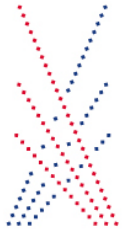

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Understanding academic entrepreneurship and diversity through the lens of institutional logics

Abstract

The purpose of this study is to explore the relationship between academic entrepreneurship (AE) and diversity in STEM (Science, Technology, Engineering and Mathematics) domains., With academic members of the staff in STEM departments of five research-intensive university and technology transfer officers of respective universities, sixty-four semi-structured interviews were conducted. Using institutional logics theory in order to comprehend complexities of the subject and develop a framework for unpacking the relationship between AE and diversity. Our study reveals co-existence of plural logics governing the relationship between AE and diversity. Existing logics include the profession logic, science logic and market logic and the new logics we identify are impact logic and diversity logic. Salience of these logics over others governing different aspects of AE and the interaction between them shape the process of AE. The results of our study suggest that strategically combining existing logics with impact and diversity logics has a significant role in capturing value through AE. We contribute to theory by introducing new forms of institutional logics and demonstrating the value of their interactive capacity in achieving intended objectives of AE.

Key words: academic entrepreneurship, diversity, institutional logics

Introduction

Academic entrepreneurship (AE) has gained increasing attention in scholarly literature and policy documents, with the emphasis on impact of applied research for wider society and economy (Patzelt & Shepherd, 2009; Wood, 2009; Abreu, Demirel, Grinevich, Karatas-Özkan, 2016; Meek & Wood, 2016; Halilem, Amara, Olmos-Penuela, & Mohiuddin, 2017). Academic researchers are highly encouraged to get involved in AE in research-based universities. As some institutions have direct impact on entrepreneurship process (Gohmann, 2012), for some academic institutions, commercialization of their research findings into innovative ideas is a requirement (Ambos, Makela, Birkinshaw, & D'Este, 2008). In addition to such institutional requirements, there are individual motivational factors for academics to engage in commercialisation such as increasing the personal income, accessing resources and learning (D'Este & Perkmann, 2010). Significance of the topic has been further reinforced with an emphasis placed on diversity agenda i.e. inclusion of disadvantaged groups for a more inclusive and sustainable (in socially sustainable) society (All Party Parliamentary Group Diversity and Inclusion in STEM, 2018; Nesta, 2018). Given this academic and policy context, the focus of this paper is to unpack the complex relationship between diversity categories (mainly gender, age and ethnicity) and AE in STEM disciplines drawing on a qualitative study undertaken in research-intensive UK universities. Acknowledging the complexity and multi-layered nature of the topic and added emphasis on the importance of diversity and inclusiveness, it is imperative to look deeper into the characteristics of AE process, its types, and the role of university structures and socio-economic impacts of the process for wider diversity implications.

Methods of commercialization such as patents, spinouts, licenses and consultancy work are less common in art and humanities (Abreu & Grinevich, 2014). Therefore, science departments in universities like medicine, engineering and natural sciences are more likely to get involved in AE process by commercializing their research results. UK Equality Challenge Unit (ECU)'s 2005 Athena SWAN Charter recognizes advancement of gender equality, representation, progression and success in STEM. However, the recent scholarly works (Tatli & Özbilgin, 2012; Karatas-Özkan, 2017) highlight lack of emphasis on diversity in AE.

Although different strands of diversity (i.e. gender, ethnicity, disability, age/seniority, sexual orientation) have been taken into account in investigating entrepreneurship in general (see Koning &Verner, 2009; Quinton, 2014; Dilli & Westerhuis, 2017; Karatas-Özkan, 2017), there is dearth of research in AE in particular. Entrepreneurship scholars tend to focus on gender more than other diversity categories. This applies to AE as well. Gender differences in entrepreneurial activities are explored in terms of family commitments, economic and social equity and gender gap. Women tend to commercialize their work less frequently than their male counterparts do (MetCalfe & Woodhams, 2012; Abreu & Grinevich, 2014). Underlying reasons and institutional factors remain mostly unanswered. In addition to gender being the primary domain, other diversity elements such as ethnicity and age have emerged from the AE literature as under-studied areas, therefore taken into consideration in this paper (see Stephan & El-Ganainy, 2007; Romero &Valdez, 2016). This has intrigued us to investigate multiple diversity categories on commercialization in STEM disciplines and cultures.

To address this gap, we apply institutional logics perspective to detangle the relationship between AE and diversity. Institutional logics are often described as sets of material and non-material (symbolic) constructions, which form guiding principles for collective organizational action (Friedland & Alford, 1991; Thornton, Ocasio & Lounsbury, 2012). Logics are often conceptualized as negotiable strategic resources that actors can deploy to influence and

justify decisions, practices and organizational change (Bruton, Ahlstrom, & Li, 2010; Dalpiaz, Rindova & Ravasi, 2016; Purdy, Ansari & Gray, 2017). Translating these ideas into AE entails a closer look at the interplay between different logics such as profession logic, science logic and market logic (Su, Zhai & Karlsson, 2016) and their intertwined impact on the diverse group of academics' engagement as professionals with commercialisation process. This has triggered the following research question that underpins our paper:

What are the key institutional logics that govern the relationship between AE and diversity in STEM domains of universities; and how this relationship is mediated by the interaction of different logics?

We make important contributions to knowledge: First, by revealing the importance of institutional influences/logics on the process of AE as enablers and constraints and how they generate strategic resources that have a dual nature, in the context of AE. We have identified co-existence of several institutional logics, such as profession, market and science logics and we have introduced two new logics: diversity logics and impact logics, both governing the relationship between diversity and the process of AE. Second, we address the theoretical and empirical gap by unpacking the dynamics of diversity in the context of AE. Third, by applying institutional logics to AE and diversity we advance theory on logics by going beyond logics pluralism and conflict and demonstrating how different kinds of logics create different kinds of salient points and pressures for academics and university policy makers.

We have structured the paper as follows: We discuss the extant literature on commercialization in STEM and diversity strands to establish the gaps in knowledge. This is followed by an overview of institutional logics perspective in order to problematize the relationship between AE and diversity. We present our method in the subsequent section. After discussing our method and findings, we conclude with a discussion of the implications

of our results for the studies of AE and diversity as well as theoretical implications for plurality and interaction of institutional logics.

Academic Entrepreneurship and Diversity Strands

We broadly define AE as commercialising academic research base for generating wider impact for economy and society. AE has attracted increasing attention in both scholarly and practitioner domains in the last years (e.g. Boh, De-Hann, & Strom, 2016; Hayter, Lubynsky, & Maroulis 2017; Mascarenhas, Marques, Galvão, & Santos, 2017; Balven, Fenters, Siegel & Waldman, 2018). Klofsten and Jones-Evans (2000) stated that all commercialisation activities, outside of the basic university responsibilities such as teaching and research are considered as AE. In order to receive marketable products and services from university research discoveries, some universities started to make significant investments to enhance university - industry collaboration. Even though commercialization of academic research is valuable to generate revenue many universities emphasize on creating social impact and economic development as an intended outcome of AE as well (Meek and Wood, 2016). More contemporary discourse on AE focuses on impactful research and translation of research base and findings into tangible outcomes for economy and society.

Institutional contexts and structures are important for achieving such impact. As noted by Siegel and Wright (2015), creating an environment that encourages student and alumni start-ups, training students who are entrepreneurially equipped, creating new jobs is equally important to having licences and patents. They observed the importance of the development of accelerator programs, initiatives to increase collaboration between industry and academics alongside the opportunities and support that are provided by science parks and technology transfer offices (TTOs) within universities, which are expected to support their faculty members who are interested in learning more about AE. This approach could also create an

understanding towards provision of alternative training for post-docs who are eager to pursue non-academic careers. In response to the increasing strategic emphasis on AE, most entrepreneurial universities have adapted their structures to include TTOs, sustain the AE process and support the development of technologies by mainly getting access to funds and creating networks (Lockett & Wright, 2005; Gubitta, Tognazzo, & Destro, 2015). These structural and functional (funding, networking etc.) dimensions are instrumental to AE success.

Challenges of commercialization in universities have also been explored in the extant literature. Nature of academic profession is such that increasingly there are multiple demands and expectations. Scholars argue that traditional roles of teaching and research might conflict with AE, thus causing less commercialized activities at university level (Ambos et al, 2008). To overcome this challenge, universities need to design new structures to eliminate the tension between traditional research, teaching and entrepreneurial activities, which might take different forms such as licensing, spinout companies, contract research and consultancy work (Abreu & Grinevich, 2013). In addition, it is essential to consider the characteristics of academic entrepreneurs as in regard to their research subject areas, seniority, experiences, external and internal supports that they receive and their ethical views on entrepreneurship (Abreu & Grinevich, 2017).

AE is also impacted by the discipline. The majority of the literature on AE and commercialization focus on STEM subjects such as natural and life science domains due to these departments' tendency to display high intensity for cooperation between university and industry due to availability of funding and industry interests in STEM projects and outputs (see Haeussler & Colyvas, 2011; Goel & Grimpe, 2012; Hughes, Schilt, Gorman, & Bratter, 2017). Therefore, we have chosen to focus on STEM departments where there is more evidence of AE and a diverse set of academics are involved in the process.

As to the diversity elements, recent discussions in the literature indicate the lack of emphasis on diversity in commercial application of academic research; the most common strand of which is gender (Goel, Goktepe-Hulten, & Ram, 2015; Abreu & Grinevich, 2017). In terms of AE in STEM departments, women have less success than their men counterparts in commercialising their academic research outputs and finding venture capital or other types of funds to support the process (Smith, Henry, Etzkowitz, Meschitti, & Poulovassilis, 2015). Gender gap in commercialization is one of the key focus of the literature in this domain. Goel *et al.* (2015) argue that female academics who are not engaged in AE might have individual motives as well as situational factors. Female academics are more likely to work in social sciences, disciplines that have comparatively low commercial activities. As evidenced in the extant literature and policy documents (Abreu and Grinevich, 2017; NESTA, 2018), there are less female academics in science departments as male academics. According to a well-known model *leaky pipeline* (Blickenstaff, 2005), women choose to drop out scientific career path in different phases of their life. Number of female academics who hold senior faculty positions or publish in highly-ranked accepted journals are less than male academics.

Higher education fails to attract and involve women academics in entrepreneurship (Howe, Juhas & Herbers, 2014). Under-representation of women in AE is present not only in social sciences but also in STEM subjects. Research by Abreu & Grinevich (2017) corroborates the point that some female faculty members consciously choose not to become academic entrepreneurs. Their self-selected research areas might not be commercially valuable. Also, some of them are merely interested in scholarly endeavour even if their work could be commercialized (Karatas- Özkan & Chell, 2015). Furthermore, limitation of time is another underlining reason for such lack of engagement in AE; while all academics put emphasis on how busy they are, women especially indicate they have already full schedules and complain

about time management being an issue (ibid). These indicate gender-related aspects of diversity in the context of AE.

Ethnicity is an under-researched diversity strand in the context of AE. Saxenian (2002) argues that foreign-born scientists have higher tendency to become entrepreneurs because they may recognize opportunities that do not exist in their home countries. Supporting this argument, Krabel, Siegel & Slavtchev (2012) note that foreign-born scientists have experiences with different research methods due to their diverse academic background and cultural environments that evolve their social capabilities. Yet, there are barriers as well, such as lack of proficiency in English (or the language of the host country), which in turn affects their involvement in AE (Romero & Valdez, 2016).

There is even less research on other strands of diversity and AE. In regard to age or seniority, the discussion is mostly related to how senior academics have a stronger network and more experience in enterprise activities (Klofsten & Jones-Evans, 2000). Therefore, being at the early stage of his or her career could affect an academic's success in AE. Senior academics are more likely to engage in AE than their junior counterparts due to their earlier experiences in commercialization and advanced networks (Stephan & El-Ganainy, 2007; Karatas- Özkan & Chell, 2015). Nevertheless, this should not imply that younger academics are not interested in commercialization; as they tend to generate many novel and original scientific and technological outputs and projects.

To date there is a dearth of literature on dimensions of diversity and their relationships with AE, despite the increasing emphasis placed on the relevance of AE and the need to create a more socially inclusive society in all work domains including academia and AE. We argue that universities should increase the awareness of entrepreneurship by creating an educational environment and supporting culture as well as developing sound institutional response

strategies for realising such potential. The importance of this study lies in this focus on the relationship between AE and diversity elements, particularly by addressing the institutional influences, norms, values and practices associated with the multi-dimensionality of academic profession. Therefore, we argue that institutional logics are an appropriate theoretical lens to unpack this relationship.

Institutional Logics: Plurality and Interaction

Institutional logics has prevailed as a growing domain as part of the institutional theory (Su et al., 2016). Institutional theory traditionally examines the relationship between organizations' legitimacy and positions by conforming to the rules and norms of institutional environment. The institutional perspective attaches importance to rules, norms and beliefs that have influence on organizations and its members (Scott, 2012).

Thornton and Ocasio (1999) introduced a new institutional analysis approach that conceived institutional logics to define the content and meaning of institutions. Institutional logics, defined as "socially constructed, historical pattern of material practices, assumptions, values, beliefs and rules by which individuals produce and reproduce their material subsistence, organize time and space, and provide meaning to their social reality" (Thornton & Ocasio, 1999, p.804). Logics can be applied in order to influence and justify decisions, practices and organizational change as negotiable strategic resources (Dalpiaz et al., 2016; Purdy et al., 2017). It is argued that institutional logics is both a theory and method of analysis that allows researchers to examine the influence of culture at the societal level on the behaviour of social actors (Thornton & Ocasio, 2008; Greenman, 2013).

Academics as social actors operate with several logics in institutional environments of universities. These logics might include profession logic, science logic and market logic. Plurality of logics is an established topic in many fields (e.g. Martin, Currie, Weaver, Finn, &

McDonald, 2017), and academics are intrigued into researching multiple logics (Zellweger, Richards, Sieger & Patel, 2016) Although logics are not always compatible and when different logics interact with each other they can promote conflicting values and goals (Pache & Santos, 2010; Jaskiewicz, Heinrichs, Rau & Reay, 2016). Reay and Hinings (2009) argue that competing logics could co-exist as long as development of collaborative relationship is maintained. In mobilizing the institutional logics lens, we seek to understand how different kinds of institutional influences create enablers or barriers for AE as experienced by diverse groups of academics. Salience of one logic over others or their interactive capacity is instrumental in shaping the process of AE. Such considerations led us to focus our empirical investigation on the following key research question. The aim is to shed light on the key institutional logics and how their interaction mediates the relationship between AE and diversity in STEM domains of universities.

Methodology

In addressing this aim, qualitative exploratory study was employed (Miles & Huberman, 1994). While focusing on the under-representation in commercialization of academic research base, namely AE, multiple diversity strands such as gender, ethnicity, and age groups /career stage were taken into consideration. We conducted 64 semi-structured interviews, of which 55 were with academic members of the staff in STEM departments of five UK universities with high research intensity ranking and nine TTO Officers (see Table 1), as part of an Engineering and Physical Sciences Research Council (EPSRC) funded project. UK Universities were selected based on their research intensity rate published in the University League Tables 2018.[1]

[1] https://www.thecompleteuniversityguide.co.uk/league-tables/rankings?

Insert Table 1 here

Participants were selected through purposive sampling technique (Neuman, 2011) in order to obtain different views from a diverse group of academics in STEM departments who have various levels of experience in AE process. Interviewees were approached by e-mail and via Heads/Deans of Schools/Faculties in the selected universities. Data collection was carried out through semi-structured interviews. The interview questions were designed to gather information on the process of AE with internal and external institutional influences facilitating or impeding this activity. Furthermore, the relationship between diversity of workforce in STEM (i.e. gender, ethnicity and age) and the enablers and impediments of AE that influence this relationship were investigated.

Due to the qualitative nature of this research, following stages of qualitative data analysis described by Charmaz (2006) and Bryman (2012) were applied. After analysing and examining the interview transcripts and field notes, collected data were organized and sorted which led to creating codes that were categorised as first-order, second-order and third order codes (see Howells, Karatas- Özkan, Yavuz, & Atiq, 2014; Kodeih & Greenwood, 2014). This approach is consistent with the analytic approach that includes open/initial coding, axial coding and selective or focused coding, drawing on Strauss and Corbin (1998). First-order codes referred to open/initial codes that lead us identify analytical concepts and categories and helps to develop more focused research questions and understand the limitations of the research (Saunders, Lewis & Thornhill, 2016). Second-order codes explored the subject of the research by investigating the relationship between concepts, categories and the purpose of the analysis in order to indicate the process of theoretical development, which is explained as axial coding by Strauss and Corbin (1998). Third- order codes (aggregate dimensions) can be described as selective or focused orders (Corley & Gioia, 2004; Gioia. Corley & Hamilton, 2013), that help us re-coding the initial codes to establish an explanatory focus to recurring

themes. Figure 1 demonstrates first-order, second-order and third order codes that were created in analysing and interpreting the interview data.

Insert Figure 1 here

Research Findings

Key Institutional Logics Shaping AE

AE is a dynamic process mediated by a multitude of elements which are driven by a diverse set of logics (see Table 1). Our analysis suggests that apart from profession logic, science logic and market logic that already exist in the literature, new logics emerged such as diversity logic and impact logic.

Insert Table 2 here

Due to dual nature of these logics and their interactive capacity, we consider both enabling and the impeding elements of logics shaping AE. Our research findings with illustrated quotes are presented in Table 2 below.

Insert Table 3 here

Profession logic is highly important for academics, who are not only contractually obliged to undertake certain professional activities but also by belonging to a particular discipline and even wider academia they engage in activities that are acknowledged as legitimate and required by their profession. One face of profession logic that affects AE is mentorship. In academic tradition, mentoring is a significant part of the academic culture. Creating a relational network is one of the most important aspects of the profession logic; people connect to each other through the nature of their discipline as part of academic profession. Its significance is not only related to develop the mentees as academic entrepreneurs by

generating further contacts, creating strategic resources and sharing their experiences, but also to instil an entrepreneurial spirit and orientation throughout the mentoring process, in order to encourage commercialisation (A1) . Mentors can be instrumental in assisting with the decision-making process as to evaluating the fitness of the commercial idea, which is often characterised by the tension between science logic and market logic. Mentors are not only considered as 'strategic resources' that provide advice throughout the process but also they are useful in generating further contacts for development of the entrepreneurial idea (A2).

Academic reputation and career development have revealed as an enabler as embedded in professional logic. There are cases of involvement in AE that has led to promotion to professorship (A3) and it can be a positive contribution to career development of an academic (A4). In addition, AE helps scholars develop further professional capabilities. In some cases, academics also have the opportunities to cooperate with colleagues from different departments, which creates a new environment to share and extend their knowledge. The study reveals that in engaging entrepreneurial activities within academia improve their abilities such as problem solving in science and in business (A5). This cultural outlook at the disciplinary level entails certain types of individuals and skill sets for developing action for AE (A6-A8). These transferable skills are required for public engagement.

Profession logic can also have impeding influences. One major issue is conflicting roles that academics need to perform as professionals. Teaching, research and administrative duties need to be fulfilled concurrently in order to maintain their position at the university. These aspects of the profession logics do not reconcile all the time. Adding AE to this equation is a difficult task for some of them (A9-A10). Furthermore, academic profession routines and ways of acting (such as agility, time and project management etc.) do not always align with the profession logics in industry. There is a gap between industry and academia in terms of

expectations and meeting deadlines, which creates misunderstandings between two parties. Such misunderstanding could be harmful for the university- industry relations (A11-A12), which form important dynamics for AE.

Turning our attention to science logic, our research has revealed the nature of STEM disciplines as more conducive for development of entrepreneurial ideas in the form of commercialisation, supported by university culture and structures (such as TTOs). In addition, close links with industry would help bridging the gap between academic work and application to practice are cited as important in STEM domains, particularly in engineering. The very notion of addressing real-world problems is an important motivation for academic entrepreneurs (A13-A15).

Science logic is not fully imbued with facilitative attributes for AE. Blue-sky research does not often lend itself to commercialisation or application to industry and some scientists show unwillingness to engage in AE in their universities (A16- A17). In addition, some of the participants argued that scientists who are involved in AE develop a bad reputation due to the opportunistic image that they are portraying; they are not seen as noble academics anymore. This perception is a negative attribute of the science logic (A18).

Most of the participants agreed on the importance of external and internal support they receive as academic entrepreneurs in STEM departments in which we interpret under the market logic. AE is a process that does not only come from the application of a scientific idea but it also needs to be mediated by the elements of the market logic. When we are discussing about commercialization in STEM departments, it is crucial to include processes such as finding funds, marketization process, developing technology into a prototype etc. Internal influences include factors such as existence of an incubator or accelerator environment, with implications for all elements of the process of AE varying from funding, legal services and

market development (A19-A20). Role of external funders is critical not only to fund the commercialisation projects but also to drive an impact agenda in order to highlight importance of impactful research with demonstrable evidence that it benefits economy and society widely. Another key point is to understand if there is a demand in the market for the product. As one of the participants pointed it out, if there is not a market for the idea, it will not be successful (A21).

Furthermore, participants discussed the lack of institutional support in terms of not having a clear understanding of the entrepreneurial process and university policies on intellectual property. They complain about the unsatisfactory support from the TTO officers mainly because, they believe people who are advising them are not qualified to understand not only the science but also the business aspect of their projects (A22-24). An academic who holds a post-doc position mentioned he was not able to get any useful advice from the TTO officers while he was spinning out, due to their lack of ability and experience (A24). It is also stated that academics have a mistrust toward the university, which creates tension between two parties (A25). This demonstrates dual nature of market logics and perceptive differences between parties involved.

New Logics and Their Interactive Capacity for AE

Our research reveals two new logics that can be instrumental in shaping AE process and related policies in STEM departments of universities. These are diversity and impact logics. Diversity logic can be explained by looking into aspects of the process associated with experiences of academics from different diversity categories and institutional underpinnings of these diverse experiences. As we have explained in the method section, participants of this study were selected from different diversity groups. Three strands of diversity have appeared

to be significant in shaping experiences of academic entrepreneurs; these are gender, ethnicity and age (mostly linked to career stage).

On a positive dimension of diversity logic, having a diverse research group with both female and male scientist indicated having better outputs in research. In other words, inclusive work environment that appreciates the value of contributions from different groups of individuals could lead to a better understanding of a market product (B1). An inclusive work environment is significant to have which can be ensured by university policies that support equal opportunities to people who wants to be involved in AE (B2-B3).

On the other hand, ineffectiveness of existing diversity schemes and compliance approach to diversity management was often mentioned as an impeding factor as part of diversity logic as an institutional influence. Even though creating an inclusive work environment is highly important, forcefully implemented change in diversity and equality would not be sustainable (B4). In addition to the need of adopting effective diversity schemes, existing values, principles and practices to diversity as underpinning aspects of diversity logic should be acknowledged and improved. For instance, an Italian academic who has lived in several countries argued that she has to face with prejudice and due to her nationality and bias towards her, which is even stronger in the UK (B5). Similarly, lack of gender balance in the STEM departments, could be explained by pressures on time for women (B6). Considering the age category, it is mentioned that managing academic and entrepreneurial career simultaneously is highly unlikely because of the responsibilities of an early stage academic could be very demanding (B7).

Impact logic has emanated from our data as the other interacting logic that influences AE highly. Engaging in research that contributes to society and economy is a major motivation for research-oriented universities. Academics consider the impact creation and implication of

their research beyond academic environments while they are managing their projects. As a result, academic entrepreneurs are guided by an impact logic that aims to enhance cultural enrichment and quality of life, improving health and wellbeing, increasing public engagement with research and influencing public policies (B8- B10). These constitute more enabling aspects of impact logic as an institutional influence.

However, our research has also identified tensions within this logic as its capacity to influence AE. Impact creation through AE sometimes is imbued with paradoxical relationship between the university management and academics, when university policies and the bureaucracy could be perceived and experienced as barriers. Even though scientists could benefit from career progression by building a personal reputation, often the pressure is too high as impact generation is seen a way to get promotion or being successful within the university (B11-12). In addition, it was mentioned that the pressure of creating impact in research is an outcome of universities' care for financial gain, which puts the scientist in a difficult position (B13).

These two logics tend to co-exist and interactively affect the process of AE as experienced by under-represented groups that belong to those aforementioned diversity categories. Their interactive capacity and salience of one particular logic over others is crucial because they provide enabling frameworks or create barriers. The context of AE is conducive to explicate the interactive power of logics as it is highly complex and multi-dimensional phenomenon, added with further complexity of diversity and inclusion agendas.

Discussion and Conclusions

The purpose of our paper is to unpack the complex relationship between the AE process and diversity and inclusiveness agendas by delineating the impact of the interplay between

different institutional logics. Commercialisation of university research is highly encouraged by research-oriented universities in order to increase the importance of collaboration with industry hence to improve economic productivity (Siegel, Waldman, & Link, 2003, Rhodes, Wright & Pullen, 2018) and social impact (Gunn and Mintrom, 2016) and social inclusion i.e. the inclusivity of the AE in terms of integrating diverse categories of researchers into the process. In this paper, we have demonstrated that it is worth questioning and problematizing the diversity issues in the context of AE in STEM departments from an institutional logics perspective, with the ultimate aim to advance our understanding of the subject and theory on logics.

Our findings support theoretical claims about co-existence of plural logics in shaping organisational phenomena (see Reay & Hinnings, 2009; Pache & Santos, 2013; Mair, Mayer & Lutz, 2015, Nicolini, Delmestri, Goodrick, Reay, Lindberg, & Adolfsson, 2016; Upton & Warshaw, 2017) as well as tension between existing logics (Binder, 2007). Primary (dominant) logics play a more important role in organizations' perceptions and reactions towards demands and requirements (Lee & Lounsbury, 2015). Dominant logics governing the process of AE include professional, science and market logic. Although they appear as conflicting in the first instance, however, in STEM departments there is an established perception and awareness about their complementarity. Two new logics that emanated from our research include diversity and impact logics. Both of them are very instrumental in shaping AE process and its links with the wider societal agenda of diversity, equality and inclusiveness.

In addition to a strong push by the governments for impact, there is an increasing acknowledgement of diversity and how it contributes to the process of AE and STEM academic cultures in general. This is not only related to compliance to laws and regulations

about equal opportunities; but also fostering a diversity culture in science, with associated values, norms and practices, what we call diversity logic in this paper.

This research adds to the broader body of research on institutional plurality. Echoing Mair *et al* (2015), we argue that logic plurality (i.e. co-existence of profession logic, science logic, market logic, diversity logic and impact logic) may facilitate AE in universities as it serves for meeting demands of different stakeholders. What we found striking is the interactive capacity of these co-existing logics and how they impact on the experiences of academics engaging in entrepreneurship.

For instance, our study demonstrates that AE is often leveraged in university environments for material (i.e. funding) as well as symbolic (reputation; impact etc.) reasons. In other words, professional logic, with associated values and processes, is configured to accommodate market and science logic and other emergent logics i.e. impact logic and diversity logic, has important implications for strategic allocation of resources and developing institutional procedures and processes to support AE. Such strategic resources have a dual nature as enablers and barriers. Linked to the wider impact logic embracing social inclusion, diversity logic, can contribute to developing strategic resources and institutional practices accessible to under-represented groups, such as women and people with different ethnic backgrounds and within different age groups.

As with previous research (i.e. Lounsbury, 2007; Goodrick & Reay, 2011; Greenwood et al., 2011; Ocasio & Radoynovska, 2016), our study hints at mechanisms to strategically manage pluralism. Awareness about existence of different logics and associated values, norms and practices of how these logics operate differently for under-represented groups in the context of AE, is the first step towards organisational commitment to such sub-sets of dominant logics (Figure 2). Strategic choices are evidenced by particular configurations of logics to

which universities will choose to make a commitment. Profession, science and market logics are established and implicitly well-understood in university contexts; however, impact logic and diversity logic are areas that universities (and other stakeholders, such as research councils) should be more responsive.

Insert Figure 2 here

Through an empirical application of institutional logics, we offer a conceptual framework that demonstrates the nature of AE process as experienced by under-represented groups from three diversity strands (gender, ethnicity, and age) and as governed by co-existence of five institutional logics (Figure 1). We propose that, in addition to coexistence of profession, science and market logics, two emergent logics i.e. logics of impact and diversity are at interplay in shaping the process of AE in order for addressing inequalities and achieving a more effective integration for an academic workforce with diverse profile. This framework contributes to the theory on institutional logics from a pluralism perspective as explained above and precipitate for policy changes on these issues.

Implications for Policy and Practice

If universities want to attract more talent and generate more academic entrepreneurs, new understandings and ways of promoting outcomes of entrepreneurship within the university could be useful. Considering the importance of the unique and diverse environment of academic population, universities should provide support and invest in people when it is needed (Baruch, 2013). Such support mechanisms should be underpinned by the requirements and associated practices of several logics such as profession, science and market logics collectively affecting the process. Senior management of universities should be

more responsive to impact and diversity agendas that entail catering needs of such a diverse group of academics and designing institutional support structures that recognize the interplay between logics.

Opportunities for Future Research

This paper explores the relationship between AE and diversity elements through institutional logics lens and improves the theoretical understanding of the field through an empirical application of the subject through data collected from five research-oriented UK universities. Future research could extend the study across the UK, including less-research oriented (teaching-focus perhaps) universities in order to gain a more holistic understanding of the phenomenon. More research is needed to have a better understanding on institutional influences on AE process so some of these logics can be explored in different institutional settings. For example, future research could also focus on differences between academia and industry in terms of perceptions over diversity and associated practices. Contextual differences such as EU, USA and emerging country contexts would also shed further light on the process as they will reveal different landscape in terms of macro-policies for AE.

References

Abreu, M. & Grinevich, V. (2013). The nature of academic entrepreneurship in the UK: Widening the focus on entrepreneurial activities. *Research Policy*, 42, 408-422.

Abreu, M. & Grinevich, V. (2014). Academic entrepreneurship in the creative arts. *Environment and Planning C: Government and Policy*, 32,3, 451-470.

Abreu, M. & Grinevich, V. (2017). Gender patterns in academic entrepreneurship. *Journal of Technology Transfer*, 42, 763-794.

Abreu, M., Demirel, P., Grinevich, V. & Karatas-Özkan, M. (2016). Entrepreneurial practices in research-intensive and teaching led-universities. *Small Business Economics*, 47, 695.

All Party Parliamentary Group Diversity and Inclusion in STEM (2018). *Diversity and Inclusion in science, technology, engineering and maths.* Retrieved at 20 February 2019 https://publications.parliament.uk/pa/cm/cmallparty/180829/diversity-and-inclusion-in-science-technology-engineering-and-maths.htm

Ambos, T. C., Makela, K., Birkinshaw, J. & D'Este, P. (2008). When does university research get commercialized? Creating ambidexterity in research institutions. *Journal of Management Studies*, 45(8), 1424-1447.

Balven, R., Fenters, V., Siegel, D. & Waldman, D. (2018). Academic entrepreneurship: The roles of identity, motivation, championing, education, work-life balance, and organizational justice. *Academy of Management Perspectives*, *32*(1), 21-42.

Baruch, Y. (2013). Careers in academe: The academic labour market as an eco-system. *Career Development International*, 18(2), 196-210.

Binder, A. (2007). For love and money: organizations' creative responses to multiple environmental logics. *Theory and Society*, 36(6), 547-571.

Blickenstaff, J. C. (2005). Women and science careers: leaky pipeline or gender filter. *Gender and Education*, 17(4), 369-386.

Boh, W. F., De-Hann, U. & Strom, R. (2016). University technology transfer through entrepreneurship: faculty and students in spinoffs. *Journal of Technology Transfer*, 41, 661-669.

Bruton, G. D., Ahlstrom, D. & Li, H. (2010). Institutional theory and entrepreneurship: Where are we now and where do we need to move in the future? *Entrepreneurship Theory and Practice*, 34, 421-440.

Bryman, A. (2012). *Social research methods*, 4th ed. Oxford: Oxford University Press.

Charmaz, K. (2006). *Constructing grounded theory*. London: Sage.
Corley, K.G. & Gioia, D. A (2004). Identity ambiguity and change in the wake of a corporate spin-off. *Administrative Science Quarterly*, 49(2), 173-208.
D'Este, P. & Perkmann, M. (2010). Why do academics engage with industry? The entrepreneurial university and individual motivations. *Journal of Technology Transfer*, 36, 316-339.
Dalpiaz, E., Rindova, V. & Ravasi, D. (2016). Combining logics to transform organizational agency: Blending industry and Art at Alessi. *Administrative Science Quarterly*, 61(3), 347-392.
Dilli, S. & Westerhuis, G. (2017). How institutions and gender differences in education shape entrepreneurial activity: a cross-national perspective. *Small Business Economics*, 51(2), 371-392.
Friedland, R. & Alford, R. R. (1991). *Bringing society back in: symbols, practices, and institutional contradictions.* In Powell, W. W. & DiMaggio, P. J. (Eds), The new institutionalism in organizational analysis, University of Chicago Press,232-363.
Gioia, D.A., Corley, K. G. & Hamilton, A. L. (2013). Seeking qualitative rigor in inductive research: Notes on the Gioia Methodology. *Organizational Research Methods*, 16(1), 15-31.
Goel, R. K., Goktepe-Hulten, D. & Ram, R. (2015). Academics' entrepreneurship propensities and gender differences. *Journal of Technology Transfer*, 40, 161-177.
Goel, R. K. & Grimpe, C. (2012). Are all academic entrepreneurs created alike? Evidence from Germany. *Economics of Innovation and New Technology*, 21(3), 247-266.
Gohmann, S. F. (2012). Institutions, latent entrepreneurship, and self-employment: An international comparison. *Entrepreneurship Theory and Practice*, 36, 295-321.
Goodrick, E. & Reay, T. (2011). Constellations of institutional logics: changes in the professional work of pharmacists. *Work and Occupations*, 38(3), 372-416.
Greenman, A. (2013). Everyday entrepreneurial action and cultural embeddedness: and institutional logics perspective. *Entrepreneurship and Regional Development*, 25(7-8), 631-653.
Greenwood, R., Raynard, M., Kodeih, F., Micelotta, E. & Lounsbury, M. (2011). Institutional complexity and organizational responses. *The Academy of Management Annals*. 5(1), 317-371.
Gubitta, P., Tognazzo, A. & Destro, F. (2015). Signalling in academic ventures: the role of technology transfer offices and university funds. *Journal of Technology Transfer*, 41, 368-393.

Gunn. A. & Mintrom, M. (2016). Higher education policy change in Europe: Academic research funding and the impact agenda, *European Education*, 48(4), 241-257

Haeussler, C. & Colyvas, J. A. (2011). Breaking the ivory tower: academic entrepreneurship in the life sciences in UK and Germany. *Research Policy*, 40, 41-54.

Halilem, N., Amara, N., Olmos-Penuela, J. & Mohiuddin, M. (2017). Too own, or not to own? A multilevel analysis of intellectual property right policies on academic entrepreneurship. *Research Policy*, 46, 1479-1489.

Hayter, C. S., Lubynsky, R. & Maroulis, S. (2017). Who is the academic entrepreneur? The role of graduate students in the development of university spinoffs. *Journal of Technology Transfer*, 42, 1237-1254.

Howe, S. A., Juhas, M. C. & Herbers, J. M. (2014). Academic women: Overlooked entrepreneurs. *Peer Review: Gender Equity in STEM*, 16 (2).

Howells, J., Karatas- Özkan, M., Yavuz, C. & Atiq, M. (2014). University management and organisational change: A dynamic institutional perspective. *Cambridge Journal of Regions, Economy and Society*, 7 (2), 251-270.

Hughes, C. C., Schilt, K., Gorman, B. K. & Bratter, J. L. (2017). Framing the faculty gender gap: A view from STEM doctoral students. *Gender, Work and Organization*, 1-19.

Jaskiewicz, P., Heinrichs, K., Rau, S. B. & Reay, T. (2016). To be or not to be: How family firms manage family and commercial logics in succession. *Entrepreneurship Theory and Practice*, 40, 781-813.

Karatas- Özkan, M. (2017). Diversity dimensions of entrepreneurship: Addressing multiple strands of diversity in entrepreneurship research IN: Chanlat, J. & Özbilgin, M. (eds.) *Management and Diversity: Main Issues and Challenges*, Edward Elgar Publishing.

Karatas-Özkan, M. & Chell, E. (2015). Gender inequalities in academic innovation and enterprise: A Bourdieuian analysis. *British Journal of Management*, 26 (1), 109-125.

Klofsten, M. & Jones-Evans, D. (2000). Comparing academic entrepreneurship in Europe – The case of Sweden and Ireland. *Small Business Economics*, 14, 299-309.

Kodeih, F. & Greenwood, R. (2014). Responding to institutional complexity: The role of identity. *Organization Studies*, 35, 7-40.

Koning, J. & Verver, M. (2009). Historicising the 'ethnic' in ethnic entrepreneurship: The case of the ethnic Chinese in Bangkok. *Entrepreneurship and Regional Development*, 25(5-6), 325-348.

Krabel, S., Siegel, D. S. & Slavtchev, V. (2012). The internationalization of science and its influence on academic entrepreneurship. *Journal of Technology Transfer*, 37, 192-212.

Lee, M. P. & Lounsbury, M. (2015). Filtering institutional logics: community logic variation and differential responses to the institutional complexity of toxic waste. *Organization Science*, 26 (3), 847-846.
Lockett, A. & Wright, M. (2005). Resources, capabilities, risk capital and the creation of university spin-out companies. *Research Policy*, 34(7), 1043-1957.
Lounsbury, M. (2007). A tale of two cities: competing logics and practice variation in the professionalizing of mutual funds. *The Academy of Management Journal*, 50(2), 289-307.
Mair, J., Mayer, J. & Lutz, E. (2015). Navigating institutional plurality: organizational governance in hybrid organizations. *Organization Studies*, 36(6), 713-739.
Martin, G., Currie, G., Weaver, S., Finn, R. & McDonald, R. (2017). Institutional complexity and individual responses: Delineating the boundaries of partial autonomy. *Organizational Studies*, 38(1), 103-127.
Mascarenhas, C., Marques, C. S., Galvão, A. R., & Santos, G. (2017). Entrepreneurial university: Towards a better understanding of past trends and future directions. *Journal of Enterprising Communities: People and Places in the Global Economy*, 11(03), 316–338.
Meek, W. R. & Wood, M. S. (2016). Navigating a Sea of Change: Identity misalignment and adaptation in academic entrepreneurship. *Entrepreneurship Theory and Practice*, 40, 1093-1120.
Metcalfe, B. D. & Woodhams, C. (2012). Introduction: new directions in gender, diversity and organization theorizing, re-imagining feminist post-colonialism, transnationalism and geographies of power. *International Journal of Management Reviews*, 14, 123-140.
Miles, M. & Huberman, M. (1994). *Qualitative data analysis: An expanded sourcebook*. 2nd ed. Thousand Oaks, CA: Sage.
NESTA (2018). *Opportunity lost: How inventive potential is squandered and what to do about it.* Retrieved at 20 February 2019 https://media.nesta.org.uk/documents/Opportunity-Lost-December-2018.pdf
Neuman, W. L. (2011). *Social Research Methods: Qualitative and Quantitative Approaches*. USA: Allyn and Bacon.
Nicolini, D., Delmestri, G., Goodrick, E., Reay, T., Lindberg, K. & Adolfsson, P. (2016). Look what's back! Institutional complexity, reversibility and the knotting of logics. *British Journal of Management*, 27, 228-248.
Ocasio, W. & Radoynovska, N. (2016). Strategy and commitments to institutional logics: Organizational heterogeneity in business models and governance. *Strategic Organization*, 14, 4, 287-309.

Pache, A. C. & Santos, F. (2010). When worlds collide: The internal dynamics of organizational responses to conflicting demands. *Academy of Management Review*, 35(3), 455-476.

Pache, A. & Santos, F. (2013). Embedded in hybrid contexts: How individuals in organizations respond to competing institutional logics IN Lounsbury, M. and Boxenbaum, E. (eds.) *Institutional Logics in Action*, Part B, 3-35.

Patzelt, H. & Shepherd, D. A. (2009). Strategic entrepreneurship at universities: academic entrepreneurs' assessment of policy programs. Entrepreneurship Theory and Practice, 33(1), 319-340.

Purdy, J., Ansari, S. & Gray, B. (2017). Are logics enough? Framing as an alternative tool for understanding institutional meaning making. *Journal of Management Inquiry*, https://doi.org/10.1177/1056492617724233.

Quinton, M. C. (2014). Self-employment as a solution for attitudinal barriers: A case study. *Work-A Journal of Prevention, Assessment, and Rehabilitation*, 48(1), 127-130.

Reay, T. & Hinings, C. R. (2009). Managing the rivalry of competing institutional logics. *Organizational Studies*, 30, 629-652.

Rhodes, C., Wright, C., & Pullen, A. (2018). Changing the World? The Politics of Activism and Impact in the Neoliberal University. *Organization*, *25*, 139-147.

Romero, M. & Valdez, Z. (2016). Introduction to the special issues: intersectionality and entrepreneurship. *Ethnic and Racial Studies*, 39, 1553-1565.

Saunders, M., Lewis, P. & Thornhill, A. (2016). *Research methods for business students*, 7th ed. England: Pearson.

Saxenian, A. L. (2002). Silicon Valley's new immigrant high-growth entrepreneurs. *Economic Development Quarterly*, 16, 20-31.

Scott, W. R. (2012). *Institutions and organizations. Ideas, interest, and identities*. 4th ed. CA: Sage.

Siegel, D. S., Waldman, D. A. & Link, A. N. (2003). Assessing the impact of organizational practices on the productivity of university technology transfer offices: An exploratory study. *Research Policy*, 32, 27-48.

Siegel, D. S., & Wright, M. (2015). Academic entrepreneurship: time for a rethink?. *British Journal of Management*, 26, 582-595.

Smith, H.L., Henry, C., Etzkowitz, H, Meschitti, V. & Poulovassilis, A. (2015). Female academic entrepreneurship: Reviving the evidence and identifying the challenges. *Trigger Research Working Paper Series. Centre for Innovation Management Research*, 1-18.

Stephan, P. E. & El-Ganainy, A. (2007). The entrepreneurial puzzle: Explaining the gender gap. *Journal of Technology Transfer*, 32, 475-487.

Strauss, A. L. & Corbin, J. M. (1998). *Basics of qualitative research,* 2nd ed. Thousand Oaks, CA: Sage.

Su, J., Zhai, Q. and Karlsson, T. (2017). Beyond Red Tape and Fools: Institutional Theory in Entrepreneurship Research, 1992–2014. *Entrepreneurship Theory and Practice*, 41, 505-531.

Tatli, A. & Özbilgin, M. (2012). An emic approach to intersectional study of diversity at work: A bourdieuan framing. *International Journal of Management Reviews*, 14, 180-200.

Thornton, P. H. & Ocasio, W. (1999). Institutional logics and the historical contingency of power in organizations: Executive succession in their higher education publishing industry, 1958-1990, *American Journal of Sociology*, 105, 801-843.

Thornton. P. H. & Ocasio, W. (2008). Institutional logics. IN: Greenwood, R., Oliver C., Suddaby, R. & Sahlin, K. (eds.) *The sage handbook of organizational institutionalism.* CA: Sage, 99-129.

Thornton. P. H., Ocasio, W. & Lounsbury, M. (2012). *The institutional logics perspective: A new approach to culture, structure, and process.* Oxford University Press on Demand.

Upton, S. & Warshaw, J. B. (2017). Evidence of hybrid institutional logics in the US public research university. *Journal of Higher Education Policy and Management*, 39(1), 89-103.

Wood, M. S. (2009). Does one size fit all? The multiple organizational forms leading to successful academic entrepreneurship. *Entrepreneurship Theory and Practice*, 33, 929-947.

Zellweger, T., Richards, M., Sieger, P., & Patel, P. C. (2016). How much am I expected to pay for my parents' firm? An institutional logics perspective on family discounts. *Entrepreneurship Theory and Practice*, *40*(5), 1041-1069.

Table 1. Profile of the participants

Overall Interview No	Position	School/Faculty	Gender	Nationality	Age
P1	Prof	Engineering	M	British	50+
P2	Prof	Engineering	M	British	25-39
P3	Post-doc	Engineering	M	Chinese	25-39
P4	Research Fellow	Engineering	M	Chinese	25-39
P5	Prof	Chemistry	M	British	50+
P6	Prof	Chemistry	M	British-Persian	40-49
P7	Research Fellow	Engineering	M	Spanish	25-39
P8	Research Fellow	Engineering	M	British	25-39
P9	Research Fellow	Engineering	M	British-Indian	40-49
P10	Prof	Mathematics	M	British-Chinese	50+
P11	Prof	Chemistry	F	American	50+
P12	Post-doc	Engineering	M	British	25-39
P13	Post-doc	Chemistry	M	German	25-39
P14	Prof	Medicine	F	British-Chinese	40-49
P15	Associate Prof	Mathematics	M	Vietnamese	25-39
P16	Prof	Chemistry	F	British-Scottish	50+
P17	Prof	Chemistry	M	British-French	50+
P18	Post-doc	Chemistry	F	British	40-49
P19	Prof	Chemistry	M	British	40-49
P20	Associate Prof	Medicine	F	British	50+
P21	Prof	Engineering	M	British	40-49
P22	Research Fellow	Physics	F	Czech	25-39
P23	Prof	Medicine	F	British-Romanian	40-49
P24	TTO		M	British	25-39
P25	Reader	Medicine	F	British	50+
P26	Associate Prof	Chemistry	M	British	50+
P27	Prof	Chemistry	M	British	50+
P28	TTO		F	Dutch	25-39
P29	Prof	Chemistry	F	British-Australian	40-49
P30	Prof	Chemistry	F	British	40-49
P31	Post-doc	Chemistry	F	British	25-39
P32	Post-doc	Chemistry	M	Thai	25-39
P33	Prof	Medicine	M	British	40-49
P34	Prof	Medicine	M	British	50+
P35	TTO		F	British	40-49
P36	Post-doc	Chemistry	M	British	25-39
P37	Prof	Medicine	F	British	50+
P38	Associate Prof	Medicine	F	British	25-39
P39	Post-doc	Medicine	F	Dutch	25-39
P40	Prof	Chemistry	F	British	50+
P41	Post-doc	Chemistry	F	Danish	25-39

P42	Post-doc	Chemistry	F	British	40-49
P43	Post-doc	Chemistry	F	British	25-39
P44	Post-doc	Chemistry	M	French	25-39
P45	Prof	Chemistry	F	British	40-49
P46	TTO		F	Indian	25-39
P47	TTO		M	British-Italian	25-39
P48	TTO		M	British	25-39
P49	Prof	Medicine	M	British	50+
P50	TTO		F	South African	40-49
P51	TTO		M	British	25-39
P52	Post-doc	Chemistry	F	Italian	25-39
P53	Post-doc	Chemistry	M	British	25-39
P54	Post-doc	Chemistry	F	British	50+
P55	Post-doc	Chemistry	M	British-American	25-39
P56	Post-doc	Chemistry	F	German	25-39
P57	TTO		F	Indian	25-39
P58	Associate Prof	Chemistry	F	Croatian	40-49
P59	PhD student	Bio/Medicine	F	British	25-39
P60	Post-doc	Bio/Medicine	F	German	25-39
P61	Research Fellow	Chemistry	F	British-Israeli	25-39
P62	Business Mentor	Bio/Medicine	F	British	50+
P63	PhD student	Bio/Medicine	F	Latvian	25-39
P64	Associate Prof	Medicine	F	British	25-39

Table 2. Academic entrepreneurship and logics

	Enabling Elements	Impeding Elements
Existing Logics		
Profession Logic	-Mentoring -Academic reputation and career development -Developing further professional capabilities	- Conflicting roles - Gap between academic and industrial partners
Science Logic	-Entrepreneurial nature of STEM departments	- Lack of application of sky blue science or unwillingness of the scientist - Bad reputation of commercialization
Market Logic	- Internal and External support	-Lack of knowledge and experience of the TTO staff -University policies on IP
New Logics		
Diversity Logic	-Inclusive work environment that appreciates the value of contributions from different groups of individuals	-Ineffectiveness of existing diversity schemes and compliance approach to diversity management
Impact Logic	-Contribution to society and economy	-Overemphasis and pressure on the academics through a structured approach to impact generation

Table 3. Key institutional logics shaping academic entrepreneurship with illustrated quotes

Profession Logic	Mentoring	**A1.** They are all serial entrepreneurs. So they are not academics, They have done it, they have done it well, but they have also failed, so they got experience of you know, what to do, what not to do, and where to seek investment. (P24, TTO Officer, Male, 25-39) **A2.** What mentoring gives you, is it gives you advice, the advice of how to actually do the thing that you want to do. It gives you the contact, because quite often the mentors have contacts that might be your customers, or they might give you law advice, or manufacturing. But it also gives you confidence. (P8, Research Fellow, Engineering, Male 25-39)
	Academic reputation and career development	**A3.** I took the Industry Fellowship for two years, it was definitely a contribution toward my career development. It was just before my promotion to full Professor, so understanding the needs of industry and research made an impact on my personal carer (P11, Prof, Chemistry, Female, 50+) **A4.** AE affects it [career development] positively. The idea affects it positively, because it is also scientifically a nice project because it will open up new science hopefully. And then when you build the first one of that kind, obviously you can be at forefront of that science. (P13, Post-Doc, Chemistry, Male, 25-39)
	Developing further professional capabilities	**A5.** The positive sides are the people and learning completely new things. I mean learning about scaling up and learning about chemical engineering, learning about business and about what the words mean and how you can do deals, all that sort of stuff. That is really fun! (P40, Prof, Chemistry, Female, 50+) **A6.** In order for that to happen, I think what you need is a mixture of people. You need the people who do the research and you need the people who help with the impact creation, working together on a day-to-day basis. (P2, Prof, Engineering, Male, 25-39) **A7.** Yes, for my personality and my own ambition, it is about inventing new things, making new things happen. It is about interacting with the people that you would never interact with. (P14, Prof, Medicine, Female, 40-49) **A8**. You have to be a certain kind of individual. You have to be able to interpret your subject, and be able to present it in an easy way. Where many of my colleagues who are genius' in their subject, but they do not even like presenting things to people in conferences. You have to be an – obviously an academic, but to be able to engage the public, and to be interesting and exciting, and instantly have an attraction to the people you are pitching to. (P1, Prof, Engineering, Male, 50+)
	Conflicting roles	**A9.** I mean it is competition between, you know, research, teaching, administration and entrepreneurship. And like anything else, you've got to compete with your time; prioritize your time, I think. (P5, Prof, Chemistry, Male, 50+) **A10.** Sometimes you have to do your other bits as well, you have to do your research, publish your papers. You have to you know, apply for grants, all these kinds of things. I have to keep my job. (P9, Research Fellow, Engineering, Male, 40-49)

	Gap between academic and industrial partners	**A11.** Also, there is a barrier in the being able to practice the expectations; you will pitch to maybe 100 groups, maybe five will be interested, maybe one will give the money. So you need to fail a lot of times, before you succeed. (P1, Prof, Engineering, Male, 50+) **A12.** There are a lot of academics still believe that they can do what they want, how they want, in things that they are interested in, and that's it. And you know, that will be very nice, but actually life is not that simple any more. If you want to do that, you have to join a research institute which is totally focused, no teaching, has something as its goal which you fit into. (P17, Prof, Chemistry, Male, 50+)
Science Logic	Entrepreneurial nature of STEM departments	**A13.** Particularly in the Engineering Departments, because they are often a little bit closer to industry, it is perhaps not seen as a bad thing that you are doing research and it translates into commercial products. (P21, Prof, Engineering, Male, 40-49) A14. I think it is really good of you can get people together; you each have slightly different areas of expertise, because it may lead to new insights. (P28, TTO Officer, Female, 25-39) **A15.** I am happy that I can participate on this project, because I really want to do something that has potential applications, which can be really used for in medicine, or something. (P22, Research Fellow, Physics, Female, 22-39)
	Lack of application on sky blue science and Unwillingness of the scientist	**A16.** Some academics do not want to do any applied research and are only motivated to do blue sky research and the fact that they want to understand how the system works. (P64, Ass. Prof, Medicine, Female, 40-49) **A17.** Some academics just have no interest at all, they just want to do research, and they do not want to be bothered. (P39, Post-doc, Mathematics, Female, 25-39)
	Bad reputation of commercialization	**A18.** I feel like academics has a bipolar attitude toward business. On the one hand, there is a perspective that is held by several academics that the commercialization of research and thinking about it when embarking on a research project is actually a dishonourable thing to do and you should not be doing that. It detracts from the purity of research. On the other hand, there is REF impact, you are constantly being assessed on your ability to engage with business and engage beyond the academic ecosystem, and there is a pressure on you to produce economic impacts. (P55, Post-doc, Chemistry, Male, 25-39)
Market logic	Internal and External support	**A19.** I was one of the founders of the Spin Out company from the University that was set up some years ago, which had investment and support from the University (and external investment). (P5, Prof, Chemistry, Male, 50+) **A20.** I think if you had an idea, the university would be very helpful in helping you fulfil that potential. So we have a Vice Dean for Enterprise. And we have a lot of opportunities to interact for example, industries. (P25, Reader, Medicine, Female, 50+) **A21.** If the idea is very good, then it could also be easier to convince yourself and others to put more resources into it, I think. But […] I mean if it is a nice scientifically brilliant idea, and there is no market for it, then the idea is rubbish, in that sense. So we fell that in this case, it's a good idea and it's a good market potentially for it. (P13, Post-Doc, Chemistry, Male, 25-39)

	Lack of knowledge and experience of the TTO staff	**A22.** We spent six months negotiating this deal, and then right at the point where they sent us the deal and we needed to make alterations and send back, that took nine months. Frequently when I've been trying to contact Legal Services, there's no response. (P6, Prof, Chemistry, Male, 40-49) **A23.** Available help [at the university] is very limited. It is not because lack of intention; I think it is the lack of skills and key facilities and capacity. (P14, Prof, Medicine, Female, 40-49) **A24.** I had a bad experience with the university. I had some discussions with people that I just felt like, they were waste of time, and they did not understand the software and how to advise. A lot of people that work in the TTOs in my experience, work in TTOs because they are not actually very good in business. If they were good in business, they probably work in a business. That is my impression with the TTOs. (P55, Post-doc, Chemistry, Male, 25-39)
	University policies on IP	**A25.** I do not think they [academics] trust the University and I think it's a part of an 'It is my baby and I should own it all and the university wants to take it from me'. (P50, TTO Officer, Female, 40-49)
Diversity logic	Inclusive work environment that appreciates the value of contributions from different groups of individuals	**B1**. Ensuring that you have a diversity is not just nice to have, it actually produces better results. The very best teams that I have run have had a mix of male and female. So actually making sure you have both women and men is you get demonstrably better outputs; you get demonstrably better product; you get demonstrably better fit to what people might want in the marketplace. (P21, Prof, Engineering, Male, 40-49) **B2.** I think people are just treated equally, regardless of their background. I think the University has good policies and I do not think there is discrimination. (P20, Prof, Medicine, Female, 50+) **B3.** We specifically target groups across the University that we can see are unrepresented faculties or disciplines. But at the end of the day, we want to see the diversity in the room. (P24, TTO, Male, 25-39)
	Ineffectiveness of existing diversity schemes and compliance approach to diversity management	**B4.** We cannot force change, if we force change it will go the other way. What we have to do is set an environment, in my opinion, where everybody has an equal opportunity. We encourage people in an equal way, and that gives hand in hand with incentives like shared parental and flexible working. (P38, Prof, Medicine, Female, 25-39) **B5.** The fact that I am Italian, it was seen where there was some prejudice. And I feel like it was stronger there in the UK. I always felt like I had to prove something, because there was some prejudice against how the Italian system works. (P52, Post-doc, Chemistry, Female, 25-39.) **B6.** There are mundane things like appointment panels. There has to be a gender balance on every appointment panel. If you have 10 women in the department, however many appointment panels in a year, they are disproportionately you are going to have to serve on them rather than the men. [In the department] there are not enough women; it means the women have to attain that balance that have to do more than men do. (P29, Prof, Chemistry, Female, 40-49)

		B7. Somebody who is just developing their academic career at 30, it's a brave person who says, "I am going to stop this, and I am going to try a Spin Out". Because that means stopping what they are doing, working for nothing for a year; you have got a family, your husband or your wife will say "Where is the money?" you know, and you will say "Oh it will come in a year's time". You have two kids and it is really hard, so you need a job. (P1, Prof, Engineering, Male, 50+)
Impact logic	Contribution to society and economy	**B8.** To bring the technology to the market and to make something useful, we're trying to move in that direction. And will have like a very strong impact, and could be used widely. (P44, Post-doc, Chemistry, Male, 25-39) **B9.** As I have gone further through, I have become more and more involved in more applied research. I think, actually coming up with something and then seeing it out there as a product that is actually being useful to people, I think is the main driver really. (P29, Prof, Chemistry, Female, 40-49) **B10.** It matters because you always want to feel that whatever you are doing has some sort of impact. The opportunity to spin out a company and take an idea forward and then realise the potential. Once that become a possibility, that motivation of doing that was intense. There is a lot of satisfaction if you are adding value to a sector, then that is impact. (P53,Post-doc, Chemistry, Male, 25-39)
	Overemphasis and pressure on the academics through a structured approach to impact generation	**B11.** Impact is important for promotion, it is important for REF. (P58, Lecturer, Chemistry, Female 40-49) **B12.** University with all the impact and the REF, they're starting to realise that they do want companies and start up and commercialisation. So I think this is why an academic, you must have a spin out company! Sometimes it feels like they encourage by saying that we have all those, ITeams and Projects when you get you know [learn about] commercialisation. But the policies and the bureaucracy is just trying to do the opposite; that's how it feels. (P61, Research Fellow, Chemistry, Female, 25-39) **B13.** Obviously, the university care about impact, and impact is extremely important for University finance. (P49, Prof, Medicine, Male, 50+)

Figure 1. Data structure

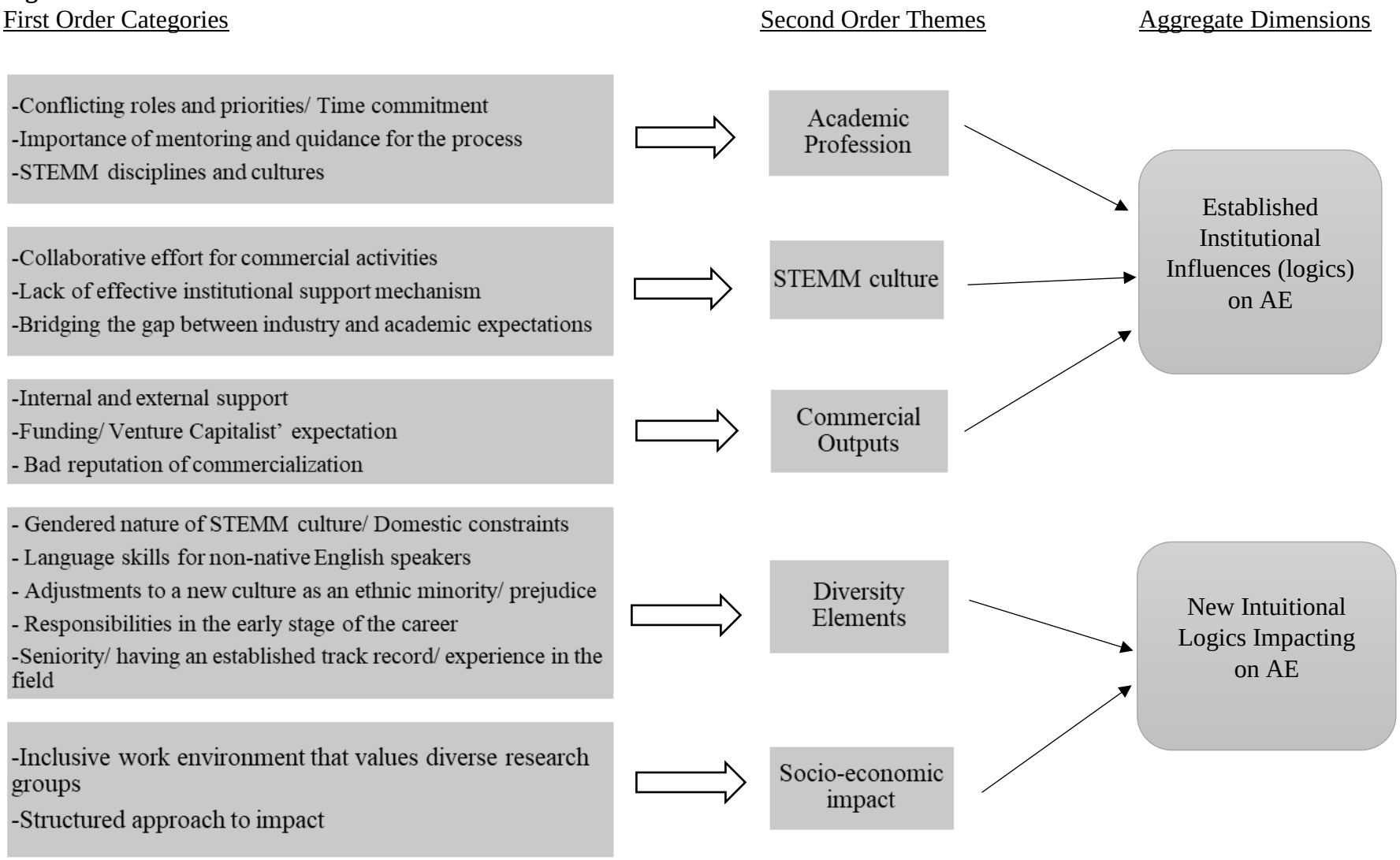

Figure 2. Academic Entrepreneurship and institutional logics