Entrepreneurial university archetypes:

a meta-synthesis of case study literature

JOHANN BRONSTEIN

Otto Group Chair of Strategic Management
Leuphana Innovation Incubator
Leuphana University of Lüneburg
Scharnhorststraße 1
21335 Lüneburg, Germany
Tel.: ++49 4131-677-2545
Email: johann.bronstein@leuphana.de

MARKUS REIHLEN

Vice-President Graduate School
Otto Group Chair of Strategic Management
Leuphana University of Lüneburg
Scharnhorststraße 1
21335 Lüneburg, Germany
Tel.: ++49 4131-677-2350
Email: reihlen@leuphana.de

Abstract: Most research on entrepreneurial universities is case study based. While this helps us understand specific characteristics of particular cases, integrative studies that build on cumulated knowledge have yet to be conducted. This study aims to synthesize existing research and to generate archetypes of entrepreneurial universities by conducting a qualitative meta-synthesis of existing cases. The underlying assumption of our research is that there is no single model or best type of entrepreneurial university. Notwithstanding, we expect to see entrepreneurial universities converge into a few distinct archetypes that display similar organizational attributes. As primary data source we used 27 case studies on entrepreneurial universities, which we inductively synthetized based on grounded theory methodology and deductively analysed following an iterative approach. As a result four empirically grounded archetypes were identified and described: *"Research-preneurial"* or research driven; *"Techni-preneurial"* or industry driven; *"Inno-preneurial"* or innovation driven; and *"Commerce-preneurial"* or knowledge commercialization driven. This study contributes to a more comprehensible understanding of entrepreneurial universities by providing an empirically based framework, which helps to overcome the context-dependency and non-generalization issues associated with single case studies. Moreover, identified archetypes can serve practitioners as heuristic tools and design elements for policy making.

Keywords: Entrepreneurial University, Archetypes, Case Study, Meta-Synthesis

Paper submitted to Industry and Higher Education Journal. Special Issue on Entrepreneurial Universities. June, 2013

Johann Bronstein is PhD Research Fellow at the OTTO Group Chair of Strategic Management and has a full scholarship from the Leuphana Innovation Incubator, where he conducts research in the field of Higher Education and university – industry cooperation for regional development.

Markus Reihlen is Vice-President of Leuphana Graduate School, Otto Group Professor of Strategic Management, Programme Director of the MBA in Strategic Management at Leuphana University of Lüneburg, and Associate Fellow of the Said Business School ath the University of Oxford.

INTRODUCCION

Over the past two decades, universities have been facing a period of profound changes and unprecedented challenges. The rise of new public management (Greening, 2001) has disrupted the institutional setting of higher education (Teichler 1996; Neave 1995; Dill and Sporn 1995), increasing pressures to comply with new rules, requirements and expectations from government and other stakeholders. The rise of managed education implies a more active role of the government in monitoring and auditing educational institutions, while at the same time promoting autonomy and competition in the name of academic excellence and efficient exploitation of knowledge (Münch, 2011; Reihlen and Wenzlaff, 2012). While normative pressures drive universities towards structural homogeneity and facilitate isomorphic change (DiMaggio and Powell, 1983), at the same time market deregulation and increased autonomy foster the emergence of distinctive structures. Hence, this paradoxical policed deregulation stimulates creative strategic responses and novel organizational configurations, which have been described as the entrepreneurial university (Clark, 1998; Sporn, 2001; Kirby, 2006), third-generation university (Wissema, 2009) or the triple-helix model of university-industry relations (Etzkowitz, 2003, Etzkowitz and Ranga, 2010).

As universities struggle with the organizational challenges of creatively responding to a shifting institutional paradigm, it becomes essential to investigate, first the emergent organizational structures of entrepreneurial universities; and second the strategic initiatives that facilitate the entrepreneurial transformation. Through the identification of relevant organizational characteristics in numerous case studies on entrepreneurial universities, we aim to generate a comprehensive taxonomy of the empirical literature and to identify distinctive emergent organizational archetypes.

Based on an inductive qualitative analysis of twenty-seven empirical cases, we develop a taxonomy of emergent university archetypes, which provides a more comprehensive understanding of recently evolving structures, processes and strategies in higher education institutions. Moreover, by describing aggregate generalizable patterns, this study should help to overcome some of the context-dependency and non-generalization issues associated with single case studies. Additionally, archetypes could serve as conceptual tools for practitioners in designing, steering and foreseeing organizational development in their organizations

The paper is built as follows: first, we review the literature on the entrepreneurial university and define our understanding of its reach and scope. Subsequently, we present a short summary of configuration theory and the contribution of archetypes to the understanding of organizational structures and strategic change. Next, we explain the methodological approach and design of our research, which will use grounded theory to assess the data of twenty-seven case studies of entrepreneurial universities. Through this process we aim to inductively identify structural attributes and organizational processes, which we later analyse in order to identify emergent patterns in organizational configurations. Afterwards, we look at the prevailing literature on entrepreneurial universities to help us enrich and contrast our results. Finally, we summarize our findings and propose some directions for further research.

THEORETICAL FRAMEWORK

Defining the entrepreneurial university

The field of entrepreneurship is characterized by a lack of agreement on precise definitions and key terms. Austrian economist Joseph Schumpeter (1936), in the early days of the academic discipline, emphasized its innovative nature, defining an entrepreneur as a person who carries out new combinations, causing discontinuity. This broad understanding was amongst the most widely accepted until the past decades, when increasing disagreement on the term and scope of the field has been the rule. Our essential understanding of the term entrepreneurial is that of generating and arranging innovative combinations of factors of production, which can be seen as resources or capitals, and methods of accomplishing a goal (Bygrave and Hofer, 1991), which can be understood as capabilities and strategic choices. Entrepreneurship involves exploitation of opportunities beyond means that are currently available, and manifests itself not only in individuals, but also in organizations such as firms or governmental institutions (Bull and Willard, 1993). These chances to exploit future goods and services are not simply taken, but created through new organizational attributes and interaction within the micro, meso and macro institutional levels (Venkataraman, 1997; Reihlen et al, 2009), thus resulting in many new organizational configurations that tend to converge into few distinctive archetypes (Hinings and Greenwood, 1988).

The concept of entrepreneurial university in academic literature tends to be diverse and ambiguous (Kirby et al, 2011). Significant differences in the meaning and scope of the term arise from the literature, depending on the context and specificity of the cases studied and discourse of the researchers (Blenker et al, 2008). Moreover since 1998 when Burton Clark introduced the term entrepreneurial university, several scholars (Röpke, 1998; Sporn, 2001; Etzkowitz, 2003; Kirby, 2005; Rothaermel et al, 2007) have used the term, while others have proposed alternative terminology such as third generation university (Wissema, 2009).

Clark's seminal work on entrepreneurial universities identifies five elements of entrepreneurial behaviour in many detailed case studies that he conducted during the 1990's of various university transformations. This five-element approach has become point of benchmark and reference in the entrepreneurial university literature over the past two decades (Bratianu and Stanciu, 2010). The elements defined by Clark (1998) are: an 'expanded the developmental periphery', which involves research transfer centres, joint ventures with industry, spin-offs, tailored educational and training programs for industry partners, etc.; a 'diversified the funding base' by looking for alternative streams such as deals local, regional and supranational public agencies, NGO's, revenues from students services and alternate platforms such as e-learning, symposia and networking events among others; a 'strengthened steering core' with decision making authority and autonomy, accountable, professional and well funded; a 'stimulated academic heartland' in which purposeful scholarly work is recognized and encouraged and innovative and collaborative research is pursued and remunerated according to its relevance; finally an 'integrated entrepreneurial culture' represented by a strong set of beliefs, principles and consistent practices, all of which "ought not to be treated independently of structures and procedures through which they are expressed, thus an institutional perspective is required. The first four of the five elements are means by which transforming beliefs are made operative" (Clark, 1998:7-8).

Various understandings on the boundaries of an entrepreneurial university and its relevant characteristics can be included into a wide reaching definition, which would come closer to the original essence of the term entrepreneur to help us frame the structure for our study. An entrepreneurial university is one that responds strategically to field logic changes, by acquiring and employing resources in an innovative manner, underpinned by an integrated entrepreneurial culture that provides support structures in order to fulfil its strategic goals.

Clark's seminal study on entrepreneurial universities was aimed at identifying recurring element among the cases he studied. In other words his methodological was intended to look for empirical regularities among the five organizations he studied. In contrast to that approach, this study aims to look for empirical heterogeneity within Clark's homogeneous but general framework, based on the premise that organizational divergence in higher education is favored by new market logics and deregulation, and on the evidence from literature suggesting that differing types of universities are all being described as entrepreneurial, even though in fact there is great variability among their organizational characteristics. In consequence, this study should generate, through the identification of archetypes, a detailed framework of specific organizational characteristics among differing forms of entrepreneurial universities

Despite the heterogeneity regarding the term of the entrepreneurial university, we would like to derive two recognizable generalizations. First, universities in the Western world are increasingly experiencing profound transformations. These changes take different paths across organizations because each transformation is shaped by a unique institutional setting, which is one reason for the differing entrepreneurial university models reflected in the literature. Second, The entrepreneurial characterization implies the framing of universities as an opportunity seeking and exploiting institution (Shane and Venkataraman, 2000). However, existing literature tends to reduce that 'opportunity seeking and exploiting' behaviour to the capitalization and commercialization of academic knowledge (Yusuf and Jain, 2008). While this is an important part of entrepreneurial behaviour, it still overlooks the multidimensionality of the entrepreneurial phenomenon, which also relates to innovative approaches in the main academic areas of education and research. In addition to engaging on entrepreneurial activities per se, universities also need to embrace an entrepreneurial culture at all levels, from teaching and research to governance and management (Clark, 1998). Hence,

the organization and its members need to interact with the organizational field in an entrepreneurial manner as well (Röpke 1998). Accordingly, an entrepreneurial university would not only be an advocate of various support initiatives for entrepreneurship, but also an institution that develops and implements innovative strategies.

The level to which the entrepreneurial culture is represented within the organization will depend on the degree to which actors in and around the university behave in accordance with these entrepreneurial values and beliefs (Greenwood and Hinings, 1993). In other words the degree to which the behaviour of members in and around the university will underpin the structures and systems, which in turn will determine its organizational attributes and emergent configurations, thus ultimately the archetype of entrepreneurial university it represents.

Archetypes as framework for analysis

This study draws on configuration and archetype theory in organizational studies as theoretical framework in order to synthetize the diverse and complex structures of universities with the aim to find discrete clusters of configurational schemes that serve as idealized types for comparability, design, and predictability (Greenwood and Hinings, 1993; Meyer et al, 1993; Miller, 1986, 1996; Miller and Mintzberg, 1983; Mintzberg, 1979; Weber, 1978).

According to Meyer et al. (1993) the term organizational configuration can be used to "convey any multi-dimensional constellation of conceptually distinct characteristics that commonly occur together". The study of configuration denotes the identification of certain key dimensions that together offers and represents how organization functions. Numerous dimensions such as structures, processes, strategies, technologies, industries, or many other chosen dimension of analysis, across different organizational levels of analysis as organizations, departments, groups or individuals, tend to cluster together to forms a representation of ideal types or gestalts within a defined organizational field (Greenwood and

Hinings, 1993) Configurations may be derived conceptually or emerge from empirical studies and emerge due to diverse forces that cause organizational to cluster together (Meyer et al., 1993). Some authors have suggested that selection based on population ecology theory of the firm drives organizations to converge into uniform clusters (Hannan and Freeman, 1977). Others such as DiMaggio and Powell (1983) as well as Hinings and Grennwood (1993) argue that powerful institutional actors exert a degree of influence through normative or coercive regulation, which forces the diffusion of few common structures and strategies within a defined institutional environment. Miller (1987) has explained how there exist also endogenous homeostatic forces that drive organizations towards uniform configurations (Miller et al, 1984). Meyer (1982) described how organizational ideologies and socio-cognitive processes undermine formal structures and shape consistent responses to external threats, which points to shared "interpretative schemes" within organizations to support the emergence of a discrete set of recognizable structures and systems that tend to congregate among few "archetypes" (Greenwood and Hinings, 1993).

Configurations result from interlinked relations among attributes across different dimensions such as structures, processes, resources and strategies. These configurations may be derived conceptually as typologies, or empirically as taxonomies (Milleret al, 1984). Configurations of single organizations tend to group within differentiated clusters whose boundaries represent "ideal typologies" or organizational archetypes (Greenwood and Hinings, 1993). The archetype concept of Greenwood and Hinings (1993) expands on the configurational framework to extend it with a strong institutionalist perspective. They define archetypes as "a set of structures and systems consistently reflective of a single underpinning interpretative scheme" (1993 p.1057). This idea conveys the important role that values and belief play in determining the manner in which groups of organizations operate within an institutional arena.

We use configuration theory as theoretical basis to review and synthesize several case studies using the grounded theory framework (Glaser and Strauss, 1967) and methodology (Strauss and Corbin, 1998), in order to identify different groups of entrepreneurial universities operating on distinct environments. Just as in other organizational fields, we might expect universities converge into a few clearly differentiated configuration clusters that display similar organizational attributes, which can be identify and described as ideal models or archetypes.

RESEARCH METHODOLOGY AND DESIGN

A growing body of literature on entrepreneurial universities has accumulated over the past decade and case studies represent a vast amount of it. As in many fields of social sciences where aggregate, complex and context-dependent phenomena is the object of analysis, case study research in higher education stands out amongst the most commonly used research design, specially in the areas of management and governance. However, since single case studies are individual by nature, these suffer from issues of empirical generalizability and non-reliability (Newig and Fritsch, 2009). By combining a grounded theory methodology (Greenwood and Hinings, 1993) for the analysis of a large number of cases, we hope to overcome some of the limitations of previous research by offering a synthesis of existing case-based research.

Grounded theory as methodological approach for meta-synthesis of case studies

The term meta-analysis has long been commonly used by quantitative researchers to synthetize and analyse large amounts of existing data accumulated from previous studies. Notwithstanding, in social sciences numerous researchers have also used meta-analysis

techniques for synthesis and analysis of accumulated qualitative research (Yin and Heald, 1975; Mintzberg and Raisinghani, 1976).

Based on grounded theory methodology we seek to conceptualize, synthetize and find patterns in high-level constructs derived from our case studies. Grounded theory methodology is a systematic approach to theory building through data coding techniques and pattern recognition (Strauss and Corbin, 1998). These emergent explanatory concepts and models are understood to explain the phenomenon under study and thus to be grounded in the data (Glaser, 1992). In this regard, variables and dimensions in this meta-synthesis will not be defined a priori, but will emerge directly from the raw data as relevant attributes and relational patterns.

Even though grounded theory was not initially intended to conduct meta-synthesis of case studies, Glaser and Strauss (1967) in their seminal work on grounded theory wrote, "When someone stands in the library stacks, he is, metaphorically, surrounded by voices begging to be heard. Every book, every magazine article, represents at least one person who is equivalent to the anthropologist's informant or the sociologist's interviewee." (p. 63), suggesting that published studies based on rich qualitative empirical data is to many senses similar to first hand data collection or to conducting interviews. This qualitative meta-synthesis draws on grounded theory methodology for research synthesis and meta-analysis.

Building on qualitative meta-analysis techniques and grounded theory, we follow a methodological approach that we have defined as a qualitative grounded meta-synthesis. This approach provides us with the means to synthesise and analyse rich qualitative data of case studies for the development of theory, grounded on data. The procedures focus on identifying emergent concepts and abstract categories from separate studies, then on building categorical relationships in a cumulative manner in and across studies, and finally on grouping these

similar categories looking for relationships and patterns among them (Stall-Meadows and Hyle, 2010). Ultimately, the emergent hypotheses are compared and contrasted with existing theory about the related phenomena. These hypotheses would only hold for the number of cases synthesised, then again could be generalized to a greater extend than single case studies (Hossler and Scalese-Love, 1989). Figures 1 and 2 provide us with a graphical overview of the iterative analytical process applied in the study and the methodological approach followed in order to derive the archetypes.

Insert Figure 1

about here

Insert Figure 2

about here

Data collection

After clear identification of the research problem or objective, it is necessary to find the relevant case studies through several sources of literature. In order to have purposive selection on candidate cases to be included in the analysis, it is essential to limit the literature search to the underlying research question (Hoon, 2012). We have searched for relevant case

studies of entrepreneurial universities published in referred academic journal in the field of management, higher education and public administration. Additionally books and articles on entrepreneurial universities based on empirical data were also included for pre-selection, as well as academic papers presented at specialised entrepreneurship and higher education conferences. The search was conducted using the most comprehensive databases and academic search engines available in the field, namely EBSCO Host, Web of science, Google Scholar; in addition to dedicated scientific books covering the topic of university management and knowledge transfer, which contained descriptive case studies on entrepreneurial universities. We performed a simple Boolean search using the following pre-defined keywords 'entrepreneurship' and 'university'; and/or 'entrepreneurial university'; and/or 'knowledge transfer' and 'university'; and/or 'university governance' or 'university management', and/or 'triple-helix' and 'university'; and 'case study'. We specified an inclusion criteria aiming at incorporating between 20 to 35 cases relevant for our study. Regardless of the topics addressed and scope of the cases, these had to self-defined the studied organization as either 'entrepreneurial university' or any of the commonly used alternative terms, such as 'third Generation University', 'enterprise university', or 'triple-helix model' among others. Moreover in order to enhance the reliability of our raw sources, selected cases had to contain enough qualitative and descriptive data with regard to the organizational structures of the universities being studied (Yin and Heald, 1975). We selected twenty-seven case studies that fulfilled the inclusion criteria, containing at least five pages of qualitative data based on the theoretical framework and research methodology. Table 1 presents the selected data sample, which contains cases representing eighteen different countries in Europe, North and South America, Asia, Russia and Australia. Thus representing a global sample of the entrepreneurial phenomena in universities, and portraying differences in environmental factors such as legal frameworks, culture, socio-economic factors and

contextual characteristics related to each country specific higher education market. Nonetheless due to the cross-sectional nature of the meta-synthesis, we have worked at a level of analysis which seeks to describe the attributes present at the meso-organizational level, hence coding and abstracting only organizational and environmental characteristic present cross-sectionally in the data sample. In line with the cross-sectional nature of this study, the data set includes case studies of entrepreneurial universities raging from 1998 to 2013. Moreover as the case studies used for this analysis are mostly descriptive and represent in-depth analysis of single organizational units usually through time and in relation to a specific context, the data set includes a wide historical range within the time dimension, but without being chronologically ordered or longitudinally compared at any point in time.

Insert Table 1

about here

Data Analysis

Open-coding and single case analysis

The level of analysis is the case study itself, not its raw data. Case studies constitute our primary data source for the analysis (Noblit and Hare, 1988; Hoon, 2012), which in this case are analogous to the raw data or narrative account from an expert interview (Glasser and Strauss, 1967). Each case is assessed with the open coding procedure, which is defined as the process of purposefully examining, comparing, abstracting and categorizing data. Using

qualitative analysis software relevant information from the cases has been identified and coded. The process of ground level concept identification is repeated for each single case.

Cross-case analysis and axial coding

Once single case analysis and open coding had been performed, we proceeded to the cross-case analysis. According to Strauss and Corbin (1990 p.99) axial coding "consists in linking subcategories to another category in a set of relationships denoting causal conditions, phenomenon, context, intervening conditions, action/interactional strategies and consequences". We make use of causal network techniques (using the software ATLAS.ti ®) to display first and second level concepts and their relations to higher level dimensions. Analogous to the axial coding procedure, we looked for patterns on data by making connections among categories resulting in related groups or families. Then, similar concepts were grouped into abstract categories, broad enough to comprise all cases under synthesis. Subsequently, emergent patterns are conceptualized into formal statements describing the relations among categories.

Theory building and selective coding

We rely on our theoretical framework to selectively integrate related first-level concepts (variables) that form abstract categories (organizational attributes), which aggregate into distinctive dimensions (configurations). Stall-Meadows and Hyle (2010, p. 416) describe selective coding as the integration of concepts into theories. In this regard, we analyse and contrast emergent configurations with existing literature in order to describe and label archetypes. The result of this final process, which emerged from the open and axial coding, is a comprehensive conceptual representation of all cases being studied, grounded in the data.

RESULTS

General Elements of entrepreneurial universities

We have conducted this meta-synthesis in order gain a to a more comprehensible understanding of the structures, processes and strategies that shape distinct entrepreneurial universities. After qualitative synthesis of 27 selected case studies, we were able to inductively derive and categorize common characteristics that shape the organizational configurations of the studied universities. These general characteristics found in the data sample, together with the elements and dimensions derived from all coded traits provided the framework for the analysis and identification of entrepreneurial university archetypes (see table 2). After open coding all qualitative data, we have identified 141 traits that represent the entirety of all attributes arising from each particular case studied. Subsequently, coded attributes were arranged into separate elements that define entrepreneurial universities. The arrangement was done by inductively arranging families of coded data and by deductively categorizing codes, using previous reviews on entrepreneurial universities and its design parameters as analytical framework (ie., Handscombe, 2003; Gibb and Hannon, 2005; Rothaermel et al, 2007; Yusof and Jain, 2008; Guerrero and Urbano, 2012; Gajon and Urbano). Moreover, the elements defining entrepreneurial universities were classified into aggregate dimensions according to the nature of the resource, capability and strategy pertaining the organization. Furthermore, these dimensions were separated into internal and external factors based on a meso-organizational level and following the conceptual model for entrepreneurial universities proposed by Guerrero and Urbano, 2012.

A foundation for the identification of archetypes was the arrangement of 176 coded attributes inductively identified in the 27 cases. These organizational attributes were coded and classified, generating 32 general organizational elements that were grouped into seven dimensions, five internal and two external. As represented in Figure 3, internal dimensions

are: structural, human resources, financial resources, tangibles and intangibles. External dimensions are: environmental and contingency. Moreover, Table 2 provides a general overview of the organizational attributes, elements and dimensions that underpinned the four identified archetypes, each of which in turn represent a distinctive cluster of single configurations derived from the synthetized case studies (as showed in figure 2).

Insert Figure 3

about here

Insert Table 2

about here

Entrepreneurial university archetypes

Based on our literature review as well as theoretical discussion on the definition of entrepreneurial university and following the configuration framework and grounded theory methodological approach, this paper offers a model showing four archetypes of entrepreneurial universities derived from an empirical sample of twenty seven case studies.

This study does not suggest that all entrepreneurial universities are convergent towards the four archetypes found; rather these are idealised types of specific arrangement of organizational attributes that altogether illustrate clusters of shared single organizational configurations. Nonetheless we do suggest that entrepreneurial universities will tend to converge non-lineally in the long run, towards these configurational clusters, contingent on its path-dependency and baggage of internal factors, economic environment, socio-cultural and political influences, as well as the vision, leadership and commitment of the academic faculty, steering core and various stakeholders. Bellow, Table 3 portraits the organizational attributes, design elements and environmental factors present in the following found archetypes of entrepreneurial universities: 1) "Research-preneurial" or research driven archetype; 2) "Techni-preneurial" or industry driven archetype; 3) "Inno-preneurial or innovation driven archetype 4) "Commerce-preneurial" or knowledge commercialization driven archetype. Bellow, we proceed to describe and illustrate each of the ideal types.

A "*research-preneurial"* archetype is a research driven entrepreneurial university. It is structurally characterised for its bureaucratic or collegial governance influenced by national higher education policies. It is traditionally structured into faculties and departments with dedicated knowledge transfer structures. Research centres and science parks developed together with government and industry are characteristic of this archetype. Most faculty members have strong scientific and basic research background and emphasis is made towards cooperative joint research projects, either with industry of government funds. Financial resources are partly diversified, but most income stream tends to flow from public and multilateral research funds, however these are project based and mostly with an applied perspective in cooperation with industry. Universities corresponding to this archetype posses dedicated high-tech research facilities thanks to state funding and direct private investment from stakeholder firms. The strategic focus is on world-class basic and applied research

carried in cooperation with industry partners. Accordingly, incentive structures project based and rewards systems are aimed at fostering applied research and transferable scientific discoveries. Strong emphasis is put on developing and maintaining university-industry networks and lobbying for research funds for applied research projects. Path-dependency plays and important role in defining the archetype to which a specific university tends to comply, consequently research-preneurial archetypes are universities with long tradition in research and teaching, having strong reputation in academic and scientific excellence. These entrepreneurial universities usually are benefited from public policies favouring scientific and academic orthodoxy as basis for industrial and technological advancement. Illustrative examples of this archetype are Stanford University, Technical University of Munich, University of California at Berkeley and Universidad Católica of Chile among the nine entrepreneurial universities comprising the research driven entrepreneurial archetype cluster.

The "*techni-preneurial"* archetype is characterised as an industry driven, technically oriented research and teaching entrepreneurial university that seeks to support regional industry and economy through applied technical cooperation and training programmes jointly developed with surrounding industry and regional public authorities. A traditional applied science university has initiated its entrepreneurial path together with government support and strong cooperation between its academic staff and regional enterprises. This strong link between academic staff and industry partners is paramount to the techni-preneurial archetype as formal and informal networks with regional businesses form the essence of the entrepreneurial characteristics of this archetype. Flagship entrepreneurs and regional industry experts usually form part of the faculty. Partly autonomous and centralised management allows for a harmonic symbiosis between a traditionally collegial and a goal based managerial administration. Financing is partly diversified but still most monetary resources come from governmental funding. Nonetheless consultancy services and tailored made training

programmes become an important income stream for this industry focused entrepreneurial university. In this regard, technology transfer departments, entrepreneurship training facilities, as well as business friendly consulting offices and conference and networking facilities form part of the important entrepreneurial infrastructure of this organization. The strategic focus is providing technical and academic support for regional industry, delivering market-oriented graduate education and tailored-made technical training in cooperation with industry partners. Incentive structure reward applied scientific research and teaching along with in-job training programmes and entrepreneurship education. This type of university has a strong regional reputation and support. A history as Applied-science University and a strong focus on technical need-based training are common defining elements of this entrepreneurial archetype. Also a solid support from regional small and medium size enterprises and strong staff and student involvement are environmental factors crucial for supporting entrepreneurial initiates started from within the organization. A moderately regulated higher education field, which promotes completion, entrepreneurialism and cooperation with industry, is necessary for supporting the internal organizational structures of this type of university. Among the cases studies we can mention University of Joensuu, University of waterloo and Hamburg University of Technology, among the five entrepreneurial universities, which form part of this industry driven group.

Insert Table 3

about here

Insert Table 3 cont.

about here

An *"inno-preneurial" university* pursues innovation driven and market-oriented entrepreneurial endeavour. This type of university adapts to market characteristics and external surroundings through novel internal changes and structural flexibility, thus its governance is flexible and entrepreneurial. Schools and interdisciplinary institutes foster innovation driven research and transfer, together with novel entrepreneurial structures such as incubators, intellectual property and transfer offices, consultancy departments and specialized professional schools with innovation teaching and training programmes. Strong formal and informal links with professional services and knowledge economy based firms strengthen and widen the opportunities for cooperation projects and knowledge commercialisation activities. Management of this archetype is professional and strategic steering and decision-making is

autonomous and centralised. Innovation is nurtured through interdisciplinary in projects, institutes and schools, as well as through well developed on-going training programmes for faculty, staff, students and cooperation partners from industry and local government and communities. Financial resources are well diversified and income streams from private sources and joint ventures are important. The inno-preneurial archetype engages in knowledge commercialisation activities such as consultancy and business services, start-up incubation, intellectual property commercialisation through patenting and licencing, as well as spin-ins and spin-offs from applied research and innovation projects carried together with industry cooperation partners. Therefore we can label its strategic focus as knowledge based innovative applied research, teaching and transfer initiatives. Moreover, formal and informal commercialization of knowledge and services is promoted and rewarded through a goal based incentive structure. The innovation driven archetype benefits from governmental and private pilot projects or experimental projects, aimed at favouring innovation, entrepreneurialism, and university involvement with the local community. National higher education policies and legal framework tends to be moderately regulated to deregulated. Also this type of university is usually located in urban areas or knowledge intensive clusters in which innovation, research transfer and consultancy services are more valued by the regional economic base. This archetypal cluster was composed of six out the twenty-seven analysed, some of which are Warwick University, Copenhagen Business School and University of York in England.

The fourth archetype is the "*Commerce-preneurial*" which is driven by entrepreneurialism focused on knowledge commercialisation and capitalisation of high-tech applied research. Constituted by novel and flexible but complex structures, such as faculties, departments, research and transfer institutes, as well as business units, incubators, technology parks with cooperation partners and spin-offs businesses among others. The commerce-preneurial university also engages in star-up investment, intellectual property capitalisation,

high-tech capital venturing and service enterprises, together with more knowledge intense professional services such as consultancy, mentoring, institutional advise and project management. Academic and scientific staff has strong links and cooperates with industry in applied research projects and high-tech start-up venturing. This archetypes' steering core is professional, autonomous and empowered through managerial or corporate governance structures and strong leaders in key steering positions, which allow for flexible and centralized but participatory goal based strategic decision-making. Funds streams are very well diversified, relying little on direct governmental funding and more on market-oriented project funding from various private and public sectors and investment groups. This archetype engages in start-up incubation and funding and has important links and networks with the venture capitalist community and entrepreneurs, usually from high-tech and knowledge intensive sector. Patenting, licencing, spin-offs and joint ventures, along property investment and venturing funds are among the various entrepreneurial and commercial activities in which this type of university engages. Mostly located in knowledge intensive urban areas and technology clusters, the commerce-preneurial archetype posses or is surrounded by top notch high-tech research and information technology facilities, and it engages in innovative high-tech basic and applied research together with industry, governmental and multilateral cooperation partners. Global knowledge networks in the academic, business, financial and public communities are very important and thus well developed, supported and maintained by this type of university. The university engages actively in lobbying activities in order to ensure funds and policies that support its own research, transfer and commercial agendas. Also important emphasis is made in the public relations and marketing department, aiming at developing and sustaining a strong image and reputational capital. This type of entrepreneurial university is usually an evolution of traditional elite research universities with a long trajectory of academic excellence and cooperation with industry in technological

developments. Located in regions where policies favour deregulation and competition in the university field and where community attitudes toward entrepreneurship are favourable. Moreover global firms and high-tech start-up tend to be physically located in the surroundings and actively cooperate with the university and benefit from its entrepreneurial endeavours. Among the cases analysed in this meta-synthesis seven where found to be within the knowledge commercialisation archetypal cluster, namely part of the list is comprised by Twente University, Bandung University of Technology and Waseda University in Japan. A list of all 27 analysed cases, arranged by identified archetype is shown below in Table 4.

Insert Table 4

about here

In general terms the meta-synthesis shows that dominant legal framework and the regional industrial base exert and important influence on the entrepreneurial archetype. Also, the environmental factors such as dominant policies, cultural attitudes towards entrepreneurship as well as the competitiveness of the higher education market play influence the structures and strategies of the individual cases. Moreover there is a strong relation between the historical conditions of the institutions and the type of entrepreneurial university, suggesting a strong organizational path dependency. For instance, traditional research universities tend to display attributes pertaining the cooperative research archetype. In contrast technical and applied science universities tend to conform to technical archetype. In this regards, further empirical research would contribute to determine how path dependency

as well as contingency and environmental factors underpinning the set of internal attributes adopted by each entrepreneurial university.

DISCUSSION AND CONCLUSION

This work contributes to a more comprehensible understanding of the structures, processes and strategies that shape emergent higher education institutions. By describing aggregate generalizable patterns, this analysis of numerous studies helps to overcome the context-dependency and non-generalization issues associated with single case studies. Moreover, archetypes can serve as conceptual tools for practitioners in designing, steering and foreseeing organizational development in their organizations.

We have identified four differentiated archetype clusters of entrepreneurial universities and we have named them according to their strategic focus and scope of their entrepreneurial activities. Using within the university context terms such as “commerce-preneurial”, “inno-preneurial” or even “entrepreneurial” should not necessarily be interpreted within the framework of profit gaining, risk-taking, and even commercial activities. Rather, these terms should be understood within a broader context of entrepreneurialism, as discussed earlier in the theoretical framework of this paper. Particularly, entrepreneurialism in higher education should be seen as the strategic response, evolution and innovative engagement in entrepreneurial activities in response to the changing socio-cultural and broader economic context around and within the university setting and academic community.

The increased endorsement of entrepreneurial activities in the universities tends to be related the rise of new public management along with increasing normative pressures which

drive universities towards structural homogeneity and facilitate isomorphic change (DiMaggio and Powell, 1983), but at the same time orchestrated market deregulation and increased managerial autonomy stimulates creative strategic responses and the emergence of novel organizational configurations. We can observe that universities engaged in entrepreneurial activities are organisations that critically assess shifting paradigms in higher education, by way of adapting their strategies and structures in order to effectively respond external expectations and internal requirements. This study identifies four different types of organisational responses along a continuum of two differing strategies: first changes in academic structures fostering increased training knowledge transfer activities in cooperation with industry and other stakeholders, in order to respond to their requirements; and second engagement in commercial and business activities embracing own firm formation and the promotion of partnership and joint-ventures with the private sector, in order to respond to market and economic requirements.

In general terms, this meta-synthesis shows that some elements play a preponderant role in the organizational entrepreneurial transformation and have the potential to influence its mission and core strategic foci. In this regard, internal actors such as managers and academics are crucial to the accomplishment of the entrepreneurial shift. Also, a diversified funding is paramount because it contributes to the accomplishment of institutional autonomy from the state and its politically influenced resource allocation policies (Clark, 1998). Moreover, governance structures are important enablers to support the entrepreneurial transformation. Furthermore goal based incentive structures that reward entrepreneurial activities tend to encourage applied innovations and knowledge commercialisation activities (Debackere, and Veugelers, 2005). Additionally, a professional management with autonomous decision–making authority and leadership roles directs and sustains a focus on entrepreneurial activities as strategic priority for the organization (Middlehurst, 2004). Likewise, organisational

structures and tangible infrastructure such as business incubators and technology transfer offices are strong support mechanisms in knowledge commercialisation activities, such as start-up formation, joint ventures, spin-offs and spin-ins (Link and Scott, 2005). In addition, entrepreneurship training aimed at improving faculty and student skills help to promote creative thinking and innovations (Kirby, 2004). Finally, location plays a preponderant role in defining entrepreneurial activities of universities, as distance to knowledge and industrial cluster influence the extent of cooperation with industry and the extend of engagement in entrepreneurial and commercialisation activities (Siegel et al, 2003).

Limitations of this cross-sectional meta-study include the wide range of case studies chosen as data set, with differing research objective and focus of analyses that conform the empirical sample. Also, the broad chronological range and various levels of analysis as well as potential interpretative biases of the cases' authors constitute important restrains that call for further studies. Therefore multilevel and longitudinal studies, which analyse changes in time among comparable units of studies, can further contribute to a broader understanding of how university structures evolve along time and in relation to changing environmental factors and expectations from various stakeholders.

All in all, research on entrepreneurial universities can clearly benefit from more comprehensive studies that go beyond methods commonly used in the field. As current research on academic entrepreneurialism and entrepreneurial universities further develops beyond case study and historical analyses, we call for more complex studies in the area. Likewise, synthesis and analysis of the rich but dispersed data would help build upon accumulated knowledge in the field, thus promoting a more holistic understanding of the elements, actors, process and environmental factors influencing emergent changes in the higher education field across the globe. Also, more representative longitudinal quantitative studies, as well as cross-sectional analyses would further contribute to gaining a broader and

deeper understanding of non-context related and case specific elements, which form part of the increasingly prevalent entrepreneurial phenomenon in higher education organisation and its institutional setting. Finally, interdisciplinary research efforts and multiple methodological approaches across various levels of analyses will further push academic knowledge in the field to go beyond understanding specific elements of individual and isolated cases of entrepreneurialism in universities, and therefore helping to generate generalizable and applicable knowledge that would benefit not only scientific understanding, but also practitioners, policy makers and stakeholders in the fields of knowledge commercialisation, transfer, academic entrepreneurialism and higher education in general.

Conclusion

The underlying assumption of this research is that there is no single model or a one best way to the entrepreneurial university. Rather, its environmental contingencies, path-dependency, and unique structures, systems, and cultures will affect the emerging type of entrepreneurial university. We argue that just like other groups of organizations in particular institutional field, we might expect to see entrepreneurial universities converge into a few clearly differentiated archetypes that display similar organizational attributes. We analysed several empirical case studies, using grounded theory as qualitative analytical approach, in order to identify and describe different archetypes of entrepreneurial universities, following configuration and archetype theory as our conceptual stance (Meyer et al., 1993; Miller, 1987a, 1996; Miller and Mintzberg, 1983; Mintzberg, 1979; Weber, 1978). The contribution of entrepreneurial university archetypes to the academic literature sheds light to a more comprehensible understanding of elements, structures and strategies that shape emergent higher education institutions. Moreover, by describing aggregate generalizable patterns, this systematic analysis of numerous studies helps to overcome the context-dependency and non-generalization issues associated with single case studies. Furthermore, archetypes can serve as

conceptual tools for practitioners in designing, steering and foreseeing organizational development in their organizations.

References

Blinker, P., Dreisler, P., Faergemann, H. M., and Kjeldsen, J. (2008), 'A framework for developing entrepreneurship education in a university context', *International journal of entrepreneurship and small business*, 5(1): 45-63.

Bratianu, C., and Stanciu, S. (2010), 'An overview of present research related to entrepreneurial university', *Management and Marketing*, 5(2): 117-134.

Bull, I., and Willard, G. E. (1993), 'Towards a Theory of Entrepreneurship', *Journal of Business Venturing*, Elsevier, 8(3): 183-195.

Bygrave, W., and Hofer, C. (1991), 'Theorizing about Entrepreneurship', *Entrepreneurship Theory and Practice*, 16(2): 13-23.

Clark, B. R. (1998), *Creating entrepreneurial universities: organizational pathways of transformation*, Oxford; New York: Published for the IAU Press [by] Pergamon Press.

Debackere, K., and Veugelers, R. (2005), 'The role of academic technology transfer organizations in improving industry science links'. *Research Policy*, 34(3), 321-342.

Dill, D. D., & Sporn, B. (1995), 'Emerging Patterns of Social Demand and University Reform: Through a Glass Darkly', *Issues in Higher Education*, Elsevier Science Inc., 660 White Plains Rd., Tarrytown, NY 10591-5153.

DiMaggio, P. J., and Powell, W. (1983), 'The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields', *American Sociological Review*, 48: 147-160.

Etzkowitz, H. (2003a), 'Innovation in innovation: the Triple Helix of university-industry-government relations', *Social Science Information Sur Les Sciences*, 42(3): 293-337.

Etzkowitz, H. (2003b), 'Research groups as 'quasi-firms': the invention of the entrepreneurial university'. *Research Policy*, 32(1): 109-121.

Etzkowitz, H., & Ranga, M. (2010), 'A Triple Helix System for Knowledge-based Regional Development: From 'Spheres' to 'Spaces'', In ponencia presentada en el *8th Triple Helix Conference*, Madrid, (pp. 20-22).

Gajon, E., and Urbano, D. (2007), 'Internal Factors Affecting the Entrepreneurial University: the Case of the Tecnológico de Monterrey (Mexico)', *Discussion Papers, Autonomous University of Barcelona*.

Gibb, A., and Hannon, P. (2005), 'Towards the entrepreneurial university', *Policy Paper, 3*.

Glaser, B. G. (1992) 'Basics of grounded theory analysis: emergence vs forcing', *Sociology Press*.

Glaser, B. G., and Strauss, A. L. (1967), *The discovery of grounded theory; strategies for qualitative research*, Chicago,: Aldine Pub. Co.

Greenwood, R., and Hinings, C. R. (1993), 'Understanding strategic change: The contribution of archetypes', *Academy of Management Journal*, 36(5): 1052-1081.

Gruening, G. (2001), 'Origin and theoretical basis of New Public Management', *International Public Management Journal*, 4(1): 1-25.

Guerrero, M., and Urbano, D. (2012), 'The development of an entrepreneurial university', *The Journal of Technology Transfer*, 37(1), 43-74.

Handscombe, R. D. (2003), 'The promotion of an entrepreneurial culture in universities: Capturing change in the cultural web', *Industry and Higher Education*, 17(3), 219-222.

Hannan, M. T., and Freeman, J. (1977), 'Population ecology of organizations', *American Journal of Sociology*, 82(5): 929-964.

Hinings, C. R., and Greenwood, R. (1988), *The dynamics of strategic change*, New York, NY, USA: B. Blackwell.

Hossler, D., and Scalese-Love, P. (1989), 'Grounded Meta-Analysis: A Guide for Research Syntheses', *Review of Higher Education*, 13(1): 1-28.

Kirby, D. A. (2004), 'Entrepreneurship education: can business schools meet the challenge?', *Education and Training*, 46(8/9), 510-519.

Kirby, D. A. (2006), 'Creating entrepreneurial universities in the UK: Applying entrepreneurship theory to practice', *The Journal of Technology Transfer*, 31(5), 599-603.

Kirby, D. A., Guerrero, M., and Urbano, D. (2011), 'Making Universities More Entrepreneurial: Development of a Model', *Canadian Journal of Administrative Sciences/Revue Canadienne des Sciences de l'Administration*, 28(3), 302-316.

Link, A. N., and Scott, J. T. (2005), 'Opening the ivory tower's door: An analysis of the determinants of the formation of US university spin-off companies', *Research Policy*, 34(7), 1106-1112.

Meyer, A. D. (1982), 'How ideologies supplant formal structures and shape responses to environments', *Journal of Management Studies*, 19(1): 45-61.

Meyer, A. D., Tsui, A. S., and Hinings, C. R. (1993), 'Configurational Approaches to Organizational Analysis', *Academy of Management Journal*, 36(6): 1175-1195.

Middlehurst, R. (2004), 'Changing internal governance: A discussion of leadership roles and management structures in UK universities', *Higher Education Quarterly*, 58(4), 258-279.

Miller, D. (1986) 'Configurations of strategy and structure - Towards a synthesis', *Strategic Management Journal*, 7(3): 233-249.

Miller, D. (1987a) 'The Genesis of Configuration', *Academy of Management Review*, 12(4): 686-701.

Miller, D. (1987b) 'The structural and environmental correlates of business strategy', *Strategic Management Journal*, 8(1): 55-76.

Miller, D. (1996), 'Configurations revisited', *Strategic Management Journal*, 17(7): 505-512.

Miller, D., Friesen, P. H., and Mintzberg, H. (1984), *Organizations : a quantum view*, Englewood Cliffs, N.J.: Prentice-Hall.

Miller, D., and Mintzberg, H. (1983) 'The Case for Configuration', In G. Morgan (Ed.), *Beyond Method*: 57-73, Beverly Hills: Sage.

Mintzberg, H. (1979), *The structuring of organizations: A synthesis of the research*, Englewood Cliffs, NJ: Prentice Hall.

Mintzberg, H., and Raisinghani, D. (1976), 'The structure of 'unstructured' decision processes', *Administrative Science Quarterly*, 21(2): 246.

Münch, R. (2011), *Akademischer Kapitalismus. Über die politische Ökonomie der Hochschulreform*. Berlin.

Neave, G. (1995), 'On living in interesting times: higher education in Western Europe 1985 – 1995', *European Journal of Education*, 30. 4. Pp. 377-393.

Newig, J. and O. Fritsch. (2009), 'The case survey method and applications in political science'. *Paper, American Political Science Association*, 3–6 September, 2009, Toronto, Ontario, Canada.

Noblit, G. W., and Hare, R. D. (1988), *Meta-ethnography: Synthesizing qualitative studies*, Sage Publications, Inc.

Powell, W. W., and DiMaggio, P., eds (1991). *The new institutionalism in organizational analysis*, Chicago: University of Chicago Press.

Reihlen, M., Smets, M., and Veit, A. (2009), 'Consultancies as Institutional Agents: Strategies for Creating and sustaining institutional capital', *Academy of Management Proceedings*.

Reihlen, M., and Wenzlaff, F. (2012), 'Institutional Change of the German Higher Education System: From Professional Dominance to Managed Education', *Discussion paper series #4*, Chair of Strategic Management, Leuphana University of Lüneburg.

Röpke, J. (1998), 'The Entrepreneurial University: Innovation, academic knowledge creation and regional development in a globalized economy', *Philipps-Universitat Marburg, Germany*: 31-47.

Rothaermel, F. T., Agung, S. D., and Jiang, L. (2007), 'University entrepreneurship: a taxonomy of the literature', *Industrial and Corporate Change*, 16(4): 691-791.

Schumpeter, J. A. (1936), *The Theory of Economic Development* (Second ed.), Cambridge: Harvard University press.

Scott, W. R. (1987), 'The adolescence of institutional theory', *Administrative Science Quarterly*: 493-511.

Shane, S., and Venkataraman, S. (2000), 'The promise of entrepreneurship as a field of research', *Academy of Management Review*, 25(1): 217-226.

Siegel, D. S., Waldman, D., and Link, A. (2003), 'Assessing the impact of organizational practices on the relative productivity of university technology transfer offices: an exploratory study', *Research policy*, 32(1), 27-48.

Sporn, B. (2001), 'Building adaptive universities: Emerging organisational forms based on experiences of European and US universities', *Tertiary Education and Management*, 7(2): 121-134.

Stall-Meadows, C., and Hyle, A. (2010), 'Procedural methodology for a grounded meta□ analysis of qualitative case studies', *International Journal of Consumer Studies*, 34(4): 412-418.

Strauss, A. L., and Corbin, J. M. (1998), *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory*, Thousand Oaks: Sage Publications.

Teichler, U. (1996), 'Comparative higher education: potentials and limits', *Higher Education*, 32(4), 431-465.

Van Aken, J. E. (2004), 'Management research based on the paradigm of the design sciences: The quest for field-tested and grounded technological rules', *Journal of Management Studies*, 41(2): 219-246.

Venkataraman, S. (1997), 'The distinctive domain of entrepreneurship research: An editor's perspective', In J. A. Katz, and R. Brockhaus (Eds.) *Advances in entrepreneurship, firm emergence and growth*, Vol. 3: 119–138, JAI Press, Greenwich.

Weber, M. (1978), *Economy and society: An outline of interpretive sociology*, University of California Press, Berkeley.

Wissema, J. G. (2009), *Towards the third generation university: managing the university in transition*, Edward Elgar, Cheltenham.

Yin, R. K., and Heald, K. A. (1975), 'Using the case survey method to analyse policy studies', *Administrative Science Quarterly*: 371-381.

Yusof, M., and Jain, K. (2008), 'Categories of university-level entrepreneurship: a literature survey'. *International Entrepreneurship and Management Journal*, 6(1): 81-96.

Figures and Tables

Figure 1: Analytical process for the identification of empirically grounded archetypes

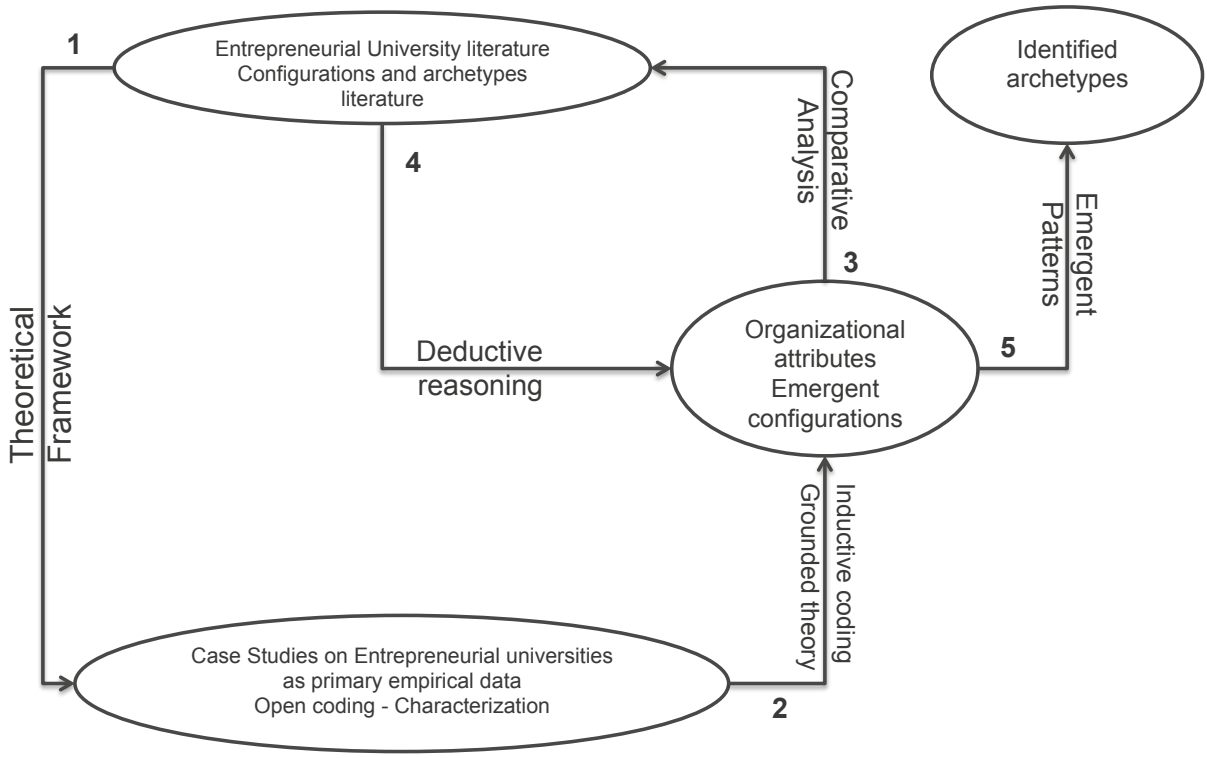

Figure 2: Meta-synthesis of case studies and the emergence of archetypes

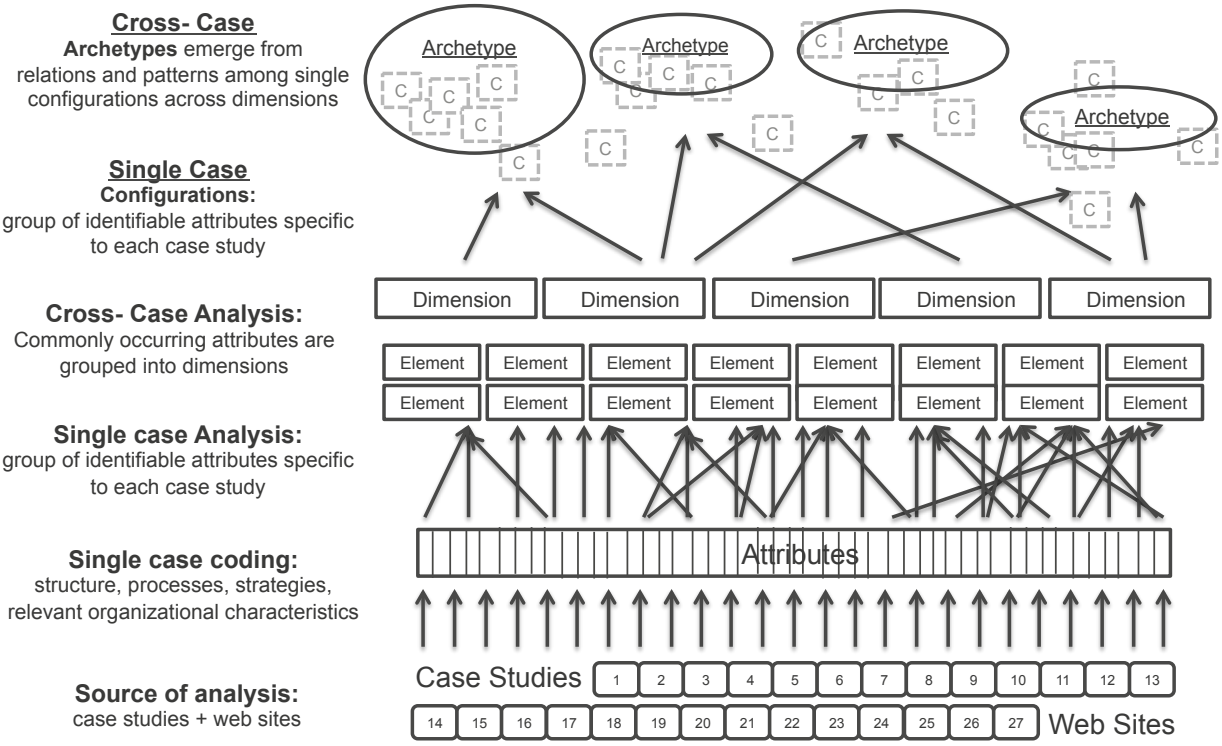

Fig. 3: Entrepreneurial universities organizational elements and dimensions

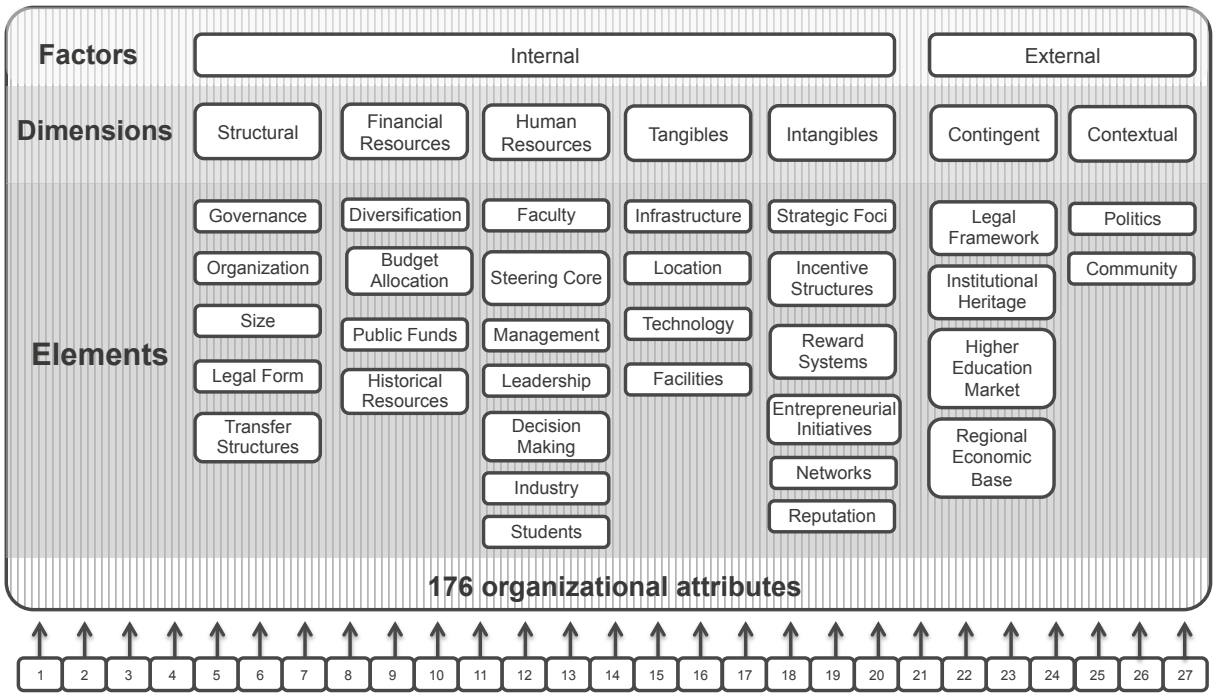

Table. 1: Selected case studies on entrepreneurial universities

	Authors, Year	University Case Study	Country
1	Clark, 1998	Warwick University	England
2	Clark, 1998	University of Joensuu	Finnland
3	Clark, 1998	Twente University	Neatherlands
4	Clark, 1998	University of Strathclyde	Scotland
5	Clark, 1998	Chalmers University of Technology	Sweden
6	Kristensen, 1999	Copenhagen Business School	Denmark
7	Etzkowitz, 2003	Stanford University	USA
8	Bernasconi, 2005	Universidad Católica of Chile	Chile
9	Yokoyama, 2006	Waseda University	Japan
10	Martinelli, Meyer & von Tunzelmann, 2007	Sussex University	England
11	Guerrero & Urbano 2007	Autonomous University of Barcelona	Spain
12	Huggins, Jones & Upton, 2007	Cardiff University	Wales, UK
13	Azele, Meyer & van Pottelsberghe, 2008	Université Libre de Bruxelles	Belgium
14	Bramwell & Wolfe, 2008	University of Waterloo	Canada
15	Zhou, 2008	Northeastern University in Shenyang	China
16	Berger, 2008	Technical University Munich	Germany
17	Ma, 2008	University of California at Berkeley	USA
18	Crow, 2008	Arizona State University	USA
19	Wissema, 2009	University of Rousse	Bulgary
20	Wissema, 2009	Bandung University of Technology	Indonesia
21	Prausse, 2011	Wismar University	Germany
22	Dodgson & Staggs, 2012	Queensland University	Australia
23	Goddard, Robertson & Vallance, 2012	Newcastle University	England
24	Vorley & Nelles, 2012	Hamburg University of Technology	Germany
25	Avotins, 2012	Ventspils University College	Latvia
26	Uvarov & Perevodchikov, 2012	Tomsk State University	Russia
27	Minguillo & Thelwall 2013	University of York	England

Table 2: General overview of the identified entrepreneurial university framework of study

Factors	Dimensions	Elements	Atributes	Codes
Internal Factors	Structural	Governance	Bureacratic / Hierarchycal	SGbh
			Collegial / Decentralised	SGcd
			Managerial / Corporate	SGmc
			Entrepreneurial / Flexible	SGef
		Organization	Faculties	SOf
			Departments	SOd
			Institutes	SOi
			Schools	SOs
			Research centres	SOrc
			Rigid / Traditional structures	SOts
			Flexible / Novel structures	SOns
		Size	Large	SSl
			Medium	SSm
			Small	SSs
		Legal Form	Public	Slpu
			Public-Private partnership	SLpp
			Foundation	SLf
			Private	SLpr
		Transfer Structures	Research centres	STrc
			Transfer / Patent offices	STtp
			Incubators	STi
			Science Parks	STsp
			Conference centres	STcc
			Spin-offs	Stso
	Human Resources	Faculty	Academic	HFa
			Scientific	HFs
			Industry links	Hfi
			Research / technical	HFr
			Entrepreneurial / Role models	Hfe
			Flagship academics / entrepreneurs	HFf
		Steering Core	Autonomous	HSau
			Partly autonomous	HSpa
		Decision Making	Centralised	HDc
			Decentralised	HDd
		Management	Professional	HMp
			Academic	Hma
		Leadership	Strong leader	HLsl
			Collective leadership	HLcl
			Low leadership	HLll
		Industry	High cooperation / dedicated personnel	Hlhc
			Low cooperation / little to none dedicated personnel	Hllc
		Students	Positive attitudes towards entrepreneurship	HSTp
			Neutral or negative attitudes towards entrepreneurship	HSTn
			Strong alumni network / Industry	HSTsa
			Entrepreneurship role models	HSTer
	Financial Resources	Historical	Well-financed	FHw
			Underfinanced	FHu
		Diversification	Diversified	FDd
			Undiversified	FDu
		Source	Public	FSpu
			Private	FSpr
			Mixed / Multilateral / NGO's	FSmm
			Research / Project based	FSrp
			Knowledge transfer / Lisencing / Patenting	FSlp
			Knowledge Commercialisation / Spin-offs	FSso
		Public Budget allocation	High	FPh
			Medium	FPm
			Low	FPl
	Tangibles	Infrastructure	Research centres	TIr
			Transfer offices	TIt
			Incubators	TIi
			Science Parks	TIs
			Conference centres	TIc
		Location	Urban	TLu
			High-Tech clusters	TLh
			Industrial	TLin
			Isolated	TLis
		Technology	Industrial based	TTh
			Knowledge based, new economy	TTk
		Facilities	Teaching oriented	TFto
			Research oriented	TFro
			Transfer oriented	TFtr
			Student friendly	TFsf
			Industry friendly	TFif
			Above average facilities	TFaa
			Average or bellow facilities	TFba

Factors	Dimensions	Elements	Atributes	Codes
Internal Factors	Intangibles	Strategic foci	Academic / scientific excellence	ISas
			Commercialisable basic research	IScb
			Applied research programmes	ISar
			High-tech transfer	ISht
			Market-oriented graduate education / in cooperation with regional businesess	ISmo
			In-job training programmes / Industry cooperations	ISij
			Post-graduate education / praxis and entrepreneuraly oriented	ISpg
			Knowledge transfer / industry cooperation	ISti
			New economy / knowledge transfer through commercialisation of professional services / consultings / training / counseling	IScc
			Knowledge commercialisation /patenting / spin-offs	ISkc
			Incubation / High tech venturing /	ISiv
			Marketable innovations / Spin-ins	ISmi
		Incentive structures	Meritocratic	IIm
			Performance Based	IIp
			Goal based	IIg
			Research aimed	IIr
		Rewards systems	Rewards academic entrepreneuralism	IRSa
			Rewards knowledge transfer and commersialization	IRSk
			Does not rewads transfer or entrepreneuralism	IRSn
		Entrepreneurial Initiatives	Support meassures for Start-ups	IEss
			Entrepreneurship education	IEee
			Spin-off incentives	IEso
			Spin-in service commercialisation	IEsi
			Patent commercialisation offices	IEpc
			Entrepreneurial courses for faculty and staff	IEef
			Tailored graduate trainingship programmes	IEtg
			Start-up funding	IEsu
			Lisencing agreements	IEla
		Reputation	Elite	IRe
			Strong	IRs
			Increasing	IRi
			Weak	IRw
		Networks	Regional	INr
			Global	INg
			Academic	INa
			Industry	INi
			Capital markets	INc
			Government / Lobbying	INl
External Factors	Enviromental	Historical Conditions	Long trajectory / Tradition	EHl
			Short trajectory / New	EHs
			Experimental / Pilot proyect	EHe
			Teaching university	EHt
			Research University	EHr
			Applied Sciences	EHa
			Technology oriented	EHto
		Higher education market	Competitive	EEc
			Non competitive	EEnc
			Global	EEg
			Regional	EEr
			Local	EEl
		Politics	Public policies favour regulation and academic orthodoxy	EPfr
			Public policies favour entrepreneuralism and competition	EPfe
		Community	Favours entrepreneruship	ECfe
			Indiferent towards entreprenurship	ECie
	Contingency	Regional economic base	Industrial	CRi
			Service	CRs
			High tech	CRht
			New economy	CRne
			Small and medium business	CRsm
			Global enterprises	CRge
			High-growth dynamic	CRhg
			Low-growth sluggish	CRlg
		Legal Framework / Public policies	Strongly regulated field	CLs
			Moderately regulated field	CLm
			Deregulated field	CLd

Table 3: Comparative table of entrepreneurial university archetypes

Dimensions	Elements	**Research-preneurial** research driven	**Techni-preneurial** industry driven	**Inno-preneurial** innovation driven	**Commerce-preneurial** Commerce driven
Structural	Governance	• Collegial or bureaucratic dependent on national regulations	• Collegial or bureaucratic dependent on national regulations	• Entrepreneurial / Flexible governance promotes autonomy	• Managerial / Corporate governance. Hierarchical but allows for flexibility
	Organization	• Faculties and departments • Traditional structures	• Faculties and departments • Traditional structures • Professional schools	• Novel structures • Multidisciplinary schools and institutes	• Faculties, departments, institutes, research centers
	Size	• Large to medium in national standards	• Large to medium in national standards	• Small to medium	• Large, medium or small
	Legal Form	• Public institution. Public-private partnership (PPP)	• Public institution. PPP	• Public. PPP. Foundation. • Private	• PPP. Public foundation. • Private
	Transfer Structures	• Research centers in cooperation with industry and government • Transfer offices • Science parks	• Strong formal and informal industry cooperation links • Transfer offices • Incubators • Patent offices	• Incubators. Transfer and innovation offices • Expanded cooperation networks. New economy and innovation platforms	• Patent offices. Techno-parks. High tech research and development centers • For profit service firms • Spin-offs. Joint ventures
Financial Resources	Diversification	• Partly diversified • Dependent on major governmental grants	• Partly diversified • Important multilateral, and funding from industry	• Well diversified • Important third party, private income streams	• Well diversified • Own income and third party funding. Licensing
	Budget Allocation	• Project based applied research. Joint-ventures	• Project based knowledge transfer and training	• Knowledge transfer projects. Marketable IP • Spin-ins, joint-ventures	• High-tech research and development. Start-ups • Spin-offs. Investment funds
	Public Funds	• High	• Medium	• Medium to high	• Medium to high
	Historical Resources	• High	• Low	• Low to medium	• High
Human Resources	Faculty	• Scientific and academic faculty with strong research background	• Practice oriented faculty with strong links with industry	• Strong formal and informal links to professional service and knowledge firms	• Academics and scientist with strong research and technical background
	Steering Core	• Partly autonomous	• Partly autonomous	• Autonomous	• Autonomous
	Management	• Academic and partly dedicated managers	• Academic and partly dedicated managers	• Professional and dedicated management	• Professional and dedicated management
	Decision Making	• Centralized	• Centralized	• Decentralized	• Centralized and project oriented decentralized
	Leadership	• Collective / institutional	• Collective	• Personal and collective	• Personal / institutional
	Industry	• High cooperation in research and development	• High cooperation in training and teaching	• High cooperation in consultancy and services	• Cooperation and direct stakes in firms and start-ups
	Students	• Alumni network with	• Links with regional industry. Technical	• Strong alumni role models	• Strong alumni network • Flagship business leaders
Tangibles	Infrastructure	• Dedicated research and development	• Technology transfer offices. Training facilities	• Service oriented transfer and training centers	• Tech-parks. Conference and network centers
	Location	• Urban, industrial and knowledge clusters	• Urban and industrial clusters	• Knowledge, media and new economy clusters	• Urban and global high tech clusters
	Technology	• Basic and applied	• Applied. Industry oriented	• IT and knowledge networks	• High-Tec: mainly applied, but also basic
	Facilities	• Above average • Dedicated high-tech research infrastructure	• Average • Training and service oriented dedicated facilities	• Above average. Office space and network infrastructure. Incubators	• Strong focus on R&D of high-tech innovations • Incubators

Table 3 cont.: Comparative table of entrepreneurial university archetypes

Dimensions	Elements	**Research-preneurial** research driven	**Techni-preneurial** industry driven	**Inno-preneurial** innovation driven	**Commerce-preneurial** Commerce driven
Intangibles	Strategic Foci	• Academic excellence • Basic and applied research transfer	• Technical and academic support for regional industry • University-industry cooperation channels	• Knowledge based innovations • Research and knowledge services and transfer • Innovative teaching	• High-tech R&D and IP generation and commercialization • Scientific technological development
	Incentive structures	• Academic meritocracy • Research based • Cooperation with industry	• Applied research • Training and teaching • Technical and praxis reputation • Cooperation with industry	• Innovation • Knowledge creation • Venture creation	• Academic and technical meritocracy • Knowledge commercialization • Venture creation
	Reward Systems	• Academic excellence • Basic and applied research • Research grants attainment	• Training and teaching • Cooperation and transfer • Applied research	• Innovations • Intellectual property • Professional services	• Knowledge commercialization • High-tech marketable innovations • Goal attainment
	Entrepreneurial Initiatives	• Basic and applied research initiatives in cooperation with industry and government	• Tailored educational and training programs in cooperation with industry • Entrepreneurship education, advise	• Consultancy services • Patenting, licensing, innovation transfer offices • Joint-ventures and incubators. New economy	• Business venturing, TTOs, Incubators, • Start-up funds, spin-offs
	Networks	• Academic • Industry • Government • Supra-national	• Academic • Industry • Regional	• Academic • Professional • Entrepreneurs • Global knowledge networks	• Global network links with influential academic, business, financial and political interest groups • National and supra-national
	Reputation	• Elite and strong reputations. Lobbying	• Strong reputation and networks with local industry	• Strong regional and increasingly global	• Strong image, public relations and lobbying
Contingent	Institutional Heritage	• Long trajectory in research and teaching • Academic excellence • Tradition and reputation	• Important trajectory in applied-science and teaching • Strong ties with industry • Regional focus	• Erratic trajectory • New pilot project Evolution from technical to knowledge intensive • Forced reinvention	• Historical innovative research university with strong cooperation with industry • High-tech innovator
	Higher Education Market	• Very competitive • National or global	• Not very competitive, regional niche • Regional and national in some cases dependent on field of expertise	• Competitive • Regional or national	• Very competitive • Global
	Regional Economic Base	• Industrial • Global enterprises • Research intensive industries (ex. life sciences)	• Strong industry base, technical, engineering • SME's, regional and some global players	• Knowledge intensive • Innovation clusters • Creative industry • New economy	• High tech industries
	Legal Framework	• Regulated to moderately regulated	• Regulated to moderately regulated	• Moderately regulated to deregulated	• Deregulated to moderately regulated
Contextual	Politics	• Policies can either favor academic orthodoxy or competition and deregulation	• Policies can either favor academic orthodoxy or competition and deregulation	• Policies favor competition and deregulation	• Policies favor competition, deregulation and engagement in commercial activities
	Community	• Positive attitudes towards entrepreneurialism • Moderate involvement with university	• Positive attitudes towards entrepreneurialism • High involvement and cooperation with university	• Positive attitudes towards entrepreneurialism • Moderate involvement with university	• Positive attitudes towards entrepreneurialism • High involvement and cooperation with university

Table 4: Archetype classification of synthetized cases studies

Case Study	Number of Cases	University	Country	Archetype
Clark, 1998	9	Chalmers University of Technology	Sweden	**Research-preneurial (research driven)**
Guerrero & Urbano 2007		Autonomous University of Barcelona	Spain	
Zhou, 2008		Northeastern University in Shenyang	China	
Huggins, Jones & Upton, 2007		Cardiff University	Wales, UK	
Dodgson & Staggs, 2012		Queensland University	Australia	
Berger, 2008		Technical University Munich	Germany	
Etzkowitz, 2003		Stanford University	USA	
Bernasconi, 2005		Universidad Católica of Chile	Chile	
Ma, 2008		University of California at Berkeley	USA	
Clark, 1998	5	University of Joensuu	Finnland	**Techni-preneurial (industry driven)**
Wissema, 2009		University of Rousse	Bulgary	
Vorley & Nelles, 2012		Hamburg University of Technology	Germany	
Prausse, 2011		Wismar University	Germany	
Bramwell & Wolfe, 2008		University of Waterloo	Canada	
Clark, 1998	6	University of Strathclyde	Scotland	**Inno-preneurial (Innovation driven)**
Clark, 1999		Warwick University	England	
Kristensen, 1999		Copenhagen Business School	Denmark	
Minguillo & Thelwall 2013		University of York	England	
Crow, 2008		Arizona State University	USA	
Goddard, Robertson & Vallance, 2012		Newcastle University	England	
Clark, 1998	7	Twente University	Neatherlands	**Commerce-preneurial (Commercialisation driven)**
Wissema, 2009		Bandung University of Technology	Indonesia	
Avotins, 2012		Ventspils University College	Latvia	
Uvarov & Perevodchikov, 2012		Tomsk State University	Russia	
Martinelli, Meyer & von Tunzelmann, 2007		Sussex University	England	
Azele, Meyer & van Pottelsberghe, 2008		Université Libre de Bruxelles	Belgium	
Yokoyama, 2006		Waseda University	Japan	