

Chapter 9

**THE METHODOLOGY AND
IMPLEMENTATION OF A KNOWLEDGE
MANAGEMENT SYSTEM IN THE ECONOMIC
AREA OF A HIGH POLYTECHNIC SCHOOL:
CASE STUDY LABS***

*Mariya Gubareva^{1,2†}, Orlando Gomes^{1,3},
Maria Margarida Piteira¹, Anabela Correia¹,
Carlos Proença¹, Nancy Edith Ochoa Guevara⁴
and José Fernando López Quintero⁴*

¹Lisbon Accounting and Business School (ISCAL-IPL) and

²Lisbon School of Economics and Management (ISEG-UL)

³Business Research Unit of the Lisbon University Institute (BRU-IUL)

⁴ECCI University, Bogota, Colombia

ABSTRACT

The knowledge management regarding scientific production of the fully employed professors and contributing lecturers of renowned

* Disclaimer: The views expressed in this chapter are exclusively those of the authors and do not represent or necessarily reflect the position of the school's board or of any extended group of its working staff.

† E-mail: mgubareva@iscal.ipl.pt. Corresponding author.

universities is a well-established practice in the major developed countries. Still, substantial improvements in this field are desirable for high polytechnic schools of Southern Europe.

This chapter presents a study on knowledge management and analyses trends of a scientific production in the economics and finance area at one of the Portuguese high polytechnic school, namely Lisbon Accounting and Business School (LABS). The data collection methodology regarding scientific research outcomes firstly was proposed and implemented at the economics and finance area. This data collection was based on the direct mail messages addressed to the effective teaching staff members followed by the individual and aggregate analyses of the obtained information regarding published works in the field of economics and finance. The time frame of scientific publications analyses spans over the period of 20 years, namely 1997 - 2016.

Later the same methodology was also extended to cover the entire institution. The knowledge management system was implemented in all the knowledge-producing units of LABS. A special database was created to keep the records. It now allows for timely consultation by the administrative bodies of the institution.

The main contribution of this study is to demonstrate that the right knowledge management in polytechnic schools is able to unleash hidden potentialities of the capacities evidenced through the implementation of the system of knowledge management. In practical terms, the aggregate results were presented in the form of a report entitled "Creating Knowledge", which was published on the Internet site of the institution.

The main findings of this report "Creating Knowledge" were used in the promotion of the LABS towards potential students and represented one of the main factors of fully accomplished enrollment of students for all graduate courses of the LABS for the new academic year beginning in September 2016 at the first stage of the enrollment process.

1. INTRODUCTION

The knowledge management regarding scientific production of the fully employed professors and contributing lecturers of renowned universities is a well-established practice in the major developed countries. Still, substantial improvements in this field are desirable for high polytechnic schools of Southern Europe.

This becomes an especially important issue, as one of the production process objectives of a high education entity is the creation of knowledge by employing the knowledge itself as a main production factor. In this context the knowledge could be defined as the cognitive activity of an individual, which is

involved in collecting information and creating ideas about the certain subject from one side, and transforming and incorporating these elements in order to achieve better perception of the subject, from another side.

Thus the crucial inputs of the high education production function are high school professors, researchers, and students working in a mode of constant interrelation within and out of the institution (see Ramírez et al., 2007; Jongbloed et al., 2008; Bratianu, 2009, Bernal et al., 2015). Thus, scientific papers, books, and organization of scientific conferences and workshops, in addition to the students' education process, represent the valuable output of a generic high education institution.

The economic value of knowledge could be measured in different ways. For example, the high education output could be evaluated using market-based method by assessing the numbers of patents, spin-offs, and the technology transfers among others. Alternatively, Rimes et al., (2014) suggest the application of churn theory as a reply to the challenge of knowledge quantification. The main idea of this theory is that the value of knowledge is as high as how often and wide it is applied.

The evaluation of knowledge is directly related to the assessment process of the organization's efficiency of an entity, which produces this knowledge. In its turn, the performance of high education school, and the respective delivery of results, depend on the appropriate organization of knowledge management system (see Riege, 2007; Anand and Singh, 2011; Omotayo, 2015). According to Marr et al., (2003) knowledge management could be defined as a set of procedures implemented by the institution in order to increase its value and thus its efficiency.

Additionally, high education institutions are normally asked by state and private funding agencies to provide the information related to their productiveness (see European Commission, 2003). Thus the knowledge management is a crucial element in the organizational structure of high education institution in particular and high education system in general.

The importance of the knowledge management regarding scientific production has been already recognized on the level of universities in the developed countries (see Tian et al., 2009; Sánchez et al., 2009; Ramirez, 2011; Wu et al., 2012; Ramirez, 2013). As a result of it, the systems of measurement, management and reporting of scientific production are implemented in many renowned universities.

Meanwhile, along with the acceptance of the necessity of the knowledge management, there is a lack regarding implementation of the knowledge management in a sphere of high polytechnic schools in Southern Europe.

The main objective of this chapter is to serve as a motivational example, which demonstrates the benefits of the implementation of the knowledge management system at Lisbon Accounting and Business School (LABS) of Lisbon Polytechnic Institute (IPL).

The Portuguese high education system consists of two types of entities, namely universities and polytechnic institutes. It is assumed that the university's responsibility is to provide the academic education and encourage scientific research, while the polytechnic institutes are in charge of much narrower specialization, and thus aimed at providing highly specific training to develop practical skills demanded by the economic ecosystem.

In this chapter we demonstrate that the development and implementation of the knowledge management system in Lisbon Accounting and Business School (LABS) of Lisbon Polytechnic Institute (IPL) evidence the existence of high capacity in production of academic research in addition to the traditionally accepted specific practical tools and manuals production.

The chapter is organized as follows. The proposed methodology of knowledge management system is presented in Part 2. Part 3 is dedicated to the application of the developed methodology in the case of Lisbon Accounting and Business School (LABS) of Lisbon Polytechnic Institute (IPL). The results are described in Part 4. The main conclusions are derived in the last section.

2. METHODOLOGY

The methodology followed by LABS in the process of the implementation of the knowledge management framework is in line with the synthetic model proposed in "The European Guide to Good Practice in Knowledge Management" (European Committee for Standardization, 2009). This document summarizes the result of research performed by the team of representatives of diverse private and public institutions from several European countries.

This team reviewed over 140 knowledge management models from all over the world and developed a synthetic model that integrates business processes, knowledge components, and organizational features such as institutional culture, staff qualifications, and technological base.

The European Committee for Standardization defines five core activities, which constitute the knowledge management cycle: identifying, creating, storing, sharing, and using and transferring of knowledge. Thus our work

targets and analyses all the five knowledge management constituent components.

From the pragmatic and practical point of view it was acknowledged by several research groups that the studies based on published research results and other outputs allow for identifying the nuclei of scientific knowledge generation. Usually these studies are carried out by means of bibliometric techniques, which analyze such variable as productivity of research teams and scientific areas, identified through the individual performance of the involved researches.

Our work follows this approach, but also considers the structural dimension of the organizational and administrative aspects. That is, we also take into account the institutional unit to which the research team belongs, be it a research nucleus, department, area or subarea, as well as the levels of hierarchy and distribution of the functions exercised by teaching and research staff.

The criteria related to the structure and organizations of the research centers of excellence are the most used by the authors when characterizing these units, which constitute the micro level of the knowledge creation. These criteria describe the norms, *modus operandi*, productivity and the forms of organization and interaction between the members of research teams. These are the criteria that determine how the intellectual capital emerges.

The criteria for characterizing research teams, according to their intellectual capital are usually classified into the three categories: human capital, structural capital, and relational capital. Human capital is defined, as a set of skills and capabilities that people are acquiring throughout their lives, be it by formal studies or from their experience. Structural capital is understood as a combination of knowledge and intangible assets that are owned by the institution. Structural capital refers to the set of relationships with external agents, which serve as a channel to obtain information and generate knowledge.

Although at the current stage of our research we adhere to a holistic view of knowledge management, the inclusion of these above-mentioned aspects of knowledge cycle will enrich the LABS knowledge management framework at the further stage of its development, as diversity and ownership of knowledge require both structuring and organizing processes in order to define the type of targeted knowledge as well as of those people who is supposed to properly handle it.

In our work we attempted to take into consideration various points such as individual values, teamwork, communication channels, organizational

structure, institutional culture and their interrelations with creation, assimilation, and distribution of the already existing and newly generated knowledge.

According to the targeted objectives of this research we adhere to the model in which a knowledge management cycle is based on five fundamental pillars, among which are the processes of identification, generation, structuring, storage, and diffusion and application of knowledge (Bernal et al., 2015).

In order for this model to become operational there is a necessity of the adequate informational system that will allow collecting significant information from external and internal sources. The must have is also a sharing network providing communication and exchange of results, experiences, and ideas among the members of the organization. And last but not least, the adequate organizational structure is needed in order to promote the exchange of knowledge and ongoing training according to the knowledge needs of the organization.

As to the universe of the knowledge management implementation at LABS, the population and sample refer to the 5 areas of the institution, namely Economics and Finance, Accounting and Auditing, Management, Law and Legal, and Information Technology and Communication Sciences department.

In respect to the survey methodologies, the existing intellectual capital survey under the current knowledge management project was based in a qualitative methodology and inspired by the case study approach. As some authors noted these methodological choices allow flexibility to articulate other methods and techniques, and help to confirm the validity of procedures, by using several sources in parallel (Stake, 1994; Yin, 1994).

In the gathering data process, first there was performed an identification of the teaching staff and the respective contacts were assembled. Then a set of tools was applied: emails, phone-calls, conversations and interviews with the members of the teaching teams of the LABS areas and departments. These conversations and interviews were aimed to identify the strategies of scientific production of their members. In addition, they were asked to sent a complete listing of publications, between the years 1996 and 2016, and order by the three categories previously defined by the knowledge management project team, namely: articles and papers, books and books chapters, and conference proceedings.

Since data are of qualitative nature the content analysis was applied, following a deductive and inferential process. Thereby the current methodological strategy was based on suggestions of Bardin (1977). The

coding process started by identifying: (i) the unit of registration (UR) - the content to be considered as the basic unit (i.e., the categories concerning the scientific outputs); (ii) the unit of context (UC) - the understanding unit to codify the unit of registration, i.e., interviews of each member of teaching staff.

This was based on the intention to make a co-occurrence analysis. However this implies that the unit of context (UC) has a significant dimension, and that the counting method of unit of registration (UR) (i.e., the rule of enumeration) must be defined. The UR chosen was the number of times that category appeared in the UC (its frequency).

In addition, the relative frequency was also calculated: i.e., the number of times that a category appeared in the UC in relation to the total number of all categories in the same UC. The outputs of content analysis were categorical and co-occurrence matrices and graphs of relative frequencies (RF).

The frequency matrices were created, which allowed a quantitative association with the absolute and the relative frequency of each category. In addition to the frequency analysis graphs were generated, showing the relative frequencies and the categories presence/absence for each UC. This helped to analyze the highlighted categories. This graph analysis was carried out by categories in each scientific area of LABS, allowing the intersection of several co-occurrences in the content analysis. In addition, software MAXQDA (version 12.1.0) was used to help in data categorization and reduction.

The final quantitative data analyses were performed through the tabulation of the data under the statistical package of the MS Excel add-on applicative. At this stage of the knowledge management implementation project, this quantitative treatment was considered as sufficient for achieving the targeted objectives as it clearly evidenced the contribution of each research area to the creation, diffusion and transfer of knowledge. The application of the described above methodology at LABS is detailed in the following section.

3. APPLICATION OF METHODOLOGY

3.1. Description of LABS

LABS, the Lisbon Accounting and Business School (i.e., Instituto Superior de Contabilidade e Administração de Lisboa - ISCAL) is a Portuguese higher education institution that offers undergraduate and graduate courses in all fields of management and business. The main educational offer

of ISCAL contemplates courses on accounting and administration, management, corporate finance, law studies, and international trade. Additionally, master courses are also available for students on subjects ranging from advanced accounting, auditing, and taxation, to financial analysis, entrepreneurship, and public administration. The school also organizes short duration courses for accountants who seek to update their knowledge, language courses, and other short-term lecture cycles in its areas of expertise.

Teaching at the LABS combines a strong practical component (courses are associated with well-defined professional careers) with a solid academic perspective. The school counts with around 3.000 students. It has an academic staff of almost 200 professors. Some of these professors are reputable professionals in their areas of expertise. It provides a valuable input in terms of sharing relevant know-how. On the other hand, the LABS employs full time teachers dedicated not only to pedagogical activities, but also to scientific research.

In regard to its organizational structure, the LABS is organized in five main areas of knowledge. These are: economics and finance, accounting and auditing, law, management, and information and communication sciences. The area of economics and finance contemplates subareas of economics and finance. This area also includes an autonomous section of applied statistics. The area of accounting and auditing is divided in three subareas: financial accounting, management accounting, and auditing. It also contains an autonomous section of mathematics. The Law area is separated into common law subarea and fiscal law subarea. The area of management is split into a corporate management and public management subareas. Finally, the information and communication sciences area counts with the subareas of information systems and foreign languages.

The management area incorporates an autonomous section of operational research, and the information and communication area has got also a section on the field of research methodologies.

The economics and finance area provides to the curricula of the courses important contents in the fields of microeconomics, macroeconomics, international economics, financial calculus, financial management, project evaluation, and public finance.

In the accounting area, we find all sorts of curricular units of accounting (financial accounting, cost accounting, management accounting, sectoral accounting, banking accounting, public accounting), management planning and control, and auditing.

In the area of law, the key lectured subjects are taxation and fiscal law, but very important disciplines also include the economic law, financial law, civil law, administrative law, and European Union law.

In regard to the area of management, the main disciplines include basic theory of organizations, marketing, logistics, human resources management, and management of public institutions.

In the area of information and communication sciences, the emphasis is given to the English language, to the communication and the self-expression techniques, and to the units covering various aspects of information systems applied to business. The curricular structure of each of the undergraduate and graduate courses available at ISCAL consists of a different combination of the curricular units mentioned above.

Being a higher education institute, the LABS is committed to improving its standards of produced and published scientific research. This is a school with a long tradition in preparing quality textbooks, mainly in the field of accounting, but also in the fields of business and management.

Besides publishing diverse didactical manuals, the academic staff of LABS is progressively adapting to the increasingly demanding requirements of the Portuguese higher education career, which requires not only the publication of pedagogical works, but also publishing of original scientific articles in reputable international research journals.

As already mentioned, the team of professors that composes the teaching staff of the LABS is heterogeneous. So, the works published by the LABS's teaching staff demonstrate the high degree of heterogeneity. In this knowledge management project, the references related to the three types of publications have been analyzed. Namely, we studied i) publications of papers in scientific journals, ii) publications of books and book chapters, and iii) publications of conference proceedings.

As it is evidenced by this knowledge management project, certain areas of the LABS are more prepared to publish technical work in the form of books and of conference proceedings. On the other hand, in several areas such as, for example, economics and finance, the research is continuously published in important scientific journals.

The composition of the teaching staff of the LABS has evolved fast in the last few years. The number of teachers holding a PhD degree has more than doubled in the last five years. It is expected that the qualifications of the personnel will continue to grow. It will certainly allow for a consistent and systematic increase in the quantity and quality of the produced research.

3.2. Economics and Finance Department

The area of Economics and Finance counts with 47 teachers (information of June, 2016). The economics subarea counts with 14 teachers. Still, their profiles and roles in the research activities and in the institution governance allowed igniting the whole implementation of the knowledge management system at LABS.

The finance subarea counts with 29 professors, while the remaining 4 professors are associated with the section of applied statistics.

Overall, the Economics and Finance area has 17 professors with a PhD, what amounts to 36.17% of the total. With more than a one third of PhD professors, this area is a one with the highest qualifications in LABS, what is clearly reflected by the number and the quality of the publications.

This area supplies teachers to all courses of the LABS, being the most relevant presence in the undergraduate courses of business, international trade, and corporate finance. The Economics and Finance area involves the participation of a few specialist professors.

There is also an important component of theory being taught (e.g., in economics, statistics, and financial mathematics). It justifies the presence of a large number of academics essentially committed to research and advanced training. There are yet a relatively significant percentage of teachers involved in disciplines offered at the doctoral level.

In the area, there is only one professor in the highest professional category of the polytechnic career, i.e., professor coordinator. This grade is similar to the full professor grade at a university carrier ladder. The large majority are adjunct professors. There are also some assistant professors, which are essentially those enrolled in PhD courses. Thus, the area counts both with professors strongly engaged in high quality pedagogical activities and a group of young teachers that provides a significant boost to the capacities of the area, given their exceptional qualifications and research skills.

Each professor was individually contacted in order to confirm the information on the respective publications. The authors of this study previously collected this information. The data available online allowed gathering almost all the relevant information, with some items being added by the professors in the mentioned confirmation phase. This data collection unveiled an area with a strong competitive capacity in terms of high-level research. Although the published research is concentrated at a few members of the academic staff, the confirmed quality, acceptance, and diffusion of the research performed by the Economics and Finance area, places the scientific

outcome of this area in line with the scientific production of the most prestigious higher education institutions in the country.

The most outstanding achievement of the area is certified by the publication of articles in technical and scientific journals. A total of 172 journal articles were identified, what gives an average of 3.7 articles per professor. Since 2005 onwards, the number of published papers has been remained persistently high. The remarkable fact is that out of the mentioned 172 papers, 82 correspond to the papers published in the indexed international journals (ISI/SJR). Publications of professors of the Economics and Finance area can be found in such highly prestigious and reputable journals as *Applied Economics*, *Economics Letters*, *Journal of Economic Surveys*, *Journal of Evolutionary Economics*, *Journal of Financial Stability*, *Journal of International Money and Finance*, *Journal of the European Economic Association*, *Labour Economics*, *Oxford Bulletin of Economics and Statistics*, *Physica A*, *Quantitative Finance*, *Scandinavian Journal of Economics*, and *Social Indicators Research*, just to cite some of those with the highest impact in the academic community.

The themes addressed in the researches of the Economics and Finance area are being published are multiple and varied. They include the role of innovation and imitation in economic growth, interacting heterogeneous agents in the macro economy, animal spirits and behavioral rules in macroeconomics, price and wage stickiness, volatility of asset prices, financial corporate policies, financial risk management and financial contagion, stock markets performance, and labor market studies.

Besides many articles in scientific journals, there is also a relatively strong presence of the Economics and Finance area in what respects publication of book chapters and conference proceedings chapters; these amount to 43 and include chapters in books edited by some renowned publishing houses, as it is the case of Emerald Publishing, Edward Elgar Publishing, Springer-Verlag, the Oxford University Press, Nova Publishers, etc.

Regarding the publication and editorship of books, 28 publications were identified. These include textbooks in general economics, macroeconomics, international economics, corporate finance, and financial analysis; and also some manuscripts in more specific areas, directed to a more restricted audience, as it is the case of books on the subjects of pricing decisions on the euro area or on the fundamentals of dynamic analysis in economics.

With a total publication record of 243 identified publications, the area of Economics and Finance is an area of LABS focused on high quality research. As in other LABS' areas, an important issue is a concentration of the

publication centered at a relatively few researchers. There are only 11 teachers with 5 or more publications in the universe of 47 teachers, i.e., 23.4%. Nevertheless, we must highlight a considerable growth in terms of researches potentially publishable in important scientific vehicles.

3.3. Accounting and Auditing Department

At the time of the data collection 54 teachers were associated with the Accounting and Auditing area, split into the following subareas: auditing – 7 teachers; financial accounting – 28 teachers; management accounting – 11 teachers; mathematics (autonomous section) – 8 teachers. Out of these 54 professors, the number of those holding a PhD degree is 7, representing less than 13% of the total number of teachers in this area.

The Accounting and Auditing area is the fundamental field of teaching and knowledge creation at the LABS. The central place that the accounting area has at the LABS requires maintaining a high level of quality research in this area. It means that the respective teachers have an important responsibility in the delivering results that contribute to the advancement of academic and applied knowledge.

A significant number of the teachers of the area are practitioners, i.e., professionals that work directly in the accounting departments of firms and other organizations. Consequently they are capable to convey an important empirical knowledge to students aspiring to obtain a degree in this field. The role of these teachers at the LABS is viewed not as an academic role, but as a role of a specialist in the respective subjects they teach. Therefore, it is not expected from them to have a substantial contribution in terms of basic research. Nevertheless, some of them are active in producing technical work that is frequently published in the journals of the professional orders and in the proceedings of specialized conferences.

Teachers who intensively develop their academic careers compose the remaining staff, circa one half of the area. Most of them are enrolled in PhD programs while some already hold PhD degrees. The autonomous section of mathematics employs teachers with a relatively different profile from the rest of the area. They are career teachers predominantly engaged in pedagogical activities.

In respect to the age profile of the teaching staff, the area is relatively well equilibrated. For example, the senior professors coordinate pedagogical, scientific, and organizational activities and provide a valuable input by sharing

relevant empirical knowledge. There is also an important group of younger teachers that are building their careers, some of them exclusively on an academic basis, while others are betting in developing parallel careers in the academy and in practicing at private accounting firms or public administration establishments.

The area counts with 4 teachers in the position of professor-coordinator, which is an analogue of a full professor category and represents the highest rank in the career hierarchy of the Portuguese higher education polytechnic system. A relatively large body of professors are in the category immediately below; the adjunct professor category. The teachers not holding a PhD and those who cannot be considered specialists from a professional point of view (i.e., those without large years of relevant professional careers) are positioned as assistant professors. In the area of accounting and auditing, assistant professors represent a relatively large number.

The teachers, responsible for each of the subareas and autonomous section were contacted in order to collect information on publications by each of the teachers in the respective subarea. Thanks to the collaboration of the heads of the subareas, this information was swiftly collected, and then duly analyzed by the knowledge management team members in order to derive synthetic conclusions. The main conclusion is that despite relatively low academic activities if measured by per teacher metrics, the area of accounting and auditing is nevertheless one of the most active areas in absolute volume of publications due to the elevated headcount of the teaching staff.

With respect to the publications in scientific and technical journals, the current teachers of the accounting and auditing area during the period under consideration have published 111 papers, implying a per teacher publication figure of 2.1 papers. Naturally, while some professors have published a lot, there are also many teachers without published papers. The most optimistic feature of this data is that 77 papers out of the total number of 111 articles, i.e., 70%, were published within the last 6 years. These figures give a good illustration of the fact that the dynamics of publication in accounting journals is a relatively recent phenomenon observed at the LABS accounting area.

The large majority of the published articles address specific issues of accounting and auditing and they are mostly published in national technical and scientific journals. Still several international scientific journals in the last few years have also become an outlet for the dissemination of knowledge generated by the accounting and auditing area of LABS. The large amount of published works is a clear sign that the accounting and auditing area is

constituted by a significant number of well-prepared professors with strong and up-to-date competences in the respective domain of knowledge.

The weakest point regarding the dissemination of knowledge produced by the area, revealed by the analysis of the published papers, is a small number of publications in indexed journals (ISI and SJR); only 7 papers were identified, with 3 of them published by professors of the mathematics subarea and other 4 by a small group of accounting teachers, which have finished their PhD in recent years. Hence, one infers that these new PhD holders act as pioneers changing the focus of the research developed within the accounting and auditing area. This cultural shift intends better complying with the requisites of the increasingly demanding and internationally competitive academic career.

Book chapters and conference proceedings also represent important channels frequently used by the teachers of the accounting and auditing area to share their research results and foster intellectual capital. Again, one finds a concentration of publications in the most recent years. During the last 6 years, 47 book chapters and proceedings were published, within an overall total record of 82 publications (thus, 57.3% were published since 2011). The per teacher publication ratio is 1.5 although, but as for published articles, the level of concentration is relatively high while knowledge generation is centered at the same few authors.

Among the book chapters and conference proceedings the vast majority of works are published as conference proceedings. It is worth noting that traditionally this area has a strong presence in terms of the number of professors attending and participating in the accounting and auditing conferences.

Finally, the number of books published by professors in the area, as single authors or in co-authorship was also registered. Fifty-two books have been published by professors in the area, resulting in an average of almost one book per teacher. It is worth mentioning that the most recent years are characterized by a stronger publication flow. The books published by the area are essentially important and influent textbooks in the fields of accounting and auditing. These books are used as a primary bibliography or teaching manuals by many accounting schools in diverse regions of Portugal as well as in other Portuguese speaking countries. They are available in practically all specialized bookstores and are among the most sold scholarly books in Portugal. Their impact on the academic and practitioners' community is significant. Among the books published by the professors of the area we encounter also a few books on mathematics, which are essentially exercise compendiums.

In summary, the accounting and auditing area of LABS provides significant contributions to the advancement of both, highly specialized and broad scientific knowledge in the field. The knowledge generated by the area intellectual capital is disseminated through articles published in technical journals, conference proceedings, and books of high quality and wide acceptance. An important transition to the publication of articles in refereed international journals is also in progress. Despite the above-mentioned positive aspects, the research effort in the area is still too much concentrated, with only 17 of the 54 professors, or 31.48%, presenting a record of 5 or more published works. This figure still can be interpreted as a very impressive positive message and as an aspirational guidance for the rest of the area teachers.

3.4. Management Department

The department of management at Lisbon Accounting and Business School (LABS) is sub-divided in two subareas, the subarea of Business Management and the subarea of Public Management.

The department of management is staffed with 19 professors, of which 15 are assigned to the subarea of business management and 4 to the subarea of public management.

Among the professors assigned to the department of management 37% hold PhDs in the area to which they are assigned, 32% have a status of a specialist, that is, they have proven business experience in the subjects they teach and the remaining 31% are developing their doctoral degree theses.

Regarding the professional categories, the teaching staff assigned to the department of management, is composed by 2 professor-coordinators; grade is similar to the full professor grade at a university carrier ladder, - 9 adjunct professors and 8 assistant professors. There are also two monitors allocated to the area, that support the Applied Management Simulation Project seeking to make students familiar with the contemporaneous business world.

Regarding employment terms of the teaching staff, of the total number of professors assigned to the department of management, 42% are full-time hires with exclusivity clause and the remaining 58% accumulate positions in external entities, being only part-time employees of LABS. It is worth mentioning that these part-time professors occupy relevant management positions in both, public and private sectors.

Some teachers of the department of management also hold positions in the management bodies of LABS, including the Scientific and Technical Council,

the Council of Representatives and the Pedagogical Council. They are also involved in the LABS Unit Organizational Structure Quality project (Lisbon Accounting and Business School) and the IPL Central Unit Organizational Structure Quality project (Lisbon Polytechnic Institute). At the same time, some professors from this department are also members of diverse renowned research centers.

The curricular units assigned to the department of management are transversal to all the courses and the academic semesters, both in the 1st cycle (undergraduate) and the 2nd cycle (master's) levels. This is also of no surprise given the high number of students seeking a degree in management.

On the other hand, globalization, entrepreneurship, innovation, quality, and social responsibility topics, among many others, represent important issues in contemporaneous management that make increasingly challenging the topics taught by the teachers of this department. The need for timely update of their professional and teaching skills makes the continuous development of skills in these areas an inevitable requirement.

Hence, the research carried out by this area is always focused on the state of the art and is aimed at productions of scientific publications, books, and other relevant documents such as master and doctoral theses.

In respect to both teaching and research activities, the case studies represent a fundamental support that link theoretical issues to practical reality. Conferences and seminars organized by the department of management contribute positively to the relationship between the institution and the labor market, and present themselves as an asset in the acquisition of knowledge, strengthening the links between the market and the teaching process.

In addition to the themes taught at the institutional level, the professors of the department of management seek to achieve knowledge through scientific work production, with numerous works published in books, scientific journals, general public targeting magazines, and conferences. The teachers of department of management share among them the conviction that the production of knowledge is an important goal of the institution, that the better management of the produced knowledge is highly desirable and there is still a long way to go.

The professors of this department are recognized internally at LABS and IPL and externally, in Portugal and abroad, in particular due to the continuous sharing of the knowledge generated by the area with other LABS and IPL units and with other educational institutions.

3.5. Legal and Law Department

The Legal and Law Department of Lisbon Accounting and Business School is sub-divided in two main areas, the subarea of General Law and the subarea of Tax Law.

The Legal and Law Department employs 50 professors, 30 of which make part of the subarea of general law and 20 belong to the subarea of tax law. In the recent years, many of those teaching staff members concluded their PhD studies in different areas of Law, defended their doctoral theses and now hold PhD degrees; others teaching staff members hold the Master degrees and some of them hold the status of a Specialist in a specific area of Law. The eligibility to this status is subject to a public audience that evaluates the knowledge of a candidate in a specific domain of Law, as well as a candidate's professional curriculum that usually contains a relevant experience (for example, the practice of advocacy or the exercise of the functions of an enforcement agent) in the same area of Law, in which the candidate seeks to obtain the mentioned status of a Specialist.

Among 50 professors in Law and Legal Department, there are 3 are full-professors, i.e., professors-coordinators (1 in general law subarea and 2 in tax law subarea), 25 are adjunct professors (12 in general law subarea and 13 in tax law subarea), 22 are assistant professors (17 in general law subarea and 5 in tax law subarea). Nowadays, the area doesn't counts with support staff such as monitors.

Regarding employment terms of the teaching staff, 11 are fully employed professors with exclusivity clause, 15 are temporary employed professors and 20 are part-time employed professors.

Two Law professors of Lisbon Accounting and Business School in the past acted as Secretary of State of former Portuguese Governments. Some of teaching staff members are lawyers and solicitors while others are public employees in the Tax.

Some of professors of the Legal and Law Department in the past participated in the governing bodies of the Lisbon Accounting and Business School, such as the Scientific and Technical Council, the Council of Representatives, and the Administration Board; others law professors participated in the governing bodies of the Lisbon Polytechnic Institute - IPL.

The Legal and Law Department is involved in teaching activities at both, the first cycle (graduation) and the second cycle (master) degree of Lisbon Accounting and Business School. Concerning the first graduation cycle in Finance, Accounting, and Management, the teaching staff of Legal and Law

Department is in charge of many curricular units, such as Introduction to the Study of Law, Business Law, Business and Labor Law, Financial Law, European Union Law, and Tax Law. Tax Law is divided in many sub-disciplines, such as the income, individual, and corporation taxes and the value added tax legislation.

The Lisbon Accounting and Business School also offers a solicitors graduation degree, which can be accomplished within 3 years. In this graduation course, which is but one of juridical courses, the relative weight of law disciplines is increased. The lectured disciplines involve Constitutional Law, Administrative Law, Procedure Law, Judicial Organization Law, Regulation and Competition Law, and others domains of Public Law. In this solicitor graduation course there are also present the disciplines of Private Law, with special focus on Civil Law, which includes Law of Obligations and Contracts, Property Law, Family Law and Inheritance Law, Labor Law, Commercial Law, and Corporation Law, among others.

A Master degree course in the solicitors' area, focused at the role of the corporation solicitor, is, nowadays under preparation and soon will be offered to potential seekers of Master degree in this area.

Teaching so many different disciplines in several areas transforms the work of the Law professors of Lisbon Accounting and Business School into a constant challenge. This challenge becomes even more demanding if one takes into consideration continuous legislative changes and emergence of the new legal instruments. The appearance of new fields and new branches of law, such as, for example, Environment Law, or Urban Planning Law, and, most recently, Aeronautical Law, Petroleum and Natural Gas Law, also stimulates continuous update of our knowledge base that we need to use in our work.

Although, being considered as a social science, the science of Law is different to others social sciences, such as, for example, the sociology. The methods that are commonly employed in law related research are not necessarily based in conversations, interviews, emails or phone-calls. Similarly, surveys and inquiries are not of a frequent use in this field.

It is also worth noting that the research in the field of law has its specificities. For example, although while addressing the state of art, diverse scientific reviews, newly published books, and other technical periodic publications in specialized journals are consulted, the main source of the state-of-art information remains concentrated in master dissertation and PhD theses.

The teaching of Law is, naturally, based in juridical methods, that are usually divided in *(i)* the study of the legal provisions, *(ii)* the study of the doctrine, and *(iii)* the study of cases and courts decisions, mainly the sentences

and judgments decisions by the high Portuguese and foreign courts, such as Portuguese Courts of Appeals, Portuguese Supreme Court of Justice; Portuguese Administrative Supreme Court, Portuguese Constitutional Court, the Court of Justice of the European Union, and the European Court of Human Rights, among others. It is worth noting that the second and the third methods require a lot of specific research work.

Frequently, the professors of Law of the Lisbon Accounting and Business School organize seminars and conferences about juridical subjects. For example, in the year of 2016 the area members managed several colloquia about the fiftieth anniversary of the Civil Code of Portugal.

The professors of Law of the Lisbon Accounting and Business School, as part of their teaching duties, also dedicate their efforts to producing scientific knowledge. In the last 20 years they contributed with 353 scientific works. From these works, 190 are working papers, periodic articles for law reviews, and others technical and periodic publications while 128 are books including manuals, and 35 are books chapters or books chapter parts.

The above-mentioned scientific works address diverse areas of Law, such as Constitutional Law, Administrative Law, Tax Law, Procedure Law, Civil Law, Labor Law, European Union Law, Criminal Law, and Business Law, among others.

In these scientific works, the respective authors have, frequently present diverse amendment proposals, the *iure condendo* or the *iure constituendo*, expressing their new views and new conceptions with objective to improve the legal solutions that exist nowadays. They undertake analytical studies in order to ascertain or clarify the existing regulation and legislation. Their mission is to assist in the resolution of diverse cases, problems, and conflicts that rise up in all the sectors of the Portuguese society including among many others families, workers, corporations, and public sector entities.

Nevertheless it is worth mentioning that at high polytechnic school it is quite hard to reconcile the teaching profession with the investigation activities. To reconcile these both teaching and researching academic dimensions requires a shared effort of the professors of the Legal and Law Department of the Lisbon Accounting and Business School - LABS and the LABS itself. Surely, the research in Legal and Law area would gain a lot with the future implementation at Portuguese high polytechnic schools of a carrier option of the *researcher profession*, as is already accomplished in the case of Portuguese universities.

The Legal and Law Department of the Lisbon Accounting and Business School also requires some more full-time employed Professors to be in a position to compete with the universities in the Law field.

Nonetheless, in what concerns law specific knowledge, the Lisbon Accounting and Business School is a top-quality institution and a well-known reference in among high education institutions in Portugal.

3.6. Information Technology and Communication Sciences Department

This section aims to describe the knowledge management in Information Technology and Communication Sciences Department (ITCSD) by means of two particular dimensions: the scientific outputs generated by the teaching staff of the department and the related communication of science, considered as a dissemination of knowledge.

Therefore, as a starting point two research questions were posed: *(i)* how is knowledge management carried out in ITCS department according to the scientific outputs generated by its teaching staff? - and *(ii)* how knowledge management could be described according to the communication of these scientific outputs to the external to LABS academic community?

In order to provide answers to these two questions, based on a previous curriculum-based evaluation of the teaching staff of LABS, the three most representative outputs were selected, namely: papers published in technical reviews and scientific journals; books and book chapters authored and/or edited by the teaching staff members, and published conference proceedings.

This section is organized as follows: primarily, it discusses the methods and techniques used in the gathering and analyzing data; and, secondly, the section offers a brief description of ITCSD and its results. Finally, the general findings are discussed, the conclusions are derived, and the future of research is addressed.

The 16 professors that compose the teaching staff of ITCS Department represented the empirical field for the data gathering and analysis.

The Information Technology and Communication Sciences department of Lisbon Accounting and Business School (LABS) was established in 2011. It comprises three areas, namely: information and communication sciences (ICS) area, subarea of language systems and autonomous division of research methods. 16 professors compose the teaching team. The following functions and professional categories are present: two area directors, seven adjunct

professors, seven assistant professors and one monitor. From this group seven are full-time employed professors, one is temporary employed and seven are part-time employees.

Despite the fact that ITCS department was officially created only in 2011, its staff has a long experience, both in teaching and research activities. The members come from other institutions and departments, carrying with them knowledge and practical experience, that contribute to the consolidation of the several scientific areas.

Thus, multidisciplinary and transdisciplinarity, crossing the borders of information and communication sciences are critical features that trigger the creation and development of knowledge at the ITCS department. Evidencing a continuous knowledge creation, the scientific production of the 16 members of the teaching staff of ITCS department, between the years 1997 and 2016, was analyzed.

Although there is a lot of work to do, particularly regarding the publication in indexed journals, the collected data clearly highlights the team efforts to produce a high quality scientific production. The respective findings are presented and discussed in the Part 4 dedicated to the description of results.

It is also worth noting that the three areas composing the ITCS department have different strategies to produce, disseminate, and communicate their scientific outputs, highlighting their specificities of scientific work and science communication. For example, the information and communication sciences area is distinguished from the others, as it is focused rather at authoring and editing of book than at publishing articles in scientific journals and conference's proceedings.

In general, the knowledge creation and dissemination at the ITCS department has been managed in accordance with internationally accepted best practices. These practices as expected vary between the three areas of the department reflecting different orientations in the communication of science and knowledge, regarding the internal and external academic community.

It was found that at the ITCS department: (i) the area of Languages Systems and Research Methods prioritize the dissemination of knowledge through book chapters and proceedings conference's; and, (ii) the area of information and communication sciences is more oriented towards authoring and editing of books.

In the first group, it can be stated that there is a tendency for interaction with peers, through participation in conferences. This type of science dissemination has a more collective component, by the discussion with other researchers and by collecting feedbacks from the academic community.

In its turn, in the information and communication sciences area, an author of the book and/or editor has a possibility to reveal in more detail an individual nature, not being subject to the discussion with many other peers. So, perhaps, this strategy arises from the highly specialized technical components and higher complexity that characterizes this scientific area. Usually, the professionals in the information and communication area usually work in a more individualized manner, characterized by distinctive conditions of knowledge production.

In both cases, the articles in scientific and technical reviews and journals do not represent the highest priority in order to disseminate the produced knowledge.

4. DESCRIPTION OF RESULTS

In this section, the results on the number of publications of the professors of the five areas of ISCAL are put together and compared. They show a great vitality and a systematically increasing effort in raising the quantity and improving the quality of the research originating in ISCAL. In aggregate terms, information about 1026 publications was collected, distributed in the following way: 540 papers in scientific and technical journals (from which 103 in indexed journals), 241 book chapters and conference proceedings, and 245 published and edited books.

To further analyze the results, six figures are displayed. They compare results by areas and type of publication; the last two show the evolution over time of the published research and the participation of teachers, by area, in the research effort.

Figure 1 relates to the number of published papers. The area of Law is the one with more publications in technical and scientific journals, followed by Finance and economics and Accounting and Auditing. The remaining two areas have generated fewer publications, what is an expected outcome since they also have less associated teachers. In Figure 2, the number of papers published in indexed international scientific journals is shown. The contrast with the bars in Figure 1 is evident. Although Law is the area with more published articles, none of this is in indexed journals; on the contrary, a significant amount of the research produced in the area of Finance and economics is published in such indexed journals; this is by far the area where indexed publications have more weight. In the other areas, this weight is almost negligible, although one can highlight the outcome of the management

area: 13 articles by ISCAL teachers can be found in ISI and / or Scopus indexed journals.

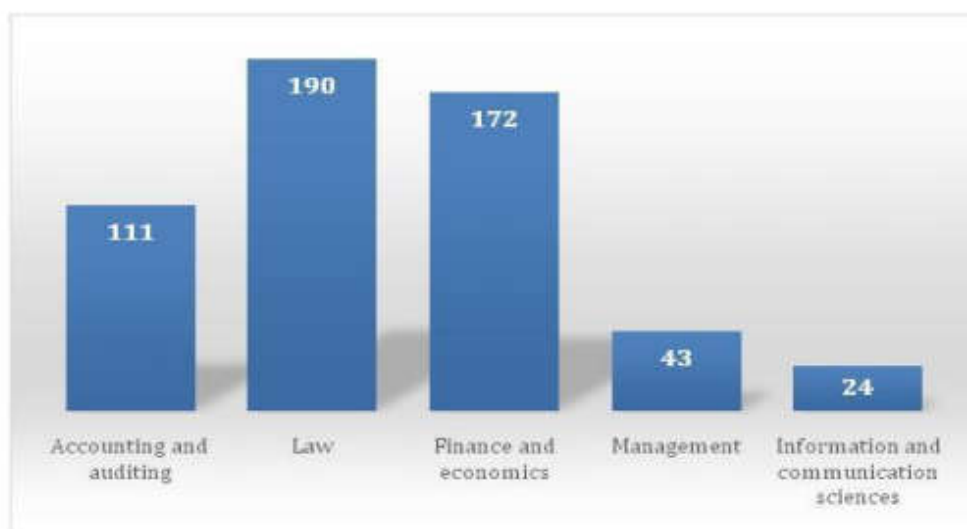


Figure 1. Published papers by area.

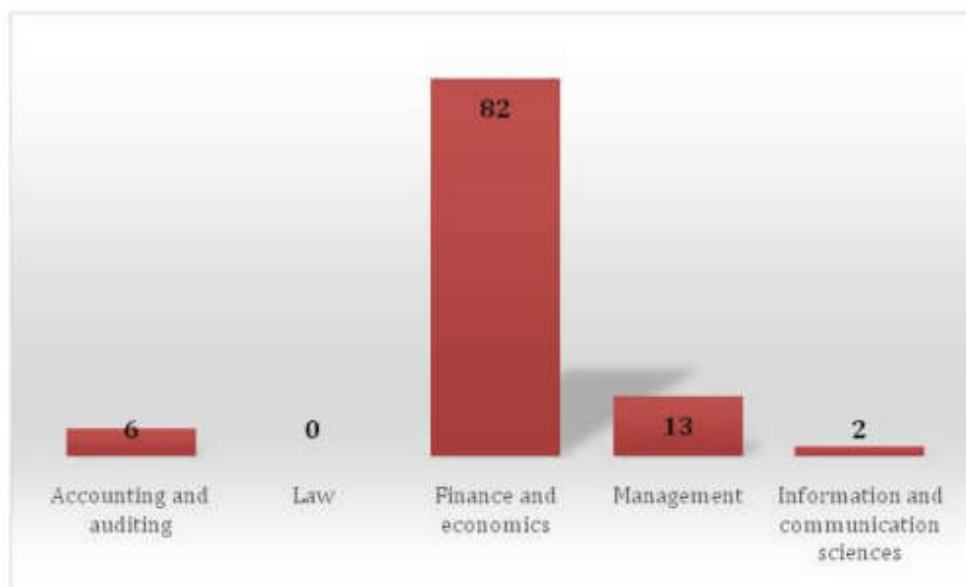


Figure 2. Published papers in indexed journals (ISI/SJR) by area.

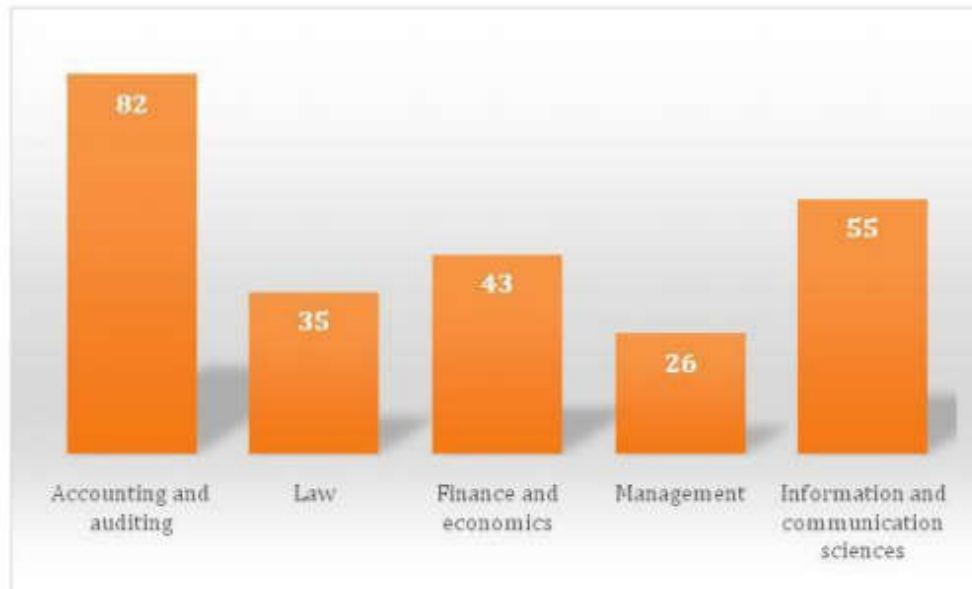


Figure 3. Chapter books and conference proceedings by areas.

In what concerns book chapters and proceedings chapters, Figure 3 reveals that all areas somehow contribute to the aggregate result, with special emphasis for the Accounting and auditing area, which occupies the first place in this category. As mentioned in the subsection where this area was characterized, the outcome is directly linked with the fact that accounting and auditing teachers massively participate in conferences, seminars and other events organized or sponsored by the professional orders, with this events typically being subject to the publication of proceedings.

The last comparison of publications across areas has to do with published and edited books (Figure 4). In this category, the Law area displays an overwhelming advantage over the other four. More than in any other area, the strongest vehicle for the dissemination of knowledge in the various disciplines of law consists in the publication of volumes, edited mostly in Portuguese language, that become available in book stores for researchers and students engaged in acquiring knowledge in legal studies. A quick look at Figures 1 through 4 reveals that research in distinct fields also signifies different platforms for the dissemination of the research results. Accounting studies appear mainly as book chapters and proceedings of technical events, Law research is published under the form of books and technical papers, and financial and economic scientific breakthroughs appear in a large extent as studies published in international scientific journals. Management and

Information and communication sciences also contribute to the global result in the various categories, although the respective results are not so salient in the figures given the lower number of teachers associated to each of them.



Figure 4. Published and edited books by area.

In Figure 5, it is displayed the trajectory of publications from year 2001 to the current date, for the whole set of ISCAL teachers. Note that 2016 is represented but only half of the year (until June) is assumed. Having this last fact in consideration, it is evident the upward tendency of the trajectory in the graphic. It is a fact, clearly visible in this figure, that the school is progressively more engaged in research and presenting stronger results from every year to the next. The main boost occurred somewhere between 2006 and 2008, years in which the number of publication more than doubled. In the last few years, the number of publication has more or less stabilized around 100, a significant value but that represents just around one publication by year for each two professors of the institute.

A last graphic, in Figure 6, gives an account of the number of teachers by area, a fact that naturally conditions the presented results. The Accounting and auditing area is the one with more teachers, closely followed by Law and Finance and economics. Management and Information and communications sciences areas have less than a half of the teachers of the largest areas. The graphic also displays the number of researchers with 5 or more publications. In

all areas, the percentage of teachers strongly engaged in research is relatively low, implying that the research effort, although increasing and already significant, is excessively concentrated in a small group of professors. Thus, a relevant corollary is that to expand the scientific output of ISCAL it is necessary to bring more of its teachers to the research activities, what implies also a wider participation of the ISCAL teachers in high quality doctorate programs that can prepare them for quality and productive research careers.

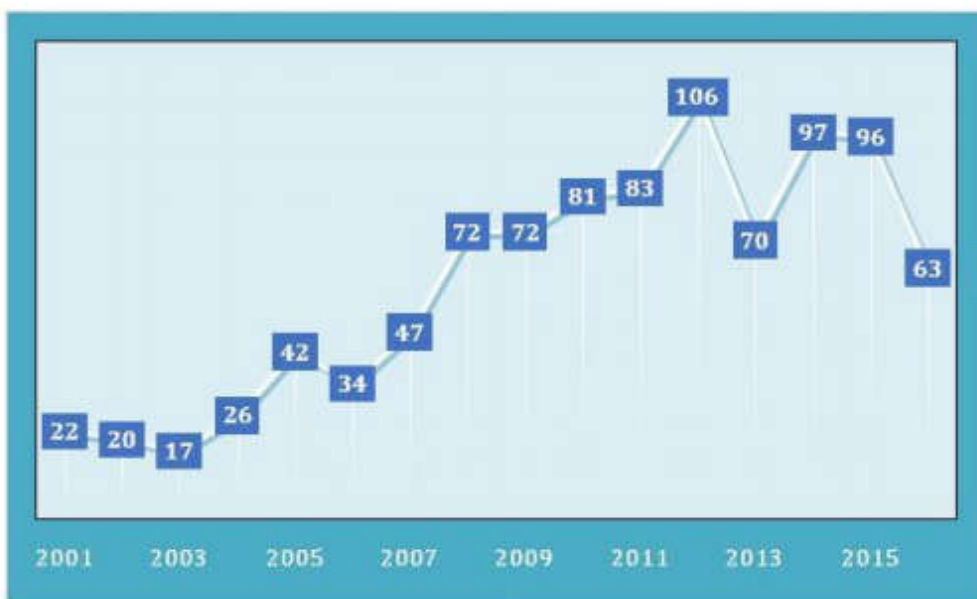


Figure 5. Publications by year.

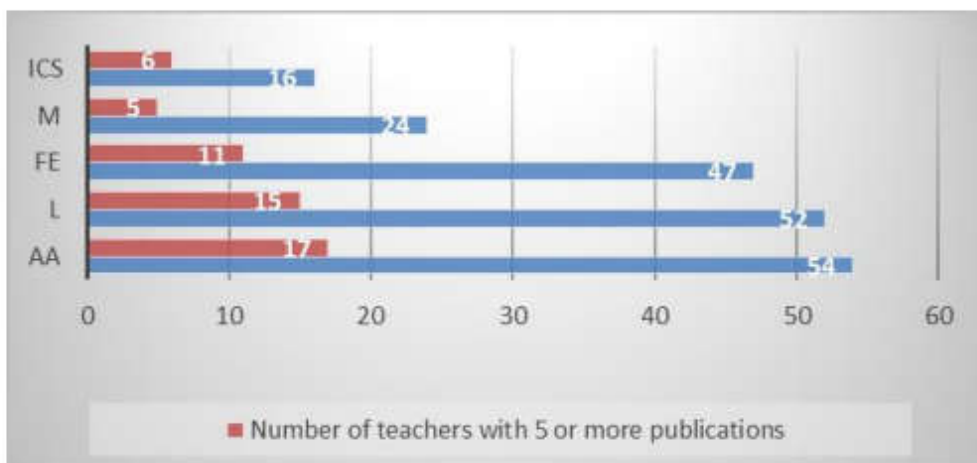


Figure 6. Number of teachers with 5 or more publications by area.

In general terms it is highlighted that the elements of knowledge creation and transfer are strengthened in the recent years.

CONCLUSION

The implementation of the knowledge management system at LABS clearly evidenced the contribution of each research area to the creation, application, and diffusion and transfer of knowledge. However, the involvement of the areas in these practices is not completely planned on ex-ante basis and often occurs on predominantly informal basis.

On the other hand, the implementation of the knowledge management system at LABS allowed pointing out the lines of action to continue working on improving knowledge management practices at both LABS and IPL, as well as on generating institutional policies that encourage the fostering of intellectual capital. A special database was created to keep the records and allow for timely consultation by the administrative bodies of the institution.

The scientific output of universities and polytechnic schools is a research quality indicator. Nowadays, there is a strong pressure to have a relevant number of publications in specialized reviews and scientific journals with a relevant scientific impact. Thereby as the first recommendation of the current knowledge management project, the strategy redefinition is to be proposed. Regarding the dissemination of outputs the primary focus should be at the publication of results in indexed journals and reviews with a relevant scientific impact.

In regard to high polytechnic schools, where knowledge areas are quite specific and more professionally oriented, future research in the knowledge management field must be developed. Further studies are needed, and a deeper comprehension of other dimensions is required. Examples of variables to be included in further researches are: the more detailed characterization of the teaching staff capabilities (e.g., the different areas of training, academic degrees, years of teaching, experience in research projects...), the more detailed description of participation in conferences, titles and scientific areas of scientific and technical reviews and journals.

In addition, comparative studies will also be required, not only between departments but also between different schools, targeting the benchmarking of the LABS against its peer institutions. Another key area to assess the modalities of knowledge management will be to understand the practices of

the public and private sectors of high polytechnic schools, in terms of differentiating teaching approaches and research strategies.

Summing up, there's a long road to go in the knowledge management field by the high polytechnic schools. Further studies are highly desirable for understanding this critical area. Thus it is possible to have a deeper reflection on knowledge dissemination and science communication strategies, and also on defining a better knowledge management policy.

At this point it is appropriate to summarize a few recommendations, which were arisen during the implementation of the knowledge management system at LABS.

First, it is highly desirable to have the complete and up-to date information on the profiles and roles of the members of teaching staff in order to capitalize the tacit and explicit knowledge within the respective areas and institution as a whole.

Second, it is important to require from the areas to continuously quantify the knowledge generated and acquired during the initial and subsequent phases of the implementation of the knowledge management system.

Third, the heads of the areas and subareas must be held accountable for the formalization, planning, and systematizing knowledge management actions according to the scientific output scheme expected to be obtained in the research process.

One of the important business related contributions of this study is the leverage of the fact the right knowledge management in polytechnic schools is able to unleash hidden potentialities of the capacities evidenced through the implementation of the system of knowledge management. In practical terms, the aggregate results were presented in the form of a report entitled "Creating Knowledge" which was published on the Internet site of the institution.

The main findings of this report "Creating Knowledge" were used in the promotion of the LABS towards potential students and represented one of the main factors of fully accomplished enrollment of students for all graduate and master's courses offered by LABS for the new academic year beginning in September 2016 at the first stage of the enrollment process.

REFERENCES

- Anand, A. and Singh, M. D. (2011). Understanding Knowledge Management: a literature review. *International Journal of Engineering Science and Technology* 3 (2), 926-939.

- Bardin, L. (1977). *L'analyse de contenu*. Paris: Presses Universitaire de France.
- Bernal, L., Garcia, V. and Lopez Quintero, J. (2015). Knowledge Management and Intellectual Capital in a University Context. *Proceedings of 10th International Conference Knowledge Management in Organizations* (pp. 741-753). AG, Switzerland: Springer International Publishing.
- Bratianu, C. (2009). The intellectual capital of universities. *Annals of the University of Ljubljana*. Ljubljana.
- European Commission (2003). *The role of the Universities in the Europe of Knowledge* (P.58) Brussels: COM.
- European Committee for Standardization (2009). *The European Guide to Good Practice in Knowledge Management* (Parts 1, 2, and 3). Retrieved from: <http://www.cen.eu/Pages/default.aspx>.
- Jongbloed, B., Enders, J. and Salerno, C. (2008). Higher education and its communities: Interconnections, interdependencies and a research agenda. *Higher Education*, 56(3), 303-324.
- Omotayo, F. O. (2015), Knowledge Management as an important tool in Organizational Management: A Review of Literature. *Library Philosophy and Practice* (e-journal), 1238. Retrieved from: <http://digitalcommons.unl.edu/libphilprac/1238/>
- Marr, B., Gupta, O., Pike, S. and Roos, G. (2003). Intellectual capital and knowledge management effectiveness. *Management Decision*, 41(8), 771-781.
- Ramirez, Y., Lorduy, C. and Rojas, J.A. (2007). Intellectual capital management in Spanish Universities. *Journal of Intellectual Capital*, 8(4), 732-748.
- Ramirez, Y. (2011). New management in Spanish universities: introducing Balanced Scorecard. *International Journal of Learning and Intellectual Capital*, 8(4), 359-377.
- Ramirez, Y. (2013). Intellectual capital management and reporting in European higher education institutions. *Intangible Capital*, 9(1), 1-19.
- Riege, A. (2007). Actions to overcome knowledge transfer barriers in MNCs. *Journal of Knowledge Management*, 12(1), 3-12.
- Rimes, H., Welch, J. and Bozeman, B. (2014). An alternative to the economic value of knowledge. In C. Antonelli and A. Link, A. (edn.), *Routledge Handbook of the Economics of Knowledge* (Pp. 154-165). London: Routledge.

- Sánchez, P., Elena, S. and Castrillo, R. (2009). Intellectual capital dynamics in universities: a reporting model. *Journal of Intellectual Capital*, 10(2), 307-324.
- Stake, R. (1994). Case studies. In N.K. Denzin and Y.S. Lincoln (Eds.), *Handbook of Qualitative Research* (Pp. 236-247). Thousand Oaks, CA: Sage.
- Tian, J., Nakamori, Y. and Wierzbicki, A. P. (2009). Knowledge management and knowledge creation in Academia: a study based on surveys in a Japanese research university. *Journal of Knowledge Management*, 13(2), 76-92.
- Wu, H., Chen J. and Chen, I. (2012). Ways to promote valuable innovation: intellectual capital assessment for higher education system. *Qual Quant*, 46, 1377-191.
- Yin, R. (1994). *Case study research. Design and methods*. London: Sage.