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INSTITUTIONAL COMPLEXITY AND TECHNOLOGY TRANSFER: A THEORETICAL AND EMPIRICAL ANALYSIS

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INSTITUTIONAL COMPLEXITY AND TECHNOLOGY TRANSFER: A THEORETICAL AND EMPIRICAL ANALYSIS

INSTITUTIONAL COMPLEXITY AND TECHNOLOGY TRANSFER:

A THEORETICAL AND EMPIRICAL APPROACH

Abstract

This Doctoral Thesis unfolds into a collection of three distinct papers that share an interest in institutional theory and technology transfer. Taking into account that organizations are increasingly exposed to a multiplicity of demands and pressures, we aim to analyze what renders this situation of institutional complexity more or less difficult to manage for organizations, and what makes organizations more or less successful in responding to it. The three studies offer a novel contribution both theoretically and empirically. In particular, the first paper "The dimensions of organizational fields for understanding institutional complexity: A theoretical framework" is a theoretical contribution that tries to better understand the relationship between institutional complexity and fields by providing a framework. The second article "Beyond institutional complexity: The case of different organizational successes in confronting multiple institutional logics" is an empirical study which aims to explore the strategies that allow organizations facing multiple logics to respond more successfully to them. The third work " How external support may mitigate the barriers to university-industry collaboration" is oriented towards practitioners and presents a case study about technology transfer in Italy.

INTRODUCTION

OVERVIEW OF THE RESEARCH PROJECT

The main objective of this Doctoral Dissertation is to contribute to neo-institutional literature by analyzing the "hot topic" of institutional complexity and how organizations manage it.

Although, neo-institutional theorists have begun to recognize that many organizations are fragmented or conflicted, containing competing requirements and prescriptions (Scott, 2008), scholars in the field tend to agree that many aspects of multiple institutional pressures are generally overlooked and under-explored (Thornton & Ocasio, 2008; Reay & Hinings, 2009; Pache & Santos, 2010; Greenwood, Raynard, Kodeih, Micelotta & Lounsbury, 2011). In particular, our knowledge about the relationship between institutional field and complexity is still insufficient and extant literature is silent about the strategies that allow organizations to deal more or less successfully with situations of institutional complexity.

The aim of this Doctoral Thesis is to simultaneously provide a framework for developing theory and empirically analyze the effect that organizational dynamics have on institutional complexity. Indeed, we want to provide an answer to the following research questions:

1) *what are the field-level dimensions that contribute to simplify or exacerbate the degree of institutional complexity experienced by organizations within fields?*
2) w*hat strategies do organizations adopt to deal with institutional complexity and what determine how successful these strategies are in responding to institutional complexity?*

By answering these questions, we explore various aspects already present in previous literature and extend current insights, providing a more holistic picture of what leads institutional complexity to be more or less deep-rooted in a context, and how the management

of it can vary among different organizations.

Regarding the empirical analysis, we rely on a sample of 9 organizations dealing with technology transfer activities between academia and industry in Italy. We believe this research setting being appropriate for alleviating the theoretical gap, because it really represents a field characterized by the presence of different stakeholders with diverse interests and objectives. Moreover, the structural changes that have occurred in Italy to the academic world in the last decade, both from a cultural and normative point of view, have deeply affected the establishment of these kind of organizations and resulted in their exponential increase. Today, we see a variation in the way university and industry interact and we also observe a variation in the degree of success that those organizations score in managing the different objectives and interests of the two worlds.

Even though university and business have been historically considered as belonging to different institutionalized spheres, both culturally and physically, holding separate streams of knowledge, in recent years something is changing and the awareness of their interdependence is growing, both within academia and industrial world. The importance of improving knowledge transfer between public research institutions and third parties has been recognized as a fundamental area for action. Therefore, the theme of public-private relationships has merited considerable recent attention from scholars, and, within this broad issue, the ones between university and industry have caught management researchers' interest.

The nine organizations we sampled represent three different types of organizations involved in technology transfer activities between university and industry: three Technology Transfer Offices (hereinafter TTOs), three University Incubators (hereinafter UIs), and three University-Business Consortia (hereinafter UBC). With regard to the sample and informant selection we will explain in detail the process we followed in the following section "Research design" and in the third chapter (see the "Methods" section). All these organizations achieve

their goals by getting in contact university and industry, in order to transfer and exploit academic results for commercial needs. In this sense, as mediating organizations, they represent a context where at least two different institutional logics are in the running, the one dominating academic environment and the other industrial word. In this sense they experience institutional complexity.

As concerns data collection, we gathered data with one-to-one interviews and archival materials. Finally, we got 53 one-to-one interviews and hundred pages of archival materials. With the exception of two skype interviews, interviews took place in informants' offices and lasted between 30 and 65 minutes. As regards the empirical analysis, we rested upon a comparative case study (Eisenhardt, 1989), using a system of replication logic, in which each case is treated as an independent experiment (Yin, 2003), that corroborates emerging theoretical insights.

The present research project is relevant both theoretically and practically. From a theoretical point of view, in the second chapter we provide a framework to guide future research on better understanding the relationship between fields and multiple logics. We argue that organizational experience of institutional complexity is fundamentally shaped by specific field dimensions, that attains to its structure and its functioning. In the third chapter, our results suggest that organizational strategies have a powerful effect on how organizations respond to the different interests and objectives coming from diverse stakeholders. This is a noteworthy point, if we consider that existing literature has often focused on the environmental, rather than internal, determinants of how organizations respond to institutional mandates. Moreover, we help to bring some insights about the micro-level dynamics of institutional theory. In fact, our study shows that the way organizational actors experience different institutional logics is not a direct reflection of how an institution appears at the macro level.

From a managerial point of view, this research, focusing on technology transfer organizations and processes, should be of interest both to academics and industrial CEOs, which want to undertake a collaborative relation with the other party, but also to mediating organizations, that should interact with parties having different mindset and objectives. It provides insights on which strategies might be undertaken by organizations in order to increase the likelihood to obtain a greater success and effectiveness in letting academics and industrial parties collaborate. Moreover, findings could be useful to organizations' managers for better understanding barriers and opportunities in technology transfer relationships where multiple interests are present.

The remainder of this Chapter is organized as follows: in the following we define the theoretical framework, then we provide a detailed characterization of the research design and data collection. Finally we describe the three essays composing the Doctoral Dissertation and we present our future objectives.

THEORETICAL FRAMEWORK

As previously mentioned, this Doctoral Thesis is focused on the study of institutional complexity and the relationship it has with organizational field and organizations.

The complexity of institutional processes and their influence on organizational behavior has been implicit within the institutional approach since the seminal paper by Meyer and Rowan (1977), where the authors underlined the idea that organizations confront different typologies of expectations, and that these may be incompatible (Greenwood et al., 2011; Pache et al., 2010). After them, neo-institutional perspective has become a dominant lens within organization theory and scholars pointed out the difficulty that organizations often face in coordinating multiple and independent institutional demands from different institutional settings (D'Aunno, Sutton & Price, 1991; Elsbach et al., 1992).

However, in the immediate decades following Meyer and Rowan (1977), research was primarily directed to other lines of inquiry respect to the one dealing with the problem of multiple and often incompatible institutional pressures upon organizations (Greenwood et al., 2011).

The most important turning-point towards this direction was provided by Jackall (1988) and Friedland and Alford (1991), who coined the idea of "institutional logics", as the experientially constructed, and thereby contingent set of rules, norms, premiums and sanctions that actors in particular contexts create and recreate in such a way that behavior and perspective are to some extent regularized and predictable. Starting from this important conceptualization, during the past two decades escalating interest in institutional logics has been registered and it still remains one of the fastest-growing stream of research in organizational theory (Greenwood et al., 2011; Thornton & Ocasio, 2008). A growing number of studies has focused the attention on the role of institutional logics, however adopting different levels of analysis and following diverse approaches. The focus has primarily been on the role that dominant logics play in facilitating conformity and legitimacy within fields, and, even where the clash of different logics has been recognized, for the most part the assumption has been that any contradiction between them is transitional and intended to come to an end (Greenwood et al., 2011). Only recently, some researchers have begun to acknowledge that some fields and organizations cope with the coexistence of multiple logics over extended periods of time (Battilana & Dorado, 2010; Reay & Hinings, 2009; Lounsbury, 2007; Kraatz & Block, 2008), but we still lack an important understanding of some dynamics, especially for what is related to our research questions.

RESEARCH DESIGN

Empirical analysis in based on an inductive, multiple case study of organizations dealing with technology transfer between university and industry, in Italy. We rest upon a

comparative case study (Eisenhardt, 1989), using a system of replication logic, in which each case is treated as an independent experiment (Yin, 2003), that corroborates emerging theoretical insights. In order to reduce potential biases associated with single case, our study focused also on variation within cases, taking into account different organizations of the same typology. This allows for a more rigorous analysis, not only in terms of reliability and richness, but also in terms of theory generalizability (Eisenhardt, 1989).

Sampling

As regards the sampling of organizations, we rested on a design at two stages. While, the first step concerned the choice of the organizations typologies, the second was about the selection of the organizations belonging to the same typology (see the "Sampling of organizations" section in Chapter 3). At the end we selected 9 organizations, subdivided in three different typologies (i.e., TTOs, UIs, and UBC).

As about informants choice, we followed the guidelines given by Lincoln and Guba's (1985) about "purposeful sampling". We firstly selected informants that would be most able to inform us on our theoretical interest (Corley and Gioia, 2004), since directly involved in decision-making processes and strategies deployment. Then we asked each informants to suggest other people who would have been useful in giving us information about the issue of interest. As regards the sampling of academic researchers and industrial CEOs, we asked for their names to the informants sampled within the organizations. In particular, we mainly followed two main criteria and we asked for 1) academics/CEOs who have been really involved in technology transfer projects, independently of the final result; 2) for academics/CEOs who have been involved in these kind of activities no more than six months ago. In total we selected 48 persons, including organizations' employees, academics and industrial CEOs.

Data collection

Data collection proceeded in three different phases. The first consisted of an exploratory stage (end of 2011), where we conducted 5 interviews (each of them lasting on average 45 minutes) with some key informants of our organizations. The second phase (from January to February, 2012) was spent in collecting archival materials. During the third step (from January to August, 2012) we proceeded with the submission of the semi-structured interview protocol to our informants. Interviews were organized around some main areas. As concerns the protocol for the organizations, we got the following sections: organizational history, organizational structure, organizational strategy, performance, stakeholders and perception of logics. Instead, the protocol submitted to academics and CEOs, was organized around the following domains: job characteristics, previous collaboration, experiences with the sampled organizations, and incentives. The two protocols can be found in Appendix A and B.

RESEARCH OUTPUTS

The whole project includes three different studies that are intended to answer the research questions set above. Whereas the first two studies (Chapter 2 and Chapter 3) are rooted in a neo-institutional approach, the last piece of work has a different nature and standard. Being it much more applied and oriented towards practitioners, it focuses just on two organizations of our sample and develops some insights on the expertise and characteristics that TTOs' employees should have to mitigate the barriers to university-industry collaboration. Moreover, it is based on the literature on relationship between academia and industrial world.

Paper I: The Dimensions of Organizational Fields for Understanding Institutional Complexity: A Theoretical Framework

The idea of this work is to integrate the stream of research on institutional logics and complexity (e.g., Pache & Santos, 2012; Dunn & Jones, 2010) with the literature on institutional fields (e.g., Wooten & Hoffman, 2008; Scott, 1995) in order to develop a theoretical framework for better understanding which field-level characteristics affect the degree of institutional complexity experienced by organizations within field. Although neo-institutional literature has recently recognized that organizational fields are often characterized by "multiple and often uncoordinated sources of legitimacy" (D'Aunno et al., 1991), so far the focus has mainly been, at the organizational level, on two facets of institutional complexity: the number of logics and the degree of incompatibility between them (Greenwood et al., 2011). We know very little about what affect the degree of complexity at the field level.

We argue that the pattern of institutional complexity experienced by organizations is never completely fixed and that the nature of that complexity is fundamentally shaped by aspects and processes within fields (Greenwood et al., 2011). To build the theoretical framework presented in Chapter, we draw on a variety of cognate literature to identify some field-level dimensions and discusses how these dimensions shape the degree of institutional complexity confronting organizations (Pache & Santos, 2010). We propose seven propositions in our model.

Overall, we contribute to the ongoing discussion on institutional complexity and fields, and we suggest a framework that may guide future scholars in comparing fields empirically.

Paper II: Beyond Institutional Complexity: The Case of Different Organizational Successes in Confronting Multiple Institutional Logics

This is an empirically work that enhance our knowledge about organizational response to institutional complexity.

Organizations experience institutional complexity every time they have to handle the divergent interests, goals and practices coming from multiple institutional logics (Greenwood et al., 2011). However, not all organizations experience institutional complexity to the same degree or are as successful in managing it.

We conducted a comparative case study of three different types of organizations carrying out technology transfer activities in Italy. As organizations that combine two previously separate institutional logics – an "academic" logic, that is mainly focused on basic research, and a "market" logic, focused on financial returns – they all have to handle prescriptions and pressures caused by different norms and rules and, therefore, to face the same problem of institutional complexity. But, they respond differently to this situation, achieving a different degree of success in confronting it. It was just observing this variation that we ranked our six organizations in "more" and "less" successful in confronting institutional complexity, obtaining three matched pairs, each composed by one "more" and one "less" successful organization in confronting multiple logics. Finally, we uncover three main strategies – having boundary spanners, mirroring institutional demands and buffering institutional logics – that explain the different success achieved by our organizations in dealing with institutional complexity. We propose four propositions.

While prior studies have emphasized more episodic "responses" to institutional complexity (Greenwood et al., 2011; Pache & Santos, 2010), we moved beyond and found that the degree of success achieved by the organization in confronting institutional complexity is dependent on the strategies that the organization uses in coping with multiple logics. Moreover, we give further insight into micro-level action (Hirsch & Lounsbury, 1997) by better understanding how actors' decisions and actions affect the management of competing institutional expectations.

This paper has been submitted to the 20013 DRUID Conference, Barcelona, June 17-19, 2013.

Paper III: How External Support May Mitigate The Barriers To University-Industry Collaboration

This is an empirical work mostly oriented to practitioners in the field of technology transfer between academia and industry. Taking into account that it was not included in the original plans of our Doctoral Dissertation, it represents a kind of byproduct that is justified by two main reasons. First, it constitutes an important issue in the existing literature on innovation and technology transfer and, second, the gathered data lend themselves very well to analyze this theme. In particular, the objective has been to write a paper that was of interest to practitioners rather than to the scientific community of reference. This is why greater importance has been given to the case-study section and the theoretical part has been left much less developed. However, the specific aim is to empirically analyze how university-industry collaboration may be affected by the support of external organizations and what characteristics, both of parties and intermediary units, might facilitate the success of these relationships. We conducted a case study of two of the most active Technology Transfer Offices in Italy, which represent a sub-set of the whole sample of our research. First of all we identify the main barriers to collaboration highlighted by respondents. We hold to the three categories of barriers identified by Van Dierdonck and Debackere (1988) and we divide our results according to this criterion. Then, we move beyond in analyzing the characteristics that might facilitate the relationships between different parties. Three major themes emerged in our analysis: the importance of specific TTOs characteristics, the previous experiences of parties and the industrial part's dimension and strategies.

Although we contribute to the discussion on technology transfer and innovation (Bruneel, D'Este & Salter, 2010; Abramo, D'Angelo, Di Costa & Solazzi, 2009; Perkmann &

Walsh, 2007; Agrawal, 2001), we think that the most important implications are the policy implications. In particular, findings could be useful to TTOs' managers for better understanding barriers and opportunities in university-industry collaboration where multiple interests are present.

This paper has been accepted for a possible inclusion in the "Osservatorio" of Journal of Industrial and Business Economics, but the Editorial Board of the Journal has suggested to submit it to the Journal itself.

FUTURE OBJECTIVES

We are completely aware that this Doctoral Dissertation represents a starting point for future developments and elaboration. In particular we report in this section our future objectives for each paper.

1. Regarding the first paper, we would like to refine the proposed theoretical model by refining the identified propositions and trying to link them reciprocally. In our opinion, this would allow to strengthen the overall model and figure out new insight for contributing to institutional literature. It would be also interesting to apply the model to the technology transfer field we have analyzed. However, throughout this process, we would like to present the paper to the most important conferences all over the world in order to have comments and opinions to improve it and render it highly publishable.
2. As concerns the second work, we are working on it to refine some details. However, we are going to submit it shortly to a Top Journal.
3. Regarding the third paper, our objective is to work more on it in order to submit it to an international Journal. We would like to deepen and develop the theoretical part, refine data and improve the conclusions section. We would try to find a journal

specifically interested in technology transfer, as it is a work that mainly gives an empirical contribution.

REMINDER

The organization of this Doctoral Dissertation is characterized as follows: Chapter 2 includes Paper I titled "The Dimensions of Organizational Fields for Understanding Institutional Complexity: A Theoretical Framework", in which we provide a theoretical framework for better understanding and exploring the relationship between organizational fields and institutional complexity.

Chapter 3 includes the Paper II titled "Beyond Institutional Complexity: The Case of Different Organizational Successes in Confronting Multiple Institutional Logics", where an empirical analysis on which strategies are more likely to lead an organization to respond successfully to a situation of institutional complexity is developed.

Chapter 4 includes Paper III titled "How External Support May Mitigate The Barriers To University-Industry Collaboration", which provides an empirical investigation about the role that external support may have for university-industry collaboration and what characteristics, both of parties and intermediary unit, might facilitate the success of those relationship.

The dissertation is completed by the following Appendices: Appendix A reports the questionnaire administered to the organizations (in Italian); Appendix B the one administered to academic researchers, executives and industrial managers (in Italian).

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PAPER I:

THE DIMENSIONS OF ORGANIZATIONAL FIELDS FOR UNDERSTANDING INSTITUTIONAL COMPLEXITY: A THEORETICAL FRAMEWORK

Elisa VILLANI[1]

ABSTRACT

Organizations confront institutional complexity whenever they face different and incompatible prescriptions from multiple institutional logics. While many aspects of institutional complexity have been discussed in extant literature and the relationship between complexity and field has been widely recognized by previous scholars, we still lack a deeper understanding of the impact that the latter has on the former. In this paper, we argue that institutional field and complexity are interdependent. We draw on a variety of institutional literature to discuss and develop the field-level dimensions that might shape the experience of complexity within the field by the side of organizations. The theoretical framework herein is presented to stimulate and guide future research in the analysis of institutional complexity.

Keywords: Institutional field; Institutional pluralism; Institutional logics; Theoretical framework.

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1. INTRODUCTION

In this paper, we integrate ideas from the literature on institutional complexity and logics (e.g., Pache & Santos, 2012; Greenwood, Raynard, Kodeih, Micelotta & Lounsbury, 2011; Dunn & Jones, 2010; Thornton & Ocasio, 2008) with the literature on institutional fields (e.g., Greenwood et al., 2011; Reay & Hinings, 2009) in order to develop a theoretical framework for better understanding which characteristics affect the degree of institutional complexity experienced by organizations within fields. In particular, we focus on fields' dimensions, taking into account not only the formal structure, but also the internal functioning.

Neo-institutional literature has recently recognized that organizational fields are often characterized by "multiple and often uncoordinated sources of legitimacy" (D'Aunno, Sutton & Price, 1991). Therefore, conforming to strong beliefs and rules is difficult for many organizations, however, because they face fragmented environments in which multiple independent groups and organizations make demands that are, at best, uncoordinated (Goodrick & Reay, 2011; Dunn & Jones, 2010; Meyer, Scott, & Strang, 1987). But to date the focus has mainly been, at the organizational level, on two facets of institutional complexity: the number of logics and the degree of incompatibility between them (Greenwood et al., 2011). While a lot of works have highlighted the presence of multiple institutional logics and fragmented environments, we know very little about what really affects the degree of complexity at the field level and it would be simplistic to take into account only the number of the different demands present in the field. Indeed, the nature and extent of institutional complexity facing organizations is fundamentally shaped by the structure of the organizational fields within which they are located. It is at this level that overarching sets of meaning and normative criteria become encoded in "local" logics that are manifested in rituals, practices and day-to-day behavior (Greenwood et al., 2011; Pache &

Santos, 2010).

For this reasons, more conceptual and empirical work is needed to map the variety and richness of institutional environments (D'Aunno et al., 1991; Scott & Meyer, 1983). Within some organizational fields, there may be clearly defined hierarchies of institutional pressures based on the salience of particular norms and beliefs. In such environments, the experience of complexity, by the side of organizations, may be relatively uniform and easily understood. Other fields, however, may be best characterized as free markets for beliefs, with several institutional logics competing for attention and acceptance. Further, there may be no central authority or powerful group limiting competition among various interests and the enforcement of rules may be less strong (Wooten & Hoffman, 2008; Goodrick & Salancik, 1996; D'Aunno et al., 1991). Overall, fields are not the same. Their dimensions may vary a lot in terms of strength and importance, conditioning the balance between diverse belief systems and rules. In this sense, institutional fields are little understood.

What are, we ask, *the field-level dimensions that contribute to simplify or exacerbate the degree of institutional complexity experienced by organizations within fields?*

Importantly, we argue that the pattern of institutional complexity experienced by organizations is never completely fixed and that the nature of that complexity is fundamentally shaped by aspects and processes within fields (Greenwood et al., 2011).

In developing this theoretical framework, we contribute to the ongoing discussion of institutional complexity and fields. Specifically, we draw on a variety of cognate literature to identify and discuss how field-level dimensions shape the degree of institutional complexity confronting organizations (Greenwood et al., 2011; Pache & Santos, 2010). We explore various aspects already present in previous literature and extend current insights, providing a more holistic picture, in terms of analytical framework, of what leads institutional complexity to be more or less deep-rooted. We offer this model as a suggested guide by which future

scholars might compare fields, empirically analyzing the relationship between them and multiple institutional pressures. Finally, we discuss the implications of this framework.

2. THEORETICAL BACKGROUND

The study of institutions has a long history in organizational analysis, beginning in the mid of the last century with Selznick and Parson, who highlighted the relationship between institutions and organizations, focusing, specifically, on the role that universalistic rules, contracts, and authority had in the integration of organizations within society (Thornton & Ocasio, 2008). This early version of institutional theory basically saw organizations as institutions infused with meaning, value and legitimacy by their members and leaders (Selznick, 1957). Even the emergence of a new approach to institutional analysis in 1970s did not change a lot this initial perspective. Indeed, in the immediate decades following Meyer and Rowan (1977), the focus has been mainly directed in understanding the way in which organizations try to secure legitimacy and support in complying with the institutional pressures emanating from the field (Powell & DiMaggio, 1983).

Although the complexity of institutional processes and the influence they have on organizations has been implicit within institutional approach since Meyer and Rowan's (1977) work, who stated that "institutional environments are often pluralistic and societies promulgate sharply inconsistent myths", also this new phase of institutional theory put its emphasis, at least at the beginning, on the taken-for-granted character of institutional rules, myths, and beliefs and on the processes by which organizations tend to be homogenous for gaining legitimacy from the external context. In this sense, this theory has generated valuable insights into the processes that define and explain institutionalization in organizational contexts and the influence they have on organizational conformity to the environment itself (Oliver, 1991). Specifically, it can be said that the processes and effects of institutionalization

occurs at two different levels (Phillips, Lawrence & Hardy, 2000). At the organizational level we observe that certain ways of acting and organizing become the recognized way of interpreting and patterning interaction under particular circumstances (Phillips et al., 2000; Meyer & Rowan, 1977). Some examples are the corporation form (Zucker, 1983) or the civil services procedures adopted by municipal governments after the reform (Tolbert & Zucker, 1983), which have become the taken-for-granted way of organizing some kind of activities. But, also at the field level we see that intra-organizational activities are affected by specific modes of behaving and organizing that become widely accepted and understood. So, institutionalized rules and norms become shared by groups of organizations that partake in related activities.

Although the relation between fields, organizations and institutions has been widely recognized for long time, only recently a renewed interest has called attention to the need to better understand the dynamics that affect this interrelationship. In particular, the recent focus on contexts highly fragmented has made this issue even more "problematic" and interesting.

ORGANIZATIONAL FIELDS

Although the notion of field has been central to institutional theory from the very beginning, it has not received very high emphasis from institutional literature. However, since the unit of analysis of most of the institutional works has been referred to social processes and forces that lie beyond the organizational boundary (DiMaggio & Powell, 1991; Scott, 2008; Hoffman, 1999), the term *organizational field* has become the one accepted for identifying the "constellation of actors that comprise this central organizing unit" (Wooten & Hoffman, 2008). We stay with the concept provided by Lawrence and Phillips (2004), who said that the field is "a set of organizations that constitute a recognized area of life, are characterized by structured network relations, and share a set of institutions".

DiMaggio and Powell (1983), in defining the field as a "set of organizations that, in

the aggregate, constitute an area of institutional life; key suppliers, resource and product consumers, regulatory agencies, and other organizations that produce similar services or products", focused the attention on the idea of "*set*", which refers to a community of organizations that directly interact with one another and are affected by their reciprocal actions and behaviors (Greenwood, Suddaby & Hinings 2002). But, more than a set of organizations, a field is the "*place*" where relations are undertaken and a common system of meaning is shared. Scott (1994), in strengthening the idea of aggregation by indicating field as "a community of organizations (…) whose participants interact more frequently and fatefully with one another than with actors outside the field", added the fundamental insight that organizations "participate in the same meaning systems, are defined by similar symbolic processes, and are subject to common regulatory rules". Therefore, organizations in the same field share common, uniform rules and resources. Also Bourdieu and Wacquant (1992) indicated a field as "a *network*, or a configuration of, objective relations between positions". Again, Greenwood and Suddaby (2006) referred to institutional fields as "clusters of organizations and occupations whose boundaries, identities, and interactions are defined and stabilized by shared institutional logics". And Mazza and Pedersen (2004) said that the field "simply defines a social space and identifies a number of nodes, points of observations or positions and their mutual relations". Therefore, building on DiMaggio and Powell's (1991) assumption that field are socially constructed, the most important aspects of field are exactly its relational and cultural elements (Scott, 1994). Indeed, each field is mainly defined by a meaning system which establishes the rules of actions, the appropriate way of behaving and the right practices that are in common among the organizational community of reference (Greenwood et al., 2002; Phillips et al., 2000).

So, firm's actions and decisions are not seen as a completely free choice among an unlimited range of possibilities, but rather a quite predetermined choice among a narrowly

defined set of options, legitimated by the repeated interactions among the group of actors constituting the whole organizational field (Hoffman, 1999; Wooten & Hoffman, 2008). Such evolving ideas focused on the fact that organizational field may be understood as a mean to better know the impact that rationalization and legitimacy have on organizations (Wooten & Hoffman, 2008). Its intermediary position between the organizational and societal level enables it to disseminate and reproduce the socially constructed expectations and practices developed by organizational actors (Greenwood et al., 2002).

In this sense, institutional literature agree upon the fact that organizations within fields are guided by institutions. Although the term institution has been used in very different ways with respect to social phenomena (Jepperson, 1991; Phillips et al., 2000), here we use it to refer to institutional logics (Friedland & Alford, 1991). So, institutional logics, as the "taken-for-granted patterns of organizing that shape and constrain the behavior of societal members", (Phillips et al., 2000; see also Berger and Luckmann, 1966; Zucker, 1983) provide the organizing principles for a field. Organizations use these sets of cultural rules and norms to structure their actions and interpret social activity, so providing stability and collective meaning to social behavior (Wooten & Hoffman, 2008; Phillips et al., 2000; Scott, 1994). In particular, these institutionalized patterns act both as a resource for solving problems and, simultaneously, as a constraining factor of social actors' decisions, providing legitimated ways of proceeding in social interaction. In fact, previous literature stressed the fact that joint values and beliefs hold together the community of actors belonging to a particular field (Scott, 2008; Reay & Hinings, 2009). Hereinafter, we refer to *community* as that entity embodying specific understanding, norms, and rules that serve as touchstones for legitimating mental models upon which individuals and organizations draw to create common definitions of a situation (Marquis, Glynn & Davis, 2007).

According to Giddens (1984), institutional fields develop through a process of

structuration, where rules and resources constituting the field are produced and reproduced by social actions (Phillips et al., 2000). Di Maggio and Powell (1983) said that this process consists of four parts: “an increase in the extent of interaction among organizations in the field; the emergence of sharply defined inter-organizational structures of domination and patterns of coalition; an increase in the information load with which organizations in a field must contend; and the development of a mutual awareness among participants in a set of organizations that they are involved in a common enterprise”.

Whereas, some conceptions of the field emphasize the extent to which field participants hold similar beliefs regarding goals, norms, and social logics, it is also true that, relatively early, analysts recognized that fields are often the site of conflict among contending factions (DiMaggio, 1991; see also Scott, 2008). In this sense, Hoffman (1999) stated that a “field is not formed around common technologies or common industries, but around issues that bring together various field constituents with disparate purposes”. The relational process within fields may more resemble to “institutional war” (White, 1992) than isomorphic dialogue.

Recently, a body of institutional research has tended to highlight the conflictive nature of field relationship, where the interplay between actors and power relations highly count. For example, Brint and Karabel (1991) defined organizational fields as “arenas of power relations” and Hoffman (1999) in terms of “centers of debates in which competing interests negotiate over issue interpretation”. Also Reay and Hinings (2005) pointed out that fields are as a ‘battlefield’ (Bourdieu, 1975; DiMaggio, 1983), where actors interact with each other continuously, sometimes in antagonistic ways.

INSTITUTIONAL LOGICS

Whereas institutional pressures have been conceived in terms of normative prescriptions, rules and social expectations (Scott, 2001), Friedland and Alford’s (1991)

seminal essay, creating a new approach to institutional analysis, posited institutional logics as defining the content and meaning of institutions. The concept of *institutional logics* was, therefore, introduced to describe the sets of "material practices and symbolic constructions" (Friedland & Alford, 1991) that establish the organizing principles of society. In this sense, logics give content and meaning to institutions, serving as a link between institutions and organizational actions (Reay & Hinings, 2009), and providing "rules of actions that help actors to cope with ambiguity and cognitive limitations" (Thornton, 2002, 2004; Tracey, Phillips & Jarvis, 2010). More in detail, institutional logics connect internal cognitive sphere with external rituals and practices, that is meaning with actions (Thornton, 2004; Tracey et al., 2010). In this work, we use the term *institutional logic* to refer to the "broader cultural beliefs and rules that structure cognition and guide decision making" (Lounsbury, 2007; see also Friedland & Alford, 1991)

The description of institutional logics that guide actors' behavior helps to define the organizational field within which they interact. The logic embedded in a specific field makes clear to its participants the rules of the game, that is the regulatory regimes and the normative orders to which organizations are subject. In this sense, institutional logics delineate the boundaries of fields, promote conformity within fields (Phillips et al., 2000), and create the identities of field members.

Friedland and Alford (1991), considering the core institutions of society, the capitalistic market, the bureaucratic state, nuclear family, democracy, and Christian religion, pointed out that each is associated with a distinctive logic, that shapes and constrains individuals' behaviors and goals. Therefore, even the concept of institutional logic, following this initial stream of research that has for a long time asserted that organizational behaviors are always reproduced in the same way because of legitimated and taken-for-granted social norms (Greenwood and Suddaby, 2006), has been, for the most part, connected to the

concepts of stability and conformity. For this reason, institutional theorists have been more involved in giving insights about the process of institutional steadiness, instead of change (Clemens & Cook, 1999). This has meant that great emphasis has been placed on how the adoption of similar practices and structures by the side of organizations works and on the role that dominant logics play in facilitating uniformity within fields. In this early view organizations and their interests were underemphasized, and in some case discounted, as relevant to understanding institutionalized practices (Goodrick and Salancik, 1996). "Institutions as equilibrium" (Calvert, 1995) has been the motto until few years ago, when the literature began to pay more attention on the possible co-existence of multiple logics within the same field or the same organization, and renew attention to interests and agency (Greenwood et al., 2011; Goodrick and Salancik, 1996; Goodstein, 1994).

This shift of direction has received, lately, a growing attention by scholar, taking into account that where multiple institutions compete or no institution is firmly established, action becomes less predictable (Oliver, 1991). Recent works have stressed the fact that whenever organizations confront different prescriptions from multiple institutional logics, they experience a situation of institutional complexity (Greenwood et al., 2011; Dunn & Jones, 2010). In this sense, scholars have recognized that institutional environment are often fragmented, with conflicting pressures that make agreement difficult and consensus impossible among multiple logics (D'Aunno et al., 1991; Dunn & Jones, 2010). Therefore, organizations dealing with multiple institutional demands operate within multiple sphere and are subject to different regulatory regimes, normative orders and cultural logics (Kraatz & Block, 2008; Pache & Santos, 2012). D'Aunno, Sutton and Price (1991) said that "conforming to strong environmental beliefs and rules is difficult for many organizations (…) because they face fragmented environments in which multiple independent groups and organizations make demands that are, at best, uncoordinated" (see also Greenwood et al.,

2011). The recognition that contexts are characterized by a plurality of demands, expression of different institutional logics, has opened the door to an almost recent interest by institutional theory in how organizations cope with these multiple pressures and how this affects the subsequent equilibrium within the organization itself. Whether before the focus had primarily been on the role that dominant logics play in facilitating isomorphism and homogeneity, without considering the possibility to have multiple logics at the same time, nowadays scholars have shown that, while institutions constrain actions, they also provide source of agency and change (Thornton & Ocasio, 2008; Reay & Hinings, 2009; Tracey et al., 2010).

A complete and uncontested institutionalization is rare and interests and agency play a role in determining how organizations adapt to their institutional environments (Goodrick and Salncik, 1996). Oliver (1991), for example, noted that because institutional environments are not always unitary and organizations are not always passive, an organization may respond to institutional pressures according to its resource dependencies. Goodstein (1994) suggested that organizations respond strategically to institutional pressures, depending on their constraints and incentives. Such conditions enhance "administrative complexity, increase decoupling between structures and activities, undermine stability of offices and programs, produce hybrid structures, and penalize organizational legitimacy" (Scott, 2008). Reay and Hinings (2009), for instance, analyzed the health care system in Canada, as a context where medical professionalism and business-like health care logics were competing for lengthy periods of time, without one prevailing on the other. Also Lounsbury (2007) investigated the way in which trustee and performance logics led to variation in practices diffusion in the field of mutual funds and professional firms. Again, Greenwood et al. (2010) explored the influence of two nonmarket logics — the state and the family — upon the behavior of corporate organizations. And, Jay (forthcoming) developed a process model about navigating

paradoxes implied in situations of institutional complexity, analyzing the Cambridge Energy Alliance (CEA) where a combination of public service and client service logics were at stake.

Both where a dominant logic prevails against some others, and where a competition or combination among multiple logics on the same footing is present over extended periods of time, the effects on organizational processes are significant. The most important consequence of combining logics is organizational instability and change, which previous scholars have largely described in terms of power struggles and negotiations among internal and external constituencies adhering to different institutional templates (Jay, forthcoming).

FIELD, LOGICS AND COMPLEXITY

Although little effort has been made by previous research in comparing organizational fields (Greenwood et al., 2011), as place where institutional logics take shape and are enacted, they constitute the most important setting for better understanding institutional complexity and the implications it has at the organizational level. Institutional logics, as the "taken-for-granted patterns of organizing that shape and constrain the behavior of societal members", (Phillips et al., 2000; see also Berger and Luckmann, 1966; Zucker, 1983) provide the organizing principles for a field.

Indeed, the condition of institutional complexity experienced by an organization, both in terms of nature and degree, is fundamentally shaped by the structure of the organizational fields (Greenwood et al., 2011). We use the term *institutional complexity* to refer to situations in which organizations have to confront the different influences and demands exerted by multiple, often conflicting, logics within their reference context.

Institutional theory has for a long time tried to provide a theoretical framework for explaining how the social environment, in which organizations are embedded, influences their behavior. Whether institutional logics represent the cultural and normative template of a field, and whether organizations confront situations of institutional complexity, it follows that

organizational fields themselves are structured around multiple logics. So, we stay with the idea that “institutional environments are often pluralistic and societies promulgate sharply inconsistent myths" (Mayer & Rowan, 1977; see also D’Aunno et al., 1991). Hoffman (1999), among others, has argued that “some fields are formed around issues rather than in terms of common products or markets” (see also, Scott, 2008). For example, chemical companies, hospitals and universities participate in a contested field defined by differences over their goals and responsibilities. The “two or more strong, competing or conflicting belief systems” (Scott, 1994) characterizing an organizational field, define the inherent rivalry among the diverse, existing positions. For this reason, “logics are formulated and relations are structured as much by disagreement as by agreement” (Scott, 2008). It is widely recognized that the boundaries of fields, the identities of field members, and the relations and interactions between field members are delineated and maintained by multiple institutional logics (Greenwood et al., 2011; Reay & Hinings, 2009; Greenwood & Suddaby, 2006).

Therefore, the concept of organizational field remind us that organizations operate in systems composed of both similar and diverse cultural and normative regimes, that the environment within which organizations act is itself organized around a complex social structure, and that organizations are affected by internal and external relations that may have both a cooperative and a competitive nature (Scott, 2008). For all these reasons, “the nature and extent of institutional complexity facing organization is fundamentally shaped by the structure of the organizational fields within which they are located” (Greenwood et al., 2011). At the end, organizational fields are described in terms of the organizations belonging to it, the set of institutional logics characterizing different cultural and normative templates and the interrelationship among them. For those who consider fields and logics as synonyms, here we stay with the prevalent idea that the field is described in terms of different aspects and it mainly refers to the idea of network, while the logics are the cultural basis through which the

field operates. This obviously implies difference between them.

Insert Table 1 about here

Even though the relationship between institutional complexity and field has been widely recognized by scholars, it has not been deeply analyzed by institutional literature. Taking into account the growing importance that complexity plays in recent literature, the attempt to theoretically understand what makes it more or less intense in the field is really significant, also for analyzing the subsequent effect it has on organizations' response. For this reason, our aim here is to develop a theoretical model for answering the following question: *which field-level dimensions do affect the degree of institutional complexity experienced by organizations within fields?*

CURRENT APPROACH TO THE STUDY OF ORGANIZATIONAL FIELDS

It is at the field level that overarching sets of meaning and normative criteria become encoded in logics that are manifested in practices, actions and day-to-day behavior (Greenwood et al., 2011). So, the rules and norms associated with institutional fields provide the context in which organizational actions occurs. But, if fields are composed of multiple logics, then organizations experience a situation of institutional complexity that subject them to confront different demands coming from different stakeholders. However, "fields are not all the same" (Greenwood et al., 2011), and the degree of complexity they confront does not depend only on the number of logics present in the field, but also on their degree of incompatibility. Thus, institutional complexity is importantly determined by the number of logics at play in the field – the higher the number, the greater will be the degree of complexity confronted by an organization – but also by the divergence among them – the higher the divergence, the more amplified will be the complexity perceived by an organization.

Although a predominant approach has been used and developed in recent years by institutional scholars, we still lack a fully developed framework.

Emerging versus mature fields

The more recent approach for studying the relationship between organizational fields and institutional complexity is that highlighted by Greenwood and colleagues (2011), which is based on the comparison between *emerging* and *mature* fields. Previous literature recognized that, whereas mature fields already have a regularized functioning and a natural and appropriate arrangement, emerging fields are in evolution and without a clear institutional infrastructure (Greenwood et al., 2011; Purdy and Gray, 2009; Déjean, Gond & Leca, 2004; Lawrence & Phillips, 2004; Goodrick and Salancik, 1996). In fact, even though an instable equilibrium caused by institutional complexity is present, established fields have more identifiable patterns of interaction among organizations in the field, with a clearer distribution of influence over norms by actors. In this sense, although few studies really tease out the relationship between field maturity and institutional complexity, and its subsequent implications, it is quite implicit for some scholars that, due to the fact that mature fields are more settled, tensions among logics have been worked out and the different demands tend to be more predictable respect to emerging fields, the degree of institutional complexity perceived by organizations should be lower (Greenwood et al., 2011). DiMaggio and Powell (1983) depicted a two-step model referring to a field life cycle. During field 'youth', changes are more likely to be implemented and instability among logics is more present, while during field 'maturity', institutional isomorphism paves the way to field stability (Mazza & Pedersen, 2004).

Goodrick and Salancik (1996), for example, based their work on the assumption that institutional standards may be uncertain. It is just the uncertainty of such institutional templates that might render them insufficient for constraining practice, therefore increasing

the likelihood for organizations to face a condition of greater institutional complexity. In this sense, emerging fields, as settings where "institutional rules defining legitimate activities, membership, and boundaries remain ambiguous, permeable, and not widely understood" (Greenwood et al., 2011), are more uncertain than mature fields and so more exposed to complexity. In fact, emerging fields typically have unsettled boundaries that allow organizations from outside to easily enter, probably bringing with them practices rooted in logics different from those present in the field, thus complicating the balance of interests and the relative hierarchy of logics within the field itself (Lawrence & Phillips, 2004; Déjean et al., 2004). For example, isomorphic pressures will be less relevant if there are no established patterns or leaders to mimic; the widely shared values associated with normative forces have yet to develop; and diffuse power makes it difficult for individual actors to coerce others (Maguire et al., 2004). The structure of the field, therefore, might be unpredictably fragmented, such that organizations would face a high degree of institutional complexity (Greenwood et al., 2011). On the other hand, other scholars pointed out that the predictability of complexity can be expected to enable organizations to be more inclined to manage and respond effectively to institutional complexity, mitigating its challenge. In this sense, fields facing a relatively predictable and consistent set of competing demands, as in the case of emerging fields, should be better able to develop appropriate internal structures and practices (Greenwood et al., 2011; Lounsbury, 2007).

Besides these contradictory insights about the relationship between mature or emerging fields and complexity, the idea of mature fields as more stable and settled in part arises from the assumption that such fields have a dominant logic, often single (Greenwood et al., 2011). But, even mature fields may be constituted of multiple logics that continue to coexist over an extended period of time (Reay & Hinings, 2009). For this reason, they might be subject to a condition of institutional complexity, where agreement exist only over a set of

institutional practices, or it does not exist at all and rivalry and divergence are always present (Greenwood et al., 2011; Goodrick & Salancik, 1996). In fact, organizational field should be seen, not as static, but as evolving through the entry and the exit of particular organizations (Barnett & Carroll, 1995) and/or through alteration of the interaction patterns and power balances among them (Hoffman, 1999; see also Brint & Karabel, 1991; Greenwood & Hinings, 1996). Indeed, whether emerging fields should be more subject to institutional complexity due to their uncertain structure, also mature ones may be exposed to profound transformations, that might result in relational changes among existing organizations, changes in boundaries of existing organizations, changes in field boundaries and governance structure, and the emergence of new populations (Mazza & Pedersen, 2004; Scott et al., 2000). Moreover, an alteration of the field configuration comes together with an alteration of the corresponding institutions, which should be redefined through a political negotiation among the interests embedded into the different logics (Hoffman, 1999; Oliver, 1991).

Thus, taking into account these different points of view about emerging and mature fields, we need to deepen our knowledge about the experience of complexity in fields characterized by different stages of development. Even though a growing number of works use this approach to deal with this issue, we think that a different one should be more useful to better understand the relationship between fields and complexity.

3. AN EXPANDED FRAMEWORK TO LINK FIELD DIMENSIONS AND INSTITUTIONAL COMPLEXITY

Although recent progress made by institutional literature in exploring institutional complexity and related issues, it is useful to provide more substantive and dynamic accounts of field infrastructure, in order to better know what, and how, affects the organizational experience of complexity within the field (Greenwood et al., 2011).

Insert Figure 1 about here

If previous work has tended to assume that all institutional demands are equal, we argue that organizational fields may be exposed to a degree of institutional complexity of varying strength and importance (D'Aunno et al., 1991). They vary in the configuration of their wider structures and legitimating rules (DiMaggio & Powell, 1983; Meyer & Rowan, 1977), as well as in the complexity of their resource and power arrangements (Pfeffer & Salancik, 1978). As a result, they also vary in the nature of the demands that they exert on organizations and in the way they impose and monitor these demands. Therefore, while few fields might have clearly defined hierarchies of demands based on the salience of particular beliefs, with very precise norms and rules guiding organizational actions, the most part of fields may be best characterized as free markets for interests and goals, with several belief systems competing for attention and acceptance. Further, considering that not all the fields are the same, in addition to the number of logics and their characteristics, we need to know the structural conditions that make a field more or less able to simplify institutional complexity.

We basically assume that each field consists of one or more available logics, as well as an array of appropriate collective organizational identities and practices from which individual organizations assemble their particular actions (Thornton, Ocasio & Lounsbury, 2012). To the extent that institutional fields are informed by plural logics, the degree of variation across them will be greater .

Indeed, our aim here is to provide a theoretical framework for comparing fields, according to particular, identified dimensions. This attempt should be useful for empirical analysis trying to catch the relationship between field characteristics, logics and complexity in a more precise way.

FRAGMENTATION, CENTRALIZATION, AND FORMAL STRUCTURING

Considering that the distinction between emerging and mature fields is not so crucial for specifying the link between fields and institutional complexity, an alternative approach, more prominent in the early years of the second phase of institutional research (e.g., Meyer and Scott, 1983), has been recently regained in order to distinguish between fields according to specific dimensions (Greenwood et al., 2011). Following this approach, fields are compared according to their degree of *fragmentation*, *centralization*, and *formal structuring*.

The basic assumption is that the degree of institutional complexity perceived by organizations within the field, is not only dependent on the number of logics, but also, and more importantly, on the specific characteristics of the field of reference.

Fragmentation

Meyer and Rowan (1977) suggested in their seminal work that organizations are embedded in pluralistic institutional environments that are often permeated with sharply inconsistent logics. While according to Greenwood and colleagues (2011), fragmentation "refers to the number of uncoordinated constituents upon which an organization is dependent for legitimacy or material resources", Meyer, Scott and Strang (1987) stated that "fragmentation refers to the number of uncoordinated organizations or social actors on which field members depend". Here we stay with the idea that *fragmentation* is about the number of logics present in a field and pressing upon organizations.

According to previous definitions, a fragmented field is made more complex by the interaction of multiple sets of institutional rules and standards which may be in conflict one another. Building on the work of Scott and Meyer (1991), we propose that conflicting institutional demands are particularly likely to emerge in fragmented fields (Pache & Santos, 2010). D'Aunno, Sutton and Price (1991), for example, demonstrated that the multiple and often uncoordinated sources of legitimacy in the health care industry, especially in the mental

health and drug abuse treatment sectors, lead organizations in the field to have complex networks consisting of different groups with different interests. Some of these groups have formal authority over specific aspects, and others have informal influence; but none has the authority to coordinate or reconcile conflicting rules and beliefs (D'Aunno et al., 1991). In the same vein, Goodrick and Salancik (1996) studied the cesarean section surgeries in hospitals, as a setting that contains observable variations in practices and organizational interests, with no certain institutional standards. Another example is that presented by Meyer and colleagues (1987) and Meyer and Scott (1983) about school system. They contended that the multiple functions and meanings attributed to education by the different stakeholders, who have competing demands, – e.g., teachers, parents, local communities, churches, local government, and so forth – give rise to complex and often conflicting pressures on school system. Pache and Santos (2010), in making a comparison between fragmented fields, such as the education sector in the United States (Scott & Meyer, 1991), and unified ones, such as the military field in most democratic countries, proposed that whereas the former are characterized by the coexistence of multiple uncoordinated actors, each favoring disparate sets of institutional prescriptions, the latter view organizations as dependent on a few decision makers.

The coexistence of multiple uncoordinated actors and their respective logics about what constitutes effective or legitimate behavior increase the likelihood that institutional expectations may compete (Pache & Santos, 2010; Ruef & Scott, 1998). In fact, the increasing heterogeneity of interests and goals embedded in the different logics and the reduced ability to control and coordinating the field according to uniform and widely legitimated norms and rules, make a fragmented institutional environment more likely to be characterized by ambiguity, dissensus, conflict, and a general lack of coordinated direction (Carroll, Goodstein & Gyenes, 1988; Goodrick & Salancik, 1996). In this sense, "it is

assumed that fragmentation alone will increase the complexity confronting an organization" (Greenwood et al., 2011).

Proposition 1: The degree of institutional complexity within a field is directly proportional to the level of fragmentation of the field itself

Centralization

While fragmentation is about the number of demands present in a field and influencing organizations within the field itself, *centralization* concerns the hierarchical power structure of the field and accounts for the presence of dominant actors at the field level that support and enforce prevailing logics (Greenwood et al., 2011; Pache & Santos, 2010).

Much of the previous thinking on institutional environments has implicitly assumed that the structure is centralized. But, building on the work of Carroll, Goodstein and Gyenes (1988) we believe that it should be a variable and should change according to different fields. Diverse ways of referring to this issue have been used by previous scholars. Whereas DiMaggio (1983) referred to a "dominance hierarchy" within fields, Mensal (1960), Eisenstadt (1968), and Shils (1975) suggested the imagery of "central" and "peripheral" organizations as a useful way of capturing these hierarchical relations (Greenwood et al., 2006). The notion of center and periphery embraces both the relative organizations embeddedness within the field, and the capacity of central actors within a social structure to establish and sustain an institutional logic favorable to their interests. As their centrality increases, organizations increasingly treat institutional logics and the social behaviors encoded within them as taken-for-granted and hegemonic (Greenwood et al., 2006).

Meyer and colleagues (1987), analyzing the change of the American educational system, pointed out that the gradual expansion of state funding and decision making represented the gradual evolution of a strong node of authority in the field, which contributed to simplify the local school district. With this change "the environment becomes more

centralized but also more unified: the organizational rules (…) become more clear, better specified, more uniform and integrated than before" (Meyer et al., 1987). Also Greenwood et al. (2010) in their study about nonmarket logics in Franco's Spain, asserted that the low degree of institutional complexity faced by organizations was dependent on the clear hierarchy among institutional referents.

So, the lack of a centralized actor within the field involves the absence of unifying and certain practices and the exposure to multiple competing demands, therefore increasing the degree of institutional complexity present in the field. In centralized fields controls are more easily imposed, leaving little room or motivation for organizational behaviors and actions that lie outside the legitimated ones. In fact, controls are coordinated and imposed unambiguously on organizations by the focal actors (Carroll et al., 1988). Such powerful actors may include educational and professional organizations (Greenwood et al., 2002), that influence behaviors through normative socialization and accreditation processes, regulatory authorities (Holm, 1995), that use their legal power to coerce organizations to behave in a certain way, and major funders (Ruef & Scott, 1998), that resort resource dependence relationships for exercising their dominance. In this sense, fields that are highly centralized typically rely on one, few principal constituents, whose authority in the field is both formalized and recognized (Meyer et al., 1987). In contrast, decentralized fields, characterized by rather weak institutional pressures, are poorly formalized. They are defined by the absence of dominant organizations and by incompatible pressures, that can be easily ignored or challenged by organizations, since the referents exerting them have little ability to monitor and enforce them. Therefore, it is often assumed that an environment in which control is shifted upward in level (and thus centralized) is thereby unified and simplified: complexity is absorbed at the central level, and a given local organization therefore faces a simpler environment (Meyer et al., 1987).

Pache and Santos (2010) proposed a different conceptualization to arrive at a similar conclusion. In joining fragmentation and centralization, they argued that fields moderately centralized, that is "characterized by the competing influence of multiple and misaligned players whose influence is not dominant yet is potent enough to be imposed on organizations" (Pache & Santos, 2010), face a more acute institutional complexity respect to others. In this sense, according to this exposition, fields experiencing the highest level of complexity are those fragmented, i.e., composed of multiple actors who are expression of different logics, and mildly centralized, i.e., subject to different demands, none of which prevailing on the others.

Proposition 2: The degree of institutional complexity within a field is indirectly proportional to the level of centralization of the field itself

Formal structuring

The third field-level dimension taken into account by previous literature, *formal structuring*, refers to whether those demands are formally or informally organized (Meyer et al., 1987). More specifically, fields characterized by formally organized interests, sovereigns, and constituency groups, has a higher formal structure than environments made up of less formally organized groups, communities, or associations (Greenwood et al., 2011; Meyer et al., 1987).

According to previous literature, it is difficult to predict if greater formalization will result in higher or lower institutional complexity (Greenwood et al., 2011). On one hand, greater formalization might make different demands more specific, so enabling organizations to deal with them in a more calculable manner. However, it may also make pressures coming from logics more formalized and coordinated. But, on the other hand, low formalization might bring to a lower definition of pressures and, therefore, to an increase of the discretion available to organization in dealing with them.

However, following the seminal paper by Meyer and Rowan (1977), the term "formal", even though it was referred to the organizational environment, is undoubtedly linked to the idea of more coordination and rationalization. In this sense, it should be possible to state that formally organized fields have a clearer differentiation of their groups of reference, of the relative interests, goals and rules embedded in logics, and of the relational aspects characterizing the field. Therefore, the likelihood to have a greater institutionalization of practices and definition of rules is higher respect to less formalized fields, and similarly the definition and specificity of logics should be greater. In a more formalized institutional field, for example, we can imagine that the interpretation of the different demands and pressures by the side of organizations should be more uniform and homogeneous, being them more definite in terms of norms and prescriptions. Just because of its superior clarity and certainty as regards the different referents' institutional demands, a formalized field might be considered a more elaborate and evolved environment, in the sense that it already knows the possible sources of disagreement and conflict.

Thus, the more a field is formalized, the more the organization of interests and groups belonging to it will be clear. Once got clarity about the different referents present within the fragmented field and the pressures that each of them should be able to exercise on the others, what we lack is an understanding about the actual ability of the competing institutional referents to enforce their demands. This is directly related to the mechanisms of power and dominance, which represent in themselves the degree of field's centralization (Pache & Santos, 2010; Scott & Meyer, 1991; Meyer et al., 1987).

In this sense, we argue that a highly fragmented field that is particularly likely to impose institutional complexity on organizations is one that is low both in formalization and centralization. In such fields an higher degree of complexity can be expected to emerge because of the existence of unspecified and uncoordinated interests, which, in addition, are

the expression of different referents that do not have enough power to clearly dominate the field on their own and resolve contradictions and conflict. Some examples are the drug abuse treatment centers (D'Aunno et al., 1991), microfinance (Battilana & Dorado, 2010), and community banking (Marquis & Lounsbury, 2007). However, we expect that in a fragmented field where the degree of formalization increase, keeping centralization constant, the perception of institutional complexity should be lower due to the well-known number of different logics, the formalization of their content, and the overall coordination. In fact, environments that are more controlled buffer organizations from turbulence (Terreberry 1968; Emery & Trist 1965).

This condition of greater certainty and clarity should reduce the complexity coming from the presence of multiple and vague pressures, and enable organizations to deal with them in a more computable way.

Proposition 3: Keeping the level of centralization constant, the degree of institutional complexity within a fragmented field increases with a decrease in its formal structuring

ENFORCEMENT MECHANISMS

In addition to the field's dimensions analyzed above, which concern the field's formal structure, there are other characteristics, which seem much more intangible and indeterminate, that might have an impact on the institutional complexity experienced by organizations in the field. Specifically, previous literature has extensively examined the effects of multiple institutional logics on complexity, but it has never addressed the fact that field's fragmentation directly implies that different enforcement mechanisms are in play (Greenwood et al., 2011). In fact, diverse nodes of authority rely upon different enforcement mechanisms, which might have a different power on the way actors conform to their logic of

reference. In addition to the structural aspects, a field is characterized by operating rules that inevitably vary depending on the circumstances.

In this sense, we can imagine fields as characterized by different enforcement mechanisms which might allow a diverse degree of discretion, and a diverse power on actors' choices and behaviors. However, extant literature has never addressed how differences in fields functioning, in terms of enforcement mechanisms of rules and norms, affect the degree of institutional complexity experienced by organizations (Greenwood et al., 2011). Thus, institutional logics, as set of broad rules that are socially enforced by field level actors, as well as by organizations, make fragmented fields arenas of multiple enforcement mechanisms of norms and practices.

The basic premise is that each field is characterized by groups of people and institutional logics. That being said, we asses that at the bottom of the field functioning there are just the rules governing the communities. Being these enforcement mechanisms those that lead or should lead any community to adhere to its logic of reference, and being the field just characterized by diverse communities and logics, we argue that these mechanisms underlie the functioning of the field itself, even influencing the pattern of relationships between the different communities. For all these reasons, differences among the enforcement mechanisms entail and lead to variance in the operation of fields.

Thus, we argue that the enforcement mechanisms can vary according to three main dimensions: the *form*, the *strength* and the *punishment* meted out to non conformists.

Form

The main assumption is based on the view that fragmented institutional fields function according to the practices characterizing the different logics they embody. The rules, procedures and actual activities implemented by each institutional group conform to the prescriptions of the specific logic of reference. Therefore, actors belonging to the same

community share the same rules of the game, and pursue the same interests and goals. As such, practices, norms and rules "belong" to social groups and must conform to group members' social expectations (Zietsma & Lawrence, 2010). Whether organizational legitimacy has traditionally been conceptualized as being derived from the degree to which the organization's goals and activities are congruent with broader societal norms, beliefs, and values (Parsons 1956; Pfeffer & Salancik 1978; Foreman & Whetten, 2002), at the individual level each member belonging to an institutional community tries to gain legitimacy by adopting a behavior that is coherent with the prescriptions to which his/her community adhere. According to institutional literature, we expect that each member implement actions with the aim to be legitimized by his/her group of reference.

Taking into account that fragmented fields are characterized by a multiplicity of actors and organizations, which are grouped in different communities according to their institutional standards and rules, and that the institutional environment not only constraints and directs human actions and behaviors through logics, but also allows individuals to act independently and to make their own choices (Powell & Colyvas, 2008; Holm, 1995), we argue that the different communities within a field are subject to diverse forms of enforcement mechanisms, which inevitably prompt them to comply with the prescriptions of their specific logic.

The healthcare system, for example, is an organizational field consisting of suppliers (health professionals, hospitals and other facilities), resource and product consumers (patients or clients), regulatory agencies (government and professional associations) and other organizations that produce similar services or products (e.g. alternative medicine) (Reay & Hinings, 2009; Currie & Guah, 2007; DiMaggio & Powell, 1983). The field is composed by various stakeholders including clinicians, assistants, managers, administrators and patients and is infused with diverse institutional logics emanating from these different groups. Whereas clinicians are regulated by a science logic, based on a quality health care involving

innovative diagnostic and therapeutic procedures to ameliorate human suffering and help eradicate disease (Dunn & Jones, 2010), managers follow values and practices from the private sector, which are oriented to account of cost, efficiency and system rationality standards, and administrators follow even different rules, that have a bureaucratic nature and are characterized by the compliance to regulation established by the state and local government, which have legislative power and control over financial resources. Therefore, clinicians, as professionals, secure authority and legitimacy by the side of their community from scientific knowledge (Dunn & Jones, 2010; Starr, 1982; Friedson, 1970). In this sense, they are pushed to conform to the prescriptions of their institutional group in order to obtain peer credibility and recognition and, then, patient satisfaction. Thus, on one hand, the enforcement mechanism of rules and standards belonging to physicians' logic takes the form of social legitimization; on the other hand, the enforcement mechanism pushing administrative staff to conform to the specific prescriptions contemplated by their logic takes the form of regulation observance, coming from the coercive power of governments.

Similarly, the academic field is characterized by very different communities of actors, with very diverse institutional logics and enforcement mechanisms. As well as in the healthcare system, we find a range of stakeholders, such as scientists, administrators, the state and local government, who have multiform interests and objectives. Even in this case, the forms of the enforcement mechanisms to which each community is subject vary considerably. Thus, whereas practices and actions socially legitimized by the Mertonian norms of open science (Bercovitz & Feldman, 2008; DiMaggio & Powell, 1983), that is based on the concept of knowledge disclosure and publications, are enforced by academic scientists in order to obtain peer recognition and reputation, those contemplated by a commercial one are enforced by administrative managers with the aim to achieve a better performance in terms of evaluation indicators that are taken into account by governmental levels. Also in this case, the

enforcement mechanisms take a different form: the former is much more based on the concept of "shaming", while the latter on formal regulation. Other examples present in previous literature are the coercive power of governments (Greenwood et al., 2010), and the normative authority of professional associations and accreditation agencies (Dunn & Jones, 2010).

Therefore, we define the *form* of the enforcement mechanism "what drives a particular community to comply with its institutional logic". The more the "what" is formal (e.g., regulation), the more the form of the enforcement mechanism will be objective. In this sense, the form is pertinent to the nature of the enforcement mechanism itself, that is where it comes from. Being the form related to the origins and structuring of logics, it might concern both written rules and laws, and legitimized but informal behaviors, that shape actors' practices as well as the decision making of organizations.

The pronounced difference among the enforcement mechanisms of logics suggests that the system of values to which each group refers might vary considerably. Glynn's (2000) study of the Atlanta Symphony Orchestra provides a vivid illustration of the tensions that arise from the promotion of competing ideologies by two key internal constituencies. Musicians, espousing the "artistic excellence" logic of their profession, sought to develop "a world-class orchestra in a world-class city." Managers, however, promoting the "economic utility" ideology they had been trained into, focused on building "the best orchestra . . . [they could] afford" (2000: 288). As a result of this competitive commitment, the two groups engaged in a passionate battle over what the orchestra's core competencies were and how its resources should be allocated, with musicians emphasizing investment in artistry and managers emphasizing cost containment (Pache & Santos, 2010). Different organizational groups exhibit "competitive commitment patterns" (Greenwood & Hinings, 1996) that lead them to fight against each other to make the template they favor prevail.

Obviously this condition involves conflict over meaning and infrastructure that is produced by the activities of field's participants (Fligstein, 2001). In particular, we argue that the relationship among communities conforming to their norms and rules according to different motivation is much more complex respect to that among actors sharing the same vision. Therefore, logics espousing the virtues of the public sector ethos, professionalism and self-regulation, continue to collide with a private sector ethos, which is sanctioned by government policy and regulation to enhance performance and efficiency (Currie & Guah, 2007). In this sense, the complexity experienced by organizations increases whether they are part of a field characterized by a multiplicity of communities, which have diverse forms of enforcement mechanisms (i.e., based on formal regulation or informal norms) and, therefore, different provenience (i.e., public or private).

> *Proposition 4*: The degree of institutional complexity perceived by organizations is supposed to increase in those fields where the compliance to institutional logics by the side of diverse communities is enforced by enforcement mechanisms of different form

Strength

Besides the different forms that the enforcement mechanisms may have, they might differ also according to the degree of strength with which they succeed in making different groups faithful to their logic of reference. We define the *strength* of the enforcement mechanism "the degree of policing put in place within a community belonging to a specific institutional logic within a field".

Much of the discussion around the institutional logic of the academic profession, for example, has considered it as a rather homogeneous logic (Dasgupta & David, 1994; Merton, 1973; Gans, Murray & Stern, wp). But, more recently, we expect considerable heterogeneity on actions and behaviors by the side of scientists adhering to it. In particular, within the

academic field, the academic profession is driven by a value of freedom, which implies a high degree of liberty in choosing which problems to cover and which approach to use in dealing with them (Sauermann & Stephan, 2011). This characteristic differentiates considerably this community from the others present within the field. Whether, according to Merton (1957), the form of the enforcement mechanism of university scientists was based on recognition within the scientific community, which emanates from publications in top-tier journals, presentations at prestigious conferences, and federal research grants (Siegel, Waldman, Atwater and Link, 2004), more recently, faculty members may also have different interests, that include personal financial gain and/or a desire to secure additional funding for graduate students and laboratory equipment and applied research (Bruneel, D'Este and Salter, 2010), which deviate from the original institutional logic. We argue that this change has been caused exactly by the characteristics of the academic scientists' logic, and, specifically, by the relative low degree of policing implemented within this community, which did not enforce their members to comply with the original values of reference in a strong way.

Whether we consider that the enforcement mechanisms present within the academic profession are based on motivational aspects, attributable to the individual sphere, and that the recognition and the observance of practices and values essentially depend on the will of each actor, then, it is quite obvious understanding that the strength of these mechanisms is softer, due to the fact that the enforcement of the institutional logic is almost autonomous and independent from controllers or formal rules. It is worth highlighting that the lower degree of policing within the academic profession and the self-regulating nature of the community have brought to the development of this logic towards multiform interests and objectives, even diverging from the original ones (Sauermann & Stephan, wp). This progressive change has increased even more the freedom and the openness present within the profession and,

consequently, has weakened the power of the enforcement mechanisms originally legitimated.

On the other hand, the other communities present within the field are enforced to conform to their institutional logic by mechanisms having a different degree of strength. For example, the degree of policing present within the administrative community is much higher respect to the one discussed above for academic scientists. In this case, the monitoring put in place by authorities with formal power, both internal (i.e. top managers) and external (i.e., State and local government) to the community, guarantees the compliance to rules and laws in a more accurate way. The bureaucratic form of the enforcement mechanisms makes the role of regulators more relevant and significant.

Also Greenwood and Suddaby (2006), in their study of the field of professional business services in Canada, distinguished between formal rules conveyed and enforced through coercive processes, and internalized cognitive schemes diffused through normative socialization. For accountants in the field, it mattered that their actions be approved by the profession, but, and this is a key point, the regulatory power of the profession remained geographically fixed at the provincial level. Provincial associations review the quality of audit work performed by their members and are responsible for enforcing conformity to institutionalized practices (Greenwood & Suddaby, 2006). This is the big difference between academic scientists and accountants communities. Even though both the groups refer “the importance of upholding the integrity of the profession” (Greenwood & Suddaby, 2006), the former is characterized by an institutional logic that is based on the progressive internalization and institutionalization of norms and practices evolving over time, while the latter is much more dependent on the object of regulation and powerful regulators. Being the strength of the enforcement mechanisms of the academic profession lower than it is within other communities, academic scientists are less constrained by institutional, legitimated

processes and more open to alternative interests.

It is difficult to foresee the effect that a greater or lower strength of the mechanisms enforcing the different communities to conform to their institutional logic has on the degree of institutional complexity perceived by organizations within the field. It is possible to state that a strong enforcement mechanism makes the deviation from the logic of reference more unlikely by the side of each community's member. This implies that fields characterized by institutional logics observing strong enforcement mechanisms have a more determinate and specified structure.

Proposition 5: A strong degree of policing exerted within the different communities makes the institutional field more formally structured

Proposition 6: Whether a greater degree of policing is supposed to lead to a more formal structured field, then organizations in those fields are more likely to experience a lower degree of complexity.

Punishment

In inter-organizational relations, and more generally in organizational fields, actors suffer social penalties because they threaten reigning interpretive frameworks (Zuckerman, 1999). Starting from this premise, the last aspect characterizing the enforcement mechanisms present in a field is that of the punishment meted out to non-conformists. We define the *punishment* provided by the enforcement mechanisms as "the infliction of hard treatment by an authority on a person or group of people for his/her/thier prior failing in some respect (usually an infraction of a rule, norms or practice)" (Feinberg, 1970). Thus, punishment is a conventional device for the expressions of attitudes of resentment and indignation, and of judgments of disapproval and reprobation, on the part of those inflicting the punishment. For this reason the most important significance of punishment is the symbolic one (Feinberg, 1970).

According to institutional literature, the threat of being denied should induce actors and organizations to adopt accepted procedures and practices to avoid the punishment for deviating from legitimated behaviors. But, rather than demonstrate that defying classification invites penalties, scholars tend to point to the homogeneity of practice and take this as evidence that defection is punished. It is thus interesting to note the idea that actors are constrained by accepted models (Zuckerman, 1999), which lead them to conform to norms and practices recognized and legitimized within their community. In this sense, the mechanisms present within each community, working with the aim to enforce the prescriptions considered by the institutional logic of reference, may contemplate a punishment method for actors deviating from socially accepted rules (Greenwood et al., 2011; Rao, Monin & Durand, 2003; Zuckerman, 1999). Even though institutional literature has recognized that illegitimacy is costly and that communities adhering to specific institutional logics are sensitive to the pressures for complying with legitimate roles (Zuckerman, 1999), the evidence of negative consequences caused by illegitimacy is scant.

Previous literature has explicitly dealt with some cases of punishment meted out for unacknowledged behaviors. Zuckerman (1999), for example, in analyzing the American stock market, as a "mediated market" in which third parties act as critics shaping market patterns through product recommendations and endorsements, explores the social processes that produce punishment for illegitimate role performance. This is a clear case of withdrawal of legitimacy caused by illegitimate behavior. Similarly, Quinn-Trank and Washington (2009) spoke about the loss of legitimacy in the business education field. Another kind of punishment might be that of firing people not respectful of rules and laws to which the community comply with. It is more likely to observe this kind of punishment in communities where the enforcement of legitimate practices and norms is dependent on the coercive power of formal authority or on the observance of formal laws enacted by State or local government.

Even marketing theory focuses on similar issues using the framework of product categories. This literature suggests that a seller must offer products that conform to accepted types lest such offerings be screened out of consideration as incomparable to others (e.g., Shocker, Akiva, Boccara & Nedungadi, 1991; Urban, Weinberg, and Hauser 1996).

In any case, those actors diverging from expected, recognized behavior engage in what Cassell (1993) refers to as the 'tricky business of "trying on"' these institutional logics: adapting and modifying them to fit their own purposes. Recently, the institutional entrepreneurship stream of research has been presented as an alternative to the deterministic images of isomorphism where actors reactively adopt diverse practices and structures because of a desire to avoid uncertainty, sanction or a loss of legitimacy (Lawrence & Phillips, 2004). What it would be interesting to empirically explore is the different effectiveness that punishment methods may have on complexity within a field.

In particular, it can be conceived that the more a punishment method is strong in terms of delegitimating effects for actors, the more likely is that actors' behavior will conform to existing practices, rules and understandings. In this sense, we argue that the punishment expected to actors deviating from institutional logic affects the way institutional complexity is perceived at the field level. A field made up of different logics, all having strong and effective punishment methods, should be characterized by lower conflict and change.

> *Proposition 7*: Enforcement mechanisms with effective punishment methods are supposed to decrease the degree of institutional complexity perceived by organizations within fields, by reducing conflict and change

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Insert Figure 2 about here

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4. CONCLUSIONS

The theoretical framework developed in this paper has important implications for

research into institutional complexity and fields. The first implication is the importance of considering the infrastructure of the institutional context when examining the dynamics of complexity coming from the multiplicity of belief systems and norms. We have argued that the experience of institutional complexity is fundamentally shaped by specific dimensions which characterize the field of reference. Thus, to fully understand the variance of the degree of complexity among fields, we believe it is fundamental to examine the characteristics of the fields themselves.

Moreover, research related to institutional complexity has been mainly focused on analyzing the relationship between logics, always trying to understand how they combine and reconfigure in new or hybrid version. But, the relation between complexity and field is still lagging behind (Greenwood et al., 2011). Therefore, the second implication of the paper is the importance of going more in depth in analyzing complexity through the field, taking into account not only its formal structure, but also its functioning. Indeed, previous scholars have examined the effect of some structural field dimensions on institutional complexity, overlooking all the aspects attaining to the operational mechanisms. This points out that the knowledge and the investigation of these dimensions by the side of organizations might allow a greater effectiveness in their response to institutional complexity.

The third implication of this work attains to the possibility for future research to compare different institutional fields. So far, we did not have a framework to do that analytically. Our attempt here is also to provide a model to advance our knowledge on this topic. In this sense, it would be interesting to use the proposed framework to compare fields with different characteristics in order to test what comes out.

Overall, we have drawn on a variety of cognate literature as well as published work on institutional logics, complexity and organizational fields to develop a framework to guide future research on better understanding the relationship between fields and multiple logics.

Given the lack of research on the topic, it is highly suggested to proceed with empirical works, in order to refine and elaborate the proposed model.

TABLES AND FIGURES

Table 1. The field

	CONCEPTS	***DEFINITIONS***	***CITATIONS***
THE ORGANIZATIONAL FIELD IS DESCRIBED IN TERMS OF:	THE ORGANIZATIONS	The field is a set of organizations that in the aggregate constitute an area of institutional life	Greenwood & Suddaby (2006); Lawrence & Phillips (2004); Greenwood, Suddaby & Hinings (2002); DiMaggio & Powell (1983); Porac, Thomas & Baden-Fuller (1989)
	THE SET OF INSTITUTIONAL LOGICS	The field is characterized by organizations that participate in the same meaning system, are defined by similar symbolic processes, and are subject to common regulatory rules	Reay & Hinings (2009); Greenwood & Suddaby (2006); Lawrence & Phillips (2004); Scott (1994); Whittington (1992); Zucker (1987, 1977); Giddens (1984); Berger & Luckman (1967);
	THE INTERRELATIONSHIP AMONG THEM	The field is a network, or a configuration of, objective relations between positions	Reay & Hinings (2009, 2005); Lawrence & Phillips (2004); Lawrence (1999); Hardy (1994); Bourdieu & Wacquant (1992); White (1992); Briant & Karabel (1991); Clegg (1989); Gray (1989); Giddens (1984)

Figure 1. The dynamic of institutional complexity

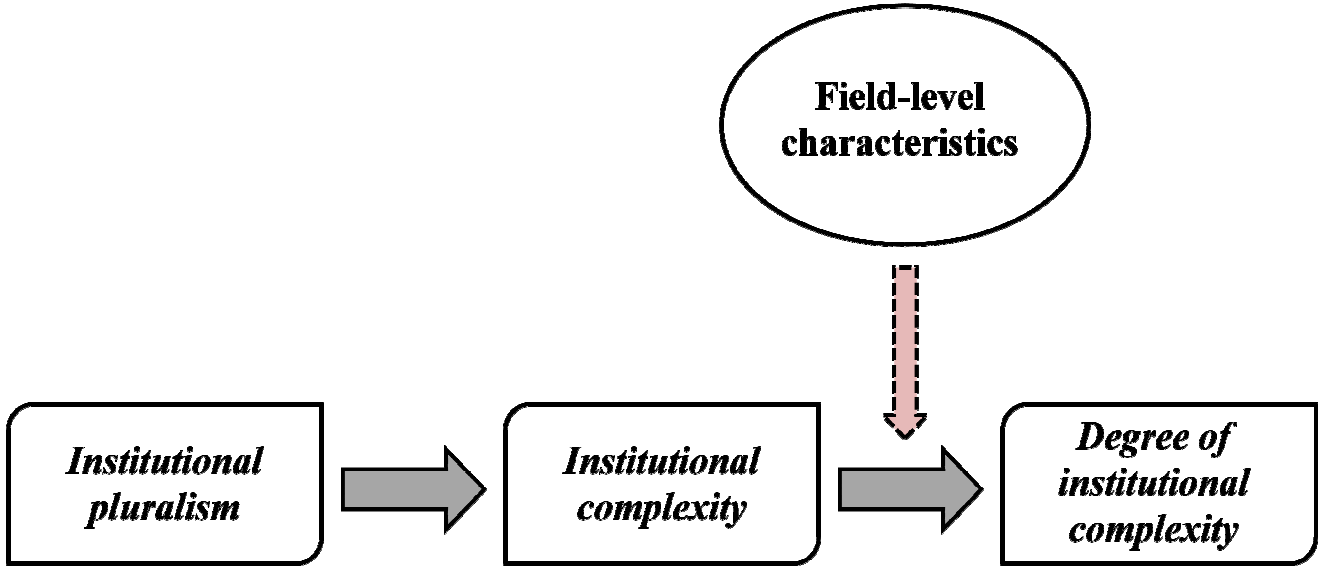
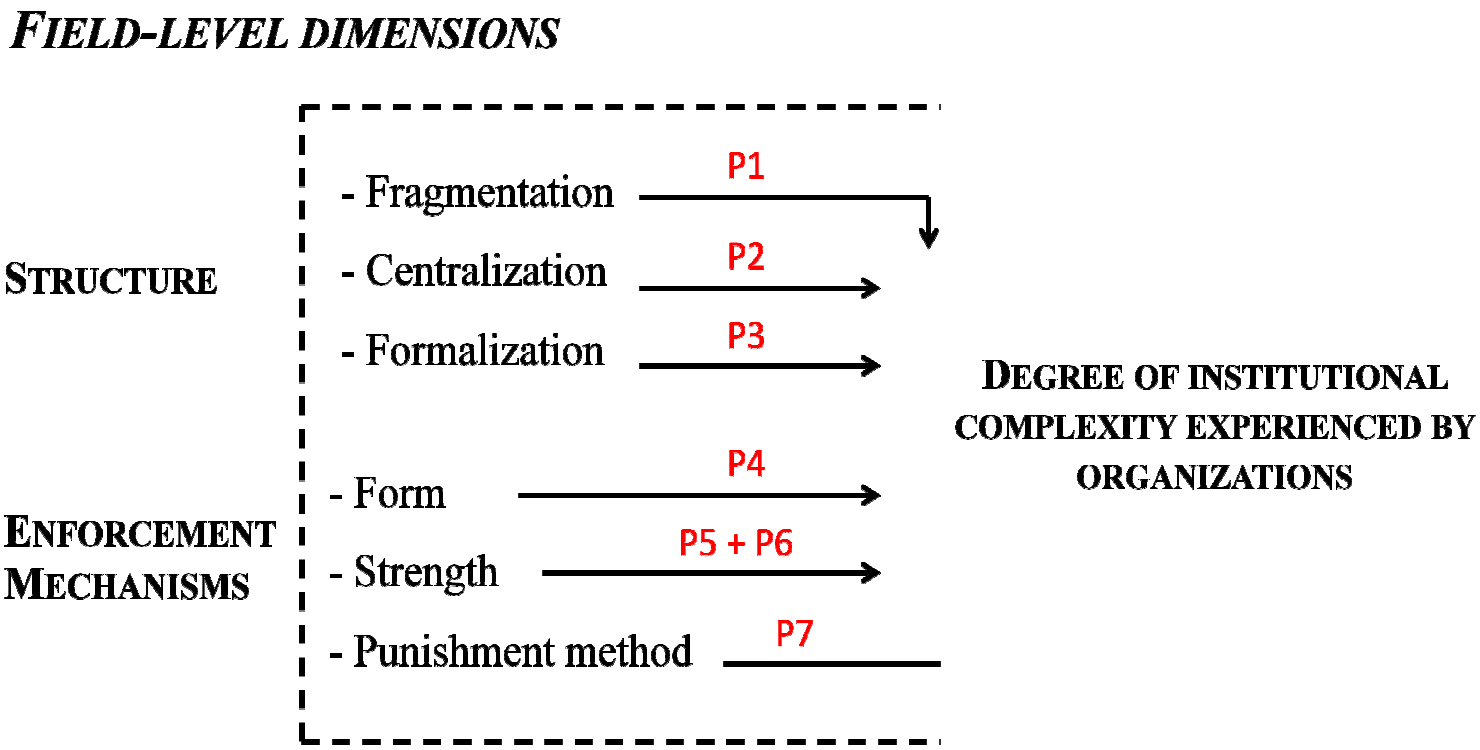


Figure 2. The theoretical framework



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PAPER II:

BEYOND INSTITUTIONAL COMPLEXITY:

THE CASE OF DIFFERENT ORGANIZATIONAL SUCCESSES IN CONFRONTING MULTIPLE INSTITUTIONAL LOGICS

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ABSTRACT

Organizations are increasingly exposed to a multiplicity of demands and pressures imposed by their institutional environments. This condition of institutional complexity makes activities difficult to carry on and consensus impossible to achieve. However, not all organizations experience institutional complexity to the same degree or are as successful in managing complexity. Prior research has suggested that some organizational and field characteristics affect the way in which organizations shape strategic responses to institutional complexity. Data from a multiple, comparative case study of three different types of organizations involved in technology transfer activities between university and industry, show which strategies are more likely to lead an organization to respond more or less successfully to a situation of institutional complexity. We uncover three main strategies that explain the variation of success: having boundary spanners, mirroring institutional demands and buffering institutional logics. This study contributes to the institutional logics perspective by showing how institutional complexity might be successfully managed within the organization.

Keywords: Institutional pluralism; Organizational strategies; Technology transfer; Case study.

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1. INTRODUCTION

Institutional logics are taken-for-granted rules that regulate action by furnishing "assumptions and values, usually implicit, about how to interpret organizational reality, what constitutes appropriate behavior, and how to succeed" (Thornton, 2004). In particular, they provide social actors with formal and informal rules of action and interaction, cultural norms and beliefs for interpretation, and implicit principles about what constitute legitimate goals and how they may be achieved (Friedland & Alford, 1991; Scott, 1994; Thornton & Ocasio, 1999). Although institutional logics, as guidelines describing the "way a particular social world works" (Jackall, 1988), may constitute an useful tool for understanding how a particular field is structured and organized, there is a growing recognition in the neo-institutional literature that organizational and societal settings are more and more exposed to different institutional prescriptions contemporaneously (Greenwood et al., 2011; Dunn & Jones, 2010; Pache & Santos, 2010; Greenwood et al., 2010; Reay & Hinings, 2009; Kraatz & Block, 2008).

Organizations experience institutional complexity every time they have to handle the divergent interests, goals and practices coming from multiple institutional logics (Greenwood et al., 2011). Hospitals and health care organizations (D'Aunno et al., 1991; D'Aunno et al., 2000; Reay & Hinings, 2005; Reay & Hinings, 2009), university departments (Nelson, 2005), arts organizations (Alexander, 1996), non-profit and social organizations (Dutton & Dukerich, 1991; Pache & Santos, 2010; Tracey, Phillips & Jarvis, 2010) and public schools (Rowan, 1982) are all examples of organizations facing institutional environments that exert pluralistic demands. In short, each of these organizations is "so many different things to so many different people that it must, of necessity, be partially at war with itself" (Kerr, 1963; see also Kraatz & Block, 2008).

To date, however, much of institutional theory has been involved in explaining the

role that dominant institutional logics play in promoting conformity within fields and organizations (Tracey et al., 2010). Organizations have been widely recognized as "entities reproducing a single coherent institutional template in order to gain legitimacy and secure support from external institutional referents" (Pache & Santos, 2012; see also DiMaggio & Powell, 1983). Only recently, some works have tried to give more attention to situations where organizations are affected by institutional complexity and to present different configurations of multiple logics coexistence within the same organization (Pache & Santos, 2012; Goodrick & Reay, 2011; Greenwood et al., 2011). For example, Goodrick and Reay (2011) presented "dominant logic", "competition", and "ongoing coexistence", as three different conceptualizations for institutional complexity, and Pache and Santos (2012) spoke about "decoupling", "compromising", and "combination", as strategies deployed by hybrid organizations to respond to multiple institutional pressures. However, if we know something about organizational responses to competing multiple logics, what is still missing is a clear understanding of why some organizations are more able to cope with institutional complexity than others. In particular, what determines organizational success in responding to institutional complexity? Which strategies lead some organizations to face pluralistic demands in a more successful way compared to others?

It is important to answer these questions, not only because they provide a deeper understanding of the relationship between institutional complexity and organizational features (Greenwood et al., 2011), but also because they offer novel insight into how organizations should act to achieve greater success in blending pluralistic prescriptions. We believe that looking at this unexplored aspect within the institutional logics approach will deepen our knowledge about the micro-foundations of institutional logics by linking actions and behaviors with organizational strategies and organizational success in managing multiple institutional logics.

To do so, we conducted a comparative case study of three different types of organizations (six organizations in total) carrying out technology transfer activities in Italy: Technology Transfer Offices (TTOs), University Incubators (UIs), and University-Industry Consortia (UIC). These organizations combined two previously separate institutional logics: an "academic" logic, that is mainly focused on basic research, and a "market" logic, focused on financial returns, that are connected to applied research and development (Merton & Storer, 1973). These are the reasons why we chose this context and, more precisely, the Italian one. As organizations that incorporate diverse logics, TTOs, UIs and UBC all have to handle prescriptions and pressures caused by different norms and rules and, therefore, to face the problem of institutional complexity. In the context of this study, we analyze how these different organizations respond to multiple logics, shedding light on the different strategies they deploy. More specifically, we want to gain an understanding of how their specific decisions and actions can lead to more or less success in coping with pluralistic demands. We focus on the variation of organizational strategies and the degree of success, with the aim of analyzing how they are related and which combination of organizational actions is more likely to lead to the successful management of institutional complexity.

In answering our research question we made two key contributions. First, we respond to a recent call by Greenwood and colleagues (2011) to empirically confirm that organizations experience institutional complexity to varying degrees. While prior studies have emphasized more episodic "responses" to institutional complexity (Greenwood et al., 2011; Pache & Santos, 2010), we moved beyond and found that the degree of success achieved by the organization in confronting institutional complexity is dependent on the strategies that the organization use in coping with multiple logics. In finding that, we develop institutional theory by furnishing new insights about institutional complexity.

Second, we give further insight into micro-level action (Hirsch & Lounsbury, 1997) by

better understanding how actors' decisions and actions affect the management of competing institutional expectations. Institutional analysis has always been insistent on the need to analyze the top-down effect of institutional pressure, such as that emanating from logics to behavior within the organization (Greenwood et al., 2011; Pache & Santos, 2012). Our findings have general implications for understanding how organizational actions may impact on the way institutional complexity is perceived and institutional logics are managed within the organization. Moreover, as management implications concerns, findings could be useful to the organization's top management for better understanding which kind of strategies might be implemented in situation of never ending institutional complexity.

2. THEORETICAL BACKGROUND

INSTITUTIONAL LOGICS AND COMPLEXITY

Institutional logics, as taken-for-granted, resilient social prescriptions, specify the boundaries of a field, its rules of membership, the role identities and the appropriate organizational forms of its constituent communities (Greenwood & Suddaby, 2006; Thornton, 2004; Lawrence, 1999; Friedland et al., 1991). They are the "broader cultural templates that provide organizational actors with means-ends designations, as well as organizing principles" (Pache & Santos, 2010; see also Friedland & Alford, 1991). The first definition of institutional logics was given by Friedland and Alford (1991), who referred to logics as sets of "material practices and symbolic constructions", by which actors and organizations produce and reproduce their material experiences and render them meaningful (Thornton & Ocasio, 2008). Thornton and Ocasio (1999) refer to logics as "the formal and informal rules of action, interaction, and interpretation that guide and constrain decision makers". If we consider that institutional logics provide social actors with vocabularies of motives and senses of self (Friedland et al., 1991), then, they not only direct what social actors want (i.e., interests) and

how they are to proceed (i.e., guidelines for action), but also who or what they are (i.e., identity) (Lok, 2010).

So far, the prevailing theoretical conceptualization has linked institutional logics to the concepts of conformity and stability. This has meant that extant literature has tended to emphasize the fact that organizations are shaped and affected by a dominant logic, which drives them towards isomorphic responses (Lounsbury, 2007; Greenwood et al., 2010). As we know, organizations try to gain legitimacy by producing and reproducing rules and norms of a single coherent institutional logic, trough repeated interactions of these taken-for-granted prescriptions. In this sense, their first objective would be that of gaining legitimacy from the field they belong to and developing common understanding about rules and values of the dominant template they recognize (Phillips, Lawrence & Hardy, 2000; Thornton & Ocasio, 2008; Reay & Hinings, 2009). Even when a phenomenon of logic change has been acknowledged (Hoffman, 1999; Thornton & Ocasio, 1999; Thornton, Jones & Kury, 2005), it has been presented as a temporary instability, where a shifting from one dominant framework to another occurred (Reay & Hinings, 2009). In this sense, scholars, who have focused on changes in logics, have conceptualized them as a replacement circumstance, instead of a situation of incoherence between multiple institutional pressures, and have simplified them as a period effects, instead of an enduring phenomenon of friction between different groups of individuals within the same organization (Dunn & Jones, 2010).

Although the idea of an institutional logic may be an useful tool to perceive and better know which norms and rules characterize a particular field, a second phase of the institutional logic approach has appeared in recent years with the idea that organizations can be exposed to different institutional demands at the same time (Greenwood et al., 2011; Kraatz & Block, 2008). Actually, this new direction is coherent with the first conceptualization of institutional logics given by Friedland & Alford (1991), who clearly stated that organizational fields are

always subject to multiple logics (Greenwood et al., 2010). Indeed, the idea of "contradictory practices and beliefs" (Friedland & Alford, 1991), whereby "multiple logics may coexist by segmenting their impact on different actors, geographical communities, or types of organizations" (Goodrick & Reay, 2011), has been explicitly asserted from the very beginning. The attention paid to institutional pluralism and complexity has increased and a growing number of scholars have begun to better explore and deepen the theoretical and practical implications of this condition. Institutional research has shifted attention away from the idea of isomorphic diffusion to develop more coherent approaches to study organizational variation and change (Marquis & Lounsbury, 2007; Kraatz & Moore, 2002). This move has opened the door to new issues embedded in the concept of institutional complexity, that are "the potential for fragmentation, incoherence, conflict, goal-ambiguity, and organizational instability" (Kraatz & Block, 2008). Such new interest arose from the fact that scholars have begun to address the role of non-dominant logics (Goodrick & Reay, 2011). In this paper we use the term *institutional complexity* to refer to situations in which a multiplicity of logics, exerting different pressures and influences, are in play in a particular context.

So, organizations incorporating elements from different institutional logics (Battilana & Dorado, 2010; Pache & Santos, 2012) face the effects of that institutional complexity and "contend with competing external demands and internal identities" (Jay, forthcoming). Kraatz and Block (2008) said that organizations operating within multiple institutional spheres "play in two or more games at the same time" (Kraatz & Block, 2008). Considering that multiple logics embodied by the organization are independent, not always compatible, and often in conflict (Friedland & Alford, 1991; Pache & Santos, 2012; Greenwood et al., 2011), organizations face heightened challenges in trying to incorporate these antagonistic practices (Pache & Santos, 2012; Tracey et al., 2010). However, although the extant literature has recognized institutional complexity being a problem for most of the organizations in their

attempt to find a proper response, "it can be argued that organizations experience institutional complexity to varying degrees, depending on their formal and informal characteristics" (Greenwood et al., 2011). Therefore, it follows that organizations will differ in their responses to complexity and these responses will differ in their effectiveness.

CONCEPTUALIZATIONS FOR INSTITUTIONAL COMPLEXITY

Overall, three main conceptualizations for institutional complexity have been acknowledged in previous literature (Pache & Santos, 2012; Goodrick & Reay, 2011), each of them specifying a different degree of balance among logics. The most unbalanced situation is displayed either where behaviors and actions are entirely guided by one dominant logic (Lounsbury, 2002; Thornton, 2002; Thornton & Ocasio, 1999), or where a decoupling between normative and operational structure occurs (Bromley & Powell, 2012; Boxenbaum & Jonsson, 2008; Meyer & Rowan, 1977; see also Pache & Santos, 2012). In the second situation, long-term tension between multiple logics until one of them wins becomes the new template (Reay & Hinings, 2005; Hensman, 2003), and a compromise strategy, where institutional prescriptions are enacted in a balanced form (Kraatz & Block, 2008; Oliver, 1991; see also Pache & Santos, 2012), have been observed. For example, Reay and Hinings (2005) explored how Alberta health care system achieved a new form of stability and re-institutionalization, after a period of deep competition, where the government attempted to move the field from a medical professionalism logic to a new business-like health care, and physicians disagreed with this change. Similarly, Meyer and Hammerschmid (2006) explored the shift from a legalistic-bureaucratic logic to a managerial one in the public sector in Austria.

A recent stream of research has highlighted a third conceptualization for institutional complexity, suggesting that "coexisting and competing institutional logics do not always resolve" (Goodrick et al., 2011), but might be combined (Greenwood et al., 2011; Battilana &

Dorado, 2010; Reay & Hinings, 2009). In those situations, diverse logics remains associated with different actors, units, communities, and so on (Greenwood et al., 2010; Lounsbury, 2007), or they enact a combination of activities drawn from multiple logics in order to secure support from the widest range of actors (Pache & Santos, 2012). For example, Battilana and Dorado (2010), as an example of logics combination, in their comparative study of microfinance organizations suggested that to be sustainable organizations have to create a common organizational identity that strikes a balance between the logics they combine. Professional work has been analyzed by Dunn and Jones (2010) and Goodrick and Reay (2011) as a context in which norms and practices appeared to be shaped by multiple institutional norms. The recent paper by Pache and Santos (2012) added a fourth response – selective decoupling – to institutional complexity. This strategy involves a "selective coupling of intact demands drawn from each logics" (Pache & Santos, 2012), which is the result of a purposeful enactment of selected practices among a pool of competing alternatives.

INSTITUTIONAL COMPLEXITY AND ORGANIZATIONAL CHARACTERISTICS

Along with different responses to multiple logics, recent works have also tried to find a relationship between particular organizational characteristics and the way organizations confront institutional complexity. Indeed, the characteristics of the organization can make organizations particularly sensitive to certain logics and less to others (Greenwood et al., 2011). The structural position of an organization in the field (Greenwood et al., 2011; Kraatz, 1998; Leblebici et al., 1991; Davis, 1991), the power and influence that groups with different logics have within an organization, both in terms of ownership and governance (Greenwood et al., 2011; Pache and Santos, 2010; Lounsbury, 2001; Goodrick & Salancik, 1996; Dobbin et al., 1993), the problem of multiple identities that actors bring from diverse fields within the organization (Greenwood et al., 2011; Battilana & Dorado, 2010; King et al., 2010; Dutton et al., 2009; Kraatz & Block, 2008; Glynn, 2008) are all aspects that have been stressed in

previous studies.

Important reference papers, in this sense, are those by Greenwood and colleagues (2011) and Pache and Santos (2010). The former developed an analytical framework for connecting institutional complexity, field structure, and organizational attributes to final organizational responses. In this framework, organizational features are presumed as filters of how institutional logics are framed and experienced within the organization. In particular, these characteristics frame how organizations "perceive and construct the repertoire of responses" (Greenwood et al., 2011) available to institutional pluralism. Field position, structure, ownership/governance, and identity are identify as the most important filters. Depending on these attributes, they identified two possible typologies of responses to multiple institutional pressures, which differ according to whether they focus upon organizational strategies or organizational structures. Whereas those referring to strategies considers power distribution and decoupling, those resting upon organizational structures are drawn from ambidexterity literature and are classified in "blended" or "structurally differentiated" hybrids. Whereas blended hybrids try to combine practices coming from different logics within a single organization (Reay & Hinings, 2009; Gulbrandsen, 2011; Battilana & Dorado, 2010), structurally differentiate hybrids compartmentalize an organization into subunits, each of them responding to different practices, norms and mindset. This is similar to the concept of "compartmentalization", which Pratt and Foreman (2000) refer to for depicting situations in which organizations "choose to preserve all current identities but not seek to attain any synergy among them" (Pratt et al., 2000). Pache and Santos (2010), in a similar vein, proposed a theoretical model of organizational responses to conflicting institutional demands as a function of the nature of the conflict (i.e., organizations' goals and means), and the intra-organizational representation of that conflict. In this sense, they identified four different typologies of responses, that are the result of different power balance within organizations

facing conflicting institutional pressures.

However, we still lack an exhaustive explanation of the phenomenon, especially for different organizations and the different results they obtain in terms of the management of institutional complexity. In this sense, we know that organizational responses to institutional complexity are unlikely to be uniform (Greenwood et al., 2010), but we do not know which kind of decision and actions might be more successful for managing institutional pluralism, and in particular, which strategies allow an organization to be more effective than others in coping with multiple institutional pressures. Examining this stream of literature, it is clear that the link between organizational characteristics, strategies and institutional pluralism is quite close. But, which strategies make an organization more successful than another in responding to institutional complexity? Our study is directed at moving forward the ongoing conversation on institutional complexity, following the above line of research.

INSTITUTIONAL COMPLEXITY AND STRATEGIC DECISION

The exposure to multiple, often conflicting, institutional logics requires organizations to exercise some level of strategic decision (Pache & Santos, 2010; Dorado, 2005; Clemens & Cook, 1999; Fredrickson & Alford, 1991). Strategic choice, as "a unified, comprehensive, and integrated plan designed to ensure that the basic objectives of the enterprise are achieved" (Glueck, 1980), is strictly linked to the responses that organizations might give to particular situations of institutional complexity. The presence of institutional pluralism makes organizational actors aware of alterative possibilities, therefore spurring them to make choices about prioritization and satisfaction of different demands and pressures. Strategy, as decisions and actions that regulate which issues and problems become more important within the organization and the way they are managed, represents an important object of analysis for better understanding the "struggle" among logics and the final response to institutional complexity. In particular, following previous literature, we state that norms, prescriptions, and

practices prescribed by different institutional logics tend to accomplish diverse objectives and satisfy diverse interests. In this sense, the organizational strategies that an organization deploys to face these contradictory demands are extremely important, in order to understand which responses might be implemented and the degree of success that each of them may achieve.

Given that not all the organizations experience institutional complexity in a similar way, "since field-level institutional processes are filtered and enacted differently by different organizations" (Pache & Santos, 2010; see also Greenwood & Hinings, 1996; Lounsbury, 2001), we agree that the strategies that organizations deploy depict the way they handle the pressures and demands coming from external stakeholders (Greenwood et al., 2011; Pache et al., 2010; Kraatz et al., 2008). In this sense, organizational strategies are exactly the ones that "frame how organizations experience institutional complexity and how they perceive and construct the repertoire of responses available to them" (Greenwood et al., 2011). We find previous research, in institutional theory, addressing the important role played by different organizational characteristics in responding to multiple logics, but we don't have a clear and comprehensive contribution about the way in which strategies shape the success that an organization can achieve in coping with this situation.

As such, our study is motivated by the following research question: w*hat strategies do organizations adopt to deal with institutional complexity and what determine how successful these strategies are in responding to institutional complexity?*

3. METHODS

In order to answer our research question, we conducted an inductive multiple case study of organizations dealing with technology transfer between university and industry in Italy. We use a comparative case study approach (Eisenhardt, 1989), in which each case is

treated as an independent experiment (Yin, 2003), that corroborates emerging theoretical insights. In order to reduce potential biases associated with single case, our study focused also on variation within cases, taking into account different organizations of the same typology. This allows for a more rigorous analysis, not only in terms of reliability and richness, but also in terms of theory generalizability (Eisenhardt, 1989). Miles and Huberman (1994) said that multiple cases "add confidence to findings".

Specifically, the research setting we refer to is composed of those organizations that have been established in Italy as a result of the recent openness towards the exploitation of research results for industrial ends in university-industry collaboration. Considering the important changes occurring in this field, and the multiplicity of interaction forms that have been recently set up by academia and industry, the setting is ideal for addressing our research questions. We, present below the field, along with the main recent changes in legislation, and how data were collected and analyzed.

RESEARCH SETTING

We studied technology transfer between university and industry in Italy. Technology transfer is a very complex field, where different typologies of organizations and multiple actors are involved. Here, we focus on the following key parties: *university scientists*, who discover new technologies, *industrial managers*, having the task of commercializing university-based technologies, and, specifically, *intermediate organizations*, which serve as liaisons between academic scientists and industry. All six organizations in our sample achieve their goals by bringing into contact academia and industry, in order to transfer and exploit academic results for commercial purposes. Therefore, on one hand, they need to display appropriateness toward a web of referents embedded in a belief system that we refer to here as the *academic logic*. Indeed, they interact with academic researchers and discuss with them their research output and its commercialization. On the other hand, given their reliance on

industrial word for the effectiveness of technology transfer process, they need to display appropriateness to industrial partners who are embedded in a *market logic*. For academics, all these organizations represent an alternative and complementary way for raising funds, and a mean to develop applied research. For firms, these organizations are potentially attractive vehicles to establish in-depth collaboration with university, providing access to state-of-the-art knowledge in specific fields of interest. In this sense, all these organizations represent a context where at least two different institutional logics are in the running

Organizations operating in this sector are quite new in Italy, considering that the first significant steps in this direction, in terms of legislation, occurred only in the late 90s. However, the last twenty years have been crucial for the Italian university system as a whole. New reforms, aiming at improving the transfer of research results to industry, have brought important consequences both for university and enterprises. In particular, before the last important reform in 2001, Italy has been the object of important legislative changes, that have tried to instill, within universities, a new culture that is more open towards collaboration and cooperation with industry. In Table 1 we report a timeline of the most important legislative changes occurred in Italy between 1989 and 2004

Insert Table 1 about here

The structural changes made to the set of norms and rules governing universities' activities and public patents right have deeply affected the creation of TTOs (along with the other forms) and resulted in an exponential increase from the mid-2000s. Today, after almost a decade, we see a variation in the way university and industry interact, both in terms of organizational forms (e.g., TTOs, UIs, and UBC) and strategies deployed. We also observe a variation in the degree of success that those organizations score in managing the different objectives and interests of the two worlds.

SAMPLING OF ORGANIZATIONS

We rested on a sampling design at two stages. The first step concerned the choice of the organizational types, the second the selection of the organizations belonging to the same type. This process allowed us to account for both variation between and within cases, in order to produce a richer and more accurate theory. As regards the first stage, in order to determine the different types of organizations involved in technology transfer activities in Italy, we have identified, with the help of key informants in the field, two main variables that will drive us in creating a matrix with the most relevant types.

Insert Table 2 about here

On the horizontal line we have the variable "field of origin", and on the vertical line we have the "positioning" dimension. While with "field of origin", we mean that organizations working on technology transfer can originate from one or multiple environments from the beginning, with "positioning", we intend that those organizations can take shape, physically, inside or outside the regulating mechanisms of one specific field of reference. This exercise to identify a priori key dimensions for differentiating the typologies of organizations, represented the attempt to define the boundaries of the institutional fields of reference. More specifically, also following our informants opinions, we expect that these variables affected the interaction between logics and the expression of them. In sum, on the horizontal line we have that organizations may be established by one institutional environment, with an open task from the very beginning, or directly by the agreement of multiple fields. On the vertical line, we find that some organizations physically stay inside one of the contexts of origin, whereas others are completely detached. Following the matrix below, we have found four main typologies of organizations, which we consider the most

relevant ones for managing technology transfer activities between academia and industrial world.

Regarding the first phase, we decided to focus on three of them and, specifically, on TTOs, UIs and UIC. The choice was mainly driven by two factors: 1) the diffusion of the identified types throughout the country; 2) the easiness of data access. Concerning the second phase, we selected our organizations according to their "geographical location" and their actual involvement in technology transfer activities. Specifically, taking into account that in Italy each city with a college has at most one TTO, with very few exceptions, we began our selection from TTOs, in order to identify the suitable contexts to take into account. As regards "geographical location", we selected them looking at the industrial context, in order to avoid the choice of very different locations in terms of entrepreneurial activities characteristics, such as firms' size and productivity. Therefore, we decided that the first TTO had to be picked out in the north-west of Italy and the second in the central part. Once identified these suitable settings, we proceeded by looking at the second measure. Their actual involvement in technology transfer has been evaluated according to the activity they have carried on during their life. So, once selected the two TTOs, we proceeded in sampling the other six organizations (two UIC and two UIs), exactly in the same cities of the TTOs in order to minimize bias related to external, environmental characteristics. Finally, we got three matched pairs, that permitted 1) to replicate cases of the same organizational typology (variation within cases), in order to account of all significant information and improve the generalizability of inducted theory, and 2) to compare the characteristics of the different organizational forms (variation between cases), to explore our theoretical issue.

Insert Table 3 about here

In terms of choosing respondents, we followed the guidelines given by Lincoln and Guba's (1985) regarding "purposeful sampling". We first selected informants that would be most able to inform us regarding our theoretical interest (Corley and Gioia, 2004), since they were directly involved in decision-making processes and strategies deployment. Then we asked each informants to suggest other people who would have been useful in giving us information about the issue of interest. Considering the focus of our research, the sampling began with the organizations' top managers, since they are considered by previous research (Pratt and Foreman, 2000; Corley and Gioia, 2004) as those people most knowledgeable about and influent in organizational decisions. Then, the choice of other informants, within the organizations, was based on their recommendations and guidelines.

Regarding the sampling of academic researchers and industrial CEOs, we asked for their names to the informants sampled within the organizations. In particular, we tried to follow two main criteria and we asked for 1) academics/CEOs who had been really involved in technology transfer projects, independently of the final result; 2) academics/CEOs who had been involved in these kind of activities no more than six months ago. The selection based on these criteria guaranteed to sample people who actually came in contact with different institutional logics and whose experience was in the recent past, in order to minimize retrospective bias and enhance data truthfulness.

In reporting findings below, we will use codes in order to preserve the anonymity of organizations and people.

RANKING ORGANIZATIONS IN "MORE" AND "LESS" SUCCESSFUL

In order to answer to our theoretical questions, we ordered the sampled organizations in "more successful" and "less successful" in dealing with institutional complexity. The most important premise concerns the fact that all our organizations are involved in highly complex activities. It was just the definition of success and the measurement of its degree that took us

up during this phase. To do this, we came along different attempts of conceptualization. At the beginning we tried to classify the sampled organizations in "more" or "less" successful in dealing with multiple logics basing on the assessment about the performance they achieved in carrying out their activities. We asked our informants, within the organizations, to respond to the following questions: 1) *"What is the main goal of your organization?"*, 2) *"Which kind of measures does the organization use to evaluate its performance?"*, and 3) *"Do you have a synthetic indicator for measuring performance?"*. Whereas some organizations aim at widening the patent portfolio, others tried to maximize the number of licenses or the ratio of licenses to patents applications, and others were focused on the number of spin-offs or the number of completed projects. Therefore, even though they all confronted issues associated with multi-logics pressures, specifically they focused on quite different goals that makes it difficult to comparison based on objective measures. Moreover, those organizations add value to the dynamics of technology transfer through very difficult quantifiable activities. So, on one hand, due to the inexistence of specific and comprehensive indicators, on the other hand, due to the impossibility to find an indicator suitable for all the organizational typologies, it was impossible to follow this path, which tried to connect the success achieved in dealing with institutional complexity with the overall performance reached by an organization.

For these reasons, we decided to proceed with another approach, based on the evaluation that academic researchers and industrial CEOs gave about their experience with the sampled organizations, and on the opinion of the employees themselves. In this sense, we based the ranking of "more" and "less" successful organizations in confronting institutional complexity, using responses we got from some semi-structured questions. In particular, as concerned academics and CEOs, we focused the attention on three specific issues, 1) *satisfaction about previous experiences with those organizations*, 2) *the likelihood to address those organizations for future projects*, and 3) *the extent to which they have maintained a*

good relationship with the counterparty. Granted that a higher satisfaction, a greater likelihood, and a better quality of the relationship constituted the result of a higher organizational success in dealing with institutional complexity, to assess these issues we concentrated upon phrases like *"I was really pleased about the result…", "I really believe they* [the organizations employees] *did a good job", "I reached so unexpected results…", "I think their help will be useful in other occasions…", "They gave me an hand in understanding how approaching the other part…"*, and other similar sentences.

Regarding organizations informants, we also tried to get their opinion in terms of success reached in managing multiple institutional logics. Specifically, we focused on responses they gave to questions like *"Do you perceive your organization being a point of reference in terms of technology transfer for academics and CEOs?"*, and *"To what degree do you perceive your stakeholders (i.e., academics and CEOs) being satisfied about the work you carried on?"*. Then we cross-checked data obtained from these two sources in order to rank all the sampled organizations. The more the satisfaction of academic and industrial stakeholders, the higher the will to turn to those organizations for future projects and the quality of the relation undertaken with the other party, the more successful the organization was in dealing with different prescriptions. At the same time, the greater the employees' opinion to be considered a reference point by academics and CEOs, the more the organization may be considered successful with the management of institutional complexity. In the end, we obtained three matched pairs, each composed by one "more" and one "less" successful organization in confronting multiple logics.

Insert Table 4 about here

DATA COLLECTION

Data collection followed common recommendations for case-study analysis (e.g. Yin, 2003; Eisenhardt, 1989), and combined archival documents, preliminary interviews, formal semi-structured interviews, and informal talks (see Table 5).

Insert Table 5 about here

We conducted the data collection process in three different phases. The first consisted of an exploratory stage (end of 2011), where we conducted interviews with some key informants of our organizations, in order to better understand the internal functioning, the different tasks held by employees and the real clash of different cultures and interests they experience in dealing with their stakeholders. This phase was fundamental for the construction of our interview protocol. We got in total 5 interviews, each of them lasting on average 45 minutes. All of them were taped in the original language (Italian) and transcribed. At the end of this process, we were completely sure that the setting was appropriate for exploring our theoretical interest.

The second phase (from January to February, 2012) was spent in collecting archival materials with the aim to develop a more in-depth understanding of technology transfer activities, the interaction between university and industry, and the change that occurred at the field level in terms of Italian and European legislation. At this stage, we collected research articles, texts of Italian and European laws, books, as well as documents produced by the organizations and electronic documentation.

During the third step (from January to August, 2012), we proceeded with the submission of the semi-structured interview protocol to our informants. Our sample of respondents included not only the employees of the organizations, but also academic researchers, executives and CEOs interacting with those organizations since they were the main stakeholders.

Insert Table 6 about here

Taking into account the different involvement of our respondents in technology transfer activities, we relied upon two separate interview protocols, one for academics and CEOs as people actively participating in the process but not employees of the selected organizations, and the other specifically designed for TTOs, UIC and UIs employees. Both the protocols were refined and adjusted over time according to new emerging aspects and to account for data saturation. Finally, we gathered 48 one-to-one interviews. With the exception of two skype interviews, interviews took place in informants' offices and lasted between 30 and 65 minutes. They were organized around a number of main areas. As concerns the protocol for the organizations, we got the following sections: organizational history, organizational structure, organizational strategy, performance, stakeholders and perception of logics (see Appendix A). In contrast, the protocol submitted to academics and CEOs was organized around the following domains: job characteristics, previous collaboration, experiences with the sampled organizations, and incentives (see Appendix B).

DATA ANALYSIS

We coded interviews and documents inductively, with the aim to find significant relationships between data, emerging themes, and existing literature. As Maxwell (1996) said, "the goal of coding is not to produce counts of things but to fracture the data and rearrange it into categories that facilitate comparison between things in the same category and between categories". Data analysis consisted of several stages.

During the first stage, we wanted to better characterize our empirical setting in terms of the logics it included. We coded questions and archival material we got in order to better characterize the main points of friction between logics following some macro issues that, according to previous literature, deserved attention. We coded the passages where informants

emphasized the difference between academic and industrial world following the macro issues that, according to previous literature, deserved attention (Merton & Storer, 1973), such as *goals*, *organization of work*, *identity*, and *mindset*. In particular, we organized and summarized the coding of these data around main themes drawn from Thornton, Ocasio and Lounsbury (2012) that seemed recurrent in the discussion with our informants and the most important in specifying the differences between the two fields. This corroborated the idea that organizations dealing with technology transfer activities are really embedded in multiple prescriptions. In Table 7 we report the specification of these results.

Insert Table 7 about here

During the second step, we coded data with the aim to identify the organizational strategies deployed by the different typologies of organizations. The analysis began with an open coding process where we tried to abstract from the context and construct general meanings. Following Corley and Gioia (2004), we used in-vivo (Glaser & Strauss, 1967; Strauss & Corbin, 1998) or first order (Van Maanen, 1979) codes, that is lexicon used by the respondents, or an evocative phase when in-vivo code was unusable. This open coding was over time refined, since we read and reread the transcripts, creating new, more precise, codes and adjusting the existing ones. Through a comparative analysis of the text, the objective of this initial phase was to give the same code to an event, act or happening which shares common characteristics. We started to code each mention with respect to how the organization organizes itself internally and how interacts with the external environment. So, sentences like *"different background and previous experiences"* (I1), *"hybrid competences"* (U1), *"people with PhD…an important resource"* (T1), and *"having specific experiences help to bridge the two contexts"* (T2) all called to mind the broader idea that previous experience make the difference in mediating between academia and industry.

Then, we began to search for relationships among the existing codes, in order to group concepts under a more abstract higher order themes and construct overarching dimensions. All the previous sentences were grouped, for example, under the theoretical category "*employing boundary spanners*". The aim at this stage was to reduce the number of units and identify theoretical categories relevant to our analysis. The overall process was an analytic procedure through which we tried to let emerge theoretical relationships until interviews failed to reveal new relationships. In sum, we proceeded from "organizational categories" (Maxwell, 1998), which represent the broad subjects around which we organize our interviews, to substantive categories, that constitute the first, descriptive segmentation of data, and, finally, to theoretical categories, which have been used to develop a more general and abstract framework for outlining conclusions.

We used matrices to organize data (Miles & Huberman, 1994), in order to facilitate the analysis during the identification of patterns and minimize the likelihood of making a mistake in translating information. Moreover, throughout the analysis we triangulated interviews with archival documents, so as to avoid possible bias during data analysis and to ensure a deeper understanding and reliability of results (Maxwell, 1996). Finally, to enhance coding reliability, we asked an external researcher, fluent in our informants' native language, to conduct a review of the process we followed to code data and of the products we obtained in terms of theoretical categories. This was useful for understanding if we overlooked something or did mistakes in separate themes conceptually. This researcher, in going through interview protocols, documents, interviews and coding schemes, provided important help in resolving conceptual discrepancies and ambiguities and in assessing whether our conclusions were plausible (Lincoln & Guba, 1985; see also, Corley & Gioia, 2004). The final data structure is presented in Table 8.

Insert Table 8 about here

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4. FINDINGS

The most important premise to our findings concerns the typology of activities that the sampled organizations are coping with. Technology transfer is an extremely complex activity, subject to conditions of extreme uncertainty. In general, the more complex a task is, the more its outcome depends on the effectiveness and efficiency with which it is handled. A good technology, just because it has an intangible, tacit, uncertain and unique nature, is not sufficient to guarantee the success of the transfer process. The overall process hinges highly upon the competences held by the organization and the strategies it uses for mediating between the two parties. For all these reasons, the strategies deployed by those organization in confronting institutional complexity are really important for understanding, not only, the final results in terms of technology transfer, but also, the success they achieve in mediating the different interests.

The results below focus on the strategies that came out from our coding (see Table 8), as those strategies that have a positive impact on the results that organizations achieved in dealing with multi-logics pressures. We show below which they are and which are the mechanisms of their functioning within the organizations.

EMPLOYING BOUNDARY SPANNERS

A common characteristic of the more successful organizations of our sample, was the employment of personnel with the specific aim of enhancing the quality of communication between parties. Specifically, people maintaining relationships with both the communities – academics and industrial managers –, or playing a key role in decision-making processes, often had a significant experience within the academia, in terms of research projects, and a previous industrial experience. Some of them even had a PhD and were hence able to act as "boundary spanners" (Aldrich & Herker, 1977; Tushman & Scanlan, 1981; Fennel &

Alexander, 1987) between the university and business worlds.

For instance, in EPSILON, the manager of the most important project had 15-years-old experience in a multinational company for 15 years after his graduation, and then decided to spend two years at New York University and at Stanford University as a senior research fellow and teaching assistant. After that, he came back to the industrial world in a multinational company. This combination of experience, education, and specific competences made him particularly able to manage the relationship between academics and CEOs and to make the communication more comprehensible between the two parties. Also the operations manager had 1.5-years experience within academia before joining EPSILON. A statement from him shows how this hybrid experience is considered valuable for the work they daily do:

> *"The work we do is very tricky, not only for the issues we deal with, but also for the kind of relationships we have. If you fail to communicate with our stakeholders* [academic researchers and CEOs], *it is over. The lack to have people with experience in both contexts* [university and business] *lies just in trying to avoid this error"* (U2).

In ALFA, people involved in keeping relations with academics and industrial managers had a science PhD and industrial experience. Having advanced technical skills, for example, allows them to evaluate the potential of a specific technology and its economic value in the right way. The application of methods for assessing the intellectual property, the protection of invention innovativeness as a response to possible objections, the identification of alternative application of a particular technology, are all examples of competences that require a deep understanding and knowledge of the overall process and a previous research experience. But, the same person has also to cope with the industrial partner and with its purpose to carry on technology development and the commercialization of products arising from that technology. For this reason an industrial experience is also important. The idea was to enhance internal skills, both for interacting with academics in the phase of intellectual

property protection and for better connecting the two sides in the following stage of research exploitation.

The role that boundary spanners had in managing logics compatibility is fundamental in two main aspects. First, they acted as a bridge between the two worlds, trying to emphasize the potential value that demands and objectives of each of them might have for the other side. In this sense, they operated as facilitators in combining the more akin aspects, in order to find the best pattern for both the parties. But, they also had an important impact on minimizing incomprehension and frictions between academic researchers and CEOs. For example, in EPSILON, the manager with the hybrid background played a key role when communication between industrial partner interested in the project and the academic researcher supervising it was required. In particular, he tried to smooth all the formal, but not substantial, difficulties, softening the point of view of each partner and broadening their understanding of the other side's interests. He also tried to let parties think in terms of complementary instead of antithetical positions. The manager told us:

> *"My role, here in EPSILON, is both to act as "shepherd" for researchers not accustomed to deal with concepts such as "budget", "operating cost", and to guarantee that things have a deeper value than for a single enterprise* (…). *I always try to lead academics straight to the point, with a problem-solving approach, and CEOs to think in a more open way, however highlighting the benefit that each of them may obtain from our activities"* (U3)

In practical terms, this means to distract academics' attention from more general behaviors, such as keeping things vague, and to focus CEOs' attention on the importance that research developments might have on their company performance, besides the more obvious commercial applications achievable in a short time.

For the same reason, in GAMMA, the general manager, who had a valuable

experience both in public and private organizations, followed the rule of behaving as a *"third part"* (I2), which meant that the same treatment had to be ensured to each part. And the same treatment is considered with respect to the competences needed to evaluate each specific situation. He told us:

> *"If you have never had a direct taste of the mindset that each part has, you cannot be really able to deal with them properly"* (I2).

A colleague said:

> *"His job is just that to assure an actual mediation between the two communities (....). He tries to get this by talking a lot with people and meeting them several times. It is often hard, but he seeks to leverage his hybrid skills to do that"* (I3)

Indeed, whereas past experience in public institutions tend to endow people with bureaucratic procedures typical of these authority, previous experience in the private sector makes them conscious about needs and decision-making criteria that characterize business processes.

As regards the organizations defined as less successful, we noted a lack of attention to the issue of boundary spanners. For example, none of the employees had a PhD or a significant period spent within the academia after his/her graduation. Summarized as a proposition:

> *Proposition 1:* As regards organizations confronting highly uncertain activities with a high cognitive content, the likelihood to achieve a higher success in dealing with institutional complexity, is greater for those employing boundary spanner people in key roles envisaging a mediation between different institutional fields

MIRRORING THE DIFFERENT INSTITUTIONAL DEMANDS

We observed that the more successful organizations had a more defined division of work, with clear-cut tasks for each area or group. For instance, in ALFA, the general manager

said:

> "I*t's very simple.* (…) *the unit is divided into two main offices: protection and exploitation. Each office has a responsible and a team of people working with him/her. We have people with a hard scientific background (i.e., biology, chemistry), useful for evaluating patent applications, and people with a legal background, needed during the contractual phase. Our real strength is to put together all these skills"* (T3)

In addition to set clear reference points for academics and CEOs, these organizations chose the tasks of each employee so to maximize the degree of success of the relationship undertaken with parties. This aspect meant that both sides were more likely to be pleased with the work done by the organization and, therefore, to have more persistence in going ahead with the relation with the other party. An industrial manager explained the issue:

> *"*(…) *having defined reference point is important for us in order to minimize response time and misunderstanding. If you have a specific problem and you know that you can rely on someone skilled on that, the reliability of the entire process increase and you are more incentivized to find a shared* [with academic researchers] *solution. In ALFA, I found that"* (C2).

A greater specialization of the process connecting academics and industrial managers increased the quality of the service provided by the organization. So, while in ALFA, T4 dealt only with patents and requests on this issue, in BETA, T5 dealt with patents, start-up and other projects and activities. This higher specialization facilitated a feeling of trust and collaboration by academics and CEOs, therefore reducing the transaction costs related to the negotiation and increasing the likelihood of managing successfully the relationship. Also in GAMMA and EPSILON, the organizational structure was well defined, in terms of subdivision of tasks and communication flow. In particular, in EPSILON, we found a manger for each project and, in each project, each person had particular assignments to accomplish,

according to his/her community of reference. This allowed for a more defined characterization of roles and for a higher specialization of tasks.

Moreover, this greater specialization played several roles in managing logics compatibility. It granted to academics and CEOs the chance to deal with people having specific competences on issues of interest. It could seem, at a first glance, a weakness, but then we realized that this characteristic was very appreciated by both parties. Indeed, the division of work ensured to face problems in a deeper way (*"the qualification of those people on specific issues, make me confident of the suggestions they give"* (C3 about EPSILON)), to understand requirements and demands of both sides and deal better with them (*"they make me feel pretty understood* (…). *I perceived that they have enough familiarity with the matter"* (C4 about GAMMA)), and to recognize possible points of frictions and smooth them ("(…) *the experience they accumulate on specific issues is important for weakening the divergences and strengthening the possible common interests"* (C5 about ALFA)). All this was confirmed by a CEO who had the opportunity to interact with ZETA and said that in most cases the failure of relationships, even before trying to reach an agreement, was due to employee's lack of a deep comprehension.

However, we wanted to make sure that this greater specialization did not undermine the communication between parties and groups, otherwise it would have meant a lower process effectiveness, where each person knew only a little part of the story. Therefore, we asked our organizational informants about frequency and contents of their meetings. In all the organizations, people met at least 2-3 times per week, in order to update the others about the new activities assumed. Moreover, whereas new information about relationships already undertaken could be of interest for other colleagues, they were promptly shared with them. A project manager of EPSILON said:

"if I receive an update or a request from a researcher or an enterprise I immediately

inform the other colleagues interested in this information, in order to make the process faster and more effective" (U4)

This way of behaving was common to all the organizations we analyzed and did not represent a distinction between more and less successful organizations. The main idea was that if an activity has a high cognitive content, then, the more the information shared, the greater the likelihood to make the overall process more effective.

Specifically, we found that the more successful organizations mirror their environment, in the sense that they envisaged specific roles for different people, according to the logic they have to cope with. In sum, they strategically provided different figures of reference for academics and CEOs, with a clear-cut division of work, and some key boundary spanners people, bridging among them and final stakeholders. Summarized as a proposition:

Proposition 2: As regards organizations confronting highly uncertain activities with a high cognitive content, communicative flow being equal, the likelihood to obtain a higher success in dealing with multi-logics pressures, is greater for those mirroring the demands they cope with, in terms of assignment of tasks and work division

Proposition 3: As regards organizations confronting highly uncertain activities with a high cognitive content, the likelihood to obtain a higher success in dealing with multi-logics pressures, is greater for those mixing some key boundary spanner figures with some specialized roles

BUFFERING MULTIPLE LOGICS, INSTEAD OF JUST LINKING THEM

ALFA and GAMMA provided a significant illustration about the "buffering" strategy. They clearly make efforts to identify relationships and exploit synergy between the different stakeholders' points of view. Their strategy was characterized by the attempt to retain the plurality coming from different logics, while minimizing conflict and maximizing their synergy. We observed a process where diverse logics were managed following a

prioritization, based on the different phases of the technology transfer process. As a manager in ALFA said

> *"at the beginning, when the academic researcher and the firm meet each other for the first time, we always have to go in depth in understanding their points of view and what they expect. Only starting from here, we can leverage, during the different phases, their skills and competences for achieving the best we can from their collaboration"* (T1)

In ALFA, they really believed that being dynamic and uncovering opportunities for parties is a good strategy to achieve better results for collaboration and higher satisfaction. These interesting opportunities might be European funding announcements, regional funds for collaborative research, etc., and are really linked to the different stages of the process. If at the beginning sources of funds are probably more appreciated, later high skilled people are more needed. In doing so, ALFA had to be deeply involved in each relationship between academic researcher and industry, acting as a buffer whenever an appreciation of the research is required, or an in-depth analysis of industrial application is needed by the researcher. An employee said that *"each party always tries to undervalue what the other does or proposes"* (T6), and for this reason *"we always have to fight against this idea, by providing clear and meaningful evidences"* (T6). Academic researcher, for example, usually do not think about the possible industrial applications of their research, since patenting is not in their priority. So the risk of compromising research results for commercial application is high. But, if the research is monitored throughout the process of collaboration, as in ALFA is, then, *"you can kill two birds with one stone and achieve results that would otherwise be impossible"* (T6). This means that the organization has to be ceaselessly in contact with both parties, and, in each phase, understand what is worth stressing and what not. An employee in ALFA said:

> *"When we license a patent, we have always to give a kind of priority to the different*

interests at stake. This doesn't mean neglecting the other part. It is like trying to find the best solution starting from different needs: while you have to preserve their peculiarities, you also have to look for the best result. For doing that we must prioritize activities, objectives, interests, and so on, according to the different stages. (…) *this always requires the ability to let the other part feel that what you are doing is important also for itself"* (T3)

So, the important aspect, connected to the behavior of being always proactive and dynamic, is that the more successful organizations managed the tension between the two logics by sequentially attending to the most pressing issue at hand. In particular, ALFA sought to achieve what each part would not reach alone, through the prioritization of certain goals in some phases and other goals in other phases. This required a high capability of communication and the awareness that being present in all the phases of the process was fundamental. This behavior allowed to damp down on discussions, which had a negative impact on the relationship, and to ensure the achievement of a good agreement. For example, during patents licensing, ALFA made efforts in emphasizing the value that each part might obtain by its interaction with the other side, in terms of visibility, subsequent research improvements and money for the academic researcher, and in terms of innovation, relationship with university and low prices for enterprises. An employee in ALFA clearly stated that *"it would be impossible for each part to achieve this surplus value, if alone"* (T2). But, for reaching stakeholders' satisfaction and good results in terms of technology transfer, ALFA had to prioritize issues and problems according to the immediate situation and let parties feel a major complicity, so maximizing the overall synergy. In doing so, parties became less obstinate on their positions and they ultimately got some benefits from their relation.

Also in EPSILON our informants clearly showed that the process through which

academics and CEOs interacted is based on the awareness that different stages were present and each of them had to pay more attention on some aspects instead of others. The general manager said:

> *"The bigger problem in this kind of collaboration is about communication. If you let parties communicate alone, then, after a while, each of them will come back home more uncertain and discouraged than at the beginning. So the bigger efforts is just in acting as mediator between them, in order to minimize incomprehension and let them understand that together could reach much more than alone"* (U5)

For example, they usually work for creating group of young researchers skilled in the issue of reference, in order to help academics and the industrial CEOs involved in the collaboration to deepen important aspects connected to the passage from basic to applied result. Also in GAMMA, the general manager said

> *"When an academic and an industrial manager meet, it's always a problem of point of view. We have to bridge their positions, without make a dent in their diversity. The effort is in leveraging one or another competence or point of view, according to the situation, in order to minimize conflict"* (I2)

For example, at the beginning they pushed academic researchers to work hard with the other party on the industrial development of research results. This might seem a facilitation for the industrial part only, in terms of competitive advantage over competitors. But, EPSILON always highlighted that this behavior would advantage academics too, especially in terms of publications, needed for career advancement. In fact, a well implemented innovation at the industrial level led academics to more appealing publications for their community of reference considering that, besides the theoretical result, they may show its applicability.

In this sense those organizations worked as a "buffer" between the two logics: keeping alive diversity, but leveraging the strengths that each part can bring in and being instigator of

different initiatives. This is a strategy for promoting the collaboration and enhancing the value of the final outcome. Paying attention to the differences that each phase of the process inevitably includes and trying to make up for the failure dangers that each of them embeds, is the key role of an organization that act as a "buffer" between two different fields.

Also in GAMMA they clearly work for buffering the different positions, by acting as promoter of new, good opportunities for both the parties (i.e., events participation, funding for research development, searching of capitalists, etc…), and always mediating between them, without letting them communicating alone. This obviously implies a very good knowledge of the process and a deep competence, in order to stress the different skills according to the phase of the process and, at the same time, do not vex the other part.

We perceived that this "buffering" strategy made stakeholders more pleased about the overall result, with better feedback in terms of quality of the relationship and a stronger belief to undertake other collaborations in the future. In this sense, we can say that this represents a way to stay exactly in the middle between the two parties, effectively promoting their collaboration, with the aim to reduce conflict and enhance satisfaction, and also to directly increase the organization reputation. An academic explicitly said:

> *"Every time we have to discuss about some issues, even not so important, EPSILON is always present. Even when you're angry about something and the intention would be that of messing up, at the end you come home with something good that you did not expect. This wouldn't be possible if we* [academics and industrial part] *were let alone"* (A1)

On the contrary, the behavior observed in the less successful organizations was much more detached and the effort was just in trying to link the two logics, letting them communicate by themselves. Their attempt was to put logics together, but without considering what might be done in addition to really obtain the best results possible. They did not pay so

much attention to the different phases of the relational process and to what each of them needed most. An employee in BETA said:

> *"There are cases in which the achievement of an agreement seems impossible. In such situations our role become too challenging and we can only let them speak* (…) *but we cannot avoid conflict"* (T7)

They were really convinced that the most important value of a collaboration was the direct communication between parties, where they acted as a link. But this strategy was not so much appreciated by a lot of stakeholders, both academics and industrial, who stated *"if the relationship is perceived in that way, perhaps their support would not be much required. I would expect something more"* (A2). A manager in DELTA told us:

> *"We really believe on face-to-face communication between parties: this allows them to confront directly on the key issues, even though it often results in strong misunderstanding, difficult for us to manage"* (I1)

Speaking, in terms of plurality and synergy, these organizations wish to preserve a high degree of the former, by favoring the aggregation of logics (i.e., safeguarding the different interests during the collaboration), but, practically, they achieve a lower degree of synergy between them, recurring to a more detached approach.

> *Proposition 4:* As regards organizations confronting highly uncertain activities with a high cognitive content, the likelihood of success in responding to institutional complexity is greater for those buffering multiple logics instead of those linking them

5. DISCUSSION AND CONCLUSIONS

Institutional pluralism and complexity have been recognized by institutional scholars to be a standard condition of organizational life in an increasing number of fields (Pache & Santos, 2012; Greenwood et al., 2011). Whereas most of the recent works using an

institutional logics approach have focused on particular responses to institutional complexity, none of them has addressed the problem of understanding which response may be considered more successful in dealing with that phenomenon. Our study brings new insights on this issue, trying to connect organizational dynamics, with strategic actions and the degree of success achieved in managing complexity. This finding allows us to advance the current debate and contribute to institutional theory by showing that the organizations do not conform passively to the demands coming from the environment, but purposively react to them, enough to get to respond differently to the same problem. In particular, we believe that our findings contribute to existing literature in multiple ways.

INTRA-ORGANIZATIONAL DYNAMICS

Following an organizational point of view, we think that our analysis gave us the possibility to better understand the phenomenon of multiple logics coexistence and the actions that organizations deploy to deal with it. The condition of institutional complexity confronted by organizations is neither straightforward nor simple. Institutional theory, which predicted passive organizational compliance to institutional demands, has been often criticized for its lack of an explicit and coherent theory of action (Pache & Santos, 2010; DiMaggio & Powell, 1991). Instead, our results suggest that organizational decisions and actions have a powerful effect on how organizations respond to the different interests and objectives coming from diverse stakeholders. This is a noteworthy point, if we consider that existing literature has often focused on the environmental, rather than internal, determinants of how organizations respond to institutional mandates (Greenwood et al., 2011; Pache & Santos, 2010). Our study suggest that to really appreciate the relationship between institutional complexity and organizational reaction, it is critical to delve into the organization and explore how actors perceive and react to those forces.

Our analysis of organizational dynamics drove us to what we consider the most

important contribution of the study. In particular, we found that not all the organizations responded in the same way to the same problem. Indeed, institutional complexity was perceived differently by organizations and that different strategies were considered significant to respond to it. Thus, an organization's response to a given institutional circumstance is not necessarily constant: it may change dramatically with respect to the organization, even if the situation itself is the same. In this sense, the analysis of organizational dynamics allowed us, on one hand, to dispel the myth of conformity and isomorphism in institutional theory (DiMaggio & Powell, 1983) and, on the other hand, to give insights about the diverse approach that organizations use in confronting institutional complexity. Our findings suggest that organizations might lessen the "conflict" experienced with institutional complexity by developing some particular strategies that allow to face that condition in a more successful way, compared to other organizations. Having boundary spanners, mirroring institutional demands, and acting as a buffer between the two logics, instead of just linking them, are the strategic actions that made a difference in the way in which organizations fared when faced with different institutional pressures.

Previous literature has explored the influence of specific organizational characteristics on institutional complexity including structure, field position, governance, ownership and identity (Greenwood et al., 2011; Pache & Santos, 2010), but we did not have an understanding of how organizational dynamics may make such complexity more or less acute (Greenwood et al., 2011). These organizational outcomes appear to reflect differences in the organization's ability to perceive the points of contrast, work on them and leverage the internal competences to find the most appropriate response. We find that particular strategies can enable organizations to please institutional referents and thus obtain their support. Thus, going in depth in exploring organizational dynamics and competing ideas, our paper provides foundational work to understand in a systematic way the impact of organizations' strategies

on this common phenomenon of conflicting institutional demands. Moreover, it allowed to know that not all the organizational responses to institutional pressures are the same, rather they may be different and associated to a higher or lower degree of stakeholders satisfaction.

MICRO-DYNAMICS OF INSTITUTIONAL THEORY

For almost two decades, scholars have stressed the need to make the micro-foundations of institutional theory more explicit (DiMaggio & Powell, 1991; Zucker, 1991), but there has been limited progress in this effort (Powell & Colyvas, 2008). The relationship between micro events in which participants act in situated and patterned ways (Goffman, 1959) and macro-level equilibrium has been recognized to be an important one (Dacin et al., 2010). In particular, in this paper, we help to bring some insights about the micro-level dynamics of institutional theory. Indeed, our study shows that the way organizational actors experience different institutional logics is not a direct reflection of how an institution appears at the macro level. Rather, institutional logics are refracted through individual experience and interaction. In other words, they are situated and interpreted at local levels.

Specifically, our findings highlight that actors' decisions and actions deeply affect the way in which complexity is perceived, experienced and managed. As an informant said, *"we* [the employees] *do not have the same perception of things* (…). I*t is just interacting with each other that we gain a more uniform idea and a clearer direction"* (U9). The decision to engage in actions, all directed to manage institutional complexity, such as employing particular figures and investing in specific competences, is an obvious example of how micro-dynamics within the organization and institutions at an higher level are connected. It was just the attention we paid to both less powerful members of organizations and managers, that enabled us to grab the importance of such micro-dynamics for the phenomenon of institutional complexity, that institutional literature has recognized to be present both at the organizational and at the field level.

We learned from our data that members of organizations engage in daily practices, deal with different prescriptions and demands, discover puzzles or anomalies, and develop answers to institutional complexity. We did not have data to explore in depth the decision-making process within organizations, but our findings clearly show that the different strategies that organizations deploy to confront multi-logics pressures are the result of actors' interaction, perceptions, choices, decisions and actions. In sum, we believe that our findings disclose that the management of institutional complexity is rooted in micro events. We therefore think that we have been able to respond to the call for institutional researchers to analyze, in a more systematic way, the relationship between organizational actions and field-level logics (Greenwood et al., 2011) and, in a sense, to return to the "coalface" of institutional theory in order to shed light on "the link between institutions and the person" (Barley, 2008; Powell & Colyvas, 2008).

LIMITATIONS AND FUTURE RESEARCH

The most important issue connected to case study research is the degree to which findings are generalizable to other contexts and to a broader sample. However, the use of a comparative, multiple case study of six organizations represented a stronger point in this sense. Although technology transfer is a particular activity, characterized by high uncertainty and complexity, we believe that our findings have applicability beyond this context, that we consider only a case among a lot of others. In fact, we sampled our organizations just looking at if they were or not involved in confronting a situation of institutional complexity and not at the content of the logics they had to deal with. For this reason, our findings may apply more broadly to other organizations subject to institutional complexity, and can be considered a result of a study that goes beyond the academic and market logics we took into account. It would be interesting to test and refine the results gained here in other contexts to more fully establish their validity and generalizability.

As regards future research, it would be interesting to analyze the decision-making process that allow an organization to successfully confront institutional complexity. We provided insights about the final strategies that made the difference in dealing with such situation, but we still lack a knowledge of the whole process that lead an organization to strategically react in a way instead of another. In this sense, it might be helpful to go more in depth in exploring the internal organizational conditions and connect them with the environment of reference (Greenwood et al., 2011). An example could be that of studying how organizational leaders' competences, skills, and capabilities affect the organization's ability to deploy some particular strategies and to respond more or less successfully to institutional complexity. This is suggestive of a more bottoms-up approach to organizational change in situations of institutional complexity.

Moreover, with respect to the institutional stream of research focused on change, it might be interesting to see institutional complexity as a process in which different phases are present, each of them with specific needs. Thus, for example, the technology transfer process, characterized by the diverging interests of university and industry, represents a dynamic process in which the equilibrium between logics change according to the different stages. The beginning and the end are not equal in terms of skills and abilities required. So, it would be interesting to better know under what circumstances, connected to the diverse phases, the perception and experience of institutional complexity change and, subsequently, how this differences affect the final response.

TABLES AND FIGURES

Table 1.

Year	Phase	Event
	The imitative openness	
1989		The State established the basic principle of self-regulation, increasing universities' administrative autonomy. Right and duties of academic scientists' relating to patents still governed by pre-republic "law on invention", which granted IPRs on employees' invention to employer.
	A more conscious working-out	
1993 - 1996		Further elaborations of the first reform introduced additional autonomy for university. In 1993, greater freedom in the use of funds coming from the Ministry In 1996 greater autonomy with respect to internal regulations (e.g., statutes)
1997		Introduction of the notion of "spin-off"
	The awareness	
2001		The State, moving in the opposite direction with respect to the European mainstream, introduced the so-called "academic privilege", that secured IPRs on scientists' inventions to the academic scientists themselves.
2004		The State returned back in stating that IPRs on public employees' inventions, that come from research financed at least by private sector or public organizations different from inventors' ones, lie with the public employer instead of the employees.

Table 2. Typologies of organizations involved in TT between academia and industry

Field of origin / *Positioning*	**One**	**Multiple**
Internal	Technology Transfer Offices	Joint Research Labs
External	University Incubators	University-Industry Consortia

Table 3. Description of cases

Cases	TTOs		UIs		UIC	
	ALFA	**BETA**	**GAMMA**	**DELTA**	**EPSILON**	**ZETA**
Founding year	2004	2001	2004	2000	2004	1997
Founding origins	University with an extended mission	University with an extended mission	University and Bank Foundation[4]	University, University Foundation and Bank Foundation	University and Firms Association	University, Chambers of Commerce, Local Governments and Bank Foundation
Positioning	Within the university	Within the university	Independent	Independent	Independent	Independent
Staff	6	4	3	2	10	9
Activity	Exploiting research results in various forms	Exploiting research results in various forms	Facilitating spin-offs creation and growth	Facilitating spin-offs creation and growth	Strengthening university-industry collaboration on specific projects	Strengthening university-industry collaboration on specific projects

[4] These Foundations are private, non-profit, autonomous organizations established in the early nineties in Italy, as a result of the law 218/90 (Amato law) which led to the privatization of the Savings banks and of the Monte banking group.

Table 4. More and less successful organizations in dealing with institutional complexity

	TTOs	**UIs**	**UBC**
More successful	*ALFA*	*GAMMA*	*EPSILON*
Less successful	*BETA*	*DELTA*	*ZETA*

Table 5. Typology of data and their use

Sources	Typology of data	Data use
Interviews *511 pages double-spaced*	*Preliminary interviews (5)* with top managers to investigate organizations history and their internal functioning	Familiarize with the organizational contexts Identify informants for the following focused interviews
	Semi-structured interviews (5) with academic executive	Go in depth in exploring changes within the academic context, to better understand the sudden opening up to technology transfer and collaboration with industrial world
	Semi-structured interviews (21) with informants within the organizations	Go in depth in exploring work processes and organizational characteristics Collect perceptions about the degree of success reached by the organizations in dealing with multiple logics
	Semi-structured interviews (22) with academic researchers and industrial manager to understand, on one hand, their objectives and interests and, on the other hand their overall opinion about the organizations involved in technology transfer	Identify the characteristics of the different institutional logics they belong to Gather opinions and perceptions about the degree of success that the organizations achieved in confronting institutional complexity
Archival materials	*Organization-related documents about*: organization chart, general data on projects, activities carried on, mission	Triangulate data and support information emerging from interviews
	E-mails exchange with top managers of the organizations	Refine information collected with interviews, have further details and triangulate data

Table 6. Descriptions of interviews

Interviewees	**Number**
Male	5 + 41
Female	7
Preliminary interviews	*5*
Focused interviews	*48*
Academic researchers	11
Academic executive	5
CEOs	11
TTOs	8
UIs	3
UBC	10

Table 7. Characteristics of academic logic and market logic

Characteristics	**Academic logic** *"Publications, open science and basic research for peer recognition"*	**Market logic** *"Secrecy and innovation for financial returns and competitive advantage"*
Goal	Basic research for publications	Innovate for competitive advantage and longer-term financial payoffs
Source of legitimacy	Personal expertise	Market position of the firm
Source of authority	Faceless	Top management
Source of identity	Personal reputation	Firm reputation
Basis of attention	Status in academia	Status in hierarchy
Basis of strategy	Increase personal reputation	Increase profits Build competitive position

Table 8. Data supporting the emergence of organizational characteristics

Theoretical categories	Representative quotations
Employing boundary spanners	"We really take advantage of previous experience that some of us had in contexts different respect to this one (…) We think that "hybrid" competences allow a more effective mediation" (UBC: Falavigna)
	"I think that my previous experience in the private sector represents an important asset for going straight to the point. The process of mediation between the two parties seems to be less difficult and complex" (UI: Fabris)
	"People with PhD represent for us an important resource: their technical background enables them to better grasp specific issues and connect the different pieces of the problem" (TTO: Conti)
	"Having people with different background and previous experiences would be important for improving our ability in bridging different positions" (UI: Bugamelli)
Mirroring institutional demands	"I perceive my organization being very clear about the division of tasks. This enhance a lot our timeliness and accuracy in responding to requests and problems" (TTO: Ruggeri)
	"In this organization we don't have a clear-cut division of assignments. Yes, I'm the reference person for spin-offs, but, if I happen to come across something else, I do it" (TTO: Pavan)
	"From the very beginning, we communicate to our stakeholders the persons to whom they have to make reference for each specific problem. So Elena deals with patents, Andrea with licenses, Francesca with all contracts, about legal aspects, (…)" (TTO: Conti)
	"(…) having defined reference point is important for us, in order to minimize response time and misunderstanding. If you have a specific problem and you know that you can rely on someone skilled on that, the reliability of the entire process increase and you are more incentivized to find a shared [with academic researchers] solution. In ALFA, I found that" (CEO di bologna)
	"We should enhance our specialization, in order to improve more our competences and proceed with a more clear division of work among us" (UBC: Malaguti)

Buffering multiple logics	"(…) it would be impossible for each part to achieve this surplus value, if alone" (TTO: Turchi)
	"When an academic and an industrial manager meet, it's always a problem of point of view. We have to bridge their positions, without make a dent in their diversity. The effort is in leveraging one or another competence or point of view, according to the situation, in order to minimize conflict" (UI: Fabris)
	"Each side could not achieve alone the same it can obtain with the interaction with the other part" (UI: Fabris)
	"During the different phases of the process, we always tray to assure the achievement of their [those of academic researchers and firms] different objectives, while leveraging their specific skills and competences for achieving the best we can from their collaboration" (UBC: Vignocchi)
	"Each phase of the process has different priorities and we definitely have to take into account this point. It is not enough trying to satisfy parties, we should seek the best solution for them, recurring to their different abilities according to the situation" (UBC: Falavigna)
	"Leveraging abilities and minimize conflict are our key priorities. We reach the result by always acting as a "buffer" between the two positions…this requires a very active role during all the process" (TTO: Conti)
Linking multiple logics	"We always try to achieve parity between stakeholders' interests. We work to reach a sort of compromise among their different objectives. But, often, we fail to reach an agreement because they stand firm on their own positions and we can't avoid conflict" (UI: Bugamelli)
	"It is very difficult to minimize the distrust they have of the other part. We believe letting them confronting face to face about their position would allow a better comprehension, but often this exacerbate the situation (…), then the relationship become even more mistrustful" (TTO: Pavan)
	"We really believe on face-to-face communication between parties: this allows them to confront directly on the key issues, even though it often results in strong misunderstanding, that are difficult for us to manage" (UI: Paulina)

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PAPER III:

HOW EXTERNAL SUPPORT MAY MITIGATE THE BARRIERS TO UNIVERSITY-INDUSTRY COLLABORATION

Elisa VILLANI[**]

Abstract

Although university-industry collaboration has been analyzed following different perspectives and approaches, some aspects are still scant and unexplored. This article assesses, by recourse to an inductive, exploratory case study of Technology Transfer Offices (henceforth TTOs), how external support may affect university-industry collaboration and what characteristics, both of parties and intermediary unit, might facilitate the success of those relationship. We considered two of the most active TTOs in Italy, namely Politecnico di Torino and University of Bologna, resting upon different kinds of documents and 25 semi-structured interviews with academics, CEOs and TTOs employees. Tapping the subdivision identified by Von Dierdonck and Debackere (1988), different barriers to university-industry collaboration, pointed out by respondents, are proposed. Additionally, our findings revealed previously underexplored aspects about TTOs support to university-industry relationship. In particular, we argue that university-industry collaboration is more likely to succeed if parties resort to external support (such as that of TTOs), and if specific characteristics of both parties and TTOs subsist. A summarizing model is proposed.

Keywords: University-industry collaboration; Technology Transfer Office; Technology transfer process; Case study.

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1. INTRODUCTION

How does a university-industry collaboration take shape when parties hold different interests and objectives? And, how external support may mitigate these barriers? With the evolution of globalization of markets and industries, European research is faced with the implications of new issues, such as innovation and new technologies, that have deeply affected research landscape (Commission of the European Communities, 2007). In particular, with the emergence of a knowledge-based economy, innovation and competitiveness are increasingly affected by the output of public research and by the ability of university and business to work together, so that technology transfer activities can be truly effective.

In this rapidly changing scenery, the importance of establishing a strong scientific knowledge base has become a fundamental asset for internal and international competition. More specifically, the change occurred in the international panorama has meant that the emphasis for competitiveness was increasingly placed on intangibles assets, rather than physical ones.

Since, historically, "research institutions were perceived as a source of new ideas" (Commission of the European Communities, 2007), the will of the business world to use these public ideas as strategic resource for competitive advantage has increased more and more. While, on a worldwide scale, for many years, university and research centers in general are providing their valuable contribution to economic development through more intense and effective technology transfer activities, in Italy, the need for sharing knowledge between public institutions and private organizations has become increasingly evident recently, leading, in particular, to a significant change in the roles of both parties. Lately, growing attention has been given to this debate, with more concrete initiatives and actions, undertaken both spontaneously and under the pressure of legislative impulses. Changes occurred at institutional level have further stimulated and facilitated actions promoted individually by

universities (Bianchi & Piccaluga, 2012). While public institutions need to play a more active role in the exploitation of their research results, industry should be more present in orienting and refining specialized research activities.

In 2001, the law 383/2001, so-called “Tremonti bis”, represented an important turning point for Italian research landscape, setting new rules about the ownership of patent rights for inventions. It allowed academic scientists to own patents arising from their research, overturning the legislation in force since 1957 (i.e., D.P.R. 3/1957), which established that the ownership of intellectual property was in-chief at the university. In 2005, the legislative decree 30/2005 strengthened the position undertaken by the Government four years before, however recognizing at the university the right to participate in any revenue for commercial exploitation of the patents.

After these preliminary remarks, the first, important consideration to do, concerns the fact that university and industry have been historically considered as belonging to different institutionalized spheres, that hold separate streams of knowledge. Their differentiation has often been based on the distinction between basic and applied research (Merton & Storer, 1973; Stokes, 1997; Murray & O’Mahony, 2007; Sauermann & Stephan, 2011). Merton and Storer (1973) highlighted that research and business world are linked to different norms and institutions, which represent different archetypes. In particular, while the research mission of academia is to carry on basic research, which results in fundamental insights, industrial world is focused on financial returns, that are connected to applied research and development (Sauermann & Stephan, 2011). All these differences constitute important barriers in managing those relationships, considering that each party may want to explore different aspects of a research project and that the results they are interested in may also diverge (Bruneel et al., 2010).

Nevertheless, the awareness of their interdependence is growing, both within

academia and industrial world. Thus, the importance of improving knowledge transfer between public research institutions and third parties has been recognized as a fundamental area for action. Many Italian universities have begun, in recent years, to set up dedicated Technology Transfer Offices, aimed at boosting and facilitating knowledge transfer, in order to promote competitiveness and contribute to the effectiveness of public research. But also other organizations involved in technology transfer activities, such as University-Business Incubators (UBIs) and Joint Research Labs (JRLs), are increasing more and more.

For all these reasons, the theme of public-private collaborations has merited considerable recent attention from scholars, and, within this broad issue, the ones between university and industry have caught management researchers' interest. In particular, although it has been widely recognized that academic and industrial worlds are substantially different, few studies have attempted to better understand the real barriers the two fields meet in collaborating and, moreover, which kind of support could attenuate the difficulties coming from these barriers, fostering their cooperation (Brunnel et al., 2010). The present work tries to fill this lack.

Our empirical results highlight barriers that academia and firms find in their collaborations. More interestingly, we emphasize in which way university-business relationship could get over these barriers, and which might be the determinants of their final success. To answer these questions, we will use an inductive, exploratory analysis, that is a multiple-case study, of two Italian TTOs. This units are considered, as contexts where science and business logics encounter for various forms of relationships. We rely on 25 semi-structured interviews with academic researchers, CEOs, and TTOs employees and on documents coming from different sources.

The paper is organized as follows: sections 2, 3 and 4 refer to previous literature to discuss the perceived differences between university and industry, the barriers to their

collaborations and the support they might receive by external units to overcome these difficulties; section 5 explains the methodology we use; section 6 shows the main results; section 7 discusses them, trying to shed light on open questions and future research, and concludes.

2. THEORETICAL BACKGROUND

THE REPUBLIC OF SCIENCE AND THE KINGDOM OF INDUSTRY[1]

According to stereotypical view, industrial and academic worlds represents two distinct knowledge production regimes, designed to perform different types of research (Sauermann & Stephan, 2011; Gomes et al., 2005). "While universities are primarily driven to create new knowledge and to educate, private firms are focused on capturing valuable knowledge that can be leveraged for competitive advantage" (Brunnel et al., 2010). As Gomes et al. (2005) said, we are speaking about the republic of science and the kingdom of industry.

The tension between the two domains is mainly based on the final interests embedded in the dominant norm which characterize those different contexts. On one hand, the academic field is described at best by the logic that emphasizes the importance of research as public good and of its disclosure in form of publications (Merton & Storer, 1973; Dasgupta & David, 1994; Sauermann & Stephan, 2011). Moreover, knowledge resulting from academic research is typically associated to basic research with little commercial value. This set of norms and values, have contributed to the development of a particular incentive system that "encourages the production and sharing of research findings based on non-financial incentives such as peer recognition from the scientific community" (Sauermann & Stephan, 2011; Merton & Storer, 1973; Stephan, 1996). Then, academic scientists are incentivized to

[1] The phrase is taken by Gomes et al., 2005

open up knowledge in order to obtain a certification of significance, represented by the publication per se (Gans et al., 2011).

On the other hand, business identity is depicted by rules and values that stress the relevance of commercial potential and financial returns. Taking into account these characteristics, business world is much more oriented to discourage research disclosure in order to rely upon secrecy and patenting of new knowledge (Sauermann & Stephan, 2011; Gans et al., 2011). So, industrial field is driven by a profit-making interest, which is in a sense maximized when an organization can exploit the competitive advantage derived from the development and capitalization of basic research. The incentives system, then, should be based on the attainment of longer-term financial payoffs.

The rules and norms associated with those diverse fields provide the context in which business contacts occur. The parties involved in a collaborative process, bring with them the logics that those contexts imply. Obviously, differences are more or less evident depending on the academic field of research (Brunnel et al., 2010; Rosenberg & Nelson, 1994). Many practical-oriented fields, such as engineering and physic, interact frequently with the industrial word and are often engaged in practical and applied problems. This implies that challenges in university-industry collaborations could vary considerably, considering academic research areas.

Despite that, their final interest and attitude remain substantially nonaligned if we consider that "the primary motivation of firms' knowledge creation activities is the appropriation of knowledge for private gain, and openness to external actors is used as a strategic mechanism to gain advantage over competitors" (Brunnel et al., 2010).

THE BARRIERS TO UNIVERSITY-INDUSTRY COLLABORATION ACCORDING TO EXTANT LITERATURE

University-industry collaborations and their influence on innovative processes and

technology transfer activities, have been a longstanding object of analysis in various scholarly communities in management studies, such as industrial organization, the economics of innovation, the sociology of science, and technology policy (Perkmann & Walsh, 2007; Hall 2004; Mowery & Nelson 2004; Agrawal, 2001). Agrawal (2001), in doing a literature review on university-industry knowledge transfer, said that papers on this topic can be divided in four categories, depending on their focus on the firms characteristics (Choen & Levinthal, 1990; Zucker et al., 2000), university features (Jensen & Thursby, 1998; Feldman et al., 2000), geography in terms of localized spillovers (Jaffe, 1989; Zucker et al., 2000), and channels of knowledge transfer (Choen et al., 2000; Colyvas et al., 2000). All these issues highlights the problem of aligning different ways of thinking and behaving, also considering that technology transfer processes have a multiplex nature that must account for the bi-directional exchange between those two institutional fields (Murray, 2002). Nevertheless, "collaboration between universities and companies can lead to several benefits" (Gomes et al., 2005). Previous works names a few, like creative breakthroughs, social change and outsider's perspective (Nissani, 1997), access to knowledge networks and funding (Saez et al., 2002), and global improvement of both management basic research and management practice (Amabile et al., 2001).

But, while most existing research focuses on the effects of university-industry links on innovation-specific variables, such as patents or firm innovativeness, the organizational dynamics of these relationships remain under-researched (Perkmann & Walsh, 2007). Also the nature of the barriers to university-industry collaborations, other than conflicts over IP, and the factors that might mitigate them are still under-explored (Brunnel et al., 2010).

UNIVERSITY AND INDUSTRY: WHICH ARE THE CHARACTERISTICS OF THEIR FIELD?

"Knowledge resulting from basic research has characteristics of a public good and typically has little commercial value" (Sauermann & Stephan, 2011). ""Ideal type" industrial

science….focuses on generating knowledge with direct commercial potential, i.e., applied research and development" (Sauermann & Stephan, 2011). Following previous literature, what basically distinguished university from industry was the nature of their goals, the reward systems, and the behavioral norms regarding the disclosure of knowledge (Dasgupta & David, 1994). Van Dierdonck and Debackere (1988) identified three categories of barriers to university-industry collaboration, that are cultural, institutional and operational (Gomes et al., 2005).

In particular, while academic research is driven by value of freedom, which implies a high degree of liberty in choosing which problems to cover and which approach to use in dealing with them (Sauermann & Stephan, 2011), applied research is much more devoted to the practical issues connected with specific firms' core business, implying a very little freedom for industrial researchers. Universities deal with work that is abstract, complex and ambiguous, considering that much of knowledge is tacit and that time spans between project initiation and output may be very long (Gomes et al., 2005).

Moreover, academic research does not rest upon a financial incentives system. It "has developed a distinct incentive system that encourages the production and sharing of research findings based on non-financial incentives such as peer recognition from the scientific community" (Sauermann & Stephan, 2011; Dasgupta & David, 1994). So, priority for discovery and publication characterizes the traditional goals of the academy, and reputation and peer recognition represent the most important internal reward mechanisms (Merton, 1973; Colyvas, 2007). And recognition by the side of peers can be obtained only by making research and its results publicly available. This incentives a lot the scientific community to rapidly disclosure the results of research via publications in top journals and presentations to prestigious conferences (Sauermann & Stephan, 2011; Siegel et al., 2003). The priority of

establishing reputation through knowledge disclosure is also critical to academic career (Brunnel, et al., 2010).

On the other hand, firms are focused on applied and practical research that promises financial returns. In order to obtain this goal, “firms rely on secrecy and patenting and discourage researchers from publishing” (Sauermann & Stephan, 2011). Moreover, the level of freedom inside the industrial word is completely absent, if we consider that it is organized in a hierarchical way. Firms desire proprietary knowledge and exclusive rights to the technologies that are generated, in order to exploit the competitive advantage derived from the development and capitalization of basic research. Business world is much more oriented to discourage research disclosure in order to rely upon secrecy and patenting of new knowledge (Sauermann & Stephan, 2011; Gans et al., 2011). The incentives system, then, should be based on the attainment of longer-term financial payoffs.

These domains posed contradictions as the features that reinforce industry also threaten to erode university (Colyvas, 2007). “Universities and companies have fundamentally different cultures, which are reflected in divergent goals, time orientations, basic assumptions, and languages used” (Gomes et al., 2005). University-industry collaboration concentrating too much on applied research and neglecting basic research may restrict academic openness, for example in the form of delays in publication or problems related to confidentiality issues, and also the quality of academic results may be affected so that the academic requirements cannot be met without extra work (Gomes et al., 2005). On the other side, one main worry related to collaboration from the point of view of firms is the outcome of such collaborations. The benefits and the output achieved may turn out to be insignificant respect to the efforts invested in joint research, and also the expected technology transfer process may not occur (Gomes et al., 2005).

We will show below a schematic table (Table 1), with a summary of the main differences between academia and industry, which represent the most important causes of barriers to university-industry collaborations.

Insert Table 1 about here

THE SUPPORT TO UNIVERSITY-INDUSTRY COLLABORATION

Within the large body of literature on university-industry relationships few attention has been paid to the role that external supporting mechanisms might play both in establishing university-industry links and coordinating them. Improving our understanding of diversities between academia and industry, could be crucial for identifying a set of organizational and managerial practices that might be significant to overcoming barriers to university-business relationships (Siegel et al., 2004).

The enhanced importance of technology transfer activities for global and local competitiveness asked the creation of dedicated offices and organizations (Piccaluga et al., 2010) for getting over the problem of aligning different ways of thinking and behaving.

In 1980, the United States legislation, known as the Bayh-Dole Act, represented an attempt, made by the Congress, to remove the obstacles to university to industry technology transfer (Siegel et al., 2003). In particular, immediately after this legislation, many universities established TTOs, to manage and protect the results of academic research. In fact, "the role of the TTO is to facilitate commercial knowledge transfer and technological diffusion through the licensing to industry of inventions or other forms of intellectual property resulting from university research" (Siegel et al., 2003).

A similar process, but a few years late, occurred in Italy at the beginning of this century with the law "Tremonti-bis", which had set new rules about intellectual property rights and had deeply sped up the process of TTOs creation. Thus, in contrast to most of the

rest of the world, the Italian legislator has introduced a rule similar to that in law is known as the “professor's privilege”, whereby the results of research conducted inside the University belong to the researchers rather than the institution (Bianchi & Piccaluga, 2012). This regulation change has obviously opened the problem of managing research results from academic scientists, in particular considering the trade-off they face in deciding how to use the findings of their pieces of research. Universities’ reaction has been to gear up for providing researchers with the necessary services to facilitate the industrial exploitation of inventions, avoiding the fact that they could independently pursue technology transfer activities.

In this way, on the one hand, TTOs bring academic research closer to practitioners and entrepreneurs in performing the commercialization of internal technologies, on the other hand, they allow firms to approach academic researchers using the support of an intermediary unit.

The 2010 research conducted by Netval, showed that the first TTOs mission was the promotion and exploitation, in an economic way, of the research results and skills. Moreover, the main objective was to improve technology transfer processes and sustain regional and local economic development. TTOs have been the subject of many studies, whereof the majority have scrutinized their effectiveness in enhancing university-industry technology transfer (Siegel et al., 2003), and the institutional, environmental and organizational factors which determine TTOs effectiveness (Siegel et al., 2003; Tahvanainen & Hermans, 2011).

So, our aim in this work is to better explore in which way the support to university-industry collaborations, in the form of TTOs, occurs and which are the features, both of TTOs, and of academic and business contexts, that contribute to mitigate the barriers to these relationships. In fact, as Siegel et al. (2003) said, the TTOs key stakeholders are: “(1) university scientists, who discover new technologies, (2) boundary organizations technology

managers and administrators, who serve as liaisons between academic scientists and industry and manage the university's intellectual property and knowledge, and (3) firms/entrepreneurs, who commercialize university-based technologies". A recent work by Brunnel and colleagues (2010) has already tried to analyze the barriers to collaborations and the factors which could mitigate such barriers, but there is still room to enhance our knowledge about this issue.

As such, our study is motivated by the following research questions: w*hat are the real barriers to university-industry collaboration? May the external support mitigate these obstacles? Which kind of characteristics are required to do this?*

3. CASE STUDIES SELECTION

The data presented in this paper have been collected as part of a larger study aimed at understanding how university-business collaborations take shape, what difficulties and incentives they meet, and which kind of support they receive by external organizations.

We will use an inductive approach for exploring the research questions we have posed. Taking into account that our aim is to bring new theoretical insights to the literature presented above and that the issues pertaining to university-business collaboration and, in particular, to the support they receive from outside, is still confusing, we retain appropriate, at this stage, to proceed with an exploratory case study method. It is important to clarify that, whether the purpose of the research is to develop theory at first, not to test it, theoretical (not random or stratified) sampling is appropriate. "Theoretical sampling simply means that cases are selected because they are particularly suitable for illuminating and extending relationships and logic among constructs" (Eisenhardt & Graebner, 2007). Using a theoretical sampling methodology, we will show below the cases we will select depending on the importance they would have for our analysis and subsequent development. In this sense, the selection of cases was very careful in choosing the ones that fit more our need to understand in depth some

aspects of university-industry collaboration.

So, in this paper, we conducted case analyses of two universities, and in particular of their TTOs, which have the goal to promote knowledge diffusion, from inside to outside, and technology transfer between university and enterprises. The two cases are the TTOs of Politecnico di Torino and University of Bologna. We considered several factors in selecting these two units as our cases.

First of all, University of Bologna and Politecnico di Torino represent two of the most active and oldest universities involved in technology transfer activities, within the Italian context, both in patenting/licensing and in spin-off creation. A second reason is that they are very different in terms of internal and external characteristics. Politecnico di Torino and University of Bologna include very different fields of research, which deeply affect the effectiveness and the success of their technology transfer work. While Politecnico di Torino is a technical University, composed only by Engineering and Architecture schools, University of Bologna has to deal with an heterogeneous university, which comprehends also humanities (besides scientific disciplines). In this sense, they allow to enhance variation between cases, which is a way for strengthening the findings from the entire study (Yin, 2004), increasing the robustness of final results. Moreover, these two TTOs had been chosen also for the importance of academic science and scientific results of the Universities they belong to. In fact, University of Bologna and Politecnico di Torino represent two outstanding examples both in terms of quality of research produced and of success in technology transfer and licensing operation (Bianchi & Piccaluga, 2012).

In Table 2 we summarize the main features of the two, that are institutional characteristics, and technology transfer and R&D involvement.

We introduce, then, the two cases, briefly explaining data gathering methods.

Insert Table 2 about here

TECHNOLOGY TRANSFER AT POLITECNICO DI TORINO

Despite Politecnico di Torino has all along developed a technology transfer culture as "institutional" mission, from a formal point of view it does not have an out-and-out Technology Transfer Office (TTO). The lack of an office so named and univocally recognized in its functions, may seem a paradox, especially for an university such as Politecnico di Torino, which has a strong technical and technological inclination and a strong technology transfer vocation (Bianchi & Piccaluga, 2012).

If we want to identify a specific period as "starting point" for a more informed discussion on technology transfer issues, we have to go back to the late '90s, when, under the rectorship of Prof. Zich, specific regulations for intellectual and industrial property and for spin-offs creation were established. The ad hoc regulations have helped to systematize procedures and processes related to patenting activities and firms creation, setting up specific principles and managerial aspects. Technology transfer activities and the relationship with the industrial world, which are usually peculiar to TTO, are managed by Ufficio Contratti, which is part of the wider Area dedicated to research support and technology transfer (SARTT). Ufficio Contratti has grown and strengthened its competencies during these 20 years: from the initial bargaining for third parties in the '80s, to the more active bargaining in the '90s, it has arrived to patent and licensing activities management and to the support to companies with high innovative value creation. So, Ufficio Contratti is not exclusively focalized on patenting, as a tool for research exploitation, but also on interconnected activities, such as the improvement of collaboration with industrial word and research centers, and the strengthening of the relations with the market for research results diffusion (Bianchi et al., 2012). As the responsible of the Office said, "the reference model for technology transfer activities is that of "Cittadella Politecnica", a label coined by rector Profumo, which

identifies a shared area, where the knowledge developed within the academia joints with practical application".

The Office dedicated to technology transfer activities is composed by 9 people, but only 7 have customary contacts with academics and firms. The Office is divided in three main domains, which are the support to national, regional and local projects, the support to European projects and the backup to negotiation with industry. The Office carries on a very productive activity in technology transfer, insomuch as the amount of funding received for national and international projects, conventions and contracts on behalf of a third party, amount to over 41 mln of euros in 2011 (Bianchi & Piccaluga, 2012). This Office is now recognized as the official interface between academic and industrial worlds.

TECHNOLOGY TRANSFER AT UNIVERSITY OF BOLOGNA

We find a formal Knowledge Transfer Office (KTO) at the University of Bologna since 2004, when a global Plan of revision and reorganization of the research area was improved. In particular, under the boosts of some academic researchers, who took as example some US universities, where they went to understand what was going on about technology transfer, an immediate awareness of the importance of such activities began to originate. Moreover, following the main idea of the Revision Plan, the fact that research had to be the central aspect of the University of Bologna and that research exploitation had also to be stimulated from on high, begun to spread over the university management level.

However, not all the rectorship have strongly worked on these issues, so that technology transfer activities related to patenting and spin-offs creation has not always been particularly stimulated. Sometimes, priority has been given to project design for European funding, while this part has been less pushed and incentivized, both from the point of view of the management of intellectual property coming from independent research, and intellectual property arising from commissioned or cooperative research. This is confirmed by the results

of the last years, which say that the quali-quantitative potential of Bologna University is at least 2/3 times what we see today.

Anyway, a continuous teamwork has led to KTO establishment, functioning, and improvement, and to the formation of two separate, but strongly interconnected, souls, that are intellectual property protection and intellectual property exploitation. While the first is much more focused on inventions protection through patents, the latter is more oriented on research valorization, both through the widening of contacts with business world, and through the establishment of spin-off coming from innovative ideas within University. As a whole KTO is now established within the bigger research area, denominated ARIC (Area Ricerca e Trasferimento Tecnologico). Nowadays, a team of 5-6 persons work full-time on these issues, trying to act as a bridge between academic researchers' inventions and industrial world needs. As a member of the management level says: "unfortunately the last and this years are unique years for the university system as a whole, with clear priorities, such as the enforcement of the university system reform – statute, governance, etc… - but, despite the situation of strong transition, with my drive and the political support of the Pro-rector for research, who has set up with the new Rectorate (this figure did not exist before), attention to the issue of intellectual property management and spin-offs creation are definitely coming back in vogue. We will see the results in a few years".

Insert Table 3 about here

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4. FINDINGS

THE OBSTACLES ACCORDING TO ACADEMICS AND CEOS

Table 4 shows the main barriers to collaboration perceived and pointed out by respondents. In particular, we hold to the three categories of barriers identified by Van Dierdonck and Debackere (1988) and we divide our results according to this criterion. We

also report in brackets the number of time that a particular obstacle was mentioned, in order to communicate the perception that respondents have about the inhibitory role of the barriers to collaboration they stressed.

The most important obstacles highlighted by academics and CEOs are in line with previous literature, even if some additional, interesting details came out. In particular, in the table below, we see that the problem of different time perception and language used is highly recognized both by academics and CEOs. Specifically, CEOs consider time a fundamental factor and a valuable resource, which has a high economic worth. Within the industrial world all is measured taking into account the final payoff and the time required to obtain it; if the latter cannot be quantified, the whole project is not worth to be undertaken. “Time is money” is the well known saying that in a well-suited manner characterizes the industrial world as a whole. On the other hand, academics consider time more as an opportunity for obtaining their results, rather than a fundamental resource which has to be controlled exactly. Whereas CEOs give a strategic meaning to it, academics are more flexible and deem more important to obtain better results in longer time rather than passable ones in a shorter one. Whereas CEOs prefer to work on time with uncertain and perfectible data, academic researchers tend to reach the best, even if it takes more time. This is not only an operational issue, but it also a matter of different incentives systems. In particular, where academics are incentivized to produce high quality research in order to obtain recognition from their peers, business world is completely market oriented, in the sense that it tries to use and exploit each result to satisfy customers’ needs. Within the industrial sector each process undertaken is much more considered in terms of costs rather than of possible benefits achievable with future investments. According to business, all the results obtained by research must respond to practical demands and be usable shortly; according to academia, the more a result coming from research is promising for future important, innovative discoveries, the more academic

researchers are prompted to go on, to try to find something really striking, without considering how long it takes.

As far as the cultural barriers concern, different mindset and motivations are the most common sources of conflicts perceived by academic researchers and CEOs in university-industry relationship. In particular, university and business world are often at variance with what they want and need. Their theoretical view, on one side, and practical, on the other side, bring too often to misunderstanding and to different approaches, which are hardly compatible without a deep mediation. Many collaborations do not come to end just due to these initial difficulties. The closeness of objectives and motivations is perceived by respondents to be highly important for undertaking a working relationship. What CEOs highlight is the fact that academic researchers often think to be in a position of superiority respect to knowledge transfer. What we, instead, believe is that both the sides have to learn from the other, and, if academia has a stronger position as knowledge holder in general terms, the industry could be more accustomed to work with practical problems. In this sense, if a collaboration aspires to become successful, the flow of knowledge, experiences and expertise should be bi-directional, instead of unidirectional from university to business world.

Subdividing barriers in cultural, institutional and operational, we found two main characteristics for each category. While the most relevant cultural barriers are mindset and motivation, the most important institutional ones are bureaucracy and incentives system, and the main operational barriers are the perception of time and the language used. In table 4 we quote pieces of answers given by academics and CEOs to our interview. We think that they are particularly suitable to clear our awareness about the specific barriers to university-industry collaborations, pointed out by respondents.

Insert Table 4 about here

WHICH ASPECTS CAN MITIGATE THE OBSTACLES TO UNIVERSITY-INDUSTRY COLLABORATION?

The most interesting issues come out from interviews are those related to support to the interaction between public research and industry. In particular, it is worth highlighting that both academics and CEOs put the attention on TTOs, as structures that could facilitate the relationships between these different parties.

Three major themes emerged in our analysis: the importance of TTO characteristics, the dimension and strategies of industrial part and the previous experiences of parties. Our results underline that the perception of respondents about the possible success or failure of TTOs, as mediators in university-industry collaboration, is highly linked to some TTOs internal characteristics and particular parties' features.

TTOs aspects can be summarized in two main categories:

- the characteristics of TTOs human resources involved in technology transfer activities;
- trust in complex and inter-fields relationship managed by TTOs.

As far as the external characteristics concern, respondents ascribe the success of those collaborations, for the most part, to two main aspects:

- the previous experiences of academics and CEOs in collaborative projects;
- the industrial part dimension and strategies.

We would like to linger over the TTOs features, that both academic researchers and CEOs stressed as those aspects that might contribute to make public-private relationships easier, especially during the negotiation phase. Specific characteristics of TTOs people and trust in collaborations managed by TTOs employees, are those aspects that both academics and CEOs have appreciated most in their past experiences.

In particular, as far as the former concerns, we found that respondents distinguish between two main typologies of characteristics: those related to competences and background; and those associated to personal attitudes. A CEO told us that "*not all the people can function as TTO employees and, in particular, as TTO manager. They should have particular characteristics both in terms of acquired competences and innate features. They have to manage complex situations in which each part tends to do its interests and reach its goals. Surely, they must look out for different needs and try to combine them*"

In table 5 we show in a schematic way what personal features of TTOs human resources are considered important by respondents for managing university-industry relationships.

Insert Table 5 about here

As we see in the previous table, both academics and CEOs think that specific expertise and attitudes of TTOs people are fundamental to hope that technology transfer takes place successfully. They stressed that TT is by itself a very difficult process, which highly depends on a large number of factors, not easily verifiable. In this sense, they believe that reducing the risk of failure with mediators having specific features and attitudes, might be a good solution for enhancing the effectiveness of TT process.

Besides the particular aspects highlighted above, another important issue, came out from interviews, in managing university-industry collaboration, is trust between parties and in particular trust in how TTOs manage those relationships. The importance of trust has been particularly highlighted both by academics and CEOs. According to academics, the quality of relationship with TTO is necessary but not sufficient to have a successful TT process. This has been even confirmed by people employed in TTOs, who firmly believe that without a relationship of trust with other parties, even the best technology would have problems to be

transferred on the market. So, the importance to play the right roles in the different phases and to align goals, methodologies and approaches, is fundamental to let researchers and CEOs think that TTO is acting in a clear way. A TTO manager said that "*trust in relationship is even more important, as we move outside the university, in the industrial world, where relations are a bit more complicated. In the business sector, there is a big mismatch between expectations and the actual TTOs ability to foster TT. Companies have strong expectations of university system, sometimes too high, sometimes too arrogant. This requires a very high feeling of confidence in TTOs employees, in order to expect a successful technology transfer process*". This is to say that, not only the feeling of confidence is fundamental per se, but it is even more significant as we go from academic researchers to business CEOs opinion; and this is due to the fact that the distrust of university offices from enterprises is higher than from inside. A CEO told that "*confidence in TTO people is a really important aspect considering that it affects the way we approach the relationships. If we trust them, we undertake the relationship more lightly and the likelihood to obtain a useful and innovative output is higher. I'm not actually able to tell which are the elements that increase trust, but surely the way TTO employees work and behave is fundamental for building a good relationship through their mediation*".

Considering the other aspects that have been mentioned by respondents, they are incident to firms characteristics, and academic and CEOs previous experiences in collaborative research. What is worth highlighting is that firm dimension often bear on the success or failure of TT processes. In particular, the most part of academic researchers and TTOs employees said that a collaboration with a big enterprise is, in a sense, easier to manage. A TTO manager told that "*big businesses already have a clear idea of what is research and what is needed to do it. Often, they have inner research units, but they lack in competences. Anyway, when you chat with this kind of persons, you can talk as equals*

because the objectives are many times convergent". So, firm size could make a huge different when TTOs try to manage university-industry collaboration. To reiterate the concept, big enterprises are often interested in frontier research, as well as in research that generates output immediately marketable. They have a more open mind and they are ready to spend more money for research usable and exploitable in the long term. This is a characteristics that academic researchers appreciate a lot, because academic research is not extremely market-oriented per se, and often springs out results that are unlikely to be used in the short period. For all these reasons, a collaboration with a big firm is more likely to succeed, also because the effort required of TTO for managing divergent goals, interests, etc. ... is lower.

As far as the last aspect concerns, all the respondents said that previous experience in similar collaborations plays a fundamental role in TT activities. In particular, if one side has already experimented a relation with a subject external to its field, when it decides to undertake a collaboration, it already knows the way of approaching, of acting and the requirements and requests of the counter-party. This allows to save time and to coordinate relationship in a more efficient way. Often, when parties decide to begin another collaboration after other experiences, it might mean that they had positive results and that the relationships with the other side was constructive. In this case, the effort to understand what the other part want and request is less burdensome. "*When I decide to embark on a relationship with a firm is always as if for the first time, even though I already had other experiences. But, when I find a company that has already experienced a collaboration with university, this is surely easier. It seems to speak with someone that already know my/our way of thinking*", said an academic researcher. A CEO of a small and medium enterprise told that "*the decision of beginning a collaboration with university is always a lottery. We know for sure when we start a project, but never when we will end. Things are different when the academic side already had an experience with our filed, because they are able to better*

understand our needs and our demands in terms of time and objectives. However, at the end, if we arrive, we are always late".

We report in Figure 1 the summarizing model, showing the main issues that have been highlighted by respondents, as those aspects that might facilitate a successfull university-industry relation.

Insert Figure 1 about here

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5. DISCUSSION AND CONCLUSIONS

The cases highlight that the absence of a unified culture and mission between university and industry lies at the bottom of incomprehension and different approaches for their collaboration. The model proposed in this work is that the presence of a third party, as mediator between university and industry, might enhance the likelihood of collaboration success a lot, if some specific characteristics are at play. What we want to stress is that the presence of a moderator is not, by itself, sufficient. Particular aspects have been identified in our work and they may be of interest both to academics and CEOs, which want to undertake a collaborative relation with the other party, but also to TTOs, that should interact with parties having different mindset and objectives. The model clearly states which are the main characteristics, identified by respondents, that might make the difference in collaboration outcome, and this could help each party to know in advance what difficulties it should meet, but also guidelines for how to let them converging.

We think that our study has both theoretical and policy implications. We contribute to the discussion on technology transfer and innovation (Bruneel et al., 2010; Abramo et al., 2009; Perkmann & Walsh, 2007; Agrawal, 2001). Although different approaches and lines of research have been followed in studying university-industry collaboration, extant works have mainly focused on the drivers of academia and industry interaction (D'Este & Patel, 2007),

on the barriers between them (Gomes et al., 2005; Bruneel et al., 2010), and on collaborations as a whole (Philbin, 2008; Perkmann & Walsh, 2007). Little is known about the aspects that might influence the performance and effectiveness of those relationships. In this sense, shedding light on the support that university-industry collaboration may receive by external unites, such as TTOs, we contribute to enhance our understanding on how the barriers between academia and industry might be mitigated. We also make a differentiation on the nature that such obstacles can have.

However, we think that the most interesting and innovative issue we report is the one related to the external support that university and industry might receive from TTOs, as outer units respect to collaboration. Surprisingly, even though some recent works appeared on the issue, such a topic is still messy and confusing on management studies. By showing some characteristics which have an impact on the collaboration outcome, we enhance our knowledge on this theme from a theoretical point of view. This has been possible thanks to the use of an inductive methodology, that try to generate theory from observation.

As far as management implications concern, dealing with TTOs, and relationships that occur among them and academics and CEOs, this work might be of use for firms managers, who are trying to establish contacts with academic researchers, but also for universities and scientists. Findings could be useful to managers for better understanding barriers and opportunities in technology transfer relationships where multiple interests are present. This is especially true in the Italian context, where no scientific researches deal with these problems.

Moreover, focusing on organizations which mediate these collaborations, will shed more light on their effectiveness in combining different interests and objectives.

We could try to test out our results in European countries that have characteristics similar to Italy, both in terms of university and industrial system. On the other hand, it might be also interesting to understand whether relevant differences exist among Italy and countries more

advanced respect to it in the market economy.

A future extension aimed at comparing Italy with another country is not excluded. In particular, it would be interesting to rest upon the variables reported in this work, and compare the results obtained in this study with the ones from another country comparable with Italy, to see if substantial differences spring up. This might be done using a quantitative approach, with hypothesis testing.

TABLES AND FIGURES

Table 1. Main differences between university and industry

Cultural differences	**University**	**Industry**
Objectives	Basic research for publications	Applied research for economic results
Motivation	Disclosure of research results for academic career and recognition	Protect research results for competitive advantage and financial returns
Institutional differences	**University**	**Industry**
Reward system	Based on peer recognition and reputation	Based on financial returns
Organization of work	Academic scientists enjoy high level of freedom vs. lower wages	Industrial researchers enjoy low level of freedom vs. higher wages
Operational differences	**University**	**Industry**
Language used	Abstract, ambiguous and complex	Goal-oriented and concise

Table 2. The main characteristics of Politecnico di Torino and University of Bologna (2011)

Institutional characteristics	**Politecnico di Torino**	**University of Bologna**
Institutional Control	Public	Public
# of students	30,000	87,000
# of academics (full, associate and assistant professors)	839	3,900
# of academics in Engineering and Architecture	900 (2011)	435 (2009)
Foreign students on the total	15%	6%
# of fileds of study	2	19
Typology of Schools	Engineering and Architecture	Arts and Humanities, Engineering and Technology, Social Science, Life Science, Physical Science, Health
# Research Doctorate Programs	< 30	> 50
Technology transfer characteristics		
Existence of formal TTO	No	Yes
Office/Area Name	SARTT Area	Knowledge Transfer Office
Establishment of TT activities	late '90	2002-2003
# of employees dealing with TT activities	7	5
# of patents	29 (approved in 2011)	177 (existing at 2011)

Table 3. Data sources

Semi-structured interviews	**Politecnico di Torino**	**University of Bologna**
Academic researchers	5	3
Academic management level	2	2
CEOs	3	3
TTOs employees	3	4
Other sources (website, formal and informal documents, report, etc…)	30 pages	20 pages

Table 4. Barriers to collaboration pointed out by respondents

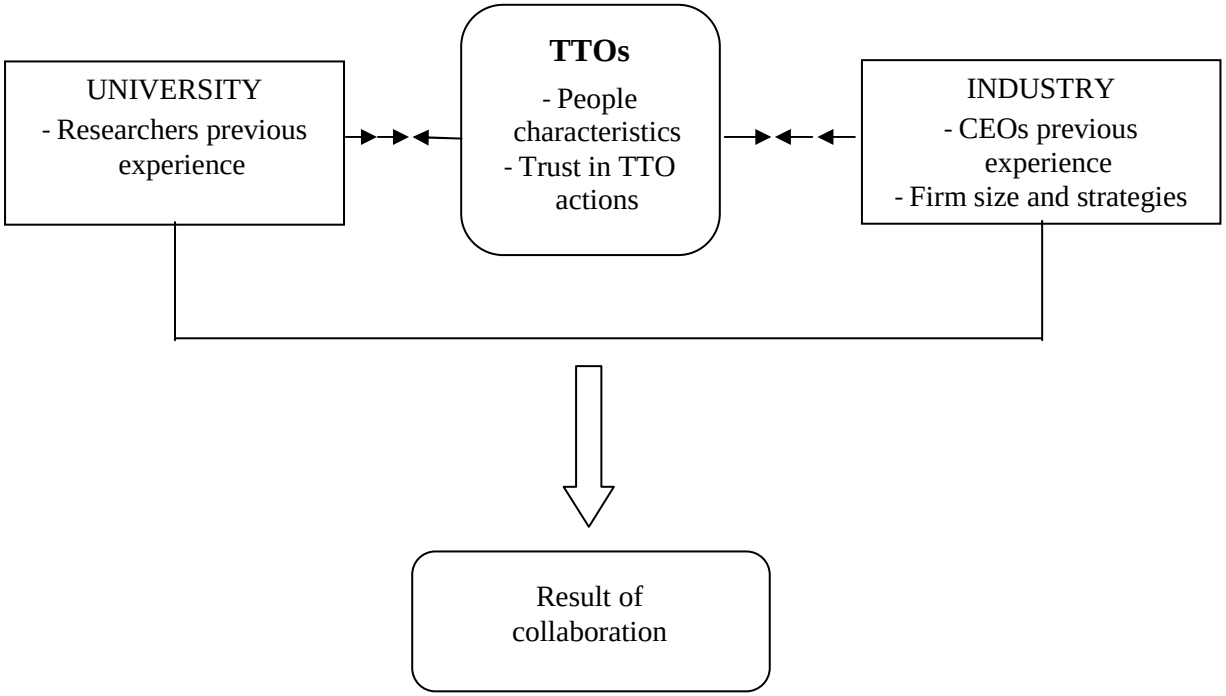
Cultural barriers	**University**	**Industry**
Mindset (24)	"Business world is strongly convinced that we have solutions ready for use. They don't understand that solutions for specific problems could take even months or years to be found. We are not a shop where they can find solutions at a low price" (resp. 11)	"Academic researchers too often believe that their inventions are useful and marketable a priori. This is absolute wrong! Cooperation and coordination is for that reason fundamental; but, academia rarely accepts instructions and suggestions" (resp. 2) "We are absolutely aware that academia is the most reliable knowledge holder. But, while we recognize its superiority on "the what", on the other hand we believe that "the how" should be agreed with us from the beginning" (resp. 3)
Motivation (24)	"We have always to consider that our first objective is to advance the frontier knowledge. So, knowledge diffusion is extremely important to let other researchers learn what we already know and what is missing" (resp. 6)	"What is sometimes hard to impose on academic researchers is the fact that results protection lies at the bottom of our competitive advantage. We are highly motivated to keep knowledge and innovative results secret, because our life is the death of our competitors" (resp. 14)
Institutional barriers		

Bureaucracy (24)	"The problem of bureaucracy within university is something that actually exists. In this case I agree with CEOs and I completely understand their point of view" (resp. 7) "CEOs always notice that our bureaucratic system is too hard-shell. It is difficult to answer back to this remark, but it is something that we cannot control at all" (resp. 1)	"Bureaucracy within university is something indescribable!! If you are in a hurry and want a contract within a week, be sure that you have to wait at least 1 or 2 months" (resp. 18)
Incentives system (17)	"Our major incentive is to produce scientific output and to publish them in top journals, in order to facilitate career and to obtain credibility and high recognition within academia" (resp. 8)	"We are incentivized to obtain economic results as soon as possible. Only in that way we can hope for pay increase and fast career" (resp. 20)
Operational barriers		
The perception of time (24)	"Our way of working is not based on the haste to arrive to a final and concrete result. This is not our priority" (resp. 16)	"Our way of working is based on short-term plans and specific goals. Time is money!" (resp. 19)

Table 5. What kind of characteristics TTOs human resources should have, in terms of both acquired and innate characteristics, and what they should do, according to academics and CEOs

Acquired expertise		**Innate characteristics**
Competences	**Background**	**Attitudes**
They vary depending on technology transfer (hereinafter TT) activity. In particular, different phases of TT require different competences in terms of legal, marketing, technical-scientific, etc… knowledge	Preferably specific kind of education: economics, law or engineering	The importance of communication and public relations in TT activities, both with academics and CEOs
Importance to do refresher courses on specific TT issues	Preferably with postgraduate education (this requirement has been much more stressed by academic researchers)	Ability to work in team
Ability to understand more or less what a technology is about and knowing the process of patenting	With previous work experience. The best would be to have work experience both in the public sector (to know its bureaucracy and rules) and in the private one (to know its needs and demands)	Ability to understand different needs and requirements and to manage and mediate among them
	Preferably with previous experience in TT activities: *learning by doing*	Ability to build and maintain social relations: to do network

Figure 1. The model



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APPENDIX A

INTERVIEW PROTOCOL FOR ORGANIZATIONS[6]

PROFILO INTERVISTATO

- Quando ha iniziato a lavorare in quest'organizzazione e che ruoli ha ricoperto finora?
- Cosa l'ha spinta a lavorare per quest'organizzazione?

PROFILO ORGANIZZAZIONE

- Saprebbe dirmi quando e come quest'organizzazione è stata fondata (chi ne ha preso parte e chi l'ha veramente voluta)?

  - ***Caratteristiche organizzative***

- Quante persone impiega attualmente?
- Qual è il tasso di crescita? Il turnover è alto o basso?

  - ***Obiettivi e Valori***

- Qual è il principale obiettivo (terminal value) di questa organizzazione? Ce ne sono di secondari? Sono collegati fra loro?
- Quali sono i valori fondamentali (instrumental values) di questa organizzazione?

(ES. efficienza operativa, soddisfazione stakeholders, soddisfazione dei dipendenti, spirito di appartenenza, massimizzazione profitto, crescita, sopravvivenza, apertura verso l'esterno, alta produttività, riduzione dei costi, ecc...)

- Nella sua percezione, gli obiettivi differiscono fra le persone che lavorano all'interno di questa organizzazione?

[6] This protocol has been drawn up following some examples present in neo-institutional literature and the valuable suggestions given by some neo-institutional scholars, such as Anne-Claire Pache and Royston Greenwood.

- Ed i valori? In che senso?

- ***Struttura organizzativa***

- Qual è la struttura di governance di questa organizzazione?
- Qual è la composizione del Consiglio di Amministrazione/Organo decisionale? Come è stata scelta questa composizione? È cambiata nel tempo?
- Che tipo di decisioni prende?
- Ritiene che la composizione del CdA/Organo decisionale, così come lei me l'ha detta, incorpori interessi provenienti da diversi contesti istituzionali?
- Pensi alla sua organizzazione; fino a che punto può essere considerata complessa in termini di:

  relazioni interne (1 = non complessa (linearità delle relazioni), 7 = molto complessa (relazioni difficili e poco chiare));

  relazioni con altre istituzioni/organizzazioni (1 = non complessa (poche relazioni con altre istituzioni), 7 = molto complessa (relazioni con molte istituzioni diverse));

  processi decisionali (1 = non complessa (processo lineare e chiaro), 7 = molto complessa (molti punti di vista da prendere in considerazione per prendere decisioni))?

- ***Caratteristiche di contesto***

- Chi sono i principali portatori d'interesse di questa organizzazione?
- Quali sono gli interessi di ognuno di essi?
- Secondo lei, ci sono dei portatori d'interesse che godono di una posizione privilegiata (ES. maggiore peso sui processi decisionali)?

- Se lei dovesse valutare la loro importanza per questa organizzazione, come valuterebbe ognuno di loro (1 = non importante, 7 = molto importante)?

- ***Strategia organizzativa***

- In che modo questa organizzazione salvaguarda gli interessi degli stakeholders provenienti da diversi contesti (es. Accademia vs. Mercato)?
- In che modo vengono gestiti i rapporti con loro? Tutti gli stakeholders vengono considerati sullo stesso piano, o qualcuno ha dei canali preferenziali e più veloci?
- Quale serie di incentivi questa organizzazione mette in gioco al fine di salvaguardare gli interessi dei suoi diversi stakeholders?
- Quale tipo di incentivi, secondo lei, potrebbero contribuire a stimolare la collaborazione fra diverse parti?
- Ritiene che questa organizzazione abbia sempre facilitato la collaborazione fra parti portatrici di diversi interessi, portandole ad un accordo/allineamento; o, piuttosto, ritiene che in alcuni casi il coordinamento di esse verso un accordo non sia stato raggiunto? Potrebbe fornirmi qualche esempio di entrambi i casi (se ce ne sono)?
- Come vengono prese le decisioni in questa organizzazione? Da chi e seguendo quali criteri? (rifletta su un caso recente in cui è stata presa una decisione e quindi sulle persone che sono state coinvolte)
- Se pensa ai processi decisionali di questa organizzazione, fino a che punto possono essere considerati ambigui e caratterizzati da conflitto fra le persone? Fino a che punto la decisione finale può essere attribuita a scelte interne e/o a politiche/attori esterni?

- Che tipo di indicatori usate per valutare la performance di questa organizzazione?
- Avete un indicatore sintetico?

- ***Strategia commerciale e finanziaria***

- Qual è la principale strategia commerciale di questa organizzazione?
- In che modo la "scienza accademica" e la "logica di mercato" vengono usate in essa?
- Ritiene che questa organizzazione abbia dei concorrenti? Se sì, chi sono?

- In generale, come viene finanziata questa organizzazione?
- Che tipo di sussidi/finanziamenti – sia pubblici che privati – riceve (se ce ne sono)?
- Come viene allocato l'utile?

- ***Tensione fra logiche istituzionali***

- Percepisce all'interno di questa organizzazione una tensione fra la dimensione "accademica" e quella di "mercato" (tensione intesa anche semplicemente come divergenza di vedute)?
- Se sì, in che senso (fornire degli esempi se ci sono)?
- Queste tensioni sono problematiche da gestire?
- Secondo lei, quali sono le principali cause di queste tensioni?
- Come pensa che potrebbero essere risolte? Come vengono realmente risolte?
- Pensi che la tua organizzazione sia un punto di riferimento, in termini di trasferimento tecnologico, per accademici e managers d'impresa?
- Pensi che loro siano soddisfatti del lavoro che voi svolgete?

- Oltre al mondo accademico e a quello del business, quali altri contesti istituzionali sono presenti in questa organizzazione? Cioè, quali altri interessi, impersonati da altre parti, vivono qui dentro?
- Secondo lei, in questa organizzazione è considerata più importante la performance economica o l'efficacia delle attività di trasferimento tecnologico?

APPENDIX B

INTERVIEW PROTOCOL FOR ACADEMICS, EXECUTIVES AND INDUSTRIAL MANAGERS[7]

PROFILO ACCADEMICI E MANAGERS D'IMPRESA

- ***Caratteristiche del lavoro svolto***

- A quale istituzione sente di appartenere?
- Se dovesse descrivere il suo lavoro (come scienziato o uomo d'affari) in 3 parole, cosa direbbe?
- Come descriverebbe, brevemente, il principale obiettivo del suo lavoro (come scienziato o uomo d'affari)? E quali sono, secondo lei, i valori fondamentali connessi ad esso?
- Se dovesse classificare la loro importanza, come li classificherebbe (1 = non importante, 7 = molto importante)?
- Quanto considera importante il loro rispetto/osservanza? Perché?
- Cosa fa/come si comporta, in termini pratici, per rispettarli?
- Se dovesse infrangere questi valori, cosa pensa che potrebbe accadere? Questo comportamento come verrebbe considerato dai suoi colleghi?
- Fino a che punto considera importante l'opinione dei suoi colleghi circa il rispetto di regole e norme relative al suo lavoro?

- ***Incentivi a collaborare***

- Quali sono, secondo lei, le differenze più rilevanti fra il mondo dell'accademica e quello del business?

[7] This protocol has been drawn up following some examples present in neo-institutional literature and the valuable suggestions given by some neo-institutional scholars, such as Anne-Claire Pache and Royston Greenwood.

- Se dovesse pensare a 5 “cose” che potrebbero incentivarla ad intraprendere una collaborazione lavorativa con persone che appartengono ad un contesto diverso (ambito professionale), quindi con diversi interessi rispetto ai suoi, cosa direbbe?
- Ritiene che collaborare con persone appartenenti a diversi contesti istituzionali, quindi con diversi obiettivi ed interessi, sia utile o no? Perché?

- Le organizzazioni di “confine” come i TTOs e gli Incubatori Univ. cosa le permettono di raggiungere in più, in termini di rapporti di collaborazione, che prima non era possibile?
- In che modo e fino a che punto esse permettono l’allineamento dei suoi interessi con quelli di parti diverse (con diversi interessi)?
- Ritiene che il compito che esse svolgono sia importante per il raggiungimento di questi accordi fra le parti; oppure, ritiene che lo stesso risultato potrebbe essere raggiunto anche senza la loro presenza?
- Qual è il tuo grado di soddisfazione riguardo alle esperienze avute con questo tipo di organizzazioni?
- Pensi che ti rivolgerai ad essere per progetti future?
- Sei in buoni rapporti con loro e con la parte industriale a cui loro, in qualche modo, ti hanno fatto avvicinare?

DOMANDE A RAPPRESENTANTI ISTITUZIONALI (ES. RETTORE, VICE RETTORE, ECC…)

- Potrebbe ricostruire il quadro organizzativo che c’è a monte della scelta delle Università, ed in particolare per questa Università, di differenziare i modi con cui interagire con le aziende private? Nello specifico, pensando ai TTO, Incubatori, Laboratori congiunti di ricerca e Consorzi/Fondazioni, cosa aveva in

mente questa Università e quali obiettivi si prefiggeva di raggiungere, nella collaborazione con il privato, con ciascuna di queste forme organizzative?

- Quando questa Università ha deciso di aprirsi ai privati? Cosa significa per questa Università collaborare con aziende private?
- A livello di processi decisionali, chi ha deciso ed in che modo è stato deciso di aprirsi verso l'esterno?
- Ci sono state delle Università che hanno fatto da capofila nella creazione di queste organizzazioni? Cioè, c'è qualcuno che ha dato l'avvio a questo tipo di strategia, a cui poi gli altri si sono allineati?