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Development and Validation of a Scale to Measure the Motivation to Pursue a Graduate Course

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Introduction. The article considers some motivation factors related to pursue a graduate course. The authors analysed aspects related to learning, better economic and work conditions, better job opportunities, alternatives to grow professionally, among other elements. Our purpose was to develop and validate a motivation scale to pursue higher education studies.

Material and Methods. Self-administered questionnaires answered by senior students of undergraduate programs in our city Medellin (Colombia) and exploratory factor analyses were employed. The methodological basis of the study is the processing and analysis of interview materials and student surveys.

Results. In the first exploratory factor analysis ($n = 315$ registers), three of four factors were retained (eigenvalue equal or greater than 1.0): Economics, Employment and educational competitiveness, and Institutional promotion and support. The factor solution explained 62.62 % of the total variance. The second exploratory factor analysis ($n = 316$ registers) confirmed the extraction of the same factors with 64.041 % of the total variance explained by them.

Discussion and Conclusion. An individual's motivations depend not only on economic aspects or the work of higher education institutions but also on subjective elements associated with individual, social and cultural variables. For that reason, the motivation scale developed in our research will enable directors of institutions and universities that offer graduate programs to direct their promotional and advertising efforts to reach a greater number of people considering their expectations and needs.

Keywords: factor analysis, graduate course, higher education, motivation, psychometrics

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Разработка и проверка шкалы для измерения мотивации к последипломному обучению

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Введение. В статье рассматриваются факторы, мотивирующие к постдипломному образованию. Авторы проанализировали аспекты, связанные с обучением, выгодными экономическими условиями и занятостью, подходящими возможностями трудоустройства, альтернативами для профессионального роста. Цель статьи – продемонстрировать разработанную мотивационную шкалу для продолжения обучения в высших учебных заведениях.

Материал и методы. Анкетирование было проведено среди студентов старших курсов, обучающихся по программам бакалавриата в г. Медельин. В качестве метода обработки данных был применен факторный анализ. Методологической основой исследования является обработка и анализ материалов интервью и опросов студентов. Для определения корреляции между переменными и правильности факторного анализа были применены критерий сферичности Бартлетта и критерий адекватности выборки Кайзера-Мейера-Олькина.

Результаты исследования. В результате первого аналитического факторного анализа (n = 315 регистров) были выделены три фактора (собственное значение, равное или превышающее 1,0): экономика, занятость и конкурентоспособность в сфере образования, институциональное поощрение и поддержка. Факторный анализ (n = 316 регистров) подтвердил извлечение тех же факторов с 64,041 % общей дисперсии.

Обсуждение и заключение. Мотивация человека зависит не только от экономических аспектов или деятельности высших учебных заведений, но также от субъективных элементов, связанных с индивидуальными, социальными и культурными переменными. По этой причине разработанная нами шкала мотивации позволит руководителям вузов фокусировать свои усилия по продвижению продолжения образования для охвата большего количества людей.

Ключевые слова: факторный анализ, последипломное образование, высшее образование, мотивация, психометрика

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Introduction

The last 20 years of the 20th century saw significant challenges across the Latin America, not only in terms of economic growth but also those of human development. One of those challenges is associated with the improvement of the productivity of organizations and, therefore, the competitiveness of countries. As a result, the related educational, scientific, technological and innovation processes certainly play a central role. Current globalized societies demand a more qualified workforce; hence education has taken a more prominent place in the political agenda in several Latin American countries [1].

For that reason, in the '80s and '90s there was a rapid expansion of the educa-

tion offered in the region and new higher education institutions were born, especially in the private sector. Besides, the number of students grew noticeably, mainly in master's programs in countries like Brazil, Chile, Argentina and Colombia [2].

The study of current educational phenomena is not an exclusive task of education professionals; such processes are also investigated by other fields, such as psychology. Advances in psychology have enabled to holistically study the phenomena of education sciences [3], such as the factors that motivate students to continue or abandon education processes.

This research posed a new set of questions regarding graduate courses that matter to education professionals as strategic



allies of education systems. Their answers will enable directors of institutions and universities that offer this type of programs to direct their promotional and advertising efforts to reach a greater number of people considering their expectations and needs. Besides, it depicts a clearer outlook of the complexity that it implies for professionals of social sciences, particularly psychology, to understand individuals' mental dimension and, as a result, analyse their behaviour patterns. This argument is supported by the ideas of Vinet and Rdz, who describe the challenge this social science discipline faces to contribute to the thorough measurement of several constructs of interest in this field [4]. Particularly, psychometrics plays a key role in the creation of instruments that ensure a better performance of professionals in this field [5].

According to the issues mentioned above, this research sheds light on several educational facts, like the motivating factors to continue with professional-level education. First, some researches are presented in the literature review section. Later, material and methods are described. Then, the main results are presented, where three of four of the constructs are supported by the data. Finally, the discussion and conclusions section is described.

Literature Review

Regarding higher education, Zahran found different factors that motivate professional nurses to pursue graduate courses [6]. Among them are the acquisition of new knowledge and skills, professional growth, access to jobs that provide better conditions and benefits, as well as staying up-to-date in the field. Likewise, Sánchez et al. maintain that a decisive factor is the development of skills that result in better job opportunities [7]. In turn, Baneviciute and Kudinoviene highlight the interest of people in pursuing this type of advanced studies because, if they are better qualified to fulfil their duty, they can be promoted higher in their workplace [8].

Similarly, Donaldson and McNicholas suggest that people enter graduate programs related to their occupations in order to gain

a theoretical perspective and the necessary knowledge to carry out their functions more efficiently [9]. Furthermore, they stress personal satisfaction as one of the main motivating factors to pursue graduate studies after a bachelor's degree.

There are additional motivations related to acquiring knowledge and skills to satisfy the growing demands of their profession and ultimately be able to meet the specific needs of their industrial sector or type of customers. Social aspirations may also be the main motivating factor for some students [10]. However, other aspects such as self-realization, professional development or meeting an academic requirement are considered in the decision making [11]. Additionally, such arguments have become more relevant in the current context, where knowledge transfer among universities and corporate structures occurs during students' course of studies as well as after graduation [12].

As a result, one of the alternatives psychology has used to make this type of measurements are psychometric tests based on statistical models. They have enabled to develop a whole new research field for the professional practice, are focused on evaluation processes and produce better aids for the psychological practice. Furthermore, there is a growing interest in such tools due to the existing social demand for the design and implementation of this type of tests [13–15].

Consequently, the available literature contains several models, in which psychometrics and its tools play a key role, that have been proposed to determine the factors that motivate the decision to pursue graduate courses. For instance, Donaldson and McNicholas hold that, since it is impossible to interact with the product before experiencing the purchase, it is important to define a mechanism based on students' interests to orient the decision-making process [9].

Another representative model was developed by Sánchez et al. [7]. They administered 716 questionnaires to senior students in undergraduate programs in social fields and humanities to identify

a series of factors that motivated them to enrol in graduate programs. Besides such identification, they managed to define three groups of people according to their motivations to pursue graduate studies. Group 1 was characterized by the motivation of receiving higher economic retributions and being professionally successful at the end of their studies. Group 2 was motivated by the contribution this type of higher education offers to them. Finally, Group 3 was strongly influenced by environmental factors (family, classmates and the market) to earn a graduate degree [7].

The previously described outlook has triggered this study, which is aimed at answering a question: What scale enables us to measure the motivation to pursue graduate studies?

Material and Methods

This quantitative exploratory study was carried out to design and validate a scale of motivation to obtain a graduate degree. The said scale was derived from the identification of some motivational factors in the literature. For that purpose, information was collected between February and June 2017. Besides, two exploratory factor analyses were used to identify and analyse the latent underlying structure connecting a set of items, and thus group them and create the corresponding subscales.

The instrument designed in this study was a self-administered questionnaire for junior and senior undergraduate students enrolled in one of two business schools in our city Medellin (Colombia). Initially, 667 questionnaires were collected and 36 of them were discarded because of inaccurate filling out. Finally, 631 registers remained.

These instruments were divided into two sections. The first part collects data that enable to characterize the sample by asking about their interest in pursuing graduate studies, fields of study and financing sources, among other questions. The second part contains 23 questions with a Likert scale from "1 = Strongly disagree" to "5 = Strongly agree". They were designed based on the aspects found in the

literature: Economics, Competitiveness, Promotion and Academic demand.

Regarding the ethical considerations that regulate the participation of students in research, they were duly informed of the study's objective, risks, benefits, costs and other key aspects. This allowed their voluntary participation and, above all, to protect their integrity, the confidentiality of the collected data and to minimize risks. All of this was put in writing in the informed consent signed by each surveyed student.

Results

To develop and validate the motivation scale, a 23-item questionnaire was created. Twelve out of them were obtained from the works by Becker, Ng et al. and Langholz and Abeles, who mention aspects related to economics, as well as employment and educational competitiveness [10; 16; 17]. The rest was based on the literature review and the consideration of some elements implicit in the definitions of the identified factors.

Furthermore, a pilot study was conducted in advance with a 30-person sample to receive feedback on the formulation of each question. This exercise enabled to better formulate the wording of some items in the instrument and ensure that they were understood by the participants.

In order to identify the latent underlying dimensions in the set of items revolving around the decision to pursue graduate studies, two exploratory factor analyses were used and the 631 data were randomly divided into two groups. The first half (315 data) was used for the first exploratory factor analysis. To determine the correlation between variables and validate the appropriateness of a factorial analysis, Bartlett's test of sphericity and the KMO (Kaiser-Meyer-Olkin) test were calculated, as shown in Table 1. In the case of Bartlett's, it can be concluded that there are significant correlations between variables, since all the values are under 0.05. Regarding the KMO test values, none of them is less than 0,50, which is acceptable [18].



Table 1. KMO and Bartlett's test values

	Construct	KMO	Bartlett
ACD	Academic demand	0.570	0
ECS	Economics	0.694	0
IPR	Institutional promotion	0.556	0
EEC	Employment and educational competitiveness	0.799	0

Source: Author's own work supported by SPSS software.

Additionally, since the evaluation of the assumption of normality was not satisfactory for all the variables (Shapiro–Wilks Tests, $p < .01$; [19]), the principal axis factoring method was used [20]. Besides, to extract the minimum number of factors that enabled the correlation among them, direct promax factor rotation was used [21] and SPSS 19.0 software was employed for the exploratory factor analysis¹.

To decide how many factors to maintain in the exploratory factor analysis, the Kaiser criterion was applied [22]. In addition, the amount of variance explained, the interpretability, and the replicability of the factors were considered [23; 24]. The evaluation of each factor ensures the unidimensional structure of the subscales involved in the decision to pursue graduate studies.

Factor solution explains 62.62 % of the total variance, and three factors present an eigenvalue equal or greater than 1.0. The

first aspect, Economics, accounted for 27.705 % of the variance. Employment and educational competitiveness were responsible for 20.66 %, and Promotion and institutional support were the cause of the remaining 14.255 %. Contrary to initial expectations, a fourth factor related to academic demand could not be retained.

In order to maximize the clarity of the model, only measurements that presented strong primary loadings were considered without cross-loadings [25]. Seven items presented loadings < 0.40 . As can be seen in Table 2, the items that support each of the three retained factors present loadings greater than 0.40 and no cross loading above 0.40 [26]. Although ACD2 and ACD5 meet the two criteria above, they were not considered because the intentions they dealt with were not on in line with what was measured by the corresponding factors (Factor 1 in the case of ACD5, and Factor 2 for ACD2).

Table 2. Factor-Item loadings of the first EFA

Construct	Factor			
	1	2	3	4
ECS3		.780	-.052	.169
ECS4		.769	.290	.056
ECS1		.692	.110	.023
ECS5		.666	.077	-.002
ECS6		.319	.251	.020
ECS2		.189	.352	.025
EEC4		.056	.781	-.027
EEC3		.067	.624	.084
EEC2		.104	.578	.180
EEC6		.077	.568	.220

¹ IBM Corp. IBM SPSS Statistics for Windows (Version 19.0). Armonk, NY: IBM Corp.; 2010.

End of table 2 / Окончание табл. 2

1	2	3	4
EEC5	.098	.521	.030
EEC1	.020	.462	.229
ACD1	.114	.307	.071
ACD2	.128	.423	.101
ACD3	.197	-.090	-.003
ACD4	-.018	.154	.002
ACD5	.435	.335	.195
IPR2	.145	.122	.691
IPR4	.193	.160	.578
IPR1	.087	-.003	.423
IPR6	-.044	.107	.409
IPR3	.196	.288	.045
IPR5	.149	.227	-.050

Source: Author’s own work supported by SPSS software.

To confirm the structure resulting from the first exploratory factor analysis, a second analysis was carried out with Sample 2 (316 data). Table 3 presents satisfactory KMO and Bartlett values that indicate the existence of significant correlations between variables.

The evaluation of the assumption of normality produced unsatisfactory results for all the variables (Shapiro – Wilks Test, $p < .01$). Therefore, the principal axis factoring method and direct promax rotation were used one more time. An exploratory factor technique in SPSS 19.0 was employed for the second analysis.

As in the first EFA, the solution of factors indicates the extraction of 3 factors (eigenvalues above 1.0) and no evidence was found to retain a fourth one associated with academic demand. The total percentage of variance of this EFA explained by the three factors added together is 64.041 %.

This proportion corresponds to 26.566 %, 21.126 % and 16.349 % of the for the first, second and third factor, respectively.

In the case of the second EFA, the loadings of 8 items were under 0.40 and none of them showed cross-loadings greater than 0.40. In the case of the first factor, the same 4 elements in the first EFA were found. Regarding the second factor, all the criteria had a loading over 0.40, except EEC3. Therefore, both exploratory factor analyses indicate that 5 items are valid for this factor. And for the third one, contrary to what the first EFA indicates, only three of the aspects that were considered presented loadings above 0.40 (IPR1, IPR2 and IPR4). Although the loadings of ACD2 and ACD4 exceeded the specified limit as well, the nature of such questions mismatched what the factor intended to measure. As a result, they were considered invalid, which can be observed in Table 4.

Table 3. Values of KMO and Bartlett’s test of sphericity

Construct	KMO	Bartlett
ACD	0.502	0
ECS	0.687	0
IPR	0.633	0
EEC	0.782	0

Source: Author’s own work supported by SPSS software.



Table 4. Factor-Item Loadings of the second EFA

Construct	Factor		
	1	2	3
ECS4	.794	.040	-.020
ECS3	.731	.145	-.022
ECS1	.661	.164	.086
ECS5	.514	.135	-.039
ECS6	.217	.382	.260
ECS2	.167	-.029	.144
EEC1	.101	.715	.321
EEC5	.098	.626	.140
EEC6	.169	.572	.145
EEC2	.078	.529	.235
EEC4	.142	.437	.247
EEC3	.042	.332	.213
ACD1	.307	.302	.122
ACD2	-.008	.017	.427
ACD3	.007	.475	.346
ACD4	.279	.294	.665
ACD5	.299	.172	.073
IPR1	-.026	.178	.580
IPR4	-.033	.202	.485
IPR2	.130	.269	.405
IPR3	.318	.241	.345
IPR5	.166	.175	.118
IPR6	.100	.386	.192

Source: Author's own work supported by SPSS software.

Discussion and Conclusion

Studying the motivating factors that lead undergraduate students to continue with advanced graduate courses, as well as the research on university dropout rates, is of great interest to current administrations. Both types of research overlap because they enable to understand the complexity of the social, individual, cultural and economic dimensions of higher education students.

Therefore, since an individual's motivations depend not only on economic aspects or the work of Higher Education Institutions but also on more subjective elements (such as individual, social and cultural variables), new tools need to be

developed to measure this phenomenon. Currently, this is a relevant topic for scientific, educational and applied research because identifying the factors that motivate an individual to pursue undergraduate and especially graduate studies is fundamental for the economic growth and human development of nations.

As Boni explains, current education systems face a revolutionary age without a doubt [27]. The role of Higher Education Institutions is decisive because they become drivers of the knowledge society. Human talent training and the knowledge transfer processes to the community promote the economic growth of the States.

Scientific and academic communities are also drivers of economic growth and generation of wealth in the knowledge society. Furthermore, they should improve not only their knowledge transfer strategies but also their in-depth analysis of the motivating factors that lead students to pursue undergraduate as well as graduate studies. Said students ensure the sustainability over time and are at the core of the mission of Higher Education Institutions [28; 29].

The findings of different authors in the existing literature highlight the importance of investigating the factors that motivate to obtain a graduate degree; for example, Sánchez et al. [7]. They used a latent class analysis to make an approximation to the motivation factors among Spanish graduate students, and identified aspects related to learning, and better economic and working conditions, among other elements. In the same line, the study by Fresán reveals that the choice of this type of programs by public officers in Mexico is a strategy to improve their salary and position [30].

Likewise, in the Mexican context, Gómez and García conducted a study to determine the factors that motivate enrolment in graduate studies in the fields of science and technology and recognized some significant elements [31]. One of them was the existing belief that this type of advanced studies will improve people's status and financial situation. This argument was also dealt with in the study by Moreno and García and who found that people see in this type of programs an alternative to grow professionally and achieve their life goals [32].

Additionally, it should be noted that research on motivational factors for education has been conducted not only on graduate but also undergraduate studies. Something they have in common are job opportunities and the warranty of stability

for individuals resulting from their university education, as Gratacós and Valencia highlighted regarding pedagogy programs in Colombia [33].

As a result, this study focused on the development and validation of a motivation scale to measure some factors that lead undergraduate students to continue with graduate courses. Each scale is composed of three subscales validated by two exploratory factor analyses. Such subscales comprise the following factors: Economics, Employment and educational competitiveness provided by this type of programs, and Institutional promotion and support.

However, interestingly, this study found no evidence to retain a fourth factor related to academic demand. This constitutes a limitation to this research, but it also suggests further analysis in future endeavours, much more so if findings indicate that academic demand is considered to be a decisive factor in the choice to continue with graduate studies.

The tools and new scales designed in this study are useful for the administrative staff of Higher Education Institutions as well as government agencies, because measuring such factors is the first step to propose and design strategies to train more qualified human capital.

In that sense, future research requires the participation of not only professionals in the fields of education and pedagogy but also from other disciplines of social sciences, such as psychology. The latter has developed psychometric instruments aiding to approach this kind of phenomena, as well as complex analyses that explore the intricacy the individuals' decisions may entail. Personal, family, social and cultural factors predetermine such choices, which may require psychological support as a key ally in education systems at different levels.

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