ORIGINAL

Understanding the role of organizational factors in shaping the research careers of women academics in higher education

Georgeta Ion[*]

Department of Applied Pedagogy, Autonomous University of Barcelona {georgeta.ion@uab.cat}

ABSTRACT

This paper represents an attempt to make a theoretical contribution to its knowledge base through an analysis of the group factors which contribute to the success of women academics engaged in research within the area of social sciences. The data were obtained through a series of in-depth interviews carried out at public universities in Catalonia, with women academics –all of whom were the heads of research groups recognized by the *Generalitat* [Regional Government] of Catalonia. The findings indicate that research groups provide a supportive and effective environment for female researchers enabling them to develop their academic careers, as measured by such key performance indicators as the number of publications and successful applications for research funding.

KEYWORDS: UNIVERSITY RESEARCH, RESEARCH CAREER, GENDER SPECIFICITIES

1 INTRODUCTION

1.1 Factors influencing the research careers

Research activity has been identified as one of the most important academic activities (Hobson, Jones & Deane, 2005) with significant studies being done by researchers in the field of educational organization. The authors' attention was focused on the performance indicators of academic staff engaged in research activities (e.g. Bruneau & Savage, 2002; Morley, 2003), including such aspects as number of publications, budgets for research projects, and the dissemination of results. All these factors can become significant in determining promotion to higher professional levels, or obtaining professional prestige.

While the literature shows that some progress has been made with regard to the level of women's participation in higher education, a distinct gender-based differentiation of roles still exists within universities (Sagaria & Agans, 2006; Smeby & Try, 2005). For example, it has been suggested that women are more commonly associated with teaching activities while men are more likely to achieve recognition both for their research and for their management abilities (Bagilhole, 2007; Tomàs, Duran, Guillarmon & Lavie, 2008). Other issues arise too concerning the different circumstances that lead women to have lower

[*]To whom correspondence should be addressed:
Universitat Autònoma de Barcelona
Edifice G6, 248
08193 Bellaterra (Cerdanyola del Vallès)
Spain

research productivity levels (Walby & Olsen, 2002) and the identification of the obstacles faced by women in their research careers. Among these obstacles stands out the fact that women have less confidence in their own skills and do not enjoy the same degree of access to academic networks as men (Doherty & Manfredi, 2005). Women consequently have less access to funding for research (Lafferty & Fleming, 2000) and have fewer resources and fewer research staff (Toren, 1993).

Despite the obstacles mentioned above, there are successful women academics and some of them have achieved considerable professional recognition. It is enlightening to identify the factors which are instrumental in enabling female academics to succeed. Whereas obstacles to success have been widely researched, little research has been conducted into the factors associated with the success of women in leadership research positions.

Some relevant studies have been published both internationally and inside Spain and Catalonia, though. Some of the significant influences identified include the study about the concept of researcher development with a special focus on female leaders (Evans, 2012), the impact of training programs and their role in promoting professional development; the importance of acquiring research skills (Devos, 2007, amongst others); and mentoring programs (Higgs, 2003; Guillarmon, 2011). Other aspects related to building a successful career are the prevailing organizational culture and the social context (Dever & Morrison, 2009).

When the factors influencing research activity are investigated, the literature usually focuses on the individual level. Most studies concentrate on the effects caused by the individual determinants of academic success upon research (e.g. Stephan & Levin, 1997). Studies on how academic research is produced therefore need to acknowledge organizational and group factors, focusing on the context where research teams operate (Stephan & Levin, 1997) and examining the way in which the quality of fellow researchers belonging to the same team or group can represent a crucial factor in the success and productivity of individuals (Carayol & Matt, 2004).

1.2 Organizational factors and their influence on the research career

Whilst a large and growing body of literature investigating the factors that influence productivity at an individual level has begun to appear, only a few studies have so far looked at research groups as factors affecting research success.

The research group represents the most characteristic organizational "micro" unit and very plastic entity with diffuse contours in some cases. Research groups are functional

organizational units, directly associated with scientific research. There is no consensus, neither on the definition of research groups nor on its differentiation from groups of researchers in different organizational units. Some authors assimilate the group to a functional, organizational unit (Carayol & Matt, 2004; Lazega, Mounier, Jourda, & Stofer, 2006). They have the capacity for self-organization and self-regulation (Rocha, Martin Sampere, & Sebastian, 2008) and their dynamics are subject to a variety of influences.

Some studies by Nowotny (1989) show the existence of multiple relationships and dependences of researchers on the scientific-technical systems, especially in relation to the dynamics of their colleagues and the evolution of different disciplines and research areas. Groups present clear advantages for research development, especially given the importance of complementarity and critical mass for certain functions. The performance of research groups is both quantitatively and qualitatively influenced, not only by individual characteristics of researchers but also by collective and contextual factors. The organizational context in which groups and researchers work significantly influences the work patterns, as well as the research cultures and dynamics. Broad contextual factors such as the discipline or scientific field, the organizational context, and the institution's prestige determine the degree of autonomy and flexibility, the financial support for research, the procedures and the assessment criteria –all of them factors which ultimately determine the productivity.

In the light of the aforementioned research, our study was designed to investigate the specific organisation factors, strategies, and work cultures associated with female academic success in the Catalan context.

2 METHODOLOGY

2.1 The research scenario

In the current university context, where academic performance and rankings are key indicators, the academic world is searching for ways to improve research capacity and productivity. Catalan universities endorse this paradigm, and their perspective has recently shifted towards an increasing emphasis on the publication of research works. Furthermore, there is pressure not only to publish but also to secure external and internal grant funding in order to ensure that future research is financially secure. Before this situation, the Catalan government through its University Quality Agency has developed an assessment model based on the overall performance of a research group, focusing particularly on the group leader's merits. Those groups have come to be known as "Consolidated Research Groups" (CRGs): each group receives public funding according to the quality of their work according to yearly academic performance reviews.

The criteria used by the Agency give particular weight to the number of publications produced by the group members and the academic prestige of the journals in which they appear. The group leader is a key figure and his/her performance is a significant determining factor in obtaining an excellent rating. Therefore, successful researchers can be defined on the basis of their CRG leadership and the number of successful applications for research funding (from within their university, from the Catalan government or from external sources). Sixty-five percent of CRGs in Catalonia are led by men, as opposed to thirty-five percent led by women.

Taking this context into account, our study focuses on analyzing group factors which have a positive impact upon the success of CRG women leaders in their academic field.

The methodology comprised interviews with the participants, who are all actively engaged in research and have achieved a degree of public recognition in their respective fields. The interview guidelines were validated by means of pilot testing and evaluation, as well as through consultation with senior colleagues. A qualitative approach was used to analyze the interviews and explore participants' perceptions of their experience in developing a successful professional research career.

2.2 Setting and Participants

Fourteen women who held leading positions in social science CRGs and worked at Catalonian public universities took part in the present study. These women's ages ranged from 30 to 60 years and their professional status varied from lecturer to associate professor and senior professor. Most of our participants were senior professors and only one was a lecturer. The groups included both women and men, all of them academics; they contained between 7 and 20 people and were composed by academics from the same field of knowledge. In the Spanish academic system, academics are obliged to fulfil three roles simultaneously: teaching, research and management. Usually the lecturers are obliged to undertake more teaching hours than associate professors or senior professors, who dedicate more time to the research activity or management.

Internal validity was ensured by the selection of informants using the following criteria: length of experience in management positions, type of research groups (different size and origin – different knowledge field within social sciences), and different typology of its leaders. This guaranteed that our interviewees conformed to a wide variety of profiles.

2.3 Data collection

Each participant was interviewed once and each interview lasted approximately 45 minutes. The interviews were conducted in Catalan and Spanish at interviewees' working places, and were tape-recorded and later transcribed.

The interviews were semi-structured, with a set of flexible guidelines adapted to the particular characteristics of the different disciplines cultivated by participants.

The interview guidelines addressed the following topics:

— The background and context which provide the professional framework of the research team leader.

— The role of research and its impact on other professional functions (its integration with teaching and management).

— The researcher's perception of factors contributing to her success (individual, group, and institutional factors).

— The culture and dynamics of the working environment (level of collaboration with the research group members, group climate, mutual support, career development, etc.).

— The group's training function (the formative role of the research group, career development of junior researchers, etc.).

2.4   Data analyses

Qualitative information analyses were carried out using MAXQDA 2007 software. Initial data analysis enabled the identification of key areas based on research topics, which were subjected to further scrutiny in order to determine each topic's components and the significance and meaning that the group and its leader attached to each one of those components.

The information was analyzed under the following categories:

— Building the research group.
— The role of research in academic life.
— The research-teaching nexus.
— The research-management nexus.
— Group culture.
— Work dynamics inside the group.
— The group leader's role in the career development of junior researchers.
— Leadership style.
— The group's formative role.

Much of the information provided by participants appears in the form of direct quotations during the analysis. Pseudonyms have been used throughout the study in order to ensure participants' confidentiality.

3   RESULTS AND DISCUSSION

The interviews revealed a set of factors associated with successful careers for women researchers: training for research, interest and motivation, the choices that they have made throughout their careers, the different stages in their academic careers, the time spent abroad, and the role of 'mentors' in assisting the development of their academic profile. In addition to these, group factors had an impact on the quality of interpersonal relationships within a research group –for instance, the working culture within the group, networks and the degree of institutional support received from academic heads.

Some of the most significant areas of this research examined the way in which female researchers defined their first steps in the research career, how they managed key milestones in their careers, how they developed their status as well-established researchers, and also their ability to ensure that the work of ongoing research programs was continued by new researchers.

Rocha, Martin Sampere and Sebastian (2008) identified the key relationship between individual and the group factors: "Individual and collective productivity is primarily influenced by the organizational context, which provides the template for such things as ways of working, research culture and the direction and impetus of work, which in turn shapes the work of both the group and the individual researcher."

The focus in our study is on the group factors which can influence the career development of women researchers. The results have been organized according to the central research themes, illustrating our finding with quotations from the participants. Details about the age and academic position of contributors are also included in order to provide contextual information that enables a more accurate understanding of their statements.

3.1   How research groups are formed and how they function

Firstly, the analysis of participants' opinions was focused on the group development process and its internal dynamics. Several stages could be identified in the research career along these lines. Our participants indicated that they initially preferred to work alone in the starting phase of their career and it was only as they advanced in their careers that they began to join other researchers. Participants characterise this moment as a period of reflection and construction of their own ideas, of consolidation in research interests and correlation with other researchers' interests.

Secondly, participants specify the strategies used in order to build research groups. In this sense, there are two types of groups: those built around a senior researcher and those formed by the gathering of a group of researchers.

The evolution cycle of groups includes processes such as construction and disaggregation, inclusion of new members or dissolution according to the interests or personal trajectories of their members. Groups are thus different in size during their existence. Our participants noted that as a group increases in size, there will be a tendency for it to be divided into smaller groups, each one focusing on a different specific research topic. Amongst the factors identified by our participants as driving this process of segmentation and dissolution are: the academic development of researchers who seek greater independence and wish to exercise their own leadership; the appearance of incompatibilities and conflicts that inevitably arise in collective enterprises; the development of new research interests among researchers, and the emergence of new opportunities for professional development. The optimal size of groups and the potential benefits of resource concentration appear as particularly controversial aspects. This topic has been analyzed by several authors. Seglen & Aksnes (2000) examined group size and the relations that this has with research productivity. Von Tunzelman, Ranga, Martin and Geuna (2003) conclude in a review of the effects that size has on research performance that studies about the connection between size and productivity provide little convincing evidence linking these factors and advocate policies to encourage interaction between small units research to counter the problem of 'loneliness' as opposed to 'nitpick.'

The internal relationships as well as social integration within the group are related to factors such as group stability, cohesion and synergy. The social integration of researchers has been studied mainly at the "macro" and "meso" research organization, much less the research groups. The studies by Nowotny (1989) reveal the existence of multiple relationships and dependences of researchers on scientific-technical systems, especially in relation to the dynamics of their colleagues and the evolution of different disciplines and research areas.

The forces that maintain cohesion within research groups have to do with the degree of satisfaction among its members in terms of motivations, professional expectations and scientific goals. Cohesion is also related to sharing a group culture where leadership, interests, work habits, communication and information flows, along with competitiveness levels, are satisfactory for all group members. In this respect, some of the participants reported that it was very important to ensure the progression and personal development of researchers and they felt that this was linked to the recognition of individual diversity inside the group. In the participants' words, professional success

is linked to progression and timing, and it depends on the particular personality of each member in the research group:

> You need to be flexible; each person has a different rhythm. I think we need to recognize that one person's contribution to a working group can be very different from someone else's. Some people work at a very fast pace, while others might proceed at a slower pace and don't publish much, even though they have a lot of knowledge to draw on (Maria, 56, senior professor, highlighted one of the participants).

The group offers its members mutual help and moral support. According to our participants, commitment to research and to the other group members is a key factor in achieving successful research outcomes:

> Teamwork is the key to success. You need to know how to ensure that a team that has a good atmosphere, as effective cooperation is essential. So now we have a core of researchers who have acquired enough experience to undertake their own research projects (Carmen, 34, associate professor).

The group's horizontal structure provides its members with a forum –where they can meet and discuss their concerns about research and academic life in general. As one participant put it:

> Well, I think that working together, collaborating instead of competing with each other is very important –the fact that people are working towards a common goal. I've always encouraged group members to show a lot of initiative (Joana, 45, associate professor).

These responses illustrate how groups serve as spaces where members can build their confidence, acquire greater responsibility, and provide a sense of community that enhances everyone's participation in the group. Lave and Wenger (1991) argue that individuals acquire respect, expertise and an identity that is valued by the community through an immersion in its environment and the participation in its practices. It is through integration into the research community that inexperienced researchers become familiar with the values, practices and knowledge of a group.

In line with the findings of Davis (2001) regarding the academic community, members acquire respect and status, intellectual capital actually, also as a result of working in a research team under the guidance of an experienced researcher. This sense of community was identified by our participants as extremely significant –since they believed that a well–functioning research group provides scope for all group members to make a contribution:

> I think we need to recognize that one person's contribution to a working group can be very different from someone else's, but you can learn a lot from all these people, and we need to take that into account and use it to our benefit. I also think it's important that everyone in the group feels they are part of the team. I see that as being your responsibility as the team leader (Maria, 58, senior professor).

Within a research community, both members and groups have a voice in the ongoing construction of the community's values, structures, and practices as well as in the development of its identity:

> Groups should have a lot of flexibility and it's important to realize that. In a large group you can't expect everyone to have the same interests, so you have to allow room for people to pursue their own interests while still participating in the group's core research. To me

that's the important thing, making sure that everyone is able to find their own place within the overall organization and the production of research by the group (Mar, 45, associate professor).

Our respondents stressed the importance of using everybody's skills and knowledge for the way in which the group develops. Such intellectual capital could be used to obtain funding and to deepen the group's knowledge base about ways of developing and structuring the research community (Davis, 2001).

As could be seen through our study, the structure, dimension and internal dynamics of a research group are important aspects that influence group functioning and have an impact on both individual and group research trajectories.

3.2 Internal group factors that influence the success of research activity

Working in a group opens up the possibility of "sharing knowledge" and "establishing wider support networks. When you work in a group, the responsibility for its collective success is transferred to everyone within the group" (Elena, 60, senior professor). This brings us to another important ingredient for professional success: the need for everyone to share a culture of collaboration within the group:

> This group has been working together for 15 years, and the shared approach to work is excellent; this is one of the best things about the group. Working as a group adds another dimension. You get to interact with lots of other people, and you get to see things from different perspectives and get ideas you would never even have considered, or at least not in those ways. There always seems to be a sense of progress and extraordinary intellectual pleasure, and that attitude is something we all share, so there's always a great atmosphere, filled with enthusiasm (Elena, 60, senior professor).

These answers highlight the power of networks and groups, an aspect which has been widely discussed by authors such as Davies (2003) and McLaren (2002).

Our participants agreed that working in research groups may well be one of the most important factors in establishing them as successful researchers. Our researchers highlighted two important aspects: firstly, they regarded autonomy as being particularly important at the start of a research career; and secondly, they stressed the potential of group collaboration to assist in obtaining academic progress and recognition.

Autonomy is related to independence in how they work:

> At least in my case, the environment at work allows me to have a certain level of freedom of choice. At first I used to work alone. I also work at home, in the mornings" (Olga, 56, associate professor).

In these circumstances, researchers can be thought of as being free and independent, if not sometimes quite isolated (Travaille & Hendriks, 2010) as our researchers recognized.

Striking the right balance between individual effort and the social aspects of being involved in research needs to be taken into account when considering results, as this can sometimes become a key factor in professional success. Furthermore, writing articles, undertaking research projects and engaging in training activities were frequently described by participants in the present study as "collaborative activities" (Grbich, 1998). They actually highlighted the fact that knowledge creation is associated with social factors such as: collaboration with other members of the group; "work meetings, discussions with specialists in the field, deciding leadership strategies";

"attending meetings with group leaders"; and "participation in seminars."

Women researchers also stressed the importance of building horizontal networks between group members. Women researchers stated that they are more able to establish relationships with other specialists in their own field of knowledge, which enhances their productivity and visibility in science:

> Establishing horizontal networks with women who are working in the same field as us is really important for us ,not just in our own departments, but with people who work in other departments at other universities, in Spain or abroad, who face similar problems and issues (Clara, 38, lecturer).

These responses draw attention to the importance of networking, which long-term studies have shown to be significant in promoting research productivity and improving promotion prospects (e.g. Bryson, 2004; Gardiner, Tiggemann, Kearns, & Marshall; Poole et al., 1997). Along the same lines, some of our participants remarked that, in the highly competitive context of higher education, being able to obtain the funding and resources to undertake research can become a source of pride in itself. Obtaining funding is one of the ways through which research groups get visibility, and when funding is granted it can have "a very positive effect on a group's mood" (Maria, 58, senior professor).

Research networks also help researchers to stay in contact with their colleagues and to better connect to the trends in their research field. Actually this capacity to anticipate trends in research has a critical importance and ensures success in research. One of the participants stated that:

> You have to be alert to all kinds of signals. This, in effect, means you have to try to anticipate the direction research is heading towards. Being a pioneer in the field has always proved to be crucial. (Maria, 58, senior professor).

Following the research trends is important but not sufficient in order to obtain the maximum results in research. The group's leaders also highlighted the importance of training within their research groups. According to participants, research groups provide the kind of supportive environment that ensures high standards and, by doing so, they effectively train the next generation of researchers. Our participants reported three main ways in which training was undertaken: visiting speakers, 'in-house' training organized by the research group itself and participating in training offered by external organizations.

> One of the things we do is to invite an expert in the field to deliver a talk," "Once a month we get together and do two things: we update each other on how the research is progressing and we engage in some training activities. We also use external training, especially in the area of statistical methodology (Cristina, 43, associate professor).

Training is essential for the development of younger researchers. Senior researchers play an important role in training younger researchers and helping to share knowledge between group members:

> Researchers need to be 'generous.' Every single grain of sand adds to the heap, and we are seeking to make advances in science, so it is important that knowledge and expertise get shared, and spread throughout the whole group. I don't want knowledge just for myself.

I want everyone to have access to it (Marina, 52, associate professor).

These statements relate to leadership style within the group. Most of the researchers who participated in our study reported that their preferred leadership style is one with a lot of responsibility delegation, and this is the most common approach inside their research groups. Participants think it is part of the research group leaders' role to encourage members to pursue their own individual professional careers, within the group's context. According to participants, another role of research group leaders is to resolve any "small" conflicts of interest that might arise between members. Moreover, all group leaders saw the maintenance of a positive and supportive environment for everyone as being one of their most important roles.

3.3 External group factors influencing success in research

In addition to internal group factors, some external organizational factors were identified as having an impact on the professional success of women researchers. The institutional context is established by departments and by the interaction of the variables found within that environment.

Some of the interviewees considered that their department offered positive support to research groups, encouraging and valuing their work. They also felt that the presence of many other research groups was a positive factor and also helped to promote excellence. In addition, one of the participants highlighted the importance for women to engage in mutual support networks, not only institutionally but also at a broader level. However, one of the participants reported that organizational influence, especially that of the faculty or department to which the group belongs, is of little importance for the development of research and only in a very few cases does it exert either a positive or a negative influence. In another case, one of the interviewees claimed that organizational demands took up a lot of time and her research team could better employ that time working directly on its research.

> I don't feel the university has supported my research career, and though that might sound unfair, that's how I see things. I received some very modest financial support but really I couldn't say that the University has supported my work (Laura, 41, lecturer).

When speaking about departmental support, the interviewees discussed this almost exclusively in terms of budgets and the allocation of funding. Most economic resources for research projects came from competitive call-for-research by public bodies at an either national or international level. Heads of departments are in charge of ensuring that the teaching responsibilities of their departments are met by the available staff, and there may be a relation between teaching and research. Although some studies have not found a direct relationship between teaching and productivity (Heinze, Shapira, Rogers, & Senker, 2009; Luukkonen, 2012), other authors argue that the relationship between these factors depends on the academic context (Griffiths, 2004).

Our results indicate that teaching and researching in the same field might have a mutually reinforcing quality: "Ideally, teaching should be closely related to your research. Engaging in research can have a positive effect on teaching and should lead to improvements in teaching, and you can incorporate the results of your research into your teaching" stated one of our participants (Laura, 41, lecturer).

Establishing a balance between research and teaching requires extra effort by everybody within the department and the results obtained in our study actually confirm the mutually supportive relationship between teaching and research. In addition, some of the interviewees pointed out that supervising doctoral and master degree students contributed to the development of their own careers: "Having master degree and doctoral students and supervising their research can prove very helpful" (Laura, 41, lecturer).

The relationship between research and teaching is widely debated in scientific literature; some authors consider them to be mutually supporting activities in the sense that one reinforces the other (e.g. Dever & Morrison, 2009).

Our participants consider that group members with high publication rates commit a lot of time and energy to their research. Rather than trying to do both things, they devote themselves primarily to research activities. The results suggest that the most productive researchers consider teaching to be less important than research and spend fewer hours teaching and preparing courses.

If the teaching activity seems to be relegated to a secondary place by researchers with a high production level, they pay even less attention to the management activity. For most researchers, management is considered to be a very "time-consuming activity" (Carmen, 34, associate professor).

The views expressed by our participants show both teaching and management activities as "disruptive" insofar as they absorb plenty of valuable time which could be better used for research. However, they made a distinction between undergraduate teaching and the supervision of masters' and doctoral theses – which they regarded as being more apt to offer new ideas and research opportunities.

As academics face greater demands on their time, they find it increasingly hard to fulfil all their academic roles: research, teaching and management. That is the reason why our interviewees made several suggestions to their departments about what could be done in order to help them fulfil their research, teaching and administrative duties. The most frequent suggestion concerned the management of teaching: it has been proposed that one term should only be devoted to block teaching, so as to enable academics to spend more overall time on research activities. Other suggestions included receiving more resources and assistance from the department to fulfil administrative tasks. Thus, the onus of finding ways to manage conflicting demands on their time is likely to fall increasingly on the shoulders of the individual academic. Sadler (1999) and Subramaniam (2003) suggest that if academics are going to engage in such important activities as research, they need to be able to decide themselves how they use their time; and that academics need to make it as difficult to be interrupted when they are engaged in research as it is when they are engaged in face-to-face teaching.

This approach is in tune with the prevailing climate within higher education, where the "good researcher" is defined in terms of a narrow band of research outputs. This conception of the "successful researcher" will produce a researcher who tends to invest as little time and effort as possible in (particularly undergraduate) teaching and administrative tasks, who has a competitive approach to grant-getting, developing skills and who needs to invest energy in self-promotion and networking, both locally and internationally.

In the participants' words, the influence of the department on research success is not conclusive, but academic freedom, a good atmosphere and a supportive environment do create a climate of trust that can contribute to a research group's success. One participant explains:

> I work in a very supportive environment. The same as in other departments, there have been some pressures, but ours is a small department with a very relaxed working environment and it's very flexible, so I've always felt that I could do what I wanted. I think I'm in a good environment, a very favorable one (Maria Carmen, 56, associate professor).

Several studies (e.g. Long, 1978) have found that providing a scientist with more free time to use for research, good quality physical resources and good social support to support his/her academic work can improve the prestige of a department. However Hagstrom (1967) concluded that, while departmental prestige is associated with a number of factors which might be expected to influence research productivity, there is no evidence for "believing that a greater productivity of scientists in high prestige departments is due more to the context where they work than to their research skills and motivations" (p. 61).

Despite the positive focus of our research, the interviewees felt that being a woman was an obstacle to building a successful academic career. In line with the findings of Guillarmon (2011), some of the women interviewed in this study pointed out that:

> Despite the high number of women found at different levels within the university: undergraduates, Ph.D. students and those in the early stages of their careers, there are only four senior women professors in Spain [in anthropology]. In addition, these professors are currently undergoing a very demanding accreditation process in which they have to travel all around Spain to find an examining board; it could be said that this field is not particularly friendly towards women (Maria Carmen, 56, associate professor).

However, the recognition of the barriers that women who head research groups have to deal with at universities is one of the factors that might improve the chance of success for other women academics. If academic women start to recognize the impact of gender disparities within the university environment, they will be able to work together to reduce such disparities and promote successful careers for other women.

4 CONCLUSIONS

Success at university is also associated with organizational factors and depends on the effective functioning of a research group. With regard to research groups, if women research directors achieve a certain level of success, it is seen as a reflection of the whole group's efforts and that success is shared among all its members. At the same time, the success of women research directors is also seen as a motivating factor both personally and at a group level. The characteristics of successful women leaders in research groups include a willingness to share knowledge, to collaborate effectively and to maintain a clear vision and a set of objectives. All these factors are essential for the achievement of success both personally and at a group level for any length of time. Women acting as research directors associated personal success with group success and knowledge sharing. The ability to work in a group, creatively and collaboratively, to interact with others and share responsibility was also mentioned as a determinant of success. Successful research groups can be recognized by the quality of their publications and the results of their research (budgets, training), by their good working environment, by their ability to meet

technical and financial conditions and by the reputation and professional recognition of their leaders. Group factors are necessary for success, as they ensure that the individual researchers partake in the overall success of the group.

This article summarizes the group factors that determine the success of women who are research group directors. Despite the institutional, group and personal obstacles, women in such positions promote academic development, better research and the effective communication of results. A willingness to continue working and changing the intellectual environment stand out among the objectives that successful women occupying directorial roles within research value most highly, even though universities in Catalonia are still perceived to be dominated by masculine cultural values.

This study has some limitations too. Findings should be viewed as an initial exploration of the group factors that affect women's career development in higher education. However, further studies are needed in order to explore the relationships and patterns that might explain changes in the professional practices from an organizational point of view.

The results of the present study could improve our knowledge of the factors associated with excellence in research amongst academic women. This could assist in the development of institutional policies and practices at the higher education level and such organizations could adopt approaches which would largely help women to build successful research careers.

REFERENCES

Bagilhole, B. (2007). Challenging women in the male academy: think about draining the swamp. In P. Cotterill, S. Jackson, & G. Letherby (Eds.), *Challenges and negotiations for women in higher education.* Dordrecht: Springer. doi: 10.1007/978-1-4020-6110-3_1

Bruneau, W. A., & Savage, D. C. (2002). *Counting out the scholars: How performance indicators undermine universities and colleges.* Toronto: James Lorimer.

Bryson, C. (2004). The consequences for women in the academic profession of the widespread use of fixed term contracts. *Gender, work and organization*, *11*(2), 187-206. doi: 10.1111/j.1468-0432.2004.00228.x

Carayol, N., & Matt, M. (2004). Does research organization influence academic production? Laboratory level evidence from a large European university. *Research Policy*, *33*, 1081-1102. doi: 10.1016/j.respol.2004.03.004

Davis, K. (2001). Peripheral and subversive: Women making connections and challenging the boundaries of the science community. *Science Education*, *85*(4), 368–409. doi: 10.1002/sce.1015

Dever, M., & Morrison, Z. (2009). Women, research performance and work context. *Tertiary Education and Management*, *15*(1), 49-62. doi: 10.1080/13583880802700107

Devos, A. (2007). Women, research and the politics of professional development." *Studies in Higher Education*, *29*(5), 591-604. doi: 10.1080/0307507042000261562

Doherty, L., & Manfredi, S. (2005). *Improving women's representation in senior positions in the higher education sector, stage findings.* Oxford: Centre for Diversity Policy Research, Oxford Brookes University.

Evans, L. (2012). Leadership for Researcher Development: What Research Leaders Need to Know and Understand. *Educational Management Administration and Leadership*, *40*(4), 423–435. doi: 10.1177/1741143212438218

Gardiner, M., Tiggemann, M., Kearns, H., & Marshall, K. (2007). Show me the money! An empirical analysis of mentoring outcomes for women in academia. *Higher Education Research and Development*, *26*, 425-442. doi: 10.1080/07294360701658633

Grbich, C. (1998). The academic researcher: Socialisation in settings previously dominated by teaching. *Higher Education*, *36*, 67–85. doi: 10.1023/A:1003104311001

Griffiths, R. (2004). Knowledge production and the research-teaching nexus in eight advanced-industrialized countries. *Higher Education*, *34*, 397-420.

Guillarmon, C. (2011). Los condicionantes de la carrera investigadora en la Universidad que encuentran las mujeres In M. Tomàs (Ed.), *La Universidad vista desde una perspectiva de género.* Barcelona: Octaedro.

Hagstrom, W. O. (1967). *Competition and teamwork in science.* Final report to the national Science Foundation for research grant GS-657. Madison: Department of Sociology, University of Wisconsin.

Heinze, T., Shapira, P., Rogers, J. D., & Senker, J. M. (2009). Organizational and institutional influences on creativity in scientific research. *Research Policy*, *38*(4), 610-623. doi: 10.1016/j.respol.2009.01.014

Higgs, J. (2003). Making a difference. In H. Edwards, D. Baume, & G. Webb (Eds.), *Staff and educational development: Case studies, experience and practice from higher education.* Sterling, VA/London: Kogan.

Hobson, J., Jones, G., & Deane, E. (2005). The research assistant: Silenced partner in Australia's knowledge production? *Journal of Higher Education Policy and Mangement*, *27*, 357-366. doi: 10.1080/13600800500283890

Lafferty, G., & Fleming, J. (2000). The restructuring of academic work in Australia: Power, management and gender. *British Journal of Sociology of Education*, *21*, 257-267. doi: 10.1080/713655344

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation.* Cambridge, M.A.: Cambridge University Press. doi: 10.1017/CBO9780511815355

Lazega, E.; Mounier, L.; Jourda, M. T., & Stofer, R. (2006). Organizational vs. personal social capital in scientists' performance: A multi-level network study of elite French cancer researchers (1996-1998). *Scientometrics*, *67*(1), 27-44. doi:10.1007/s11192-006-0049-5

Long, S. (1978). Productivity and academic position in the scientific career. *American Sociological Review*, *43*(6), 889-908. doi: 10.2307/2094628

Luukkonen, T. (2012). Conservatism and risk-taking in peer review: Emerging ERC practices. *Research Evaluation*, *21*(1), 48-60. doi: 10.1093/reseval/rvs001

McLaren, M. (2002). *Feminism, Foucault and embodied subjectivity.* Albany: State University of New York Press.

Morley, L. (2003). *Quality and Power in higher education.* Buckingham: Open University Press.

Nowotny, H. (1989). Individual autonomy and autonomy of science: the place of the individual in the research system. In S. E. Cozzens et al. (Eds.), *The research system in transition* Dordrecht, Kluwer Academic Publishers.

Poole, M., Bornholt, L., & Summers, F. (1997). An international study of the gendered nature of academic work: some cross cultural explorations. *Higher Education*, *34*, 373-396. doi: 10.1023/A:1003075907126

Rocha, J. R., Marín, Sampere, M. J., & Sebastian, J. (2008). Estructura y dinámica de los grupos de investigación. *Arbor*, *732*, 743-757.

Sadler, R. (1999). *Managing your academic career: strategies for success.* Sydney: Allen and Unwin.

Seglen, P. O., & Aksnes, D. (2000). Scientific Productivity and Group Size: A Bibliometric Analysis of Norwegian Microbiological Research. *Scientometrics*, *49*, 1, 125-143. doi: 10.1023/A:1005665309719

Sagaria, M., & Agans, L. (2006). *Gender equality in US higher education: International framing and institutional realities.* Higashi, Hiroshima City: Research Institute for Higher Education, Hiroshima University.

Smeby, S., & Try, S. (2005). Departmental contexts and faculty research activity in Norway. *Research in Higher Education*, *46*, 593-619. doi: 10.1007/s11162-004-4136-2

Stephan, P. E., & Levin, S. G. (1997). The critical importance of careers in collaborative scientific research. *Revue d'économie industrielle*, *79*, 45-61. doi: 10.3406/rei.1997.1652

Subramaniam, N. (2003). Factors affecting the career progress of academic accountants in Australia: Cross-institutional and gender perspectives. *Higher Education*, *46*, 507-542. doi: 10.1023/A:1027388311727

Tomàs, M., Duran, M. M., Guillarmon, C., & Lavié, J. M. (2008). Profesoras universitarias y cargos de gestión. *Contextos educativos*, *11*, 113-129.

Toren, N. (1993). The temporal dimension of gender inequality in academia. *Higher Education*, *25*, 439-455. doi:10.1007/BF01383846

Travaille, A. E., & Hendriks, P. (2010). What keeps science spiralling? Unravelling the critical success factors of knowledge creation in

university research. *Higher Education*, *59*, 423–439. doi: 10.1007/s10734-009-9257-2

Von Tunzelman, N., Ranga, M., Martin, B., & Geuna, A. (2003). *The effects of size on research performance: A SPRU review,* Brighton: University of Sussex.

Walby, S., & Olsen, W. (2002). The impact of women's position in the labour market on pay and implications for UK productivity. Department for Trade and Industry. Retrieved from http://www.womenandequalityunit.gov.uk/pay/research.htm#impact

ACKNOWLEDGMENT