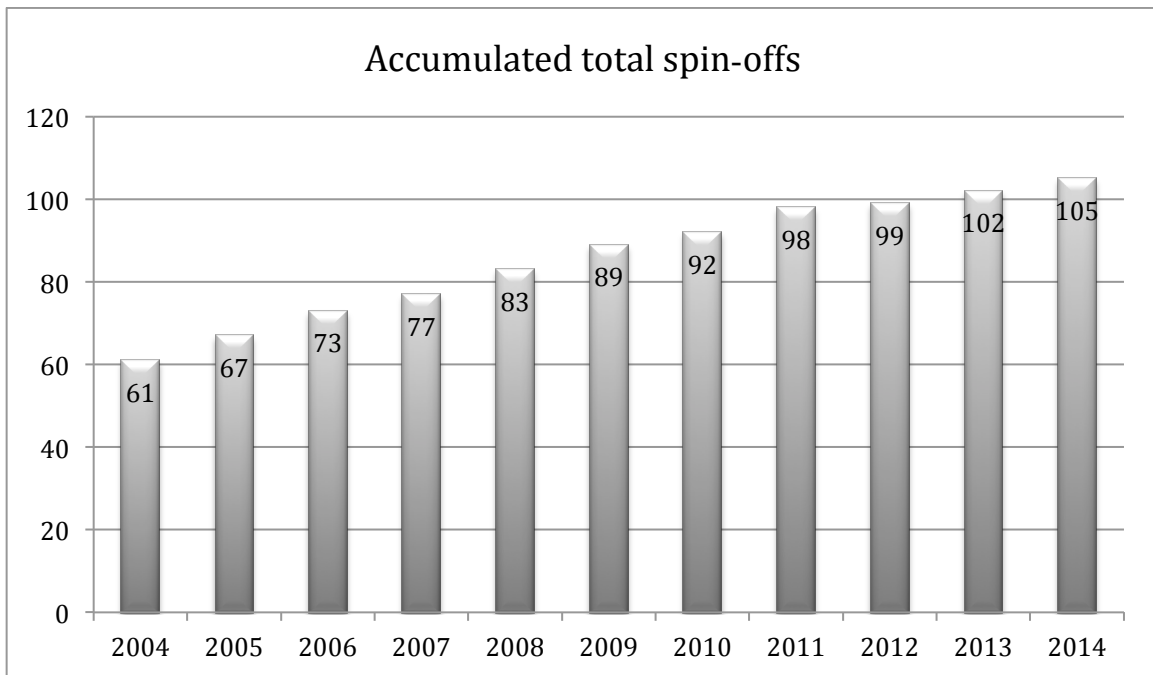
**Figure 6** LRD patents 2004-2014. Source: Creating a virtuous circle in technology transfer – The case of KU Leuven, 2015



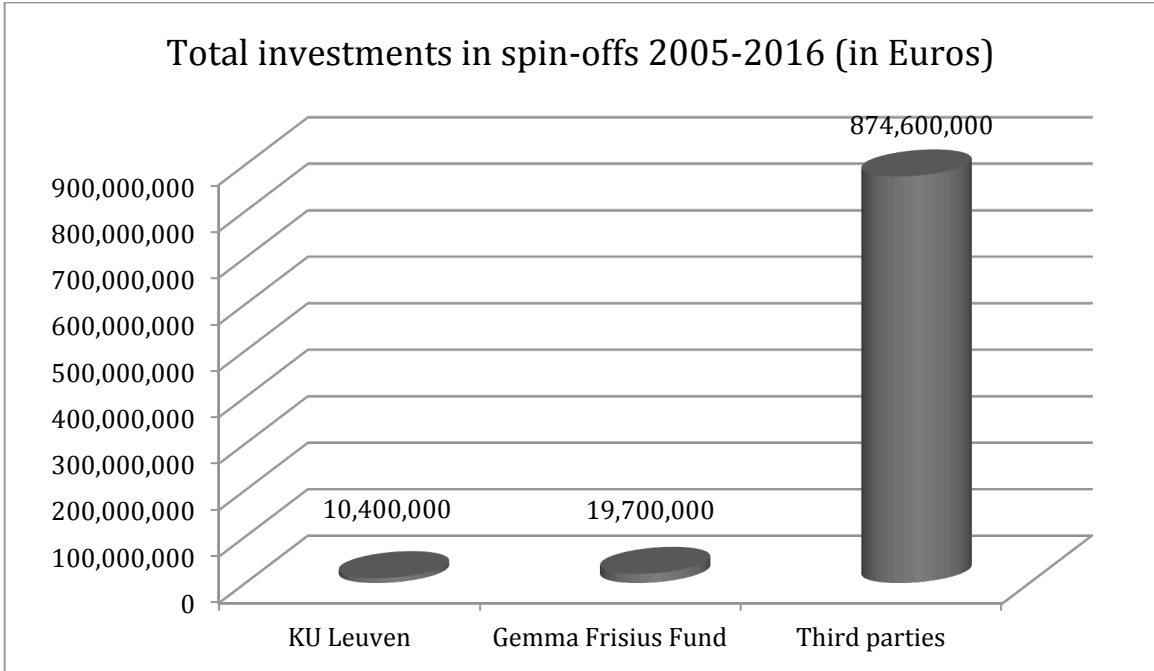
**Figure 7** LRD licensing income 2004-2014. Source: Creating a virtuous circle in technology transfer – The case of KU Leuven, 2015

- **Spin-off companies**

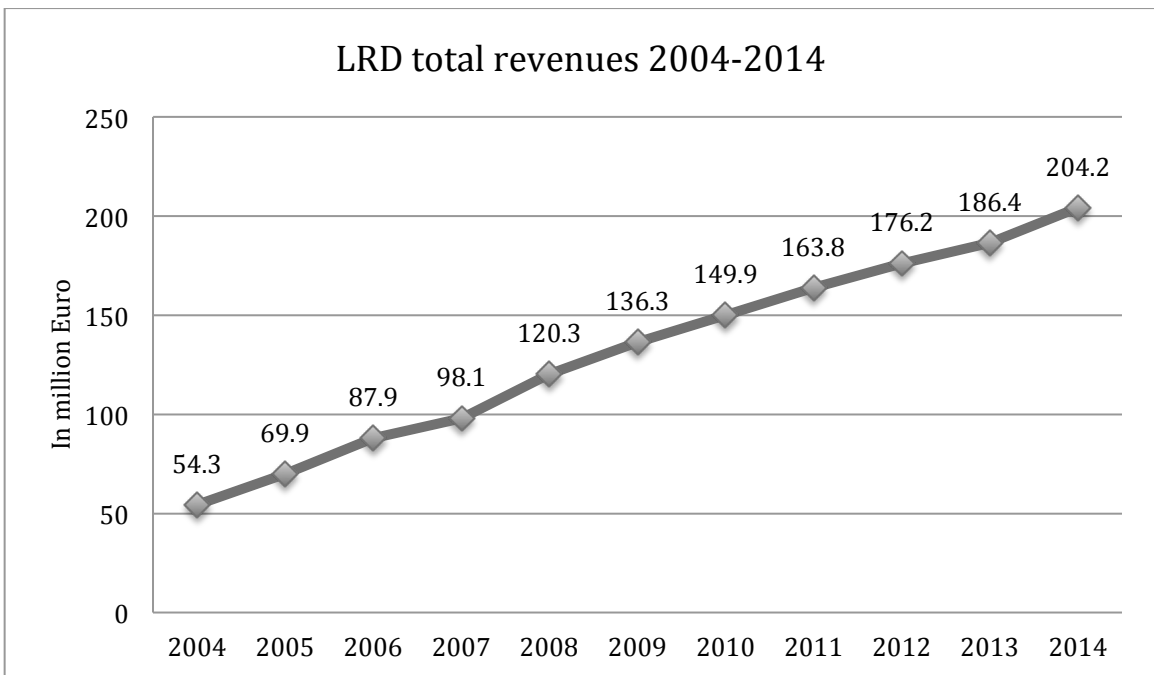
LRD takes on the role of promoting entrepreneurship by assisting the researchers to create spin-off companies with the patents. They help the researchers to develop business plans, validate the market, find investors and infrastructures; they offer the researchers legal support and help managing the growth of the spin-offs. As of 2016, the total spin-off companies created over the years were 116. Out of the created 116, 92 of them are still active. The accumulation of spin-off companies from year 2004 to 2014 can be seen in **Figure 8**. The total investment in spin-off companies can be seen in **Figure 9**. What is to be noticed here is that the industry is the major investors in the spin-offs. **Figure 10** shows the increasing total revenue of LRD over the years.



**Figure 8** Accumulated total spin-offs 2004-2014 with KU Leuven investment. Source: Creating a virtuous circle in technology transfer – The case of KU Leuven, 2015



**Figure 9** Total investments in spin-offs 2005-2016. Source: KU Leuven Research & Development – Bridge between research and industry, 2018



**Figure 10** LRD total revenues 2004-2014. Source: Creating a virtuous circle in technology transfer – The case of KU Leuven, 2015

- **Incubation and seed funds**

There are several incubators provided for research groups and spin-off companies. KU Leuven Innovation and Incubation Centre (I&I) provides new research-oriented business shared facilities such as meeting rooms and parking, shared equipment such as computer network and software, management support such as reception and accounting, etc.

Leuven Bio-incubator provides entrepreneurs and innovative companies laboratory and office facilities. Kortrijk Innovation & Incubation Centre (IICK) offers infrastructure and management services to high-tech companies.

In 1997, a seed capital fund - Gemma Frisius Fund was created to provide technology transfer expertise and help spin-off companies financially in their early stages of development. The fund is a joint venture between KU Leuven (20%), KBC Bank (40%) and BNP Paribas Fortis Private Equity (40%).

- **High-tech ecosystem**

An ecosystem needs to go beyond a single university. It needs the participation of the region and the people. The city of Leuven creates a climate and networks for innovation and technology transfer. Leuven has a few renowned knowledge institutes such as KU Leuven Association, imec (nanoelectronics research institute) and Flemish Interuniversity Institute for Biotechnology (VIB). They hire about 20,500 employees and among them, 8,000 are researchers. Leuven has significant investment capital, several incubators, science parks, and business centers. The spirit of innovation and entrepreneurship and the environment of the region nurture hundreds of high-tech spin-off companies located in the area. The international orientation of the city, the network organizations, the technology platforms, and the strong cooperation between universities, industry and the government, all take parts in creating a high-tech ecosystem of Leuven.

LRD is a well-established TTO with long operating history. One document takes KU Leuven and LRD as a role model to presents some elements that lead to establishing a successful TTO (Edmondson, 2015). Some of the elements can be triangulated with the interview results:

- Start at the top with strong commitment by university leaders
- Dedicate sufficient funding to the TTO at their starting phase
- Ensure the autonomy and flexibility of the TTO
- Create a clear mission for the TTO - to serve
- Offer incentives for academics to participate in technology transfer
- Hire experts with knowledge of industry and academia to work in TTO
- For newly established TTO: focus first on collaborative research
- Seek or create partnerships with the outer world
- Set up a seed fund only after everything else is working
- Advertise the success of the TTO

### **5.3 Leuven Community for Innovation Driven Entrepreneurship (Lcie)<sup>3</sup>**

Lcie being a sector of LRD was founded in 2014 with student-driven initiatives to stimulate students' involvement and engagement of entrepreneurship. It is a faculty-independent and bottom-up community driven entity. The introduction for such community initiative can be related to three main institutional contexts (Fyen, 2016). First of all, the massive student population enrolled in KU Leuven and their diversified disciplinary difference made inclusion a key factor. To introduce entrepreneurship to students from all backgrounds and to encourage interdisciplinary cooperation was one push factor to set up a low threshold community organization to reach down to every individual student. Secondly, formalize entrepreneurial learning and courses in the university setting required systematic changes that was not effective for the time being, therefore a bottom-up initiative could be more effective to spread the entrepreneurial spirit among all. Lastly, the new trend of educational policy put emphasis on the entrepreneurial skills that students should acquire regardless their disciplinary differences, which was in parallel with the Lice initiative.

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<sup>3</sup> The information about Lcie was summarized from its official website: <http://lcie.be/en/>, and the following document: The Leuven community for innovation driven entrepreneurship (Lcie): A student-driven initiative to Foster Entrepreneurship and Entrepreneurial skills at a research intensive university, 2016

Following are the community initiatives that engage students in innovation and entrepreneurship:

- **lusStart:** lusStart provides free of charge legal advice for student entrepreneurs. The service is provided by voluntary doctoral students from the Faculty of Law, with co-supervision of experts from legal practice. The aim is to bring together law students and student entrepreneurs to translate academic knowledge into practice.
- **TechStart:** TechStart provides free of charge technical advice for student entrepreneurs. The consultancy project can be developed and solved by a group of students from Faculty of Engineering Science. PhD students are in charge of the management of the undergraduates who participate in the projects with supervision of academic researchers. One feature about this initiative is that the participating students can earn 3 ECTS credits through the course Entrepreneurship in Practice.
- **Id-Start:** Id-Start provides free of charge creative advice (such as ideas for branding, marketing, advertising, and virtual design, etc.) for student entrepreneurs. This initiative is collaborated with several institutes, namely LUCA School of Arts, Thomas More and University College Leuven-Limburg.
- **Product Innovation Project (PiP):** PiP is a full-academic-year interdisciplinary project/course that students can earn ECTS credits. The project is provided by the company that provides operating budget. About 10 students from various disciplinary backgrounds form a team to develop solutions, make prototype, and make it a business case for the project. Students are supported with various workshops and coaching from the professors and researchers.

## **5 Findings and Discussion**

The mission statement of KU Leuven has shown their published values on excellent research, cooperate research, internationalization, academic autonomy, personal initiatives, and participation in technology transfer. The increasing impact of LRD can be seen in the facts and figures displayed in chapter four. There has been growing numbers on the research collaboration contracts, the patent filed and granted, the licensing income, the spin-off formation, and the total revenue of LRD.

To detect the underlying assumptions from the espoused beliefs and values is not an easy task. The following analysis of the interview content is divided into multiple sections according to the five entrepreneurial elements. The number codes represent each interview participants. Accompanying the manifest figures and facts, the findings lie in the details of what people say and how they say it. The core research question is trying to address the impact of the TTO on institutional entrepreneurial culture formation. Since culture formation is highly related to individual person, the analysis below addresses both the individual and organization (TTO) level.

### **5.1 Autonomy**

Autonomy in higher education setting refers to individuals or teams being independent actors that have the will and freedom to be self-directed in the pursuit of opportunities. The overall answer for the professors about their autonomy on research and innovation is “absolute”. However, as every other occupation in the world, there are always rules: rules of the faculty, rules of the university, rules of the industry, and rules of the government. No one has the absolute freedom under all the rules. Nevertheless, it is up to the individual’s determination to accomplish the tasks (01). Some rules must be changed to accommodate the present situations, but change always takes time (01).

KU Leuven in itself is a very big ecosystem. Within the legal framework of KU Leuven, there are, besides education activities, two entities that are independent. One is the

University Hospital; the other is LRD. Operationally, LRD runs as an autonomous business center within the university (06). The operational budget of LRD comes from a flat fee of 8.5% of every commercialization project. It is a self-sustainable entity that has the capacity to operate autonomously.

## **5.2 Innovativeness**

Innovativeness in higher education setting refers to producing and translating science and technology to have impact on the society and economy. The gap between the university research and the industry can be bridged by translating process. Incremental or translational research that adds value to the discovery is considered a common exercise for the university researchers. Nevertheless, the commercialization of bringing innovation from the university to the market is somewhat in conflict with the underlying assumption of commercialization and implementation is for the industry. “Entrepreneurship is never a core element of many universities” (05). “Universities in most cases focus on proof of principle and innovation” (02). From the interview result, the general value of innovation for the academics is not to make a fortune, but to discover and have impact on the society. One participant commented (01): “It is not our main focus to generate money for the university. Our focus is knowledge. But of course, without money...”

“Money” seems to be a dilemma for academic work. Money is not the focus, but it is indeed essential. Producing knowledge, translating knowledge and transforming knowledge into products is more of a novel process to connect the universities with the communities. It is also an entrepreneurial process of making the universities more self-sustainable. The establishment of LRD is to take on the entrepreneurial task of technology transfer. From both the angles of academics and LRD officers, LRD is a facilitator of innovation, a service provider. It plays an indispensable role for the professors and researchers who want to participate in technology transfer. However, the driven force of innovation and entrepreneurship and the leading actors are the individuals (researchers, professors, and students). It is the individuals who have visions for changes initiate actions. Between the initiation and realization, LRD offers comprehensive



services. One participant remarked (01): “Nowadays the new ideas are all very complicated. Collaboration is a new issue. At this moment, one can not realize the idea without services anymore.” LRD provides expertise, support and resources/funds, which are great aid for self-driven entrepreneurs in the university. One participant remarked:

“The professors do not see LRD only as a compulsory administrative organization where they need to get stamps or signatures from. They see LRD as their own tools; a mechanism that they use as their own to work with the industry. ... LRD is financed by a small portion of the turnover generated by the professors, so the professors feel that LRD are their personal tools” (05).

Another participant stated (06): “It all starts with the professors doing excellent research that they want to bring the research result into the market. If there is no professor wanting to do the technology transfer, LRD has no role to play”.

Promoting innovation and entrepreneurship among academics, a clear top-down entrepreneurial mission, motivation, and well-defined entrepreneurship is essential (01). One participant stressed (05): “The most effective way of promoting entrepreneurship is leading by examples; it is as simple as that”. Series of rectors and vice rectors in KU Leuven are entrepreneurs themselves and are very active in technology transfer (05).

To encourage student entrepreneurship and innovation, the most frequent method mentioned by the participants is using role models. Role models can be famous entrepreneurs that students hear and see on the newspapers or social media; also can be graduates from KU Leuven who have become successful entrepreneurs. The later one might be more inspiring since the students share similar experience with the graduates (04). Inviting role models to give speeches or have meetings with the students to share their stories and experience is a common practice to promote innovation and entrepreneurship. Two obstacles are mentioned for student entrepreneurship: First, many students develop ideas that are mainly locally focused. Students do not envision globally enough, and a good start-up company should have global vision at the beginning. The other challenge for student entrepreneurship would be that being full-time students, they

cannot devote 100% of their time on the entrepreneurial projects. It takes several years to realize any ideas, and not many students are willing to commit to it (06).

### **5.3 Risk taking**

Risk taking in higher education setting refers to large financial risks that individuals, teams, or the university undertake while the outcomes of the new initiatives are unknown. In the academic world, individuals taking up financial risk seem to be relatively limited. Developing science in the university is sponsored by various partners. The university is largely funded by the government, and the academics and researchers are funded either by the government or by the internal mechanism of the university. The sponsorship makes having financial risk for individuals relatively limited. On the other hand, it is the process of finding the funding that makes launching a project difficult. One participant noted (02): “The funding mechanism in Belgium is not geared towards high risk projects. There is always a debate between high risk-high return projects versus the expected lab projects.” Risk taking for academics can be presented in other aspects, such as extra time and effort devoted to the project (06). The real financial risk occurs when the professors enter the market with their spin-offs (02). In case of spin-off companies, the investors often expect the founder (which may include professors who want active position in the spin-off) to commit also personally some financial contributions to show their commitment and add to the credibility (06). One participant commented that despite some of the financial risks that one might be involved in creating a spin off, the benefits still clearly outweigh the risk. The experience gained from interacting with the venture capitalist and the like is worth taking the risk (03).

Not everyone will be an entrepreneur, but some have the aspiration to become one. One participant praised: “LRD creates an ideal environment for those who want to take the risk and go ahead for it” (03). All the projects and activities that are carried out by the professors and researchers are set up and monitored by the virtual companies created within the accounting system of LRD. In this accounting system, professors can set up new virtual companies by creating new divisions under the LRD accounting system. By

working in this way, professors can be commercially active without needing to actually start a company. LRD makes agreements with professors who set up such virtual companies to ensure that all the transactions taking place in the virtual companies are isolated in the accounting system. Legally all the money belongs to KU Leuven, but practically the professors who “earned” the money can decide on its usage. For example, professors can use the money to invest in their own laboratories and hire additionally employees by using LRD’s HR service (06). Using such internal mechanism and transaction under the roof of LRD, the financial risks for the academics to participate in technology transfer is honestly limited.

Belgium in general has a risk-adverse climate, and people do not like to see failed entrepreneurs. Professors like to stay in academia instead of taking the risk and setting up companies to do commercialization of their research. By Setting up virtual companies under the umbrella system of LRD, professors are highly supported to be entrepreneurial without having to take any financial or administrative risks. Although all the money is isolated and managed under LRD’s accounting system, the professors still have full control of how to use the money that is generated by their virtual companies. One prominent feature of KU Leuven’s financial distribution system is - for every research goes to commercialization, 17% of the overhead goes to KU Leuven. Of the 17%, half (8.5%) goes to LDR, which covers the organization’s operational cost, and half (8.5%) goes to the university. 17% is a flat fee for every project. The rest 83% (the largest part) goes back to the research division. Out of the 83%, 50% can go back to individual professors or researchers. There is a legal law in Belgium that the university can give surplus back to individuals as wage supplement (the surplus needs to be taxed) (06). One participant (06) commented: “Many professors are not doing the commercialization just to make money. In most cases they are doing it to have societal impact with their research”. They rather see all the money goes to hiring more employees and upgrading equipment than transferring the money to their personal bank account. The professors prefer to spend the money in favor of their research.

The importance of having a well-designed, well-distributed financial structure (financial return) was stressed by all professors. The professors expressed their satisfaction with the financial mechanism exercised in KU Leuven. One participant remarked that if the bulk of money goes back to the laboratory of the professor who generates it, it can increase the chance of this group generate profit again in the future due to their successful experience (03).

Students also do not like to take risks, especially in Flanders. It is crucial to let the students understand that risk is part of the entrepreneurship and failing is normal. In the one-year post-graduate program - Entrepreneurship and Innovation in Engineering, the program invites people who have experience on failure to share their experience with the students (04). There are also some financial mechanisms to support student entrepreneurship. The extension of LRD – Lice, which is to serve the wider student population, provides students free consultancy, free incubation spaces, and some possible funds. One participant stressed: “We try to take away a lot of risks for students, so they can focus on their star-ups” (07).

“What is this little difference between people who are good at doing their jobs, and a little bit more of being entrepreneurial” (01)? The Belgian culture has been mentioned by a few participants as being a factor of discouraging entrepreneurship. Belgians are described as not so international. People like to stay within the environment that they are familiar with. There are some possible explanations for the anti-entrepreneurial and anti-risk-taking behavior in Belgian society (02). First of all, to associate entrepreneurship (profit) with academic work is still perceived negatively by public in the European society, especially when the university is supported by the government. The phenomenon is changing, but there is still a mix of conflicting feelings towards university becoming a “moneymaking machine”. Secondly, there are rarely elements about entrepreneurship exposed to the students in their education system. The students who are familiar with entrepreneurship are usually the ones who have entrepreneurial family backgrounds. Third, Belgian citizens in average have reasonably comfortable life, they might all have houses, cars, protected vacation days, and pensions, so they could have “a lot to lose”,

and therefore are afraid to change. Fourth, the fear of failure is prominent in the Belgian culture. Failure is perceived negatively in general. Failure should be accepted as a part of entrepreneurship; as a preparation for the future success.

#### **5.4 Proactiveness**

Proactiveness in higher education setting refers to individuals, teams or the university taking on the leading roles of knowledge production and translation in the pursuit of future breakthroughs. As discussed in the innovativeness section, the individual academics take the leading roles to initiate ideas and projects. “It is very important that you take yourself forward” (02). “The individuals must be the driven force” (01). Professors also take on roles of being facilitators to promote entrepreneurship. They occasionally invite people from LRD to the laboratories or classes to advertise LRD’s values and services.

At the organization level, LRD also presents features of being proactive. LRD makes initiative contacts with the professors at times when they see opportunities for collaboration. LRD keeps contacts with the professors and the laboratories frequently by having an effective “structure”. That is, by using the internal financial mechanism managed by LRD to provide services that the professors use regularly (05). However, it is still challenging for LRD to keep contact with every professor. One participant (06) commented: “The most efficient and effective approach is to keep the entrepreneurial spirit positive”. From the overall impression of the professors, LRD does not directly impose themselves on the academics. Instead, they present an image of low threshold and easy accessibility. One participant describes LRD as the players in the sport “curling” (06). LRD does not launch things (throw the ball), but they work strategically together to influence the track of where the ball may go.

Looking at the development of LRD from 1972, the organization was not a well-accepted concept by public at the start. Commercialization of research was considered as “non-pure” and the process was regarded as anti-academic autonomy. Nevertheless, one

visionary rector back then decided to take the proactive action and set up LRD as an independent entity for technology transfer (06). LRD is designed to serve the 5,000 researchers (include 1,500 professors) in KU Leuven. Seeing the growing trend and need of student entrepreneurship, LRD established Lcie as an extension few years ago to service the larger student population. Lcie was founded with student-driven initiatives to stimulate students' involvement and engagement of entrepreneurship. It is a faculty-independent and community bottom-up driven entity. It is right now at its starting stage with many challenges encountered. One participant remarked: "We are a bit like a start-up our own" (07). The TTO has to be in constant change, and that is what LRD has been doing over the years. The TTO should not be waiting for the works to knock on the door. Instead, the TTO should look forward and identify gaps and loop holes and actively cease or create opportunities (05).

The establishment of Lcie was an example of students' initiative and organization's (LRD) proactive attitude meet half ways. One participant noted: "Lcie really starts from the students telling us their situations and needs" (07). When Lcie was trying to launch the one-year Product Innovation Project (PiP), there were voices expressing the concern of the unfeasibility. The project intended to involve various faculties to work together, and there were no such collaboration model existing in the past. Nonetheless, the first PiP project was realized with the support from the student community. In the first year, the students who joined the interdisciplinary project, only some of them obtained full credits (6 ECTS), some received 3 credits and some did not even receive any credit for it. The students acted as strong initiators to make the project happen. There was a board of students facilitate running PiP. They arranged contacts with the faculties and the companies, and organized series of workshops for the students (07).

KU Leuven is a big ecosystem. LRD is a facilitating unit for entrepreneurship. Faculties that dwell in this ecosystem also have their own initiatives. Take engineering faculty for instance, they initiated a one-year post-graduate program, Entrepreneurship and Innovation in Engineering, in 2013 to promote student entrepreneurship. Later on, this program has been implemented in other five Flemish universities. Students can choose to

work for companies on certain projects or use the time to learn skills, develop good business plans, and create their own start-up companies after they graduate. Another option for the students is to work together on certain innovative projects in groups. The group project appears to be the most popular one among students. During the process of setting up the program, one prominent obstacle was to have the professors and teachers involved due to the lack of reward mechanism for the involvement. Companies on the other hand were more willing to collaborate (04). The program offers professors and teachers coaching sessions, which is to prepare the teachers with basic coaching/teaching skills that can stimulate students' innovation, creativity, and other entrepreneurial capabilities. One participant commented: "The biggest obstacle is to get the professors and teachers involved, and getting them to the training sessions are also not so easy" (04).

The program also initiated their own "Technovation Hub", due to the shortage of incubator spaces and service provided by the central office (LRD and Lcie). LRD currently provides service and incubator spaces to the students through Lcie, but the scale is relatively small at the moment. Lcie is only stationed in Leuven, but KU Leuven has other campuses. The rest campuses are remote from the service that Lcie provided (04). Technovation Hub provides students services such as consultancy, bank accounts, insurance, and funding. This organization is consisted of KU Leuven, students, industry partners, and entrepreneurs. KU Leuven is one of the shareholders, but they do not hold shares more than 50%, so the organization can be independent from the university be more flexible (04).

### **5.5 Competitive aggressiveness**

Competitive aggressiveness in higher education refers to aggressive moves, strategies, and decisions that are taken by individuals, teams or the university to maintain their outstanding performances. Competitiveness was a very tricky question to ask during the interview process. Most of the interviewees would translate or direct it to "collaboration". One participant addressed (03): "We have more colleagues than competitors".

Collaboration is more often a discussed issue than competition (01). Competition /

Competitors were usually commented while the question was rephrased and asked the second time. One participant remarked (02): “In the academic world, you probably know who your competitors are, you can assess them from the meetings you attend and the publications you read. In the private industry, you never know who they are and what is going on.” During the process of translating basic research, at the beginning, the competition is in the academic world for doing better researches. Later on when the development becomes more important, the companies in the industry can be potential competitors who are doing the similar development. When it comes to the time to launch the product to the market, one can discover the real competitor in the industry. (02) Another participant noted (01): “To be competitive, you have to stay sharp in your domain”.

The same collaborative phenomenon can be seen among students. Take the program of Entrepreneurship and Innovation in Engineering for example, students like to work together as much as possible. Only when the project becomes promising and the students realize the value of it, the competition starts to reveal (04). Take PiP for another example, one of their goals is to bring the faculties together, to facilitate the interdisciplinary collaboration, so that the students can have the chance to collaborate with people from various domains (07). From the overall impression with the interviewees, collaboration is a much common used word and concept than competition.

## **5.6 Entrepreneurial ecosystem**

Entrepreneurial culture was studied and analyzed according to the five entrepreneurial orientations in the previous sections. In this last section, an overall view on the entrepreneurial ecosystem is addressed to bring a holistic view on the entrepreneurial turn of the university. According to most of the participants, the university should be a place for both basic research and entrepreneurship. University as more of a static institution, it needs to be a free environment where basic research is supported when there is no immediate value to the society. At the meanwhile, university should also embrace entrepreneurship in order to move forward (02). University is different from the industry,



because knowledge and research is the foundation of the university (01). “I have much respect for colleagues who don’t do any valorization and focus on the basic science”, one participant stressed (03). Meanwhile, when the opportunities for valorization occur, the university should be able to take them. No one knows what holds for the future; the university has to be flexible and adapt to new situations (03).

A good balance between pure science and entrepreneurship was desired among the responded entrepreneurial professors. Entrepreneurial education as a closely related topic was also frequently mentioned by the interviewees. One participant commented: “I think all these courses benefit the overall society more than the impact they have on the university itself” (03). Since universities are to a large extent funded by the government, they must make a positive impact on the society. In the current knowledge era, the society needs more people with entrepreneurial competences. Promoting entrepreneurship on campus and encourage students to start their own companies is just the tip of an iceberg. A more urgent issue is that the vast majority of the students are not familiar with entrepreneurial behaviors. It will benefit the society as a whole if the entrepreneurial spirit and competencies are embedded in the entire education system (06).

## 6 Conclusion

The aim of this thesis was to address the institutional culture in relation to organizational changes - the development of the TTO. After studying the TTO in KU Leuven, and conducting multiple interviews with the academics and officers of the TTO, this thesis addressed the research questions with the available evidence gathered: 1) *What is the impact of the TTO on institutional entrepreneurial culture formation?* The findings indicate that a well-established and proactive TTO does not only facilitate the entrepreneurship at the operational level; it also becomes an indispensable unit embedded in a larger entrepreneurial ecosystem that has considerable impact on the entrepreneurial culture of the institution. Such statement is supported by the testimonies of several entrepreneurial professors. High technology products nowadays are too complex to be a single-man work. From ideas to realization, without sufficient support from professional unit such as a TTO, the technology transfer result is problematic to attain. A well-functioned TTO embedded in a large ecosystem also creates its own ecosystem to reinforce the entrepreneurial culture through successful daily operations.

The establishment of a TTO shows a top-down mission on entrepreneurship. Having a clear mission, being led by examples and having role models around can impact the intuitional culture. Culture formation is by reinforcing a chain of successful experiences that are shared by the members of a group (Schein, 2004). An efficient TTO facilitates the technology transfer process, and creates a positive environment for the entrepreneurship activities. Successful entrepreneurial stories and experiences occur more often within a healthy ecosystem, thus the entrepreneurial culture can be reinforced and formed over time.

KU Leuven itself is embedded in a larger ecosystem of the Leuven region. LRD is embedded in KU Leuven, and the individuals are spread out and embedded in this overall entrepreneurial ecosystem. A well-designed incentive mechanism can motivate the individuals to participate in the entrepreneurship activities. All the respondents in this research have a consensus on individuals being the drive and push factor for

entrepreneurship. However, through the story telling of some participants, without a reasonable or attractive financial return, it is hard to keep the entrepreneurial spirit active within the system. The high financial return mechanism employed in KU Leuven and LRD encourages the professors to continue engaging in entrepreneurship activities. A well-designed financial incentive is a key factor for a TTO to effectively influence the entrepreneurial vibe.

A TTO that constantly adapts to the changing environment and seeks improvements creates a sustainable ecosystem to encompass bottom-up initiatives. The student driven organization – Lcie is a good example of the integration of bottom-up initiatives. Individual initiative transforms to a shared value or action is the process of culture formation (Schein, 2004). The balance between top-down and bottom-up initiatives is crucial for the ecosystem (Göktepe-Hultén, 2008). A flexible TTO that adjusts itself to new conditions and challenges creates a healthy ecosystem for the initiatives to prosper.

Regarding the second research question: 2) *What role does the TTO play in shaping institutional entrepreneurial culture?* The findings indicate that there are several roles in play as a TTO. First of all, there are a few out-spoken terms of the roles of a TTO, such as a facilitator, a service provider, a tool, and a catalyst. The author would like to address the roles of a TTO from the perspective of the five entrepreneurial orientations. The TTO and individual academics are both autonomous actors in the KU Leuven ecosystem. Having absolute academic freedom, the professors and researchers regard the TTO as a service provider. Especially in the case of LRD, it is acknowledged by both the professors and LRD officers that LRD is a very useful tool. A well-functioning service station can attract more people for using the service, especially when professors are autonomous individuals who may or may not need the service according to their own academic aspiration. When a TTO is considered as being a useful tool, the successful usage experience shared among the users can influence the entrepreneurial culture.

A common consent on the role of the university is to educate people and conduct excellent research. Nonetheless, the third mission of committing to serve the community

involves technology transfer. Additionally, facing the reality of financial resources being scarce, third stream income becomes imperative for the sustainability of the university. During the innovation and technology transfer process, the individual academics are drivers for the innovation and the TTO is a facilitator for the technology transfer by providing their professional services.

The TTO plays a crucial role on the risk-taking behavior of the academics. In the case of LRD, by providing a risk-free financial mechanism within the accounting system of LRD, professors can set up virtual companies to experience the market without taking any actual financial or administrative risks. Such mechanism has considerable impact on the risk-taking behavior of the academics. To the author's surprise, all the participants referred to Belgian culture as being risk-averse and the fear of failing is prominent. For the people who have the entrepreneurial spirit and are willing to take some risk, the existence of such financial system offers the entrepreneurs an ideal starting environment. The more convenient and better developed the system is, the impact on the entrepreneurial culture becomes greater.

Being a proactive TTO shows the determination of seeking for continuous growth. The environment is constantly changing; the survival of every organization depends on its capacity to take the challenges. From the interview results of this research, there are many proactive academics and students within the institution that influence the entrepreneurial culture. Allowing the bottom-up initiatives to properly representing the university's capacity to move forward in a faster pace. LRD noticed the increasing need for student entrepreneurship; with both LRD and the student community taking proactive actions, Lcie was established and many experimental projects are currently taking place.

The competitive phenomenon in the business world does not seem to be fully applied in the academic world. Although the competition still can be seen among the academics and the students, "collaboration" is a more pronounced concept than competition according to the interview result. The concept of collaboration also applies to the TTO in its daily operation. With the TTO taking on the role of being a bridge between the university and

the industry, collaboration becomes its daily task. Being an intermediate, the TTO connects academics to work with each other, assists in finding firms to collaborate with the academics, and bridges the gaps between research and technology transfer. Functioning as a bridge also transmits the ideologies and cultural values in between different parties.

The last research question addressed the obstacles that a TTO faces: 3) *What are the obstacles to achieve a unified institutional entrepreneurial culture?* Once again, a TTO is embedded in a bigger ecosystem of a university; and the university is embedded in a national system. The national culture has influence on each individual. Take student entrepreneurship as an example, devoting extra time on engaging in entrepreneurial activities might affect students' performance on their academic subjects. The public value in general is for the students to obtain degrees first before they fully commit to other types of activities. To embed the entrepreneurial education in the higher education system is a great challenge. It requires a systematic change of the curriculum and the active participation of the teachers and the professors. Although giving incentives is a key factor for the academics to participate in entrepreneurship and entrepreneurial education, the static environment of the university and the traditional focus on academic paper publishing makes engaging in entrepreneurial activities a dilemma. National and institutional culture is slow to change, since culture formation is based on individuals sharing the same beliefs and values. It takes time for the individual values to have impact on the mainstream culture.

This thesis is a single-case study, thus the observation on the impact of a TTO on its institutional culture is limited, considering there are different types and sizes of the TTOs. Nevertheless, this research selected a well-designed and effectively functioned TTO as an information-rich sample to exhibit the possible impact a TTO can have on the entrepreneurial culture formation. The autonomy, effectiveness, proactiveness and successful experiences that the TTO presents can form a positive force to influence the institutional culture. Further studies on gathering more information on various TTOs that operate differently can provide diverse insights. Interviewing a wider array of participants

can also contribute distinct perspectives on individual's values and beliefs, which are the parcels that construct the broad culture.

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## Appendix

### Appendix 1 Interview guide for academics

<b>1. Personal information</b> 1.1 Position at KU Leuven
2. Autonomy 2.1 When you initiate a new project, how much freedom do you have to carry it through to completion? 2.2 During the commercialization process in cooperation with LRD, how would you describe the power allocation? Who is in control?
3. Innovativeness 3.1 How do you value innovation and commercialization of your research? 3.2 What are the incentives provided for innovation and commercialization at the University of Leuven? 3.3 How does LRD promote and support commercialization of your research?
4. Risk taking 4.1 What are the risks involved when you initiate a new project? 4.2 What is your opinion about risk taking behavior for academics? 4.3 How is the risk shared when the commercialization process is in cooperation with LRD?
5. Proactiveness 5.1 Can you describe the occasion when you initiate a new project? (Is it an opportunity offered by the industry, first contacted by LRD, or it is your own initiative?) 5.2 From a research project to commercialization of the technology, how active are you during the process?
6. Competitive aggressiveness 6.1 Who would you say are your major competitors in the field of research and innovation? 6.2 Is competition one of your major concerns in research and innovation?
7. Overall 7.1 Overall, in your opinion, what is the impact of LRD on the entrepreneurial culture of KU Leuven? 7.2 What would you say are the obstacles to promote entrepreneurial culture among academics?

## Appendix 2 Interview guide for LRD officers

<p><b>1. Personal information</b></p> <p>1.1 Position at LRD</p>
<p>2. Autonomy</p> <p>2.1 What kind of organizational type is LRD? (A part of the university's administration office, an independent unit owned by the university, or completely independent?)</p> <p>2.2 During the commercialization process between academics and LRD, how would you describe the power allocation? Who is in control?</p>
<p>3. Innovativeness</p> <p>3.1 How does LRD address the gap between licensed technology and product launched to the market?</p> <p>3.2 How does LRD promote and support commercialization of research?</p>
<p>4. Risk taking</p> <p>4.1 What are the risks LRD take in daily basis?</p> <p>4.2 What is your opinion on the risk taking behavior of academics?</p> <p>4.3 How is the risk shared during the commercialization process in between the academics and LRD?</p> <p>4.4 What are the risks for students when they are involved in the entrepreneurship activities?</p>
<p>5. Proactiveness</p> <p>5.1 For every licensing and commercialization of the research, who is the initiator? (The academics or LRD?)</p> <p>5.2 From a research project to commercialization of the technology, how active is LRD during the process?</p>
<p>6. Competitive aggressiveness</p> <p>6.1 Who would you say are your major competitors in the field commercialization?</p> <p>6.2 Is competition one of a major concern at LRD?</p>
<p>7. Overall</p> <p>7.1 Overall, in your opinion, what is the role of LRD on the formation of entrepreneurial culture in KU Leuven?</p> <p>7.2 What would you say are the obstacles to promote entrepreneurial culture among academics? And among students?</p>