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What are university professors' motivations? A realistic approach to self-perception of Spanish university professors' professional development

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Abstract: Background: The university must take on the challenges that arise at all levels. Within this mechanism, university professors play an important role as facilitators of knowledge. **Aim:** To analyse the motivations that influence the professional performance of Spanish university professors. **Methods:** 102 university professors from 9 Spanish public universities participated in the study. [Male: 54 (52.9%); Female: 48 (47.1%)]. A questionnaire of 22 closed-ended Likert-type questions was designed, scoring from 0-10 (do not agree at all, strongly agree). **Results:** The questionnaire, finally composed of 17 items, showed good internal consistency. (Cronbach's alpha=0.858). The validity analysis showed a value of 0.822 (>0.5) in the sample adequacy measure KMO (Kaiser-Meyer-Olkin) and Bartlett's sphericity test ($p < 0.0001$). The exploratory factor analysis showed a clustering in 4 factors (2 for internal goods and 2 for external goods), explaining 64.33% of the total variance. Comparisons between each factor scores by gender (male and female) showed differences statistically significant by gender for factor F1 (higher for females) and F2 (higher for males). Finally, Q1 and Q13 showed a statistically significant correlation ($p \leq 0.05$) with years of teaching experience. **Conclusions:** The motivations of Spanish university professors seem to be associated with the age and gender of the teacher.

1. Introduction

University and society are closely related. Although university teaching should be student-centered, university professors play a crucial role in the teaching-learning process [1,2]. In their teaching activity, teachers contribute to the transmission of the specific competences of their disciplines as well as a series of transversal competences directly related to the exercise of critical and committed citizenship [1,3-5]. In this context, it is necessary to study attitudes and training that professors need to work in education by competences [6]. Recently, Clifford and Zaman developed an analysis of transversal competences in engineering and health education in different parts of the world [7]. They highlighted the importance of the teacher's role in higher education reform [7]. In the same vein, Zamora-Polo and Sánchez-Martín proposed a framework to teach SDGs in Higher Education institutions, their framework have five dimensions: students, students' competences, professors, teaching methodology and alliances[1].

This challenge of change for teachers has taken on added meaning in the wake of the global health crisis caused by the SARS-CoV-2 virus. On 14 March 2020, the Government of Spain decreed a state of emergency, thereby beginning a period of confinement in order to stop the spread of the SARS-CoV-2 virus. This situation forced an immediate adaptation to new educational contexts, where face-to-face learning was replaced by new methodologies so far little explored. In order to cope with this situation in the educational field, it has been highlighted that the influence of teachers' self-efficacy and school administrators' transformational leadership practices on teachers' innovative behavior [8]. However, to date there are limited studies that analyze factors that could influence the motivation of university teachers.

In this sense, this global crisis has underpinned the increasing interest in studying the role of higher education institutions in promoting sustainability [1,9,10]. On the one hand, many researchers have delved into the impact of higher education institutions. For example, Yáñez et al. analyzed the role of Sustainability Reports in the promotion of sustainability in Higher Education Institutions [9]. Lo-Iacono-Ferreira et al. have studied the use of Life Cycle Assessment (LCA) as a tool for Ecological Footprint Analysis (EFA) [11], the development of a strategy for carrying out an analysis

of the organizational Life Cycle Assessment (o-LCA) at the university [12] or the creation of Key Performance Indicators (KPI) to provide the information for carrying out a correct analysis of the environmental impact of Higher Education Institutions (HEI) [13]. On the other hand, there has been an increase of sustainable development inclusion in the university curriculum [1,2,10,14]. There are several strategies to seek the promotion of sustainable development in higher education institutions [2,14,15]: a) a specific course on Sustainable Development, b) a program of specialization in the curriculum, c) integration of environmental concepts in a course or module, d) development the concept of SD in a transversal way in regular courses, e) a degree or master addressing SD.

The irruption of Sustainable Development Goals (SDGs) represents an opportunity to deepen inclusion of the concepts of sustainability and sustainable human development in the university [1,2,10,16,17]. The inclusion of sustainable development has several challenges among them we can find: the lack of institutional support and the training and awareness of academics [2,18]. Despite the importance of the impact of academics in higher education [2,18,19], studies analyzing the interpersonal factors influencing the professional activity of teachers are limited.

In this paper, the motivation of university teachers is analyzed. This is a fundamental result for the design of activities to promote sustainability in the field of higher education as well as for the design of training actions for teachers.

2. Theoretical background

2.1. Fundamentals of motivation

Emotions play a fundamental role in teaching-learning process. In this sense, the motivation of the professor, can contribute to generate diverse emotions in the act of teaching [20]. On the other hand, recent studies state that a teacher's motivation will determine students' motivation and academic performance [21]. Recently, Skaalvik and Skaalvik found a positive correlation between teacher with low self-efficacy and motivation and students with stress, dissatisfaction and misconduct [22].

Despite the importance of this issue, there have been limited studies that have delved into the main motivations of university professors. There are two possible causes:

1. Teaching has played a secondary role in the interest of university professors. Traditionally, research activity has been the center of interest for teachers [21] Thus, it was assumed that teachers were motivated in their teaching facet.
2. The university professors' opinion has not been considered a priority in education reforms in recent years.

In Spain, despite the importance of education in the changes of the European Higher Education Area, most of the innovative actions have been linked to the good will of university professors, and there has not been a systematic change in university teaching based on research [23].

2.2. Factors determining the motivation

From the psychological point of view, motivation has been defined as the process that determines people towards action to achieve a specific goal [24–27].

From the epistemological point of view. Maslow (1991) explained the motivation are based on human beings' needs (expressed in pyramidal form) [28]. These needs include biological needs, as well as anthropological needs such as self-realization. Thus, the motivation comes from [29]:

- The expectations of success in relation to the subjective perception of the probabilities of success in the task (need for power).
- The degree of incentive, challenge or challenge involved in a task (need for affiliation).

Weiner relates motivation to attribution. Attributions influence the expectations of success or failure before a certain task. The attribution of an action can be related to different causes [30]:

- Internal or external causes of actions.
- Stable or unstable states of the person.
- Controlled or uncontrolled situations.

Recently, from neuropsychology, motivation is defined as a process in which different mechanisms and neurotransmitters in the brain intervene to activate the human being to achieve an objective, depending on survival instincts or the rational decision to achieve a decided objective [31,32].

Considering motivation as a process. It has an initial phase; the person's will be directed towards the achievement of an action. And a second phase (continuity dimension), that consists of maintaining the effort for the achievement of the task. Some authors such as Marina (2013) define them as initial motivation and motivation for the task [33].

Cortina (1986) and Hortal (2002) describe the reasons why a person targets specific objectives [34,35]. Two types of origin can be distinguished in this motivation [35–38]:

- Internal or intrinsic motivation is the motivation whose starting point is the interest that the objective itself awakens.
- External or extrinsic motivation, which refers to an engine that is outside the objective itself, and which derives from the achievement of the objective.

2.3. Motivation and the teaching profession

The above-mentioned aspects can influence the university professor in a concrete way. University teachers are motivated by various elements both internally and externally. In the case of the university professor, several types of activities converge teaching, research, transfer of research results. This work is focused on teaching functions. In this way, teachers are mobilized towards the exercise of their profession and towards certain teaching objectives [39,40].

As in any other human activity, the decision to engage in the teaching profession, as well as the performance of that profession, is affected by internal factors, such as vocation or need for personal satisfaction, and external factors, such as family factor, status or social recognition. In the case of the teaching profession, motivational factors address the specific features that define the profession [41]. Studies such as Burke's (1987) categorize in two major dimensions the factors that affect the motivation of the teaching profession (personal and organizational) [42]. Another relevant variable that has been analyzed with an impact on teacher motivation is the time spent in the profession [43], or the courses taught [44,45]. However, the number of papers that have studied the teaching motivations of university professors is limited. This paper tries to fill this gap.

2.4. Research objectives

Thus, the aim of the work is to answer the following questions: What are the perceptions of university professors regarding their teaching work, what are their motivations, are there differences between internal and external motivations?

Formally, the objectives of this work are: i) designing a reliable instrument to measure the motivational perceptions of university teachers; ii) To analyze academics' auto-perception of teaching activity; iii) To study whether there are differences between internal and external motivations of university professors; and iv) to detect training needs for academic staff.

3. Methodology

3.1. Data collection

This is an observational research based on a cross-sectional study developed through a survey. A questionnaire was designed to determine the teaching motivations of university professors. The questionnaire aims to categorize the motivations by relating them to internal and external goods as proposed by Hortal (2002) [35].

Initially, the questionnaire was provided to a sample of 31 university professors from 9 Spanish universities teaching in various fields of knowledge (scientific, humanistic, biomedical, social and technical) [40]. Subsequently, the questionnaire was redesigned. To this end, improvements were made in the formulation of the questions, as well as in the inclusion of 1 more item. Then, the questionnaire was analyzed by a group of experts. They made a judgement on the comprehensibility of the questions. Finally, the questionnaire was composed of 22 items with Likert answers, ranging

from 0 (totally disagree) to 10 (totally agree). 11 of them oriented to aspects related to intrinsic motivation as university professors (internal goods), and 11 oriented to extrinsic motivation as university professors (external goods).

The questionnaire was provided online [10,46,47]. This format has advantages as it allows for a quasi-automatic transcription although it may have a lower response rate [48]. The answers were anonymous. This encourages professors to freely express their opinion. The teachers received information about the nature of the study and its objectives.

3.2 Sample description

102 university professors voluntarily participated in the study. Inclusion criteria were:

Professors (full or part time) from the G9 group of Spanish universities. This group is made up of the following public universities in Spain: Cantabria, Castilla La Mancha, Extremadura, Illes Balears, La Rioja, Navarra, Oviedo, Basque Country and Zaragoza.

Professors with a minimum of two full academic years' teaching experience at the higher education level.

Professors with previous training in the development of transversal competences through one of the university guidance and teacher training services.

Professors who did not respond to the questionnaire in the established time period and those who had no employment relationship with the university were excluded.

3.3. Data process

In order to analyze obtained data, IBM SPSS Statistics software v. 22 for Windows [49] and the statistical software and programming language R v. 3.6.1 [50] were used.

Firstly, the reliability of the questionnaire was analyzed using the Cronbach alpha coefficient [51]. According to studies previously published in the literature it is considered that a set of items is part of the same construct when an alpha coefficient greater than 0.8 is obtained [52,53]. Successive reliability analyses were carried out in order to simplify the questionnaire. Previously, the KMO (Kaiser-Meyer-Olkin) sample adequacy measurement [54] and the Bartlett sphericity test [55] were performed in order to determine whether the study of the dimensional structure of the questionnaire was pertinent or not.

Secondly, an initial confirmatory factor analysis with the designed questionnaire was analyzed to know if the items can be grouped in the two dimensions that we have initially defined (Internal Goods and External Goods). As this initial analysis was unsuccessful, once the questionnaire was simplified after the successive reliability analyses, an exploratory factor analysis was carried out using principal component analysis as extraction method and an oblique rotation method (Oblimin with Kaiser normalization) [56,57] to determine the optimal number of dimensions or factors of the new questionnaire.

Subsequently, descriptive analysis of the obtained results was carried out in order to design a global landscape of the sample. After studying normality [58] and homocedasticity (Levene's test) [59], non-parametric inferential analysis was developed in order to look for significant differences between gender (male/female) for the punctuation in the questionnaire using Mann-Whitney-Wilcoxon test [60], and between ages using Kruskal-Wallis test [61]. These comparisons were developed at each of three levels: global questionnaire, factors and each item of the questionnaire.

Finally, the correlation between teaching experience and questionnaire items was analyzed using the Spearman correlation coefficient [60]. The p-values were corrected for multiple tests by the false discovery rate (FDR) method [62].

3. Results

Table 1 shows the descriptive results of the sample. The sample presents a homogeneous distribution for the different categories collected by gender and previous training activity. This is also valid for age group, except for the category <30 which represents an approximately 4% of the sample according with the percentage that these young professors represent in the population of Spanish university professors. Most of them are Lecture, Senior Lecture and Professor.

Table 1. Participants in the study in frequency percentages.

Title	Category	Frequency (%)
Gender	Male	54 (52.9%)
	Female	48 (47.1)
Age (years)	<30	4 (3.9%)
	30-40	40 (39.2%)
	40-50	38 (37.3%)
	>50	20 (19.6%)
Position	Associate Lecturer	22 (21,78%)
	Lecturer	33 (32,67%)
	Senior Lecturer and Professor	24 (23,76%)
	Others	22 (21,78%)
Previous training in Ethics	Yes	60 (58.8%)
	No	42 (41.2%)

Table 2 shows the statistics for the questions in the questionnaire. The items with the highest scores were Q1, Q4, Q5, Q8, Q10, Q11, Q21, all exceeding 8/10 points on the Likert scale (Table 2).

Table 2. Descriptive statistics of the questionnaire items

Variable	$\bar{X} \pm SD$	Median \pm IQR	Min-Max
Teaching Experience (years)	12.96 \pm 8.12	11 \pm 12.25	2 – 38
Q1	8.76 \pm 1.40	9 \pm 2	5 – 10
Q2	5.09 \pm 2.92	5 \pm 4	0 – 10
Q3	6.33 \pm 3.13	7 \pm 5	0 – 10
Q4	8.65 \pm 1.68	9 \pm 2	0 – 10
Q5	8.48 \pm 1.07	9 \pm 1	5 – 10
Q6	6.26 \pm 2.58	7 \pm 3	0 – 10
Q7	7.77 \pm 2.40	8 \pm 3	0 – 10
Q8	8.51 \pm 1.27	9 \pm 1	2 – 10
Q9	7.37 \pm 2.19	8 \pm 3	0 – 10
Q10	8.73 \pm 1.34	9 \pm 2	4 – 10
Q11	8.14 \pm 1.66	8 \pm 1	0 – 10
Q12	6.40 \pm 2.50	7 \pm 3	0 – 10
Q13	3.98 \pm 2.88	4 \pm 4	0 – 10
Q14	7.33 \pm 2.25	8 \pm 2	0 – 10
Q15	2.52 \pm 2.47	2 \pm 4.25	0 – 9
Q16	5.54 \pm 2.78	5 \pm 4.25	0 – 10
Q17	6.40 \pm 2.49	7 \pm 3	0 – 10
Q18	7.93 \pm 2.3	8.50 \pm 2.25	0 – 10
Q19	1.92 \pm 2.80	0 \pm 4	0 – 10
Q20	1.47 \pm 2.49	0 \pm 2	0 – 10
Q21	8.27 \pm 1.75	9 \pm 2.25	0 – 10
Q22	5 \pm 3.23	5 \pm 6	0 – 10

\bar{x} : Medium; SD: Standard Deviation; IQR: Interquartile Range; Min: Minimun; Max: Máximun

The validity analysis showed a value of 0.786 (>0.5) in the sample adequacy measure KMO (Kaiser-Meyer-Olkin) and Bartlett's sphericity test ($p < 0.0001$). These results confirm that the analysis is relevant.

Cronbach's alpha for the complete questionnaire seems to have good internal consistency, achieving a large Cronbach's alpha (0.858). However, the sequential study based on the homogeneity index and the increase in Cronbach's alpha when each item is eliminated (those items whose homogeneity index is less than or equal to 0.2 -see Ebel, 1965-

and that when eliminated and Cronbach's alpha is greater than or equal to that of the total were dispensed with). Thus, by eliminating items Q14, Q18, Q19, Q20 and Q22, a Cronbach alpha index of 0.872 can be obtained (Table 3).

Table 3. Item – Total Score Statistics

Item	Corrected item - total score correlation (Homogeneity Index)	Cronbach's Alfa without element
Q1 Compatible with my values	.606	.864
Q2 Adequate economic level	.433	.870
Q3 Employability	.643	.859
Q4 Social utility	.508	.866
Q5 Appropriate competencies	.389	.870
Q6 Adequate social level	.616	.860
Q7 Access to other studies/personal growth projects	.550	.863
Q8 It allows to help other people	.501	.867
Q9 Better person	.599	.861
Q10 Vocation	.466	.868
Q11 It allows to improve the society	.631	.862
Q12 Success and recognition	.573	.862
Q13 Don't waste the curriculum vitae working outside the university	.445	.869
Q15 University social recognition	.420	.869
Q16 I like university	.413	.870
Q17 The profession is valued positively by society	.628	.859
Q21 Teaching allows me to help others	.410	.869

Finally, the questionnaire consisted of 17 items (**Appendix 1**). In the sample adequacy measure KMO (Kaiser-Meyer-Olkin) a higher result was obtained [0.822 (>0.5)] and in Bartlett's sphericity test, $p < 0.0001$. Thus, the relevance of the analysis was confirmed.

The exploratory factor analysis of the new 17-item questionnaire showed a clustering in 4 factors -those corresponding with eigenvalues greater than one-, (2 for internal goods and 2 for external goods), explaining 64.33% of the total variance (**Table 4**). The factor analysis according to rotated components showed the following grouping for the 4 factors **F1**: Q4, Q8, Q9, Q11 and Q21; **F2**: Q13, Q15, Q16, Q17; **F3**: Q1, Q2, Q3, Q6, Q7, Q12; **F4**: Q5, Q10. The items of factors F1 and F4 correspond to Internal Goods and the items of factors F2 and F3 correspond to External Goods. Notice that Q1 (Compatible with my values) could be included in both F3 and F4, this is due to the fact that shares characteristics of both internal and external goods (Table 5).

Table 4. Grouping of items by factors according to the percentage of variance explained

Factor	Eigenvalues	% of variance explained	% of cumulative variance explained
1	6.177	36.337	36.337
2	2.168	12.753	49.090
3	1.558	9.166	58.256
4	1.032	6.071	64.327
5	.934	5.493	69.819
6	.833	4.903	74.722
7	.744	4.374	79.096
8	.591	3.479	82.576
9	.560	3.293	85.869
10	.412	2.421	88.290
11	.379	2.228	90.519
12	.358	2.104	92.622
13	.341	2.005	94.627
14	.285	1.677	96.304
15	.248	1.462	97.766
16	.211	1.244	99.010
17	.168	.990	100.000

Table 5. Grouping of items by factors according to rotated component matrix¹

Item	Compound			
	1	2	3	4
Q8 It allows to help other people	.893	-	-	-
Q21 Teaching allows me to help others	.873	-	-	-
Q11 It allows to improve the society	.631	-	-	-
Q4 Social utility	.539	-	-	-
Q9 Better person	.496	-	-	-
Q13 Don't waste the curriculum vitae working outside the university	-	.795	-	-
Q16 I find the university organisation attractive	-	.791	-	-
Q15 University social recognition	-	.718	-	-
Q17 The profession is valued positively by society	-	.506	-	-
Q2 Adequate economic level	-	-	-.826	-
Q6 Adequate social level	-	-	-.765	-
Q3 Employability	-	-	-.735	-
Q12 Success and recognition	-	-	-.578	-

Q7 Access to other studies/personal growth projects	-	-	-.577	-
Q1 Compatible with my values	-	-	-.455	.416
Q5 Appropriate competencies	-	-	-	.885
Q10 Vocation	-	-	-	.689

¹Extraction Method: Principal Component Analysis Rotation method: Oblimin with Kaiser standardization. Rotation has converged into 10 iterations.

In general, comparisons made between questionnaire scores by gender (male and female) and by age group (under 30, 30-40, 40-50 and ≥ 50 years) showed no statistically significant differences ($p > 0.05$) for the total score (i.e., the sum of each item score). However: analyzing the total score for each factor (i.e., the sum of the scores of each item of the factor), we found differences statistically significant by gender for factor F1 (higher for females) and F2 (higher for males) (**Table 6**). No statistically significant differences were found when we compare each factor score by age group (**Table 7**).

When we analyze each item separately some of them showed statistically significant differences ($p \leq 0.05$). Specifically, Q8 and Q13 in the comparison with respect to gender (**Table 6**) and Q3 and Q7 in relation to age (**Table 7**).

Finally, regarding the correlation with years of teaching experience, only Q1 and Q13 show a statistically significant correlation ($p \leq 0.05$), maintaining in both cases a negative correlation (the older the professor, the lower the score on the questionnaire items) (**Table 8**).

Table 6. Comparison by gender for the total score, each factor and each item in the questionnaire

Item	Gender		p-value
	Male	Female	
	(N=54)	(N=48)	
	$\bar{X} \pm SD$	$\bar{X} \pm SD$	
	Median \pm IQR	Median \pm IQR	
Total Score	118.80 \pm 19.95	115.44 \pm 23.83	0.573
	118.43 \pm 30.25	116.5 \pm 31.25	
F1	40.17 \pm 5.91	41.81 \pm 7.27	0.050
	40 \pm 5.25	43 \pm 6	
F2	19.98 \pm 6.76	16.71 \pm 9.12	0.026
	19 \pm 6.5	15 \pm 12	
F3	41.63 \pm 10.90	39.5 \pm 11.24	0.334
	42 \pm 18.25	41.5 \pm 17.25	
F4	17.02 \pm 2.32	17.42 \pm 1.97	0.486
	18 \pm 3	18 \pm 10	
Q1	8.63 \pm 1.50	8.92 \pm 1.29	0.377
	9 \pm 2	9 \pm 2	
Q2	5.46 \pm 2.96	4.67 \pm 2.84	0.136
	6 \pm 5.25	5 \pm 4	
Q3	6.5 \pm 3.03	6.15 \pm 3.25	0.617
	7 \pm 5	7 \pm 5.75	
Q4	8.59 \pm 1.50	8.71 \pm 1.87	0.365
	9 \pm 2	9 \pm 2	
Q5	8.43 \pm 1.11	8.54 \pm 1.03	0.606

		8.50 ± 1	9 ± 1	
Q6		6.70 ± 2.36 7 ± 4	5.77 ± 2.74 6 ± 3	0.078
Q7		7.85 ± 2.23 8 ± 3	7.69 ± 2.60 8 ± 3	0.942
Q8		8.28 ± 1.32 8 ± 1	8.77 ± 1.17 9 ± 2	0.021
Q9		7.15 ± 1.99 7.50 ± 1.75	7.63 ± 2.39 8 ± 2	0.080
Q10		8.59 ± 1.47 9 ± 2	8.88 ± 1.18 9 ± 2	0.447
Q11		8.11 ± 1.34 8 ± 1	8.17 ± 1.97 9 ± 1	0.277
Q12		6.48 ± 2.28 7 ± 3	6.31 ± 2.75 7 ± 3	0.991
Q13		4.52 ± 2.55 5 ± 3.25	3.38 ± 3.13 3 ± 5	0.027
Q15		2.74 ± 2.40 3 ± 4	2.27 ± 2.56 1 ± 5	0.237
Q16		6.09 ± 2.33 6 ± 3	4.92 ± 3.13 5 ± 5	0.059
Q17		6.63 ± 2.02 7 ± 2	6.15 ± 2.93 7 ± 4	0.627
Q21		8.04 ± 1.73 8 ± 2	8.54 ± 1.76 9 ± 2	0.062

\bar{x} : Mean; SD: Standard Deviation; IQR: Interquartile Range; Min: Minimum; Max: Maximum; p-value: significance level.

Table 7. Comparison by age for each item in the questionnaire

Item	Age				p-value
	<30 (N=4) $\bar{x} \pm SD$ Median ± IQR	30-40 (N=40) $\bar{x} \pm SD$ Median ± IQR	40-50 (N=38) $\bar{x} \pm SD$ Median ± IQR	>50 (N=20) $\bar{x} \pm SD$ Median ± IQR	
Total Score	123.8 ± 18.46 117 ± 30.75	122.4 ± 20.1 127 ± 31.25	111.8 ± 24.1 111 ± 32.25	115.9 ± 19.8 115 ± 20	0.197
F1	44.5 ± 6.4 45 ± 11.5	40.9 ± 6.48 41.5 ± 7.75	40.03 ± 7.45 40.5 ± 7	42.05 ± 5.04 41 ± 5.5	0.691
F2	23.75 ± 6.18 23 ± 11.25	19.83 ± 7.72 19.5 ± 9.75	17.18 ± 8.40 18 ± 7	17 ± 8.12 17 ± 11.75	0.120

F3	38.25 ± 10.84	44.08 ± 9.88	37.84 ± 11.7	39.5 ± 11.13	0.107
	37.5 ± 20.75	47 ± 17.25	37 ± 20.25	41 ± 15.5	
F4	17.25 ± 0.96	17.58 ± 2.02	16.73 ± 2.32	17.35 ± 2.23	0.369
	17.5 ± 1.75	18 ± 3	17 ± 2.5	18 ± 2.75	
Q1	9.25 ± 0.96	9.15 ± 1.25	8.39 ± 1.55	8.60 ± 1.31	0.057
	9.50 ± 1.75	10 ± 1	9 ± 2	8.5 ± 2	
Q2	3.50 ± 2.89	5.05 ± 3.08	5.24 ± 2.76	5.20 ± 3	0.698
	3.50 ± 5.50	5 ± 4.75	5.50 ± 4.25	6 ± 5.75	
Q3	6 ± 1.16	7.43 ± 2.81	5.47 ± 3.21	5.85 ± 3.35	0.026
	6 ± 2	8 ± 3.50	6 ± 5.25	6 ± 5.75	
Q4	9.25 ± 1.50	8.73 ± 1.62	8.37 ± 2.02	8.90 ± 0.97	0.611
	10 ± 2.25	9 ± 2	9 ± 2	9 ± 2	
Q5	8.25 ± 0.50	8.75 ± 0.98	8.26 ± 1.16	8.40 ± 1.10	0.315
	8 ± 0.75	9 ± 2	8.50 ± 1	8.50 ± 1	
Q6	5.50 ± 3	7.03 ± 2.19	5.68 ± 2.88	6 ± 2.41	0.137
	5 ± 5.50	7.50 ± 2.75	6 ± 3.25	6 ± 3	
Q7	7.25 ± 2.06	8.65 ± 1.70	7.37 ± 2.59	6.90 ± 2.85	0.018
	7 ± 3.75	9 ± 2	8 ± 2	7.50 ± 4.75	
Q8	9 ± 1.41	8.43 ± 1.58	8.34 ± 1.10	8.90 ± 0.72	0.246
	9.50 ± 2.50	9 ± 1.75	8 ± 1	9 ± 1	
Q9	8.25 ± 2.06	7.40 ± 2.36	7.37 ± 2.09	7.15 ± 2.16	0.809
	8.50 ± 3.75	8 ± 3	8 ± 2.25	8 ± 3.75	
Q10	9 ± 1.16	8.83 ± 1.34	8.47 ± 1.43	8.95 ± 1.23	0.473
	9 ± 2	9 ± 2	9 ± 1.25	9 ± 1.75	
Q11	9 ± 1.16	8.15 ± 1.55	7.79 ± 1.96	8.60 ± 1.19	0.250
	9 ± 2	8 ± 1	8 ± 2	9 ± 1.75	
Q12	6.75 ± 2.63	6.78 ± 2.53	5.68 ± 2.61	6.95 ± 2.04	0.176
	7.50 ± 4.75	7.50 ± 3.50	6 ± 4.25	7 ± 3	
Q13	5.75 ± 2.50	4.53 ± 2.92	3.47 ± 2.94	3.50 ± 2.61	0.210
	5.50 ± 4.75	4.50 ± 4.75	4 ± 5.25	3 ± 3.75	
Q15	2.25 ± 1.50	2.60 ± 2.32	2.58 ± 2.83	2.30 ± 2.34	0.957
	3 ± 2.25	2 ± 5	2 ± 5	2.50 ± 3	
Q16	7.25 ± 3.40	5.78 ± 2.79	5.24 ± 2.74	5.30 ± 2.81	0.528
	8 ± 6.25	5.50 ± 2.75	5 ± 5	5 ± 5	
Q17	8.50 ± 1.29	6.93 ± 2.42	5.89 ± 2.61	5.90 ± 2.25	0.044
	8.50 ± 2.50	7.50 ± 2.75	6.5 ± 4	6.50 ± 3	
Q21	9 ± 1.41	8.20 ± 1.95	8.16 ± 1.81	8.50 ± 1.28	0.707
	9.50 ± 2.50	9 ± 2.75	8 ± 2.25	9 ± 1	

\bar{x} : Medium; SD: Standard Deviation; IQR: Interquartile Range; Min: Minimum; Max: Máximum; p-value: significance level.

Table 8. Correlation between professors' years of experience and the questionnaire items

Item	Spearman Rho		corrected p-value
	Correlation Co-efficient	rho p-value	
Q1	-0.293	0.003	0.024
Q2	0.102	0.307	0.435
Q3	-0.174	0.080	0.271
Q4	-0.116	0.288	0.435
Q5	-0.111	0.268	0.435
Q6	-0.141	0.156	0.380
Q7	-0.145	0.146	0.380
Q8	-0.027	0.785	0.953
Q9	-0.125	0.210	0.397
Q10	0.005	0.962	0.975
Q11	-0.090	0.370	0.484
Q12	-0.134	0.181	0.384
Q13	-0.302	0.002	0.024
Q15	-0.003	0.975	0.975
Q16	-0.191	0.055	0.232
Q17	-0.201	0.042	0.232
Q21	-0.010	0.924	0.975

4. Discussion

The aim of this study was to design a questionnaire that would allow for the analysis the factors that determine the motivation of university professors. Currently, the development of higher education institutions is moving towards sustainability [63]. However, although the impact of professors on these areas of development is well known [64–66], studies analyzing professor-related aspects are limited. In this sense, previous studies analyzed the main characteristics of academics committed to the promotion of sustainable human development stand out as motivating factors of university teaching staff internal factors, such as vocation or help to students [17,40,67].

The results showed that the aspects grouped in factors 1 and 4, related to the profession internal goods, scored higher (42.408%). The items grouped in F1, seem to have common characteristics of personal projection towards society (Q4: social utility, Q8: profession allows me to help others, Q9: helps me to be a better person, Q11: allows me to improve society, Q21: teaching allows me to help others). The items with a higher score in Table 2 are grouped in the factors related to internal assets (F1 and F4). Authors such as Pontes Pedrajas et al [68] analyse the importance of the social utility of university knowledge. Other similar studies affect this same idea of the impact of the teaching profession on the improvement of society, from the physical education area [69] or in the health professions area [70,71].

Regarding factor 4 (Q5: Appropriate competencies, Q10 Vocation), which contributes 6.071% to the percentage of the accumulated variance, Q1 presented a strong clustering in both F3 and F4, although it was higher in F3. This fact explained why it was associated with F3. Compatibility with personal values has a double meaning, being values related to the internal motivations of the university professor (F4) or values related to external motivations (F3) (Table 5). The main differences that group F1 and F4 into two different factors can be found in the fact that F4 refers to personal characteristics (emanating from the university lecturer's own being), while F1 groups together the possible consequences that such characteristics may have for the university lecturer. Related to the vocation factor, Fernández Guayana affirms the need for the teaching staff understands the educational task as a vocation for the other (the student), both from the professional level as the ethical level [72]. Zabalza highlights the need for teachers to combine their specific training with their vocation to train and train others, being aspects that directly influence the motivations of professors. [73].

Motivations related to external goods were categorized into factors 2 and 3. Factor 2 groups issues of a professor's interpersonal nature (Q13: no wasted curriculum vitae, Q15: social recognition, Q16: attractive university organization, Q17: teaching work well regarded by society). In relation to F3, (social recognition and the external projection of the

teacher) Cuesta-Moreno contributes to his study a valuable reflection about the teaching experience about their social recognition: on the one hand, to highlight the burden and the concern that generates the need to seek prestige and appreciation at the academic level [74]; on the other hand, the demand for public and social recognition of teachers in society is shown. From this perspective, Malinowska draws attention to the assessment made of the teaching profession in society [75].

In comparisons by gender, statistically significant differences were found for F1 and F2, showing that, on average, women give more importance to the projection towards the society (for helping others) of their profession than men, and men value more the social recognition of being professors than women. Analyzing each item, for item 8, significant differences were found between men and women, with women attaching greater importance to the ability of the profession to help others. In contrast, significant differences were found in item 13. Men, on average, place greater importance on not wasting the curriculum (Table 6). In this sense, León-Rubio et al [76] and Cabezas et al [77] indicated the greater social and professional recognition for men than for women. In this same line, Reyes & Álvarez highlight the inequalities of professional recognition of teachers based on gender [78]. In this sense, the study by Alós et al carried out in secondary education teachers showed significant differences in the incidence of the importance that teachers give to social recognition based on gender [79].

In the other hand, Lozano & Barreiro-Gen [14] analyzed through a survey provided to European academics the integration of sustainable development into the curriculum in higher education institutions. According to the survey results, women tend to integrate sustainable development in a more balanced way. On the other hand, academics from the UK, Sweden and the Netherlands scored higher than those from other European countries [14]. The fact that the participants in this study were part of the same university system could be seen as a limitation of the study. Future studies are needed to analyse possible differences in the motivations of university professors from different countries.

Regarding comparisons according to age, certain trends were found. Specifically, significant differences were found in three items (Q3, Q7 and Q17). These items are grouped F2 (Q17) and in F3 (Q3 and Q7), related to external goods. These results seem to indicate that age conditions the concerns of the university professors. Thus, professors with an age range between 30-40 years scored higher than the rest of the age groups in the possibility offered by the teaching work to access other professional activities beyond teaching (Q3) and others that allow personal growth (Q7). Statistically significant differences were found between professors under 30 years and the rest with respect to whether the teaching work is well regarded by society (Q17), showing statistically higher average values than the rest of the age groups (Table 7). Professors with higher age groups (40-50 years and >50 years) obtained lower scores in the previous items (Q3, Q7 and Q17) linked to the external goods. These results are consistent with other studies that indicate the association between years of teaching performance and age with the increase in importance given to the lack of social and professional recognition [79–81].

5. Conclusions

The questionnaire designed seems to be reliable and valid for detecting motivations in university professors staff. The questions were grouped into 4 factors (two of them associated with motivations related to internal goods and two with motivations related to external goods). The motivations of Spanish university professors seem to be associated with the age and gender of the teacher.

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Appendix 1

Motivation questionnaire for university teachers

Gender: Female Male

Age:

 Under 30 years 30 to 40 years 40 to 50 years over 50 years

Center where you teach:

Teaching figure at the University:

- Associate Professor
 Guest Lecturer
 Professor Assistant
 Lecturer Adjunct Professor or Professor
 Others

Current teaching experience and load:

Have you carried out any teaching activities that encourage the development of experiences that work cross-cutting skills in your students (SOFD, G9 courses etc...)?

Value the influence each of the following items has on your exercise as a university professor. Indicates the degree of agreement on each item.

1. It is a profession compatible with my values

0	1	2	3	4	5	6	7	8	9	10
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2. The teaching profession for which I prepared is well paid

0	1	2	3	4	5	6	7	8	9	10
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3. Being a university professor can allow me to Access other professional activities beyond teaching

0	1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	---	----

1. It is a profession with social utility

0	1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	---	----

2. This is a profession for which I have skills and abilities

0	1	2	3	4	5	6	7	8	9	10
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3. The profession can bring me good social status

0	1	2	3	4	5	6	7	8	9	10
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4. Being a university teacher allows me to Access other personal growth studies/projects

0	1	2	3	4	5	6	7	8	9	10
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5. The profession allows me to help others

0	1	2	3	4	5	6	7	8	9	10
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6. Being a college teacher helps me become a better person

0	1	2	3	4	5	6	7	8	9	10
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7. It is a profession for which I feel a vocation

0	1	2	3	4	5	6	7	8	9	10
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8. The profession of university teacher gives me the opportunity to work with others to improve society

0	1	2	3	4	5	6	7	8	9	10
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9. I can succeed and recognize by teaching in the degree for which I prepared at first

0	1	2	3	4	5	6	7	8	9	10
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10. I didn't want to waste my resume to qualify for an out-of-college position

0	1	2	3	4	5	6	7	8	9	10
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11. I felt that my teaching work would be related to the degree for which I trained and specialized.

0	1	2	3	4	5	6	7	8	9	10
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12. I am a teacher to obtain a university social recognition even if it is not related to the profession to which I wish to Access or practice

0	1	2	3	4	5	6	7	8	9	10
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13. I found the type of university organization, in which I always wanted to work, appealing to me

0	1	2	3	4	5	6	7	8	9	10
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14. The teaching work for which I have prepared and continue to prepare is well seen by society

0	1	2	3	4	5	6	7	8	9	10
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15. The profession of the university teacher is creative

0	1	2	3	4	5	6	7	8	9	10
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16. Family tradition has weighed on my decision to be a university teacher

0	1	2	3	4	5	6	7	8	9	10
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17. My reality as a university teacher exists because I was unable to Access the profesional studies o routings I really wanted

0	1	2	3	4	5	6	7	8	9	10
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18. Teaching allows me to help others

0	1	2	3	4	5	6	7	8	9	10
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19. **I teach the subjects taught because they were the ones that I liked the most when I studied these contents in university degree**

0	1	2	3	4	5	6	7	8	9	10
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