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Facultat de Ciències Jurídiques i Econòmiques · FCJE

ORGANIZATIONAL AMBIDEXTERITY IN THE ACADEMIC RESEARCH CONTEXT

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1. <u>INTRODUCTION</u>

Nowadays it is well-known that the world is characterized by complexity and dynamism, this clearly involves the strive for differentiation, competitiveness and competitive advantage. There are more exigencies for organizations and as a consequence the need of acquiring new and more capacities and skills, becomes a priority on all kinds of organizations, this is understandable if you take a look at the actual the economic context which develops as an extremely competitive environment.

In this context the main goal for every institution on the economic system is to survive in the long run and generate profit in order to prolong the activity to the longest possible time. It is understandable that the main tools for achieving this, are the capabilities and resources of a firm or organization because it represents an absolutely fundamental pillar in order to grow and prosper. With this in mind we can observe that this circumstances provoque an exhaustive strive for competitiveness for organizations, countries and firms, in order to gain a position in the market and sustain the resources and capacities in the long run with the aim to not only survive, but to stand out in their respective markets and action areas.

The best way an organization can achieve this, is to manage wisely its core competencies, some authors talk about this, such as Prahalad and Hamel (1990) determined that core competencies are multi use, valuable and inimitable. Barney (1986,1991) identified the conditions for a resource to offer sustained competitive advantage as value, rarity, inimitability and non-sustainability. Grant (1991) analized that for profit-generating sustainable capacity to emerge, it must be durable, non-transparent, non-transferable, non-replicable and appropriable. Peteraf (1993) describe the conditions underlying sustainable competitive advantage as resource heterogeneity ex post limits to competition, imperfect resource mobility.

This is closely related to the resource based perspective of the organizations nowadays and of course this can be improved through organizational learning and adopting new capabilities.

This Learning Organization concept would help us define and understand the ambidexterity because the resource perspective consider firms as learning organizations, that are capable of improve capabilities through experience. It is considered a institution that is always being shaped, and modified. (Nelson and Winter, 1982) Knowledge-based competencies are enhanced even as they are applied (Prahalad and Hamel, 1990), since they are firm-specific assets, which are subject to learning and change through their very application to problem solving. (Dosi and Marengo, 1992)

This concepts makes us realize that obtaining and maintaining the competitiveness in the long run has much to do with the entire process of resource acquisition, and it may be so complex that even the firm may not know the exact process by which it came to be acquired.

This resources and competencies will mark the path for success or failure. The authors Nelson and Winter say "There is an irreversibility in organizational decisions and firm resources evolve in a path-dependent manner -past resource acquisitions determine and constrain future opportunities. A firm has only a limited range of repertoires, and these ingrained repertoires limit its future choices". This concept reflects on how difficult it is to master the efficiency of today and the adaptation and visioning the future with dareness.

As a response of this situation the concept of ambidexterity has an increasing importance for the new firms and institutions of the 21th century and it is gaining attention by the experts and of course it is opening new areas for investigation and research in order to understand its correlation with the organizations capacities maintained in the long term, and the performance attributed to it.

Ambidexterity tries to ensure the success of any institution, organization or firm. This concept stresses the idea that there is a need to develop the capability to maintain equilibrium between the dichotomy of two opposite objectives that we are going to explain in further deep: exploit and explore. If an organization is capable of efficiently manage this duality it will be able to develop and maintain the competitive advantages in time.

The Ambidexterity concept seems really attractive and at the same time useful for facing the adversities of today's world. For all this, this work mainly intends to analyze the contextualization of this concept due its importance, and in particular we are going to study its impact on a near scenario. To emphasize the research on a real environment, we are going to focus on a real frame of reference: The University.

The University represents a strong part of the productivity and competitive advantage for both countries and firms, even if it has an indirect relation, we understand the great importance for the economy in general and the impact on innovation, education, patents, technology, professionals, values, etc.

As we can see a university becomes a more an more complex organization with strong traditional values but with a soul of innovation which represents the center of knowledge for countries and firms. Universities have increased tensions and conflicts between new activities of commercialization, and the traditional ones related with teaching and research (Chang and Yang, 2008).

The core reason behind applying this in the university is mainly due by the close relation between research and innovation. Since this activities are tightly linked with the competitiveness for governments and even firms due by the interdependence of the organizations and the impact of this activities on the struggle for competitiveness.

Understanding this parameters we can see that innovation needs a very particular environment to successfully develop, a dual complex process which needs both: explorative and exploitative aspects. Innovation (West & Farr, 1990) is defined as "the sequence of activities by which a new element is introduced into a social unit, with the intention of benefiting the unit, some part of it, or the wider society". Clearly, when we read this definition, we can immediately think about the universities mission.

In order to understand ambidexterity, this paper has the objective of clarifying the concept of ambidexterity, analize some factors that foster it, compare them in the reality on research groups at Universities, analize if they have this factors and if the theory meets the practice.

2. AMBIDEXTERITY

The Ambidexterity Concept is considered to begin in 1991 with March. He is known as the pioneer by the literature, he explained that there are two main factors that we have to take in account: explore and exploit. In organizational terms the ambidexterity can be defined by the capacity to combine two opposite paradigms such as exploitation and exploration and maintaining an appropriate balance between them. But to understand this more clearly we have to understand this two previously mentioned contrary concepts.

Exploiting is related to concentrating efforts on the existing competencies and capabilities that the firm or organization in a traditional way. This means choice, refinement, production, selection, execution efficiency and implementation. But focusing too much on the exploitation blurs the long term horizon and it may indirectly provoque the loss of their competitive advantages. Exploitation is associated with activities like "refinement, choice, production, efficiency, selection, implementation, execution" (March, 1991, p. 71).

Exploring refers to the emphasis on the creation of potential opportunities, preparing the conditions for innovation and not being afraid to take risks. But if we take this to the extreme could result totally counterproductive. Exploration is associated with activities like "search, variation, risk taking, experimentation, play, flexibility, discovery, innovation" (March, 1991, p.71).

James March refers to this as: "The exploration of new possibilities and the exploitation of old certainties.". Balancing this elements is called Ambidexterity. It is also known as "an organization's ability to be aligned and efficient in its management of today's business demands while simultaneously being adaptive to changes in the environment" (Raisch, Birkinshaw, 2008, p. 375). The three major approaches at the organizational level identified within the literature are temporal, structural and contextual ambidexterity (Tushman and O'Reilly 1996).

In one hand structural ambidexterity is explained by organizational mechanisms, formal structures and coordination mechanisms. As the authors Gibson and Birkinshaw say: Structural ambidexterity can be achieved by "developing structural mechanisms to cope with the competing demands faced by the organization for alignment and adaptability" (2004 p.211).

This authors, as well as Simsek et al., 2009; Tushman and O'Reilly, 1996; Simsek, 2009; maintain that the conjunction of exploitation and exploration create the structural ambidexterity. Structural ambidexterity involves the creation of different but loosely coupled organizational architectures within a company in the form of physical spaces, incentives, business models, metrics, or cultures (Burns and Stalker, 1961; Tushman and Anderson, 1986; O'Reilly and Tushman, 2004). In the past, structure often meant physical separation between innovation and improvement projects.

On the other hand temporal and structural ambidexterity, exist when exploitation and exploration obstruct each other. Farjoun (2010) says that the duality of exploitation and exploration will generate conflict. "Duality suggests instead that stability and change in different units and hierarchical levels may intertwine and depend on common practices and that rather than negating and displacing one another, they can mutually reinforce each other in a process of renewal" (Farjoun 2010, p. 218).

Temporal ambidexterity was proposed by Duncan (1976), an it mainly implicates division of time between tasks, this means that a part of the organization will focus on certain tasks at a given time (Volberda, 1996; Victor et al., 2000), working on innovation projects first and improvement efforts later. This means that the activities regarding exploration and exploitation will have specific periods of time.

Contextual ambidexterity concept was introduced in posterior years. It accentuates the alignment among the organization, individuals, and teams in order to sustain superior performance. This process naturally translates into a sustained competitive advantage. (Gibson and Birkinshaw, 2004). The authors also said in their study that the difference between the contextual ambidexterity and structural ambidexterity is that the contextual ambidexterity is not achieved by the existence of two separate structures, but by building systems that support the individuals to make their own judgments about how the division of their time between conflicting demands for alignment and adaptability (Duncan, 1976; McDonough & Leifer, 1983; Tushman & O'Reilly, 1996) They also explained that: "Simultaneous development of the two activities is a primary factor in system survival and prosperity. Under this logic, contextual ambidexterity should be a key driver of business-unit performance over the long term" (Gibson and Birkinshaw, 2004 p.212)

4. CONTEXTUAL AMBIDEXTERITY IN UNIVERSITIES

For the aim of this research, we are interested on inquiry the ambidexterity on a contextual perspective, since the environment of the academic research is considered to have a remarkable importance about the organizational context, concerned about systems, processes and beliefs that shape individual-level behavior in an organization (Ghoshal and Bartlett, 1994).

Gibson and Birkinshaw (2004) say that business unit contexts enable employees to conduct both exploration and exploitation activities, this means the individual's ability to explore and exploit.

One way to achieve contextual ambidexterity is when individuals decide between applying the exploitation or the exploration in their daily work and divide their resources on both activities. This environment should be designed to allow and encourage all people to judge for themselves how to divide their time between conflicting demands for exploitation and exploration (Gibson and Birkinshaw, 2004; Griffin, Neal and Parker, 2007). This statement makes clear the need for flexibility of the organization because it has to be capable to allow employees to discern between the dictocomy of both options and how they are going to divide the time and effort between them.

Unlike the structural ambidexterity or temporal ambidexterity, contextual ambidexterity actually separates the exploration and the exploitation, this means that exploration and exploitation are encouraged in the same unit within the organization which moves employees towards a effective management of their time between both types of activities.

As we explained before, the balance of both is based on some behavioral mechanisms that enable organizations to address exploitation and exploration activities within the same unit. Gibson and Birkinshaw (2004)   The authors also define contextual ambidexterity as "the behavioral capacity to simultaneously demonstrate alignment and adaptability across an entire business unit" (p.209).

With this in mind we understand that Universities of the 21th century have to face multiple and different challenges owing to globalization and internationalization, such as the increasing interdependence with governments, firms and stakeholders in general. Henderson (1998) and Mowery (2002) confirm that commercialization activities by universities are correlated with national competitiveness, and international competitive advantage. It is significantly important to understand that the competitive advantage for the Universities is not only measured through the quality of the research or the lessons taught, but also by patents; the number of publications, and the generated reputation by this elements. Which of course will be linked to government budgets and number of students, which in turn will repercute on the University's financiation.

This means that the University has to effectively manage the same adversities as firms and governments, but with some particularities. They have started combining the traditional activities with others that would not come directly to mind, for example: agreements with firms or institutions, commercialization of patents. Of course the duality of the environment demands the evolution and the integration of this activities on a whole different level.

For this reason, the Institution has to develop Ambidexterity in order to balance this two sides of the coin. The individuals of the organization have to decide about making their own decisions about the division of their time between the demands for alignment and adaptability, this means exploration and exploitation (Gibson and Birkinshaw 2004).

It is important to point that we will focus on the analysis at the research group level since they represent the main units that carry out the investigation process, although this tasks are also carried out by universities institutes, or chairs. Considering this, the research groups are going to be analyzed and also the factors that influence the contextual ambidexterity. And to better understand it we are going to align the research for this work with the approach through the value chain and its relation with the exploration and exploitation activities following the study taken by Li et al. (2007).

They analyze different perspectives on exploration and exploitation, they talk about the study made by Lavie and Rosenkopf (2006) where they refer to 'function domain' which defines exploration and exploitation according to the unique nature of a specific value chain function and it is s unique in its type of learning (Lavie & Rosenkopf, 2006).

Exploration and exploitation through the value chain is going to be consider in the following way: the earlier function is considered to be exploratory, because it brings the input for the next function to exploit. The first stages activities are more research oriented, and the last activities are more commercially oriented. In this way is rational to think that firms may allocate learning activities on different value chain functions.
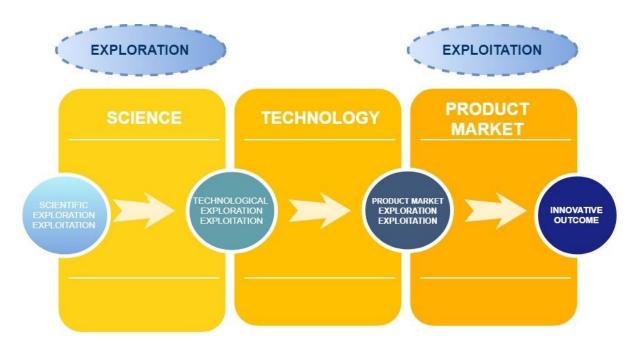

Figure 1: Exploration and Exploitation Combined Process Own Elaboration Based on Li et al (2007)

Therefore, analyzing the aforementioned, we can verify that this analysis is the most useful to develop this work. We will use this approach to apply it in the university so we will consider basic research as exploration and patents as exploitation. Despite the fact explained by Li et al 2007, in the process both exploration and exploitation tasks will be found through the chain, although we will not give this fact much priority.

The authors say that an organization can allocate resources, processes or activities in the different stages of the learning value chain, but especially in the early stages, firms invest in fundamental research to gain scientific knowledge.

In the middle stages, firms conduct applied research to develop new technology. Meanwhile the activities based on exploration and exploitation are carried out all along the process, and the same phenomena can be observed in the the subparts on the chain.

Following Li et al (2007), we consider that the activities developed in the first stages of the value chain are orientated to develop the main roles for the researchers, and this activities are going to be obtained through exploration, this means: the research done by the groups and that is embodied in scientific articles.

On the other hand the activities developed in the last stages are the ones considered to be orientated to exploitation, this means the intent of commercialization of this research, mainly through patents or other activities. And all along the chain exploitation and exploration activities are developed in order to obtain an innovative outcome.

5. KEY ELEMENTS FOR CONTEXTUAL AMBIDEXTERITY

The literature reveals several concepts about the factors that favor Ambidexterity.

For example, Tushman and O'Reilly (1996) found that a common culture and supportive managers are key factors to become ambidextrous. Gibson and Birkinshaw (2004) pointed that previous research on (contextual) ambidexterity did not fully cover all variables that influence contextual ambidexterity. Gibson and Birkinshaw (2004) suggest that variables that influence contextual ambidexterity are characterized by discipline, stretch, support and trust. Ghoshal and Bartlett (1994) researched these variables in a longitudinal field study. They identified discipline, stretch, support and trust as the primary dimensions of organizational context defined by them as: "The way in which the four behavior-framing attributes of discipline, stretch, trust and support are created and reinforced by a variety of macro and micro level actions taken by managers at all levels of the organization" (p. 96).

Lubatkin et al (2006) note that behavioral integration—the senior team's wholeness and unity of effort—can help process disparate demands and will have a positive correlation with ambidexterity.

Jansen and colleagues (2008) cite formal senior team contingency rewards and informal senior team social integration as important mechanisms to enable senior teams to host contradictory forces. All these studies provide a strong indication that organizational factors have to be considered alongside personal characteristics when explaining individuals' ambidexterity and its influence on the research groups.

Leadership is a crucial element for ambidexterity, like Gibson and Birkinshaw (2004) studied the role of leaders in creating a propitious atmosphere for contextual ambidexterity. But Nemanich and Vera (2009) sustain that the type of leadership for this purpose should be transformational.

There are also researches that considered as relevant the capability of the leader to adapting to manage complexity of environmental stimuli in order to influence what others think by their interactions (Stacey, 2010) in order to foster contextual ambidexterity, specially in project-based organizations, which matches with the research groups of the University. A situation mainly featured by a high pressure for contextual ambidexterity (Lee, DeLone, & Espinosa, 2007).

Turner et al. (2013) makes emphasis on the lack of interest of ambidexterity in Human Resources Management (HRM) journals, even though nowadays HRM scholars are getting more and more interested specially on a organizational level (Tarba and Cooper, 2015). (Patel et al.2013: p1422) explains us that: 'although the ability to achieve ambidexterity arises out of the human resource base itself, it is likely to be supported by the system of HRM practices employed by an organisation'.

Erhardt (2011) develops a really useful concept for this research. He sustains that the use of teams enriches opportunities for the creation of exploitative and explorative knowledge creation that promotes innovation.

Studies support that heterogeneous teams of experts, with different skills and backgrounds supported structural ambidexterity, Although HRM practices destined to improve relationships seemed to be a cornerstone for contextual ambidexterity. Contextual ambidexterity is preserved by the long-term relationships created through internal alignment of work design, staffing, training and development, remuneration and performance management.

HRM articles accentuate high performance work practices (HPWP) to exploit system-based synergies for enhanced organisational performance (e.g. Combs et al., 2006). In fact, Patel et al. (2013) discovered correlations between the use of HPWPs and organizational ambidexterity.

Nevertheless, for the development of this research and the relevance for research groups it makes sense that we are going to focus on the last two factors mentioned, Ambidextrous Leadership and Human Resources Management, due by the importance on teams, people and its contribution to contextual ambidexterity in general.

5.1 Ambidextrous Leadership

The ambidextrous leader faces more adversities than usual because we have to take in account that individuals develop both exploitative and explorative tasks on a daily basis.

Amabile (1996) suggests that the personality of individuals differ, depending in their activities, whether it is exploration or exploitation. Gupta et al. (2006) enforce the idea of the difficulty of managing both exploitation and exploration.

With this in mind, previous authors explain that ambidextrous managers deal with conflict (Duncan 1976, Floyd and Lane 2000) This fact causes contradictions and conflicting goals (Smith and Tushman 2005), engage in paradoxical thinking (Gibson and Birkinshaw 2004), and fulfill multiple roles (Floyd and Lane 2000).

Smith and Tushman (2005), for example, note that the ability to engage in paradoxical thinking may be vital for effectively managing exploitation and exploration.

Cohen and Levinthal (1990) argue that individuals need prior related knowledge to assimilate and use new knowledge. Individuals with a breadth of prior knowledge categories, as well as various linkages across them, may thus be better prepared to take on both tasks. In addition to personal characteristics, organizational factors affect individuals' ability to act ambidextrously.

Because of this contradictory thinking the ambidextrous leader has to be able to multitask (Birkinshaw and Gibson 2004, p. 45; Floyd and Lane 2000). And should be more generalists than specialists (Birkinshaw and Gibson 2004, Leana and Barry 2000).

Another special characteristic is that this managers refine and renew their knowledge, skills, and expertise (Floyd and Lane 2000, Hansen et al. 2001, Sheremata 2000).

Examples of previous research show us that managers engage in both reliability-enhancing and variety-increasing learning activities (Holmqvist 2004, McGrath 2001), process and acquire both explicit and tacit knowledge (Lubatkin et al. 2006, Nonaka and Konno 1998), and engage in both local and distant search for knowledge and information within their network of contacts (Hansen et al.2001, Subramaniam and Youndt 2005).

Mom et al(2007) highlight that the ambidextrous manager acquires top-down and bottom-up knowledge flows, or top-down and horizontal knowledge flows, the higher the levels of exploration and exploitation activities this manager may face. O'Reilly and Tushman 2004, Probst and Raisch (2005) say that the ambidextrous manager should combine short-term and a long-term orientation.

The well-known authors Tushman and O'Reilly (1996), say that only a reduced group of managers are going to be able to integrate exploration and exploitation performed by the individuals of the organization.

In their study, they discovered that managers can exhibit to different degrees of personal ambidexterity by joining exploitation and exploration. Also the extension will vary within
and across contexts. The variance is originated from both personal characteristics and the organizational contexts faced by the manager. And of course that the organizational ambidexterity is also influenced by personal ambidexterity.

The following table will summarize the most relevant concepts and characteristics of an ambidextrous leader.

Ambidextrous Leadership	
Concept	**Author**
The ambidextrous leader should be able to integrate exploration and exploitation performed by the individuals of the organization.	Tushman and O'Reilly (1996)
Ambidextrous managers have to deal with conflict.	Duncan (1976) Floyd and Lane (2000)
They constantly refine and renew their knowledge, skills, and expertise.	Hansen et al. (2001) Floyd and Lane (2000) Sheremata (2000)
The ambidextrous leader should engage in paradoxical thinking.	Gibson and Birkinshaw (2004)
They have to face contradictions and conflicting goals on daily basis.	Smith and Tushman (2005)
The leader engages in both local and distant search for knowledge and information within their network of contacts	Hansen et al (2001) Subramaniam and Youndt (2005)
Multitasking is an oustanding quality. They have to fullfill multiple roles.	Birkinshaw and Gibson (2004) Floyd and Lane (2000)
He/She should be more generalist than specialist.	Birkinshaw and Gibson (2004) Leana and Barry (2000)
The ambidextrous manager should be able to combine short-term and a long-term.	O'Reilly and Tushman 2004, Probst and Raisch (2005)
They acquire top-down and bottom-up knowledge flows, or top-down and horizontal knowledge flows, the higher the levels of exploration and exploitation activities this manager may face.	Mom et al(2007)

Table 1. Ambidextrous Leadership Variables

5.2 Human Resources Management

The second factor that seems relevant to study are some of the Human Resources variables. Some authors explain that the application of certain management practices, by themselves, do not produce competitive advantage, but an increase in the performance arises when considering the synergic effect between several of them forming a system of a high performance team (Huselid, 1995; Wright et al., 2001; Wright et al., 1994). In this sense, recently research about this topic have stressed the importance of human resources management, specifically the use of HPWS, (High Performance Work System) and its relation with creating the right context for the development of ambidexterity (Patel et al., 2013; Kang and Snell, 2009; Garaus et al., 2016)

The authors Claver et al developed a study in order to understand if high performance groups contribute to the creation of an adequate organizational context to simultaneously explore and exploit (Flickinger et al., 2013), the authors determined that the use of an HPWS is positively related to the organizational ambidexterity.

Some Human Resource Practices can create systems and processes that foster a supportive organizational context where exploration and exploitation can flow simultaneously. It is also important to highlight that ambidextrous organizations are influenced by staffing decisions, the systematic application of knowledge, and selection procedures to ensure exploration and exploitation through staff competencies. (Güttel and Konlechner, 2009) They studied in particular the following variables: exhaustive selection, broad training, evaluation of development-oriented performance, equitable reward system and employee participation system. (Claver et al 2017)

There is no consensus on what should the best human resources practices should be (Becker and Gerhart, 1996; Guest, 1997; Wright et al., 2003), although there is unanimity in considering that these systems must contain at least three dimensions (Aryee et al., 2012): i) practices aimed at improving skills, which include rigorous selection and training; ii) practices to improve the motivation, such as an adequate retribution system and the evaluation of performance; and iii) practices aimed at improving opportunities, such as participation or promotion.

In order to summarize the variables related with human resources that potentiates the ambidexterity on the organization we are going to concentrate the main points on a table.

Human Resources	
Concept	**Author**
i) practices aimed at improving skills, which include rigorous selection and training. ii) practices to improve the motivation, such as an adequate retribution system and the evaluation of performance. iii) practices aimed at improving opportunities, such as participation or promotion.	Aryee et al (2012)
High performance groups contribute to the creation of an adequate organizational context to simultaneously explore and exploit	Flickinger et al (2013)
Exhaustive selection, broad training, evaluation of development-oriented performance, equitable reward system and employee participation system.	Claver et al (2017)

Table 2. Human Resources Variables

Specifically on Universities the Human Resource Process gains a certain degree of complexity due by the nature of the activities developed on the organization. For this reason the Research group is considered a high performance group, due to its difficult process and strict control.

The Human Resources Department of the Universities are in charge of carrying out the general process, according to teaching needs of the organization always keeping in mind the national and the specific practices regarding leadership and motivations are carried out within the group.

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5. EMPIRICAL STUDY

Subsequently we are going to develop a empirical study in order to understand the concepts and contrasting them with the reality. Given the fact that the main unit at universities in developing research are the research groups, are going to analyze two research groups of two different Universities, with the aim of studying the different variables that determine ambidexterity. Focusing on the two selected variables:

1. Ambidextrous Leadership
2. Human Resources

5.1 METHODOLOGY

For this research we are going to develop a Case Study with the objective of observing if the groups indeed have the different characteristics studied previously, we will list them and analyze them. In order to study its correlation with the ambidexterity we are going to apply qualitative research, specifically we are going to obtain the data through primary and secondary sources.

The case study method has the advantage that, through its development, we can observe the behavior of the people involved in the studied phenomenon and recorded it, which for our study is more appropriate than quantitative methods since they only focus in verbal information obtained through questionnaire surveys (Yin, 1989).

This type of investigation is appropriate because as Yin (1989) considers that the Case Study is optimal for analyzing subjects that are considered new, since the empirical research examines the phenomenon in its real environment and multiple sources of data are used.

The data will be obtain from two different resources: primary and secondary. The primary information is going to be obtained by conducting interviews with the groups leaders, which are going to be recorded, transcribed and analyzed with posteriority. The secondary information is going to be obtained through Universities webs, groups news, articles, magazines and published patents.

Then we are going to link the theory with the significant information that the interviews can provide in order to arrive to important conclusions about ambidexterity and if this studied factors are truly influencing the research groups. Although the exploitation can include more things like the creation of companies, or contracts with firms we will focus on the patents.

The groups were selected considering the following aspects:
 1. *The group has a patent.*
 2. *The Groups are from different universities.*
 3. *Access to the team leader in order to conduct an interview.*

The process began by contacting by email in order to analyze the possibility of an interview, fortunately both agreed from the first moment so both groups were selected. It was later confirmed by telephone/mail for determining the time and place of the interview, the interviews were conducted in person. The interviews had a duration of approximately 40 minutes, we recorded them, transcribed them and analyzed them with posteriority.

Next we are going to present the two groups of study, and summarize in terms of exploration and exploitation of the two leaders of the teams on a table:

Group Leader	Felipe Peñaranda Foix	Julio José Suay Antón
Exploration		
Publications	96	68
Exploitation		
Patents	3	3

Table 3. Group Leader's Exploration and Exploitation

We can notice that both analyzed groups count with an important trajectory developing both exploration and exploitation tasks. They count with an important number of publications and patents.

- **Group 1: Microwave Metrology - ITACA Institute - Universitat Politécnica de Valencia (UPV)**

The Group is part of The Institute of Information and Communication Technologies (ITACA) of UPV that was born with the mission of the improvement of our society through the transfer and application of knowledge from research in the field of Information and Communications Technology (ICT). With a global vision, ITACA conducts cutting-edge translational research using an approach based on responding to the challenges that our society is facing, creating scientific advances that can be directly implemented by public and private entities. There are more than 100 researchers, that are characterized by a strong collaboration with other research centers and industry, with a interdisciplinary approach, ITACA conducts research on different areas including digital electronic systems, industrial electronics, telecommunication systems, telematics, ICT systems in healthcare, sensor integration, electronic compatibility, electromagnetism and microwave research.

In particular the Radiofrequency and Microwave Metrology conduct theoretical and experimental research to develop basic metrology and specific and accurate measurement devices. Measurement services are provided for power, noise, impedance, dielectric and magnetic material properties, etc.

- Leader: Felipe Laureano Peñaranda Foix

He is a professor at UPV and works in the Higher Technical School of Telecommunications Engineers, and specifically at Communications Department, also develops a role as International Relations Subdirector of Higher Technical School of Telecommunications Engineers . He combines it with his work as a co-director of DIMAS Group (microwaves Division) which works in ITACA Institute by UPV, he counts with 3 patents:

Patents: Felipe Laureano Peñaranda Foix

Peñaranda Foix, Felipe Laureano; Catalá Civera, José Manuel; Canós Marín, Antoni Josep; García Baños, Beatriz; Reyes Davó, Elías de los. Method for Non-invasive monitoring of the curing of a thermostable plastic by means of the use of microwaves and microwave device for implementing sai. UNIVERSIDAD POLITECNICA DE VALENCIA, EP2241879 (A1.

Peñaranda Foix, Felipe Laureano; Catalá Civera, José Manuel; Canós Marín, Antoni Josep; Elijah of the Kings. Microwave sensor and method to measure the degradation of the fluid components of shoe soles. UNIVERSIDAD POLITECNICA DE VALENCIA, ES2255388. May 14, 2004

Penaranda-Foix, Felipe L .; Reyes Davó, Elías de los; Catalá Civera, José Manuel; Canós Marín, Antoni Josep; García Baños, Beatriz. Method for the non-invasive monitoring of the curing of a thermostable plastic material through the use of microwaves and a microwave device for the application of said method. UNIVERSIDAD POLITECNICA DE VALENCIA, P200800285. 04 Feb 2008

- **Group 2: Polymers and Advanced Materials - Jaume I University - (UJI)**

The group belongs to the Jaume I University Technology and Experimental Science Faculty and to the Engineering of Industrial Systems and Design Department

They have different Research lines, like: Polymer packaging and packing, polymers for energy applications, coatings and composite materials biomaterials and technologies of corrosion and conservation. They also count with technological and technical services such as: Characterization of polymers, electrochemical characterization and material spectroscopy Processing of polymers: thermoforming, flat extrusion, mixing and compression modeling, development of biomaterials, etc.

- <u>Leader: Julio José Suay Antón</u>

He is the leader of the Polymers and Advanced Materials Group, he has dedicated his research to the development of functional materials and coatings for the industrial sector. In particular, he develops two lines of work: (1) development of functional materials for regenerative medicine and (2) development of organic anticorrosive coatings and electrochemical evaluation techniques. His main objective is to transfer knowledge to the productive sector and create wealth and utility in society.

He has worked on different projects on both public and private sector, this has made possible to obtain a prototype that will later be patented and licensed to companies in the sector. As has been the case for two types of scaffolds for bone regeneration patented as ES2331678 (B2) and ES2330823 (B2) licensed respectively to companies in the biomedical sector Metis and Tequir S.L. respectively.

On the other hand, for osteoinductive coatings, the PCT patent WO2013110843 licensed to the company Ilerimplant. This last patent has passed to national phases in the US and Europe and European funding has been obtained in the field of H2020 to go to the clinical trial. He counts with three patents.

Patents: Julio José Suay Antón

Hybrid co-continuous structure for the regeneration of bone defects
José Luis Gómez Ribelles, Myriam Lebourg, Manuel Monleón Pradas, Julio José Suay Antón. P200800516. 02-14-2008. Dominican Republic. 2008

Macroporous three-dimensional supports for tissue engineering
José Luís Gómez Ribelles, Myriam Lebourgh, Manuel Monleón Pradas, Julio José Suay Antón. P200800390. 04-02-2008. Dominican Republic. 2008

System and method of evaluation of the anticorrosive protection of organic coatings
Julio José Suay Antón, Santiago Juan García Espallargas, José Javier Gracenea Zapirain. P200802742. 21-12-2009. Espanya 2009

5.2. RESULTS

5.2.1 Ambidextreous Leadership

- **GROUP 1: Felipe Laureano Peñaranda Foix**

- **Integrate exploration and exploitation performed by the individuals of the organization.**

He has to face a real challenge in order to manage to combine efficiently the exploration and exploitation within the research group. He is constantly trying to focus on teaching some hours, research and publications, fulfill contracts with firms and taking in account also the public contests that can be profitable for the research group in order to obtain financiation.

The group is mainly formed by Engineers and Telecommunications Doctors, there is also an Industrial engineer, a Technician and a mechanic. They may share a common background, but the group is multidisciplinar and they perceive their work in their own particular way. Felipe has to lead in a way that all this factors can be beneficial for the aim of the individuals, the group, the institute and the university. In conclusion he aligns the objectives of the group and effectively manages exploitation and exploration within the group.

- **Ability to lead with conflict.**

We ask him if he considers himself proactive, risk taker, with a tendency towards improvement, to which he responds: "Obviously, people depend on us, if there is no money you can not pay them, you have to be continually looking contacts, going to congresses, is complicated because people depend on you, so you have to be a seller "

We can see that Felipe has to deal with this on daily basis. Because in a traditional way the University has to focus on teaching and research. But in another hand the links of the University, firms and organizations have push them try to "sell" this knowledge, this means apply to public contest or get the firms to know them.

In this way they can afford to continue research. But on the other hand he has to be conscious about the patents, the public contests, and subsidies, in order to maintain that exploitation part.

- Refining and renewing their knowledge, skills, and expertise.

The group is in constant contact with firms, some projects are destined to solve the business problems, this is why they have to face different challenges when they work with firm contracts. For this, the group has to develop new knowledge and try to solve that problem.

Felipe said that "Apart from microwaves, we develop device control, movement and assembling parts, which are more mechanical parts. So we develop new knowledge one, of the contracted doctors is very good at that, he tries to learn the other field. " So they had to hire an industrial engineer in order to build something more mechanical because they didn't had the knowledge.

They work in a multidisciplinar way with the group of Material Technology in order to develop the projects and reinforce in that area. But of course he is in a very specific research area that involves some strict knowledge but as we explained before the group proposes the research subject and they develop different ideas from it.

Since he has to develop on his existing knowledge, but they have to be very innovative and work with new things everyday. Therefore, Felipe develops his knowledge on his area, but also takes in account another type of knowledge to be able to transfer all this to patents.

- Paradoxical Thinking

The group has to develop solutions to problems based on companies needs. The research and the solutions are transferred and sometimes this means a transferred patent, this is a difficult process, therefore the leader and the group must be able to combine those different ways of seeing things due to this difficult context, regarding the study area, the multidisciplinary group, the combination of exploitation and exploration within the group and the university, shows us that Felipe has to confront paradoxical thinking on daily basis.

-Face contradictions and conflicting goals

" We have National Projects from the point of view of more theoretical research and contracts with companies. Normally the contracts force you to publish less but you have more resources, and on the other hand the one that gives you less money for example the projects of the Generalitat, but you have more efficiency of publications, we make a combi, we have everything, we have both ". This statement makes clear that he has to face the challenge of combining all this activities and allocate resources within all this projects and combining with all the activities of the group.

- **Engages in both local and distant search for knowledge and information within their network of contacts**

When we asked him about their network of contacts he explained that "In September we organized a European congress that takes place every two years, which is a way to get known". "We have a knowledge of techniques in this case in the microwave and what we do is sell it when you request a public project or you get to know with a company and once you enter the network they know you through the web or through congresses and then they contact you " This statements shows us that he is in contact with his network and tries to improve relations constantly.

- **Multitasking/ Fullfil Multiple Roles**

Felipe has to face a dilemma when deciding which issues require prompt consideration, whereas others are less vital. He has to prioritize tasks and make decisions within the group. at the same time, with the nature of the group it is clear that he has to develop several tasks.

He is the ITACA Co-Director but also the International Relations Subdirector. Which is a different role with different required skills and capacities. This proves that he is proactive, a risk taker, and he is trying to constantly improve he says that people depend on them, and that they depend on the projects. He is really worried about the people involved and this showed us his motivation for doing a great work.

He fulfills different roles within and outside the group, we understand it when he said that: "The facet of teaching in the university is valued more, then there is the part of management that I carry with the sub-direction and everything else goes to research."

In conclusion he has to fulfill multiple roles such as the professor role where he has to dedicate some hours to teaching, and some more ours to research. And of course as a group leader he has to take in account different aspects of the research, align the team members in order to achieve the objectives in a efficient way. Felipe is also the Co-director of the Institute which means that he also has to involve in management tasks of how to obtain and manage resources for the Institute, and also the role that it plays when dealing with companies to establish long-term relationships with them. So we observe that he applies this different roles in order to to balance exploration tasks such as research and exploitation.

- **More a generalist than specialist.**

Due to the research area it is evident that it is a microwave expert although over time and the development of the group has developed different capacities and knowledge due to the multidisciplinary nature of the group while having to perform different tasks and applied knowledge result more diverse.

- **Combine short-term and a long-term.**

We can observe this behaviour in the way that they are involved with activities which objective is creating a contact network and giving some kind of publicity for the research. They do this through the congress and contacts with firms. Without losing sight of the daily tasks and activities of their routinary work.

- **They acquire top-down and bottom-up knowledge flows, or top-down and horizontal knowledge flows, the higher the levels of exploration and exploitation activities this manager may face.**

The team structure is flat, the information and ideas flow along the group, they have a good relationship along the members. They work in small groups within the team, each one focusing on a more concrete aspect and that's where ideas can arise, and then the conclusions are put in common to whole group, so we understand that knowledge flows are vertical and horizontal.

The ideas from the researches como from within the group or as a proposed problem by the firm contracts. The generation of knowledge occurs interactions between the people of the organization, be top-down, and bottom-up.

In conclusion we observe that Felipe follows the parameters for an ambidextrous leader and this fosters ambidexterity within the group since he creates and coordinates an environment in which the members can develop ambidextrous activities and tasks.

- **GROUP 2: Julio José Juay Antón**

- **Integrate exploration and exploitation performed by the individuals of the organization.**

He explained us that "There are very few licensed patents, because they require contact with companies and this in the academic world this is not well evaluated", therefore there is not enough motivation for the academic researchers to do it. He says that: "For there really to be a transfer you need companies to be involved from the first moment, many times the work with the companies is ungrateful for our curriculum. I try to convince young people to get into issues of innovation and transfer, but the answer is always the same" But Julio tries to encourage young people to get involved with this world, this fact shows us that looks up to integrate both exploration and exploitation.

- **Ability to lead with conflict.**

He considers that for the development of the dental patent his research group is formed by GMI which is the firm were the patent has been transferred, UJI engineers, UHV (País Vasco University) chemical members, IBV wich are in charge of in vivo tests, and the UPV develop the in vitro.

The group is diversified it includes commercials, production and management. In the conglomerate they think in very different ways, but they were all looking for the company's objective. He illustrated this when he commented: "The group was always in crisis"

- **Refining and renewing their knowledge, skills, and expertise.**

Trying to combine different worlds like biology and technology in order to look for solutions to a problem. The group has several lines of investigation and it is formed by two professors and a doctor. Julio of course has to maintain updated knowledge and be aware of the industry trends, this means that indeed he has to renew his skills and expertise in some degree.

- Paradoxical thinking.

In his study area, in which innovation is a crucial part, the contradiction is that the work done with the companies results ungrateful for a professor's curriculum, since they are evaluated by the number of publications done by them. Also we have to take in account that for the development of the dental the group was diverse: commercials, production and management. Even though they were all looking for the company's objective. This increase the difficulty and created extra complexity.

- Face contradictions and conflicting goals

He explained us that leading a multidisciplinary project is very complex because "We do not speak with the same jargon or have a similar mental structure". "Only interdisciplinary groups can solve this kind of problems". The project begins with research that obtains prototypes of materials synthesis in vitro in vivo. preclinical, obtaining of the " C Market". Goes to a clinical study: "It is a long and expensive process" He stresses. Again the nature of the multidisciplinary group brings conflicts and contradictory goals which were successful carried out by Julio.

- Engages in both local and distant search for knowledge and information within their network of contacts

He commented that some companies are waiting for the Ce market to launch their products. For example, hip prosthesis. they work with companies and another research group in this case, German. This shows us that Julio has a network of contacts and the information and the knowledge flows within.

An for the specific case for the patent they worked with UJI engineers, UHV chemical members, IBV wich are in charge of in vivo tests, and the UPV develop the in vitro. "The UHV and the UJI have been working for more than 15 years contributing the most chemical part, they are two professors". This shows us that the group maintains the network of contacts and cooperate with them.

-   Multitasking/Fulfill multiple roles.

In the process of innovation, the tasks that Julio has to perform are very varied, and many times it is necessary to go back in the process and return to a previous stage. He is also the main contact with the companies, so Julio has to balance various tasks for the good functioning of the group.

Julio has to divide his time wisely between teaching and research, and also maintaining the contact with the firms in order to never lose the focus of the researchers. For this, he has to face important complications in order to arrive to innovations. In order to achieve this he says that : "The key element is a strong communication with firms and the business world".

-   More generalist than specialist.

In his area, his uses his knowledge to develop the researches in the best possible way he is in contact with different departments and organizations such as firms or clinic centers, organizations that have nothing to do with his area of study at least in a direct way.

-   Combination of short-term and a long-term.

As we said before, his daily tasks have some additional difficulties since the evaluations consider a transferred patent the same as an article. He considers that he as a professor could develop 65-70 published articles in his life, but patents may arrive to one or two.

This is not simple and it is not valued enough as well as some other relevant factors to consider for example the fact that he had his own company. and this is not relevant for an academic curriculum.

He explains that for their patent, an implant company gave ask them to solve a dental prosthesis material for patients with chemotherapy or diabetes, he explained: "Taking a look in the linear model of innovation and the chain model innovation process, we can arrive to the conclusions that it is important that the company to be present in all moments because the patent, this one in particular is bio, means that the objective of the research are patients with real needs. This kind of research seeks to capture a need, which doesn't happen with the basic research".

In this particular area the patients and the dental clinics transmit the needs to the research group. Analyzing his words we observe that he has to combine all this tasks in order to balance short run and long run. Because he has to divide his time in all of this tasks without losing sight of the future but also ensuring the present.

- **They acquire top-down and bottom-up knowledge flows, or top-down and horizontal knowledge flows, the higher the levels of exploration and exploitation activities this manager may face.**

The same as the previous case the generation of knowledge occurs interactions between the people of the organization, be top-down, and bottom-up. The structure is flat so we understand that knowledge flows are vertical and horizontal.

In conclusion Julio is considered an ambidextrous Leader due by the nature of his study area an intimately linked to innovation. He has developed all this skills and fosters the environment for ambidexterity in the group.

5.2.2 Human Resources Management

Analyzing the Human Resource Process we can observe that some stages are common for both universities and both groups. First of all we are going to analyze the university system will first explain the general characteristics of this process and later the groups specificities of each team will be analyzed.

- **Recruitment/Selection**

In general, the selection process starts at a state level by National Agency for Quality Assessment and Accreditation (ANECA) and at a regional level by the AVAP, this agencies are universities faculty evaluators. These agencies put some difficult requirements, they evaluate the curriculums and to give accreditation just in order to give permission to apply to different offers for example accreditation to assistant, to doctor assistant, to hired doctor, to holder, to professor. If those agencies do not give the accreditation the candidate can not submit to vacancies in Spanish universities. Sometimes a punctuated interview is included.

Although there are different requirements for the diverse range of job levels at the University, the general requirements include first being in possession of a bachelor's degree, a master's degree and a PhD. In addition, it requires a training course of 1 or 2 years, where specific research subjects are studied.

They have to carry out a research project with a 5 year limit called Advanced Studies Diploma (DEA), which is the prelude to the doctoral thesis. The candidates are evaluated in terms of resume, previous experience in companies, thesis, and it is required to have taught at least 60 hours per year.

The body created by the Ministry of Education in 2002 ponders different elements and prepare a report about publications, teaching hours, academic training and experience in management and educational administration. If the report is favorable, the professor may present himself to fill the vacancies published by the centers. Nowadays, the requirements are greater, since it is necessary to have published in journals with a certain impact index.

In addition to teaching, it is important to have published teaching manuals and to have made mobility stays in a prestigious university abroad. Ongoing training is also important as well as attendance to congresses. In the following table we can observe the Evaluation Criteria carried out by ANECA:

Aneca Evaluation Criteria
1.1. Research experience 60 points of 100 and, therefore, is considered the priority element in evaluating the existence of international patents and technology transfer to support R & D are particularly relevant in the fields of Experimental Sciences, Sciences health and Technical Education
1.1.A. Scientific publications anonymous peer review process and international patents in exploitation. accepted as such those that occupy important positions in the scientific fields listed by the "Subject Category Listing" the Journal Citation Reports Science Citation Index (SCI),
1.1.B. Books and book chapters supported by the number of citations, the prestige of the publishing, publishers, the collection in which the work is published, the reviews in scientific journals, extent and translations into other languages.
1.1.C. Research projects obtained in public competitive calls, especially research contracts of special relevance to public administration or companies financed by national, European or other international field programs.
1.1.D. Other research findings, especially those that produce technology transfer and innovation contribute to the productive sector.
1.1.E. Supervision of doctoral thesis
1.1.F. Contributions presented at conferences, seminars or other meetings of scientific relevance
1.1.G. Other research merits not covered in the previous sections.
1.2. Teaching experience
1.2.A. Amplitude, intensity, degree of responsibility, cycles and type of teaching in the university disciplinary field in regulated and nonregulated education.
1.2.b. Assessments of the quality of their teaching
1.2.c. Acting as speaker at seminars and courses, and participation in conferences specifically aimed at training for university teaching.
1.2.D. Teaching materials and publications related to teaching
1.3.a. Academic training
1.3.B. Professional experience
1.3. Academic training and professional experience
1.4. Other merits

Table 4. ANECA Criteria. Official ANECA Website

-   Training

On general basis in the universities, the continuous training is promoted in order to promote the improvement of the academics and the own universities try to implement different tasks or programs for that aim.

-   Compensation

The compensation system consists of a mixed salary formed by a fix part and a variable part. The fixed part is related to the type of position and its requirements for example there are professorial positions which demand certain amount of publications, directed projects, positions of responsibility. The salary also contains a variable percentage that would be linked to the number of class hours taught; it is important to know that this parameter is revised every 5 years, and the number of publications that are revised every six years.

Therefore, the salary promotes research activity, which means that exploration is promoted. In addition there is also a part of variable remuneration that is different according to universities and according to communities, according to budgets and pacts with the administrations.

There are also other parameters such as the grade of the students' surveys, and other options to get incentives, this incentives also include items related to patents and transferred knowledge transfer, so this is a good example of how exploitation is potentiated through the compensation system. In this way we can observe that it encourages both exploration and exploitation .

- **GROUP 1: MICROWAVES - UPV**

Exploring the interview we can differentiate two different situations:

- First situation: the research group member is a University teacher/doctor.
- The second situation is that a specific research provoques the demand for some particular profile such as technician or mechanic for the research group for a specific project.

Both cases are regulated by national norms, and specific norms developed by the universities. But in the second example the research group is the one that demands those profiles, but this new hirings are also carried out by the traditional public recruitment processes of the university, the differential factor basically consists that the team itself that establishes the characteristics that candidates must meet, and the candidate is selected according to that criteria.

- **Recruitment/Selection**

Regarding to recruitment, the selection process has certain requirements that work as a preliminary control to ensure that candidates have a certain level to carry out what the research group wants to develop, because, as we explained before, depending on team requirements certain profiles are required.

On first place the candidate must fulfil all national and regional requirements and secondly, specifically for UPV the process also counts with severe selection and the following table illustrates all the requirements depending on the contractual figure.

Specific Requirements for Each Contractual Figure - UPV -
Contracted Doctor 1. Be in possession of the Doctoral Degree 2. Having received a positive evaluation from the National Agency for Quality Assessment and Accreditation or by the Valencian Commission for Quality Accreditation and Evaluation.
Assistant Doctor: 1. Be in possession of the Doctoral Degree 2. Have a positive evaluation of your activity by the National Agency for Quality Assessment and Accreditation or by the Valencian Commission for Accreditation and Quality Assessment. 3. The candidate's stay in universities or research centers of recognized prestige, Spanish or foreign, other than the UPV, will be preferable.
Helper 1. Be admitted or in a position to be admitted to PhD studies.
Associate Professor 1. Specialists of recognized competence that certify their professional activity outside the academic field, for a minimum period of 3 years within the last 5 years.
The concurrence of all the requisites required must be referred to a date prior to the expiration of the term of presentation of instances.

Table 5. UPV's Criteria. Official Valencia Polytechnic University Website

- **Training**

The training on UPV is expected to be continuous and it is formed by different initiatives. First of all we must say that the main training is within the team itself, in the sense that they try to specialize each group in some particular aspects depending on the research project.

The UPV also counts with The Institute of Education Sciences which is responsible for helping teaching, offering training, support and advice to teachers in the field of university pedagogy, and promoting the dissemination and use of new educational resources and technologies, contributing to the innovation process and evaluation of the quality of teaching.

As well as develop training activities and provide psycho-pedagogical support for the student in order to meet their needs for guidance and academic, personal and professional advice. In order to respond to the demands in training, both individual and teaching teams.

This Institute pursues some important objectives such as: Facilitate communication and exchange of experiences and knowledge about university teaching, accompany teachers and groups in their process of teacher improvement.

Also, analyze the impact of training on the quality of teaching and professionalization of teachers, propose criteria and systems for accreditation and recognition of the quality of teaching,etc.

- **Compensation**

For Felipe's case the Institute pays the salary and the university pays the administrative tasks. They look for specific profiles that later will develop specific tasks.

They have fix retribution but they also have incentives which are mostly related to publications, but they destine this money to new hirings. Since the retribution system is public, it promotes equity and at the same time it pushes the human capital to improve since the salary will be linked to a position.

At the end of this analysis we can observe that observe the majority of the practices that are discussed in the literature. We are going to summarize the results on a table.

Human Resources Results - Group 1	
i) practices aimed at improving skills, which include rigorous selection and training;	i) This element is fulfilled due by hard selection and for UPV, the training is supported by The Institute of Education Sciences which is responsible for helping teaching, and offering training. Also the training is developed within the team.
ii) practices to improve the motivation, such as an adequate retribution system and the evaluation of performance	ii) This element is fulfilled due by the two part salary, publication incentives, the students surveys and the number of taught hours.
iii) practices aimed at improving opportunities, such as participation or promotion.	iii) This element is fulfilled due by the close participation of the professors with the university, by congresses or professor exchanges.
High performance groups contribute to the creation of an adequate organizational context to simultaneously explore and exploit	The group is clearly a High performance group as we explained before, mainly due to they have showed the achievement of difficult process that also requires roles with high requirements.
Exhaustive selection, broad training, evaluation of development-oriented performance, equitable reward system and employee participation system.	This element summarizes all of the above. The University has exhaustive selection, a continuous learning aimed at the improvement of skills through all this elements. As well as the mixed salary and the motivation of the groups through incentives.

Table 6. Human Resources Results - Microwaves Group

GROUP 2: POLYMERS AND ADVANCED MATERIALS - UJI

- **Recruitment/Selection**

University Jaume I follows the same process. In Julio's case, the same requirements are made, the national and regional parameters. In addition we can observe UJI's specific criteria summarized on the following table:

UJI Criteria	
A)Extra-university professional activity linked to the area of knowledge	**Up to 35**
B) File	**Up to 20**
Academic record, other university degrees (diploma, degree, degree, master's, postgraduate). FPI scholarships and approved i stays in other universities or foreign research centers.	5
Third cycle studies (third cycle file, research work, DEA).	5
Title of Doctor	10
C) Reasearch	20
(Articles, books, book chapters, communications at congresses, participation in research projects.)	
D) University teaching	10
(Includes assessment of the quality of teaching at the university of origin.)	
E) Knowledge of Valencian	5
(Official accreditation.)	
F) Knowledge of English	5
(Official accreditation.)	
G) Other merits	5
(Knowledge of other languages of scientific interest, prizes, honors, computer science, innovation, educational, etc.)	

Table 7: UJI Criteria. Official Jaume I University Website

There are also other specific criteria depending on the study area, of course this brings additional difficulties to the process. Also it is important to highlight the difficulty of the research areas, which makes us understand the exhaustive selection. As we can observe the research is well considered, this means that exploration is incentivized. On other hand exploitation (patents) is important, but it is more difficult to encourage among the staff, since in the university career the articles are more rewarded, and also because patents are very long term. Nevertheless Julio encourages exploitation within the group and they are very oriented and in consonance with that.

- **Training**

At the beginning the candidate that enters, doesn´t have the doctorate degree, in this way the doctorate degree itself, is considered the training program and culminates with a doctoral thesis. The training consists also on attendance to congresses and courses. Once the candidate is accepted the training process is already done in the workplace through the teaching practice and the research initiation with the research team.

In the case of the Jaume I University, the training is also carried out in the University by the Novel Program for training in teaching, it has a duration of two academic years and there are two different modalities:
- Face-to-face training.
- Tutoring and counseling, counting with the collaboration of professionals

The tutor could be any teacher with more than 5 years of teaching experience and who participates in a Educational Innovation Group (GIE) or in a Permanent Seminar on Innovation Educational (SPIE) officially recognized by the UJI.

The program is aimed at professors of the Jaume I University who have less than three years of contract as PDI. Nevertheless the participation in the program is voluntary, free and at all times must be active. Digging deeper in the research area, there are also training courses about methodologies done by assistance to courses or research seminars where theories are explained. For this, basically the formation is done within the team itself through the work the team is performing.

- **Compensation**

The compensation follows the same pattern with a mixed salary with a fix and a variable part. And the profesorate also count with incentives depending on publications and hours taught, but also with the role of the position. In this way both exploration and exploitation are encouraged. Since the retribution system is public, it promotes equity and at the same time it pushes the improvement of human capital. For simplicity and a better visualization we are going to summarize the results on a table.

Human Resources Results - Group 2	
i) practices aimed at improving skills, which include rigorous selection and training; **ii) practices to improve the motivation, such as an adequate retribution system and the evaluation of performance** **iii) practices aimed at improving opportunities, such as participation or promotion.**	i) This element is fulfilled due by hard selection that we explained before, The continuous training is obtained in the teaching case with the Novel Program and for training about research it is acquired within the research group. It is also done by the assistance to congresses, exchanges, etc. ii) This element is fulfilled due by the publication incentives, the students surveys and the number of taught hours Also the retribution system is public, it promotes equity and at the same time it pushes the improvement of human capital. iii) This element is fulfilled due by the close participation of the professors with the university, thorugh congresses or exchanges.
High performance groups contribute to the creation of an adequate organizational context to simultaneously explore and exploit	The group is clearly a High performance group as we explained before, mainly due by the difficulty of the process and the high requirements of the roles. Research is well considered, this means that exploration is incentivized. Nevertheless Julio encourages exploitation within the group.
Exhaustive selection, broad training, evaluation of development-oriented performance, equitable reward system and employee participation system.	This element summarizes all of the above. The University has exhaustive selection, a continuous learning aimed at the improvement of skills through all this elements. In addition exploration and exploitation are encouraged. Since the retribution system promotes equity and at the same time it pushes the improvement of human capital.

Table 8. Human Resources Results - Polymers and Advanced Materials Group

6. CONCLUSIONS

Once we analyzed the results we can conclude that two important factors that foster ambidexterity are Ambidextrous Leadership (Liselore et al, 2015) and Human Resource Management (Jørgensen F., Becker K, 2017). This elements play an important part in the creation of an ambidextrous environment within the research groups. On one hand Ambidextrous Leadership is going to "prepare the scenario" , and the Human Resource Management looks forward to assure the selection, motivation and retention on the professionals that have the ambidextrous capacity, or are willing to develop it along the way.

The Ambidextrous Leadership is considered to be one of the most relevant elements in order to promote this capacity. It represents a key element since he or she is going to be the one in charge to canalize the efforts, both exploitative and explorative, in order to obtain the objectives of the research group.

The multidisciplinar and diverse character of the research groups clearly shows us the contradictions that the groups face on daily basis and how only an Ambidextrous Leader could lead effectively this kind of groups. The leader of this kind of groups are going to face to paradoxical thinking (Gibson and Birkinshaw, 2004) deal with conflict (Duncan, 1976) (Floyd and Lane, 2000) and contradictions and conflicting goals on daily basis. (Smith and Tushman, 2005). Due by the study areas of the research groups have high exigencies, and the increasing competitive context of the University is tending to develop more multidisciplinar groups, which means carrying out exploration and exploitation tasks.

Closely linked to this concept we can also determine that the High Performance Group is essential on the research group in order to foster ambidexterity on the team. The human resources process that this groups face are really strict due by the exigencies and the nature of their work. All along the process, starting with the recruitment and ending with compensation, showed us that the research group is considered a High Performance Team were motivation, and constant improvement are a motto. This elements contribute to the creation of an adequate environment to simultaneously explore and exploit (Flickinger et al, 2013).

Developing ambidexterity becomes almost a need on such complex fields. The University represents a complex organization as we have already explained. Since the world evolves faster every time. New skills and capacities are needed, this summed up with the almost obliged incursion of the University in new areas such as the "commercialization of knowledge" and the improvement of reputation along the academic world in order to differentiate and ensure its future. This of course has developed by the interdependence with institutions as well with firms and organizations.

This multidisciplinar scenario can only be managed with an ambidextrous look. As the research and the methodologies evolve fast and the environment increases it complexity the urge for developing this kind of capacities is important for the research groups and universities. This studies made us understand that the best way to obtain full potential and better results of this whole process, is the combination of this dichotomy and the effective management of both exploration and exploitation.

The University needs ambidexterity to function because the research groups are one of the main units which form the organization. They play an important role on the development of knowledge and innovations. They are constantly improving and training on different skills, and have some complex responsibilities.

On one hand the groups have to develop their research, taught the knowledge in the classes, and acquiring new skills and competences in order to obtain more and better results. But they also pursuing some non-traditional objectives as we can realize by analyzing the interviews. It can be easily noticed that both interviewed teams carry out exploration and exploitation activities, since they count with several publications and the two team leaders count with three patents.

The professors are trying to contribute to the society by generating new technologies for firms in order to improve their performance; or even developing innovations on different areas than their study fields in order to help patients problems. This shows us that the academic world is getting closer and closer with the business world and the society. Verifying once again that the world is interdependent and that in order to achieve great things, we must expand our vision in order to be able to cooperate with the environment.

Clearly the world today is hostile, competitive, and difficult. But if we develop capabilities like ambidexterity, we will be one step closer to develop knowledge and achievements that could not be obtained in any other way.

This work showed us the importance of this factors in order to foster contextual ambidexterity within a research group. Still, it would have been interesting to conduct interviews with the members of the teams, or someone of the business environment, or members of the collaborating Universities, etc in order to contrast the information and have a wider picture of the environment. Even though it was more appropriate to conduct the interviews to the group leaders since this paper focuses on leadership and HR practices, and their opinion is optimal for the development of this work.

In addition the study would have been more complete if we had compared the teams with similar teams that do not have results in patents to analyze the variations in results, this may constitute an interesting future research. In addition for future researches, it would be interesting if the patents are considered in a more qualitative way, in the sense of separating them in categories: submitted, granted and licensed.

Even if there are limitations in this work, some of the aspects analyzed were extremely helpful in order to understand the coexistence of determining factors for the creation of patents and the transfer to companies and it´s with the different tasks of the academics such as research of teaching, and the important role performed by the human resources system, the incentives of the universities, the selection of the group members and of course the role of the ambidextrous leader.

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