UPC Universitat Politècnica de Catalunya

Talent management in Academia

Is it worth it to differentiate between the professors in a university?

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Abstract

Purpose - The purpose of this paper is to contribute to the currently limited research area Talent Management in Academia and investigate if an exclusive approach is valuable to adapt in an organizational education context. This is done by examining if it is worth differentiating between the professors in a university.

Design/methodology/approach – The methodology used in this study consist of two main steps, a literature review, and data analysis. The data analyzed was gathered during a four-year period at Universitat Politècnica de Catalunya (UPC), which is a technological university located in Catalunya, Spain. This study investigated how different variables were related to the professor's performance, which is measured mainly by the number of published articles.

Findings – The result proposes that there are variations of the performance between different professors based on their position, type of employment contract, as well as their belonging to the field of knowledge and department. This indicates that it is of importance to differentiate between the professors in order to increase the university's competitive position. In accordance, new Talent Management practices and workforce differentiation strategies could be implemented.

Originality/value – The majority of existing research about Talent Management in Academia is performed at Dutch Universities. Therefore, this paper creates value by examining Talent Management in a currently unexplored context, at a Spanish University.

Keywords Talent Management, Workforce differentiation, Talent Management in Academia, Higher Education

Paper type Research Assignment

1. Introduction

Talent Management (TM) is considered to be one of the most important Human Resource Management (HRM) challenges within organizations since it helps to secure the sustainable competitive advantage of an organization (Mensah, 2019). The competitive advantage is increased through value creation by the differentiation between strategic and non-strategic roles within organizations (Collings & Mellahi, 2013). In fact, this is the essence of the most cited TM definition (see, Gallardo-Gallardo, Nijs, Dries, and Gallo, 2015):

> [TM refers to] activities and processes that involve the systematic identification of key positions which differentially contribute to the organization's sustainable competitive advantage, the development of a talent pool of high potential and high performing incumbents to fill these roles, and the development of a differentiated human resource (HR) architecture to facilitate filling these positions with competent incumbents and to ensure their continued commitment to the organization (Collings & Mellahi, 2009, p.305).

Several authors (e.g., King & Vaiman, 2019) agree on the fact that TM is concerned with first identifying strategic positions within the firm followed by the identification, development, and management of high performing individuals to fill these positions. Schreuder and Noorman (2019) further state that this TM practice enables top talents to really make the strategic difference within firms. TM could, therefore, be described as a form of workforce differentiation (King & Vaiman, 2019). In fact, the strategic side of this TM approach is what helps to differentiate TM from HRM. According to King and Vaiman (2019), HRM is a human resources-centric practice of TM, but the two concepts differ in several ways. HRM concerns the wider workforce, while TM is about individuals. For example, the recruitment of HRM refers to the attraction and retention of the wider workforce and TM is about secure access to talent for specific strategic positions.

Collings and Mellahi (2013) argue that organizations need to focus on where to invest a limited pool of resources to maximize the contribution of talent within the organization. This suggests an exclusive approach of TM where only some proportion of an organization’s employees is seen as the organizations’ talent (King & Vaiman, 2019). Tyskbo (2019) states that the exclusive perspective focuses on the segmentation of the people themselves, not in relation to their position or title. When distinguishing talented people in an organization it can be based either on their input or output, performance, and results (Dries, 2013). According to Collings and Mellahi (2013), a shift is required focusing less on inputs and more on outputs. The shift in focus towards the output is argued for because gathering several talented individuals will not necessarily lead to high levels of output and organizational performance. Therefore, in this study, an exclusive approach focusing on output is used since it makes more sense when implementing a strategically important practice.

Mensah (2019) highlights that the majority of existing research within TM is carried out in profit-seeking contexts. The competition for talent and shortages of talented employees is

though also evident in public organizations and, therefore, TM issues are beginning to surface within these organizations as well (Mensah, 2019). Currently, there are few studies within TM in academia and most of them examine Dutch universities. Thunnissen and Van Arensbergen (2015) argue that universities in Europe are confronted with an accelerating competition for academic talent, due to an aging workforce and the need for recruiting a new generation of academics. Furthermore, Van den Brink, Fruytier and Thunnissen (2013) state that stakeholders in the institutional context are putting hard pressure on higher education institutes. The goal is to strengthen the European position in the global knowledge economy by increasing efficiency, quality, and excellence. As a result, "marketization" is taking place and the ability to attract and retain top talent is becoming a key HRM issue for universities since they are not the only employer competing for highly qualified employees. Moreover, it is argued that the academic staff influences the university's reputation and competitive position in the academic community, which is a further argument why talent and performance management would be included in the strategic HRM agenda of universities.

According to Gallardo-Gallardo, Dries, and González-Cruz (2013), there is no consensus about the definition of talent, which is hindering the development of TM practices. Thunnissen and Van Arensbergen (2015) also highlight the lack of a common definition of talent in academia. They state that a broad variety of characteristics and definitions were given of talent throughout their study, although they conclude that most people see talent as a person who possesses a set of outstanding characteristics. A talent academic particularly stands out because of intellectual abilities, scientific understanding, and academic expertise. Therefore, academic TM need to stimulate the development of intellectual, academic abilities, in particular for junior positions. For experienced academics, it is more important to control and measure performance.

Van den Brink et al. (2013) examined the recruitment and selection practices for junior and senior academic talent in the Netherlands within different fields of knowledge. The authors argue that the use of individual performance measures within academia has increased and that bibliometrics is having increased importance for the evaluation and recruitment of professors. Accodingly, Thunnissen and Van Arensbergen (2015) highlight the importance of professors' performance, and state that excellent performance is the starting point for selection to a talent pool. In the study by Van den Brink et al. (2013) differences in how performance is measured between the different fields of knowledge were found. For the field STEM, which includes science, technology, engineering and mathematics, they state that committee members believe that objective and quantifiable criteria are the best and fairest ways to select candidates. Examples of these criteria are the number of publications, citations and impact scores. They conclude that these individual performance measures are becoming more important in academia and is closely linked to concepts such as 'talent' (Van den Brink et al., 2013). Considering that this research assignment is performed at a technological university with the majority of professors within similar fields as STEM, the number of publications will be used as the performance measure throughout the study.

This research assignment contributes to advance the understanding of TM in public sector organizations, specifically, universities. The purpose of this study is to examine the worth of differentiation between professors in academia.

2. Methodology

For the purpose of this study, we followed two main steps in order to understand and analyze data from the technological university Universitat Politècnica de Catalunya (UPC) in Spain. In the first step, we selected and reviewed publications in the literature about Talent Management, Workforce Differentiation, and Talent Management in Academia. We examined the literature to be able to understand the context of the data, and also to have enough knowledge about the area of research to draw conclusions regarding workforce differentiation. The second step was to analyze data collected from the university UPC, describing the number of articles published by different types of professors. The focus was to explore similarities and differences related to published articles from different subgroups of professors. Thereafter, an interpretation of the results was presented.

2.1 Step 1: Reviewing the literature

The research was started with literature studies to get an understanding of existing research within the area. The initial search for article identification and retrieval was done through the Chalmers Library database. This search engine was chosen because of its access to several databases such as Business Source Premier, ScienceDirect, Gale Academic OneFile, and Complementary Index. The keywords used in the study were 'Talent Management', 'Workforce Differentiation' and 'Talent Management in Academia'. The initial search for articles about 'Talent Management' resulted in a too-large sample to review (over 190,000 articles), therefore we decided to apply some criteria. In this study, we consider only academic and peer-reviewed articles written in English. We chose to restrict our search to only international articles since it is the preferable language for our understanding. A further reason is that according to (Gallardo-Gallardo & Thunnissen, 2016) non-English articles have little influence on the international academic debate about a topic. Further, to provide a guarantee of the quality and increase the credibility of this study, we only included articles with a method section, so-called "scientific structure". According to Thunnissen, Boselie, and Fruytier (2013), the area of TM has moved from infancy to adolescence in 2011. This is further stated by Thunnissen and Gallardo-Gallardo (2019), who confirms that the first empirical TM appeared shortly before 2011 and since that time has the amount of quantitative research increased significantly. Therefore, we limited our research to empirical articles that have appeared in international peer-reviewed journals from 2011 to 2019 (both years included) as the time frame for relevant TM articles. Our final database ended up in a total of 29 full-text format articles published from 2011 to 2019, and the content found was used for the justification of our study.

The same criterions were used when searching for 'Workforce Differentiation'. The criterions helped to narrow down the search result, which made it possible to get a better overview and find relevant articles within the two areas, Talent Management and Workforce Differentiation. For the initial research, 20 articles were collected, 12 within the area of TM and 8 within the area of Workforce Differentiation, which helped to form broader insights within the two areas and also how they coincide. Further on, research on 'Talent Management

in Academia' was searched. Here, it was only a limited sample to review and it resulted in only two relevant articles. To fill in gaps discovered while writing, seven more articles about TM and talent were read and summarized.

We jointly considered reading all articles in the final database in order to analyze and interpret the content of the 29 articles, to thereafter relate it to the data of UPC. To secure the information needed from the articles, we executed individual summaries. Key-takeaways were highlighted to extract the necessary data for situating the topic in an already known context. Following, a comparison of the summaries and discussions were made, with the aim to bring different views and connect to the relevance for the area of research. If issues such as confusion, diverse information, or uncertain classification concerning our respective summaries were found, a further discussion and if needed, additional research was made to make sure a mutual and correct understanding of the subject was established. This cross-checking ensured not only consistency but also a common understanding and a reduction of the likelihood of error in this study.

2.2 Step 2: Quantitative data analysis

The review of the literature was made to understand the areas TM and Workforce Differentiation, in order to further draw conclusions from the data analysis. The analyzed data in this study examines the professors at UPC. The purpose of the analysis is to clarify if another workforce segmentation than the currently employed could be useful based on the professor's performance.

A quantitative analysis was executed on data that previously had been gathered by UPC. The data was collected during a four-year period (2014-2018) and includes information about 1 583 professors. The data consist of five variables for the professors: field of knowledge, position, type of agreement, department and the number of published articles during the four-year period. To analyze the data, it was transferred into the statistical software JMP from SAS.

The first step of the analysis was to combine the number of published articles to the four variables: field of knowledge, position, type of agreement and department. The focus was on the number of published articles since it is what determines the performance of the professors. When the variables had been investigated separately together with the number of published articles some combinations of the different variables were done. The field of knowledge was combined together with the position and type of employment contract as well as together with the department.

Further, it was not possible to investigate all different combinations of data, thus samples have been considered. Due to the variating number of professors within each of the subgroups, it was not possible to include all subgroups in the analysis. Therefore, purposive sampling has been used, and the smallest subgroups have been excluded from the analysis due to their low numbers, which would lead to inconclusive results. One example of a

purposive sampling that was done was for the department variable where the three most common departments were chosen for further analysis. These three departments make up 26% of the total amount of professors. Considering the Pareto principle that usually 80% of the effects come from 20% of the causes these three departments were considered representative for the whole sample.

Graphs were made to show the distributions of published articles for each of the subgroups within each variable. When examining the number of published articles, the data shows that 97,5% of all professors have published less than 35 articles during the four years. Therefore, the majority of the graphs are limited to 0 to 35 published articles to exclude the outliers to easier see and compare the distributions within the different groups. Unless the other is stated the x-axis shows the number of published articles from 0 to 35, and the y-axis shows the percentage of people within that specific group that has published a certain number of articles, this scale is generally from 0 to 40%. These scales were chosen to get comparable graphs with the same values on the axes.

Apart from the graphs showing the distributions several statistical summaries were used showing the values for the mean, median, standard deviation and the maximum number of publications within each of the subgroups. This was done to easier see differences between the groups and also to make sure the conclusions drawn were based on facts.

With the knowledge obtained from the previously done literature review conclusions were drawn from the results obtained from the data analysis. This was done in order to give practical implications to UPC and conclude further areas to research.

3. Result

3.1 Organizational Context

The following part aims to describe the organizational context at UPC in order to further understand the different variables in the data analyzed.

3.1.1 Number of published articles

When the professors at UPC get examined for their performance, it is the number of published articles every year that is the main criteria for determining the outcome. UPC adopts an exclusive approach of TM since the university has requirements of the number of articles a professor needs to publish in order to get promoted. Therefore, professors who publish many articles and have a high publication count can be seen as talent and top performers, in comparison with professors who publish few or no articles. Thus, being labeled as an academic talent starts with performance, and at UPC research effectiveness is the crucial determinant for promotion, tenure and other rewards.

3.1.2 Different Field of Knowledge

The professors at UPC are divided into four different fields of knowledge; Engineering and Architecture, Sciences, Social Sciences, and Humanities. The different fields of knowledge have an unequal distribution as demonstrated by figure 1 below. For example, 73% of the professors belong to Engineering and Architecture and only 1% to Humanities. This could be explained by the study being performed at a technological university, which leads to the majority of professors operating within Engineering and Architecture, followed by Sciences.

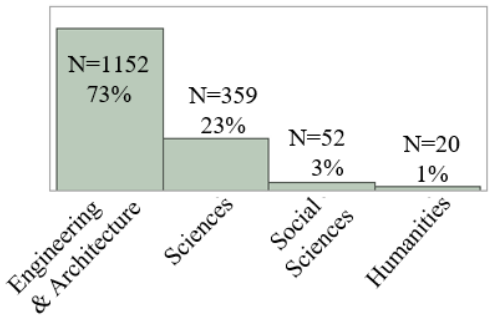

Figure 1. The number of people working in different fields of knowledge at UPC.

3.1.3 Professors position and type of contract

There are five different types of professors in academia; Full Professor, Associate Professor, Assistant Professor, Full Lecturer, and Visiting Professors. The positions are hierarchical, Full Professors in top of the hierarchy and Visiting Professors furthest down. These positions are not specific to UPC, the same is applied to all universities in Spain. Within the different positions, some professors are employed as civil servants, which is a permanent position. This employment can lead to implications when implementing new TM practices since these might not affect all professors in the same way. The number of professors at UPC within each position varies considerably as seen in figure 2 below, with the most common one being

Associate Professors, and the least common being Visiting Professors. The Visiting Professors are further excluded from the analysis due to their low number as well as their variating roles within the organization.

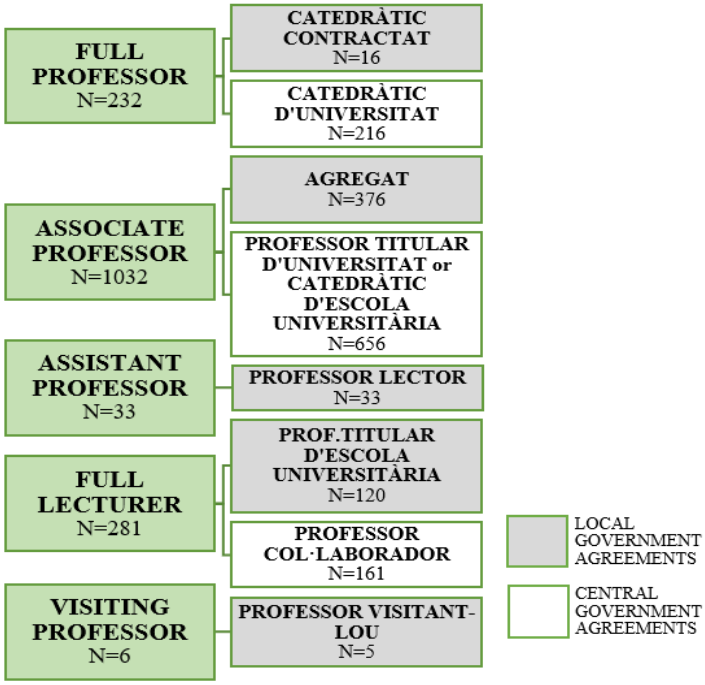

Figure 2. The different professions and their different contracts.

Apart from the professor's position, they are also employed by different work contracts. There exist two different types of contracts in Spain, the local government agreement and central government agreement, and each professor is employed by either one of the two types. The central government agreements are older contracts and there are no longer professors employed to these. For the different contracts, there have also been different requirements of how you get promoted to different positions. For example, with the previous central government agreement, it was not mandatory to publish articles to get promoted to a Full Professor. With the newer local government agreements, there are requirements of how much the professor needs to publish to get promoted. The number of articles needed to be promoted differs between the different fields of knowledge due to their variating length of articles. One example of this can be shown in table 1 below where the number of publications to become an Associate Professor is shown.

Table 1. The number of publications needed to become an Associate Professor within the different fields of knowledge that exists at UPC.

Field of knowledge	**Number of publications to become Associate Professor**
Engineering and Architecture	25
Sciences	30
Social Sciences	20
Humanities	20

All professors at UPC has the same requirement of how many hours they need to lecture every week. The minimum requirement is to lecture eight hours every week, which is similar between all different positions and agreements. Therefore, all professors have the same amount of time to complete research within their field of knowledge. Although, Full Lecturers are different from the others since it is full-time employment with the main responsibility to lecture. Therefore, they do not have the same requirements to perform research.

When starting the career as a researcher the first step is becoming an Assistant Professor, which is a time-limited contract of four years. When examining the Assistant Professors, it is therefore important to take into account the fact that people in this position could have started their employment in the year between 2014-2018, when this study took place. Therefore, there is a chance that the result can be misleading since those started during this period did not have time to publish the same number of articles in relation to other positions. The Assistant Professor needs to perform well during their four-year contract to be promoted into an Associate Professor, which is a permanent position. Furthermore, to become a Full Professor the Associate Professor needs to get a Ph.D. and publish at least five articles.

3.1.4 Departments

At UPC the different fields of knowledge are further divided into different departments. In total there are 30 different departments. The most common departments are Matemàtiques, Enginyeria Civil i Ambiental, Física, Eng. Electrònica and Teoria Senyal i Comunicacions.

3.2 Data analysis of performance at UPC

This section will present several comparisons of the above-presented variables: field of knowledge, position, type of agreement, department, and the number of published articles, with a focus on the number of published articles. The focus on the number of published articles is due to it being the variable that currently measures the performance of the professors. Further, the other variables will be compared to find similarities and differences to understand where the high performers are to identify potential workforce differentiation strategies.

3.2.1 Different Fields of Knowledge

The first differentiation is done between the four different fields of knowledge to see if the performance of professors within the different areas differs, which in turn can affect the preferred workforce segmentation.

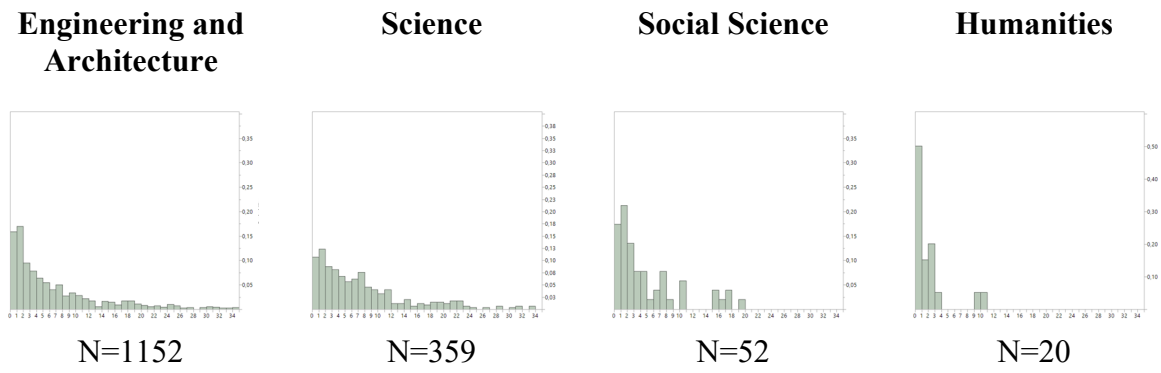

Figure 3. Showing the number of professors that have published a certain number of articles within the different fields of knowledge. The graphs are ordered from 0 to 35 publications.

When comparing the distribution of published articles between the different fields of knowledge some differences can be seen. At first glance, the greatest difference is seen in the two fields Social Sciences and Humanities. This can also be seen in the statistical summary shown in table 2 below, where Engineering and Architecture and Sciences have more similar results which differ from Social Sciences and Humanities. Due to the low number of professors within the two latter fields, it is although hard to draw any conclusions from this data since it is not possible to generalize the result. Therefore, further analysis will focus on the two largest fields of knowledge Engineering and Architecture together with Sciences.

Table 2. Statistical summary of the number of published articles for the different fields of knowledge.

	Engineering and Architecture	**Sciences**	**Social Sciences**	**Humanities**
Mean	7,38	7,69	4,52	1,65
Median	4	5	2	0,5
Standard Deviation	11,5	8,89	5,19	2,85
Maximum number of publications	124	69	47	39

Comparing the two largest fields of knowledge, Engineering, and Architecture with Sciences, the distribution curves look slightly different as shown in figure 3. Although, when looking at the statistical summary shown in table 2 it is noted that the mean and median values for the two groups are quite similar. The mean and median values are though slightly higher for Sciences. This could possibly be explained by the diverse criteria for promotion since this group needs to publish more articles to be promoted compared to Engineering and Architecture. The greatest difference is thus seen for the standard deviation and the maximum number of publications.

Further comparison of the two fields of knowledge, Engineering and Architecture, and Sciences is shown in figure 4 below. This figure shows similar graphs as in figure 3 but includes the full distribution curves. Instead of limiting the graph to 35 publications it also includes the extremes and shows the maximum number of 124 publications, to perceive the

full distribution curves. The distribution curve for Engineering and Architecture is positively skewed with a steep slope making it an L-shaped distribution. The same can be shown in table 1 with them having slightly lower mean and median values, but a higher standard deviation compared to Sciences. This induces that within Engineering and Architecture a larger portion of the professors have published few articles, but then there is a greater difference between the rest of professors. The distribution curve for Sciences is also positively skewed but with a less steep slope. Here the standard deviation is lower which means that it is more common to publish around the mean value. This indicates that there is a greater difference between the performance of the professors within Engineering and Architecture compared to Sciences. When there is a greater difference in the performance it is also easier to identify the high performers within that group. They are easier identified since they extinguish themselves more from the rest of the group by publishing considerably more articles. It is thus harder to do a distinction between professors and identify high performers in a group whose performance does not differ considerably.

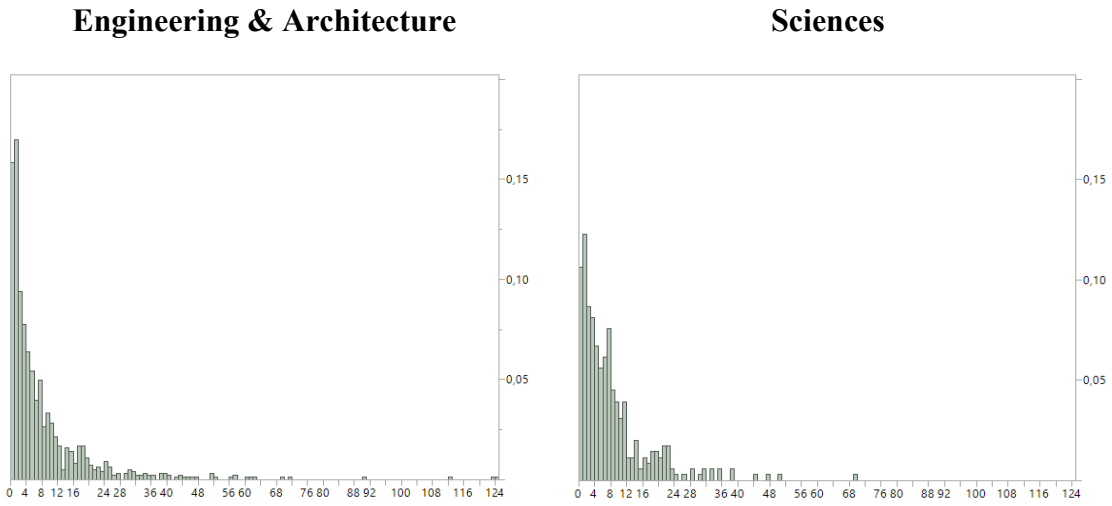

Figure 4. The number of published articles within the two largest fields of knowledge including the extremes, meaning x-axis ranging from 0 publications to 124. The y-axis shows the percentage of people within the subgroup.

3.1.2 Professors position

The following graphs show the distribution within different positions. These variables are compared to the number of published articles to see if the performance varies between the different positions.

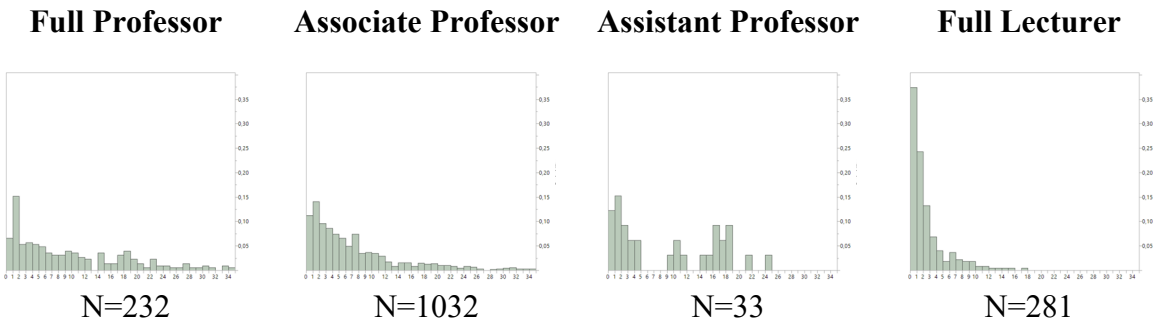

Figure 5. Showing the number of professors that have published a certain number of articles within the different professions. The graphs are ordered from 0 to 35 publications. The number of N indicates the number of professors within each subgroup.

As seen in the graphs in figure 5 above there are some differences in the distribution and number of published articles depending on the professor's position. The position that has the distribution curve closest skewed towards zero and publishes the least articles are Full Lecturers. This could be explained by them being employed for lecturing at full time, leaving less time for researching compared to the others. Since Assistant Professors are the smallest groups of professors the result may be the most troublesome to interpret and generalize. It is also harder to draw conclusions for this position since it is a time determined position, which means that probably few of the Assistant Professors have worked within that position for the full four years when the data have been gathered. The number of published articles for Assistant Professors could though be divided into four different chunks as seen in the graph in figure 5 above. This could probably be explained by the professors within this group being at different stages of their careers since it is a four-year position. To be able to generalize the result from this group it would although be preferable to have more data within this position since only a number of 33 respondents have been included in the study.

Table 3. Statistical summary for the number of published articles for the different types of positions at University level, including all fields of knowledge.

	Full Professors	**Associate Professors**	**Assistant Professors**	**Full Lectures**
Mean	14,06	7,09	9,75	2,16
Median	8	4	9	1
Standard Deviation	19,21	8,39	10,14	3,66
Max number of publications	124	61	47	39

When looking at the statistical summary shown in table 3 above, clear differences can be seen between the different positions. Full Professors are the position with the highest mean value, but also the group with the highest standard deviation. This implies that generally Full Professors publish more than the other positions but there are also larger differences between the performance of professors since the number of publications varies considerably. This indicates a possibility for further workforce differentiation within the position. Full Lectures is the position with the lowest performance with low mean, median and standard deviation which corresponds to the distribution graph shown in figure 5 above. The Assistant

Professors have the highest median value which could be an explanation by their low amount or due to their time-limited work contract, which they need to perform to be promoted. The literature studies also suggest that there is a difference between TM practices for fixed employments and contingent workers. It is stated that there is a gap in TM policies between academics with fixed-term positions and temporary lectures. Further, the literature suggests that temporary lectures tend to get less support for their development. This could also be a possible explanation as to why the result for Assistant Professors differs from the others.

Considering that the performance of professors is measured by the number of published articles, one possibility for workforce differentiation could be to differentiate between the different positions since considerable differences are observed between them. Although, further differentiation could also be needed within the different positions respecting the distributions and standard deviations of the number of published articles.

3.1.3 Local government agreement or central government agreement

A differentiation could also be done depending on if a professor has either a local or central government agreement. The two types of contracts are compared in figure 6 and table 4 below at the university level, including all professors within the two types of contracts.

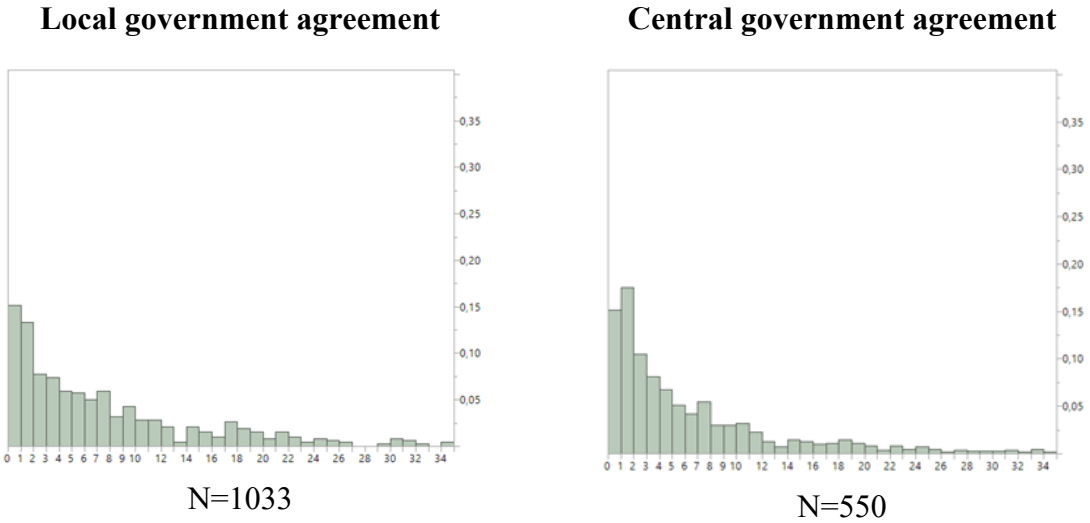

Figure 6. Distribution for local and central government agreements at the university level, including all professors within the different types of contracts. The graphs are ordered from 0 to 35 publications. The number of N indicates the number of professors within each contract.

Comparing the two types of agreements they present quite similar distributions, which both are skewed to the left as seen in figure 6 above. The statistical summary, shown in table 3 below, for the two types of employment at the university level also produces similar numbers on the mean, standard deviation and the maximum number of publications. The only exception is for the median value which is slightly lower for professors with local government agreements. This indicates that a workforce differentiation based on whether the professors belong to a local or central government agreement is not enough since there are only small differences between the two contracts.

Table 4. Statistical summary of the two types of employment contracts at the university level.

	Local Government Agreement	Central Government Agreement
Mean	7,03	7,75
Median	3	5
Standard Deviation	11,05	10,19
Maximum number of publications	124	123

3.1.4 Professors position and type of contract within different fields of knowledge

In order to identify means for workforce differentiation within the different subgroups the position and number of published articles are further combined with the two variables: field of knowledge and type of employment contract. Due to the low number of professors within the fields of knowledge Social Sciences and Humanities, these are excluded from the following analysis. The same concerns the Assistant Professors which only are 33 persons which means there is a very low number of professors within each subgroup.

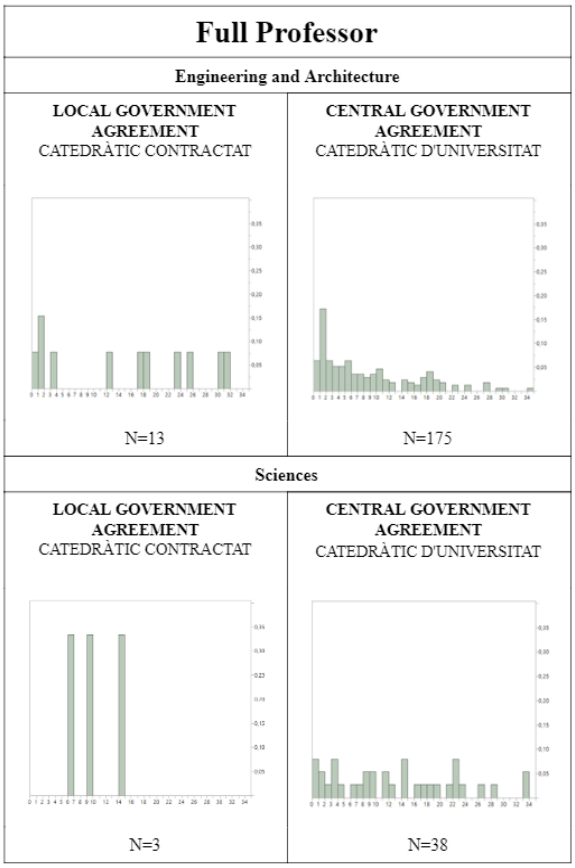

Figure 7. Comparison of the two different contracts, local and central government agreement for Full Professors. A distinction is also made between the two largest fields of knowledge Engineering and Architecture, and Sciences.

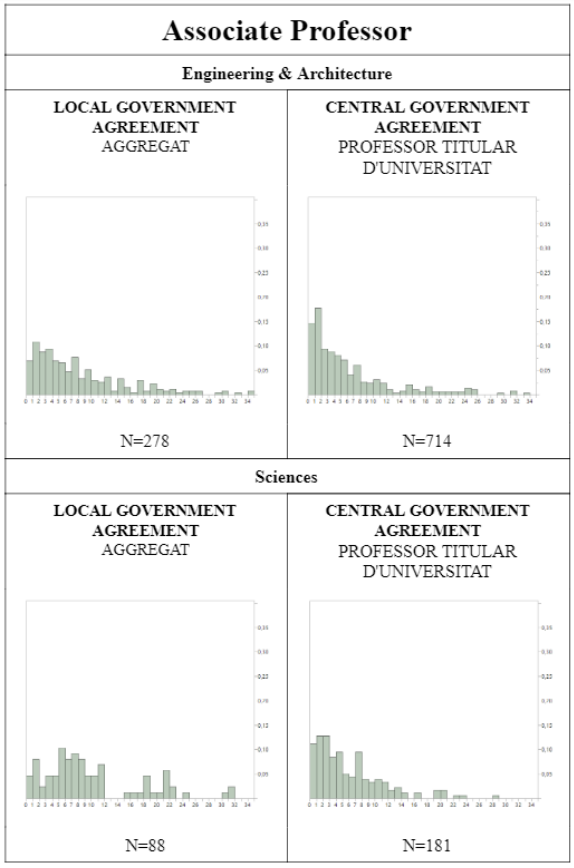

Figure 8. Comparison of the two different contracts, local and central government agreement for Associate Professors. A distinction is also made between the two largest fields of knowledge Engineering and Architecture, and Sciences.

A comparison of the field of knowledge and the different contracts for both Full and Associate Professors is shown in figures 7 and 8 above. More similarities can be seen between the different fields of knowledge, than between the different contracts. When making a comparison between the different contracts for both Full Professors and Associate Professors the distribution looks different for the local government agreements and the central government agreements. The distribution for central government agreements is skewed closer to zero published articles compared to the local government agreements. This indicates that it is more common for professors with local government contracts to publish larger amounts of articles. This could be explained by the previously described difference between the agreements, with them having different requirements of publications before being promoted. Although, the most evident difference is seen for Associate Professors since it might not be possible to draw conclusions for the Full Professors which only have 13 respectively 3 professors within the subgroups.

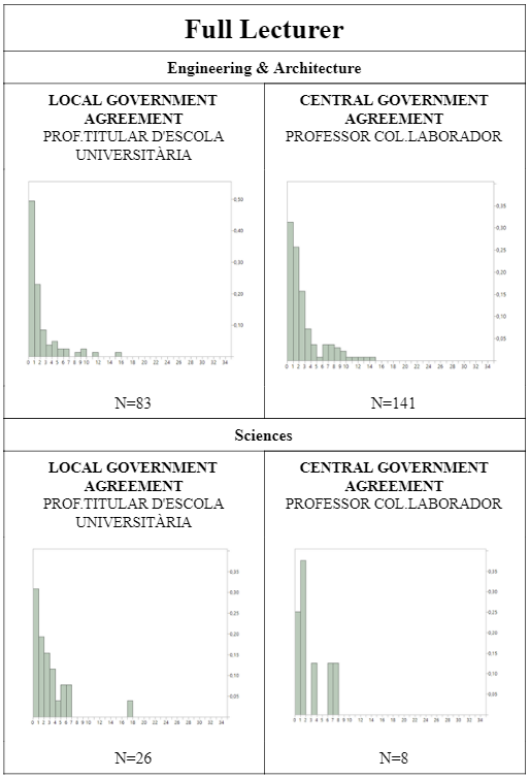

Figure 9. Comparison of the two different contracts Prof.Titular d'escola universitària and Professor col.laborador for Associate Professors between the two fields of knowledge Engineering and Architecture and Sciences.

The distribution for Full Lecturer, as shown in figure 9 above, shows more similarities between the four graphs compared to the two previously examined positions Full Professor and Associate Professor (shown in graph 7 and 8 above). The distribution is located close to the left and 0 publications with a steep shape meaning that the greatest part of professors has published very few articles. Here each of the four subsamples is more similar to the whole group of Full Lecturer previously shown in figure 4. This might be because of the role of this position which is not focused on research but rather at lecturing.

3.1.5 Department level

The professors are further divided into different departments which also could be a possible way to differentiate between the performance of the professors. The graphs in figure 10 below show the three largest departments at UPC, which corresponds to 26% of the total amount of professors, and the number of published articles during the four years investigated for each professor within that department. The distribution curves look different for the three departments which indicates that different workforce differentiation strategies might be needed for the different departments.

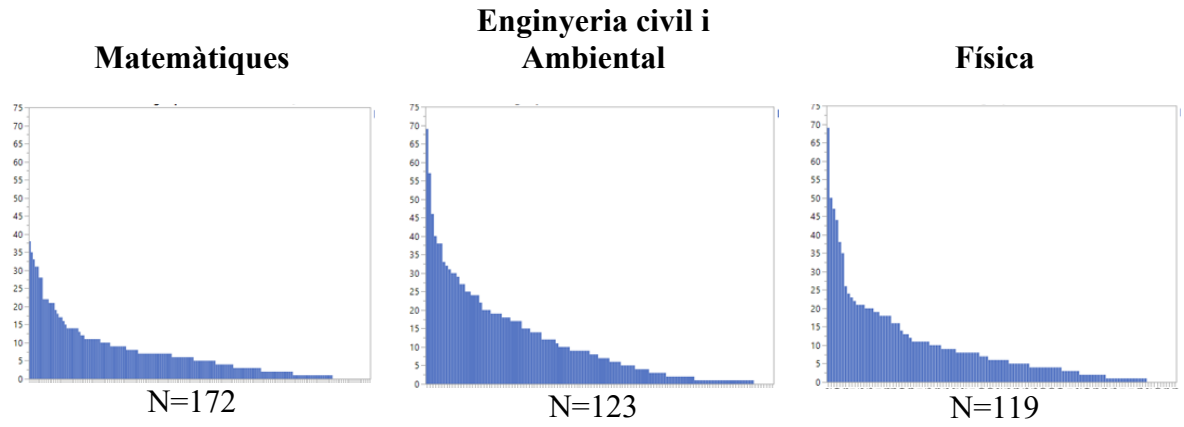

Figure 10. The number of publications on the y-axis (0-75) and professors of all positions within one department on the x-axis ordered descending to the number of publications.

Matemàtiques and Física belong to the Sciences field of knowledge while Enginyeria civil i Ambiental belongs to Engineering and Architecture. When comparing the distribution curves and the statistical summary (see table 5) most similarities can be found between Enginyeria civil i Ambiental and Física, which belongs to different fields of knowledge. This could indicate that the performance and the need for a different workforce differentiation strategy are more determined by the department belonging rather than the field of knowledge.

Table 5. Statistical summary for the three largest departments at UPC.

	Matemàtiques	**Enginyeria civil y Ambiental**	**Física**
Mean	7	11,25	9,39
Median	5	7	6
Standard Deviation	7,39	12,34	11,17
Maximum number of publications	38	69	69

4. Conclusion

The analysis indicates that there are great variations in the performance of different professors at UPC. Therefore, there is a need for a greater workforce differentiation by strategic capabilities in order to be more competitive. In academia are the strategic roles often filled by professors that publish many articles, which can be seen as talent and top performers. It is shown that the greatest difference in performance for the professors at UPC is based on their position in the organization, which means that they might need separate TM practices. This is in accordance with previous studies that argue for differences between junior and senior positions in academia. Although, the standard deviation within the positions is considerably high which indicates that there are large differences in the performance. For example, the greatest standard deviations are seen for the position Full Professors and the least for Full Lectures, which could be explained by their different roles within the organization. This means that it might not be enough to base the workforce differentiation solely on the position of the professor.

When combining the professor's position with their fields of knowledge and type of employment contracts, there seems to be a larger distinction of the performance between the different employment contracts compared to the field of knowledge. Therefore, one managerial implication could be to establish a workforce differentiation strategy on the professor's position together with their type of employment contract. Since no significant distinctions could be seen when combining the field of knowledge with both the professors' position and department, it seems to not be a good factor for further workforce differentiation. Although, one limitation is that this study is performed at a technological university and therefore the main analysis has been within only two fields of knowledge, Engineering and Architecture, and Science. Since previous studies show more distinctions between fields of knowledge, one suggestion for further studies is to complete a similar study at other universities that have more professors employed in other fields of knowledge, such as Social Sciences and Humanities. Thus, it has to be noted that only one performance objective was used in this study, which possibly could limit the study.

One challenge when implementing new TM practices and workforce differentiation strategies within academia is the lack of control of HR. For example, the different positions and types of employment contracts are not determined by the university itself but by government decisions. Although, workforce differentiation is not about hierarchical positions but rather about differentiation by strategic capability. This could imply another challenge since the professors still are within a hierarchical structure with different types of contracts. For example, some of the professors are employed as civil servants, which is a permanent contract. Due to their type of contract, it might be hard to get rid of non-performance civil servants and fill the organization with only talented employees. This implicates that even if new TM practices are implemented, it might not affect all professors. Therefore, HR in academia may not reach the desired results even if a new TM practice is implemented because other factors affect the outcome.

To examine if these conclusions are applicable to the entire academic world, similar studies in diverse types of universities are suggested. Another proposal could be to complete a further literature study, including a greater variety of articles. For example, the criteria used when finding articles to the literature study were the same for all keywords, which might exclude interesting articles published before 2011. One additional limitation of this work could be that samples were used in the data analysis due to the huge amount of available combinations between the variables. In order to analyze the combining effects of all variables, other techniques such as machine learning could be useful for big data analysis and an idea for further studies.

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