

Factores que inciden en la publicación de artículos de profesores de ingeniería de una universidad privada del Perú

Factors that affect the publication of articles by engineering professors from a private university in Peru

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Abstract– *The objective of this research was to determine the relationship between personal and institutional factors and the scientific production of teachers at a private university in Trujillo. In this basic research, with a descriptive, correlational, and non-experimental design 50 under-graduate teachers were surveyed in the Faculty of Engineering and Technology of a private university in Trujillo. For data analysis, the SPSS v.26 program was used where the Chi-Square statistical test was applied and the results obtained showed that 4 personal factors and 3 institutional factors were significant in the Chi-Square test because a value of $P < 0.05$. Finally, it was concluded that the RENACYT category, the time of teaching service; the preference for research activity; personal time dedicated to research; teaching dedication; the workload time assigned to research, and having been trained to prepare and write articles are significant personal and institutional factors that directly influence the publication of articles by undergraduate teachers of the Faculty of Engineering and Technology of a private university in Trujillo.*

Keywords-- *Personal factors; Institutional factors; Scientific production; publication of articles.*

I. INTRODUCTION

At an international level, it is mentioned that scientific production is one of the objectives that universities seek to develop and with which they seek to transcend in a particular way, thus defining scientific production as the consequence of the research carried out by teachers. and their research groups [1,2]. Scientific production is also considered an important element to quantify quality education at the university level because it contributes to the development of knowledge to solve the problems present in society, improving the quality and lifestyle of individuals [3,4].

The dissemination or communication of scientific production derived from scientific activity towards the scientific community is part of the process of scientific research, which should not culminate only with obtaining a

result and the refutation or acceptance of some hypotheses [5]. This reason, within scientific communities, we seek to disseminate this new knowledge through the publication of articles, publication of books, presentations at conferences, university theses, patents and registered products [6,7]; and it is mentioned that scientific knowledge or content is stored in databases, with Web Of Science (Wos), Scopus, Ebsco, Redalyc, Scielo, Latindex, High Wire and Dialnet being the most consulted databases internationally due to that most of the world's scientific production is found in these [8].

Publications of articles in indexed or high-impact scientific journals are gaining greater weight to categorize the academic success of universities within the hierarchical order of the academic world, and these are one of the main communication channels between communities. scientific research at an international level [5,9]. Many authors mention that it is prestigious to publish in magazines that circulate internationally and even more so in the English language. Different studies show that, in the last 10 years, international scientific production has had a slight annual increase [10]. The Scimago Institutions Rankings ©, prepares the international ranking of institutions, which is based on the number of publications of articles registered in recognized scientific journals such as Web of Science, or Scopus [9]. Current information, for 2022, shows that Harvard University is in first place internationally. Peru, as part of Latin America, contributes 2% of scientific production [7]; and according to Web of Science, about a thousand articles are produced annually in Peru and only three universities generate 42%. of all that production; where the Peruvian University Cayetano Heredia UPCH is in first place for its high scientific production and behind it are the Universidad Nacional Mayor de San Marcos (UNMSM) and the Universidad San Ignacio de Loyola (USIL) [1,11].

A scientific article to be published requires new findings that will enrich knowledge in different academic areas and must be the result of a meticulous search and consultation effort [12].

Digital Object Identifier: (only for full papers, inserted by LACCEI).

ISSN, ISBN: (to be inserted by LACCEI).

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When talking about the elements that have a direct impact on the publication of scientific articles by university professors, it is mentioned that there are external and internal factors, which can influence positively or negatively and within the external factors we can mention institutional policies, resources (equipment and infrastructure), the assignment of administrative tasks and work overload; while within the internal factors we have: motivation, commitment, availability and teaching knowledge [3,5,11,13]. During the COVID-19 Pandemic that affected all countries worldwide, it was decided to implement teleworking in order to minimize the spread and contagion of the virus and initially it was thought that social isolation would last a few months, however, it lasted longer than expected [14]. A study carried out in Peru in 2021 found that during the first year of the pandemic, scientific production was very low in Latin America, this in reference to the studies and publications reported by developed countries [15]; and as an alternative, it encourages teachers to propose action plans and implement policies to improve the quality of teaching using active methodologies and collaborative tools.

Various studies mention that among the associated factors that encourage or hinder the publication of scientific articles are: the low support in economic or infrastructure resources that universities assign to carry out research, the allocation of time or academic load that is assigned to the teachers, the level of the English language of the teachers, the low publication culture and the deficient research training [3,5,16,17,18,19]; and based on what has been mentioned, the present investigation allows us to verify the positive or negative effect of the factors that are mentioned theoretically in the literature, as well as to be able to identify new proposed factors that can influence in a way positive or negative in the publication of scientific articles by teachers; and on the other hand, the importance of knowing what factors influence the publication of articles by undergraduate teachers will serve as support to make appropriate decisions in academic and administrative terms that stimulate not only quantity, but quality of publications within universities.

II. MATERIAL AND METHODS

A. Population

The population was made up of undergraduate teachers from the Faculty of Engineering and Technology of a private university in Trujillo – Peru, who had a work relationship with the university during the second semester of 2022. As an inclusion criterion, undergraduate teachers who wish to participate voluntarily and who are teaching classes to students on the Trujillo campus were considered; and as an exclusion criterion, there are postgraduate teachers and teachers who do not adequately complete the questionnaires.

B. Sample and sampling

The sample or sample population was made up of 50 university professors who were teaching undergraduate classes

at the Faculty of Engineering and Technology, to whom the designed questionnaire (instrument) was sent. The sampling applied is non-probabilistic for convenience because this research group was selected based on ease of access.

C. Data collection techniques and instruments

In the present investigation, a questionnaire of 26 questions was applied, which was carried out virtually through a “Google” form, and using a digital link it could be disseminated to the teachers' email. This helped us reduce the application limitations of an inperson survey. The questionnaire was composed of 3 sections, the first where the respondent records his personal data such as: age, sex, marital status, etc.; the second where her characteristics or working conditions are recorded and the third where the publications of articles in the last 2 years of work are quantified. The applied instrument (questionnaire) was validated by the judgment of 03 experts who evaluated the relevance, relevance, clarity and sufficiency of each of the items. Additionally, the consistency and reliability of the instrument was measured based on the measurement scale of the Cronbach's Alpha coefficient, obtaining a value of 0.90 in the Cronbach's Alpha Test [20].

D. Evaluation of teaching scientific production.

The levels of teaching scientific production were evaluated using the value obtained from the sum of the scores assigned to each of the 8 questions of the third part of the applied questionnaire [21]; and for this investigation it was established that the minimum and maximum value considered in each question is 0 and 3, respectively. The combination of the sum of the values obtained in each question helped us establish three levels of scientific production of teachers (Table I).

TABLE I
CLASSIFICATION OF LEVELS OF SCIENTIFIC TEACHING PRODUCTION.

Level of scientific production	Punctuation
Null	0
Low	1 – 8
high	9 – 27

E. Statistical analysis of data

The statistical analysis of the data was carried out in the SPSS v.26 software where the Chi square test (χ^2) was used; and the value of $p < 0.05$ is the one used in social science and psychology studies [22].

F. Ethical aspects

Respect for people, the search for good, justice, informed consent, privacy and confidentiality were considered, these being the ones used when conducting research in health sciences and social sciences [23,24]. The surveys applied were anonymous, since no personal data, such as the name and identity document of the teachers, were recorded, like wise the teachers were not forced to participate in the present study and the data obtained were directly extracted of the surveys, without any modification or variation to what was stated by the teachers.

III. RESULTS

In Table II, shows the results on the scientific production (publication of articles) observed in the teachers of the Faculty of Engineering and Technology of a private university in Trujillo; verifying that in 44.0% of teachers, scientific production is high and in 28% scientific production is zero.

TABLE II
SCIENTIFIC PRODUCTION OF UNDERGRADUATE TEACHERS OF THE FACULTY OF ENGINEERING AND TECHNOLOGY OF A PRIVATE UNIVERSITY IN TRUJILLO – PERU.

Scientific production	Frequency (N°)	Percentage (%)
Null	14	28,0
Low	14	28,0
high	22	44,0
Total	50	100,0

In Table III, shows that most of the respondents, 40%, are between 40 and 50 years old and 16% are over 51 years old. The male sex predominates with 76%, and 48% have a master's degree. 72% are not within the Registry of Researchers – RENACYT. 32% have been between 6 to 10 years old; Regarding teaching dedication, 56% are part-time, 52% prefer research activity but 52% do not allocate personal hours to carry out research.

TABLE III
SOCIODEMOGRAPHIC PROFILE OF ENGINEERING TEACHERS AT A PRIVATE UNIVERSITY IN TRUJILLO - PERU.

Sociodemographic characteristics		N°	%
Age	31 – 35	6	12.0
	36 – 40	8	16.0
	41 – 45	10	20.0
	46 – 50	10	20.0
	51 – 55	8	16.0
	56 or more	8	16.0
Gender	Female	12	24.0
	Male	38	76.0
Academic degree	Master's degree	24	48.0
	Doctoral student	6	12.0
	doctor degree	20	40.0
Language level	Basic	20	40.0
	Intermediate	28	56.0
	Advanced	2	4.0
RENACYT Category	No	36	72.0
	Yes	14	28.0
Length of service as a teacher	< 2 years	6	12.0
	3 to 5 years	8	16.0
	From 6 to 10 years	16	32.0
	From 11 to 15 years	12	24.0
	More than 15 years	8	16.0
Preference for research activity	No	24	48.0
	Yes	26	52.0
Teaching dedication	Part time	28	56.0
	Full time	22	44.0

In Table IV, we can see that the personal factors that directly influence the publication of scientific articles are the RENACYT category ($\chi^2=8.771$; $P<0.05$). The length of service as a teacher ($\chi^2=20.671$; $P<0.05$) and the preference for research activity ($\chi^2=13.994$; $P<0.05$), according to the statistical analyses, would be the significant personal factors.

TABLE IV
PERSONAL FACTORS THAT DIRECTLY INFLUENCE THE PUBLICATION OF SCIENTIFIC ARTICLES BY TEACHERS AT A PRIVATE UNIVERSITY IN TRUJILLO.

Personal factors		Publication of scientific articles						Chi square	p
		Null		Low		High			
		N°	%	N°	%	N°	%		
Gender	Male	12	24.0	12	24.0	14	28.0	3.292	0.193
	Female	2	28.0	2	28.0	8	44.0		
Age	31 - 35	0	0.0	4	8.0	2	4.0	10.519	0.396
	36 - 40	2	4.0	2	4.0	4	8.0		
	41 - 45	2	4.0	4	8.0	4	8.0		
	46 - 50	4	8.0	2	4.0	4	8.0		
	51 - 55	4	8.0	0	0.0	4	8.0		
	56 a mas	2	4.0	2	4.0	4	8.0		
Academic degree	Master's degree	10	20.0	6	12.0	8	16.0	9.416	0.052
	Doctoral student	0	0.0	4	8.0	2	4.0		
	doctor degree	4	8.0	4	8.0	12	24.0		
Language level	Basic	6	12.0	4	8.0	10	20.0	6.827	0.145
	Intermediate	6	12.0	10	20.0	12	24.0		
	Advanced	2	4.0	0	0.0	0	0.0		
RENACYT Category	No	10	20.0	14	28.0	12	24.0	8.771	0.012
	Yes	4	8.0	0	0.0	10	20.0		
Length of service as a teacher	< 2 years	4	8.0	2	4.0	0	0.0	20.671	0.008
	3 to 5 years	2	4.0	2	4.0	4	8.0		
	From 6 to 10 years	4	8.0	4	8.0	8	16.0		
	From 11 to 15 years	4	8.0	6	12.0	2	4.0		
	More than 15 years	0	0.0	0	0.0	8	16.0		
Preference for research activity	No	10	20.0	10	20.0	4	8.0	13.994	0.001
	Yes	4	8.0	4	8.0	18	36.0		

In Table IV, shows that the significant institutional factors that directly influence the publication of scientific articles by teachers are teaching dedication ($\chi^2=6.991$; $P<0.05$). The workload time assigned to the research ($\chi^2=15,700$; $P<0.05$) and the training to prepare and write articles ($\chi^2=11,735$; $P<0.05$).

TABLE V
 INSTITUTIONAL FACTORS THAT DIRECTLY INFLUENCE THE PUBLICATION
 OF SCIENTIFIC ARTICLES BY TEACHERS AT A PRIVATE UNIVERSITY IN
 TRUJILLO.

Institutional Factors		Publication of scientific articles						Chi square	P
		Null		Low		High			
		N°	%	N°	%	N°	%		
Teaching dedication	Part time	6	12.0	12	24.0	10	20.0	6.991	0.030
	Full time	8	16.0	2	4.0	12	24.0		
Workload time assigned to research	No	4	8.0	2	4.0	0	0.0	15.700	0.047
	1-2 hours per week	8	16.0	4	8.0	6	12.0		
	3-5 hours per week	0	0.0	4	8.0	6	12.0		
	6-10 hours per week	2	4.0	2	4.0	6	12.0		
	More than 10 hours per week	0	0.0	2	4.0	4	8.0		
He considers that the academic load is a limitation that does not allow him to carry out research	Yes	6	12.0	6	12.0	16	32.0	4.461	0.107
	No	8	16.0	8	16.0	6	12.0		
Training to prepare and write articles	No	6	12.0	2	4.0	0	0.0	11.735	0.003
	Yes	8	16.0	12	24.0	22	44.0		
Recognition of the institution	No	12	24.0	12	24.0	14	28.0	3.292	0.193
	Yes	2	4.0	2	4.0	8	16.0		
Allocation of the economic bonus per publication	No	8	16.0	10	20.0	20	40.0	5.571	0.062
	Yes	6	12.0	4	8.0	2	4.0		

IV. DISCUSSION

In the last 5 years, studies have been presented where the scientific production of health professionals who teach at universities has been measured; These studies showed that scientific production was insufficient and low in obstetrics and nursing professionals, respectively [13,25]; While the results found in the present research work (Table 2) differ from what was reported, since it was obtained that 44.0% of the teachers surveyed have a high scientific production, this difference can be explained because the studies carried out health professionals, these are carrying out two activities: one in a healthcare manner and the other in teaching, which takes away their time, conditioning them to not be able to prepare and develop scientific research projects, which does not happen with engineering teachers.

Various investigations show that there are factors that positively or negatively influence the number and/or quality of scientific publication, managing to identify and classify them as personal, family, social, cultural and institutional factors [6,17,25]; and within these factors you can find academic

training, motivation, the resources the institution provides to the teacher to generate research and the overload of activities are personal and institutional factors that are directly related to the teaching scientific production [3,17,26]. In this research work, the Chi square test (χ^2 with a significance p-value of 0.05) was applied between 7 proposed personal factors and the publication of articles, using the statistical software SPSS v.26, obtained those 3 personal factors would be significant in the publication of the articles, among which we can mention the RENACYT category. The length of service as a teacher and the preference for research activity are significant personal factors that influence the scientific production of teachers; while gender; age; academic degree and language level are not significant personal factors. The results obtained are related to what was mentioned in Reference [5,13,17] who in their research found that: the allocation of time or academic load hinders scientific production; mentioning that lack of time is a limitation to research and publish an article.

The results obtained for personal factors such as age and gender coincide with those reported in Reference [13,27], who reported that the age and gender of teachers have no significant relationship with scientific production, while in Reference [27] did not find statistical significance ($p > 0.05$) between these factors and the publication of articles. Currently, the appearance and increase of women in the area of science and engineering has reached a frequency of up to 63% as authors of original or review articles [28, 29]; In this work it was found that 24.0% of male teachers have zero and low production, which increases by 4.0% in female teachers, while 28% of male teachers have high production which increases until reaching 44.0% in female teachers; Therefore, the participation of women in publications of scientific articles is the reason why gender is no longer presented as a significant factor in the publication of articles [30,31].

On the other hand, when it comes to explaining the connection between age and scientific production, sociologists mention that as people age, they acquire greater emotional judgment, which influences perception and understanding in order to achieve a better understanding. greater performance in the exercise and/or development of an activity [26]. In this research it was found that initially 8% of teachers between 31 - 36 years old have low production which decreases by 4%, then rises by 4% and drops again by 4% in the following 3 age groups. Furthermore, 4% of teachers between 31 - 36 years old have high production which increases by 4% in the following 3 age groups. These slight decreases and increases in scientific production in each age group are not significant enough, for this reason the statistical analysis showed that age is not presented as a significant factor in the publication of articles.

In this work, 48.0% of the teachers surveyed have a master's degree compared to 40.0% who have a doctorate degree; and the results showed that 12% of teachers with a

master's degree have a low production, which decreased by 4% in teachers who had a doctorate degree, in addition, 16% of teachers with a master's degree have a production high, which increases by up to 8% in teachers with a doctorate degree. Likewise, 40% of the teachers surveyed have basic English studies compared to 56.0% who have intermediate English studies, resulting in 8% of teachers with a basic English level having low production, which increased by 12%. In teachers with an intermediate level of English, in addition, 20% of teachers with a basic level of English have high production, which increases by up to 4% in teachers with an intermediate level of English. The results obtained differ from those reported in Reference [32], who in their study reported that the only variable associated with the increase in scientific production at the UNMSM is the degree of Doctor, stating that an increase in the number of doctors, the number of publications in Scopus increases, but they differ from what was reported in Reference [11], when I evaluate the level of English language proficiency to publish scientific articles, mentions that this has a significant dependence on the publication of scientific articles in Scopus, Web of Science or Scielo since when applying the multivariate regression analysis logistics mentions the English language significantly hinders the publication of scientific articles [11]; In both cases, for the present study, the slight decrease and/or increases in scientific production among the different groups relating the academic degree and the level of English with the publication of articles is not significant enough, for this reason the analysis statistics showed that they are not significant factors in the publication of articles. Additionally, we can mention that currently, it is mandatory to have a teacher's degree to teach at universities and at least study a foreign language. These are essential requirements to be able to be a university teacher. These statements help us understand why currently academic degree and English level are no longer significant factors in the publication of articles.

Likewise, when trying to relate the time of service as a teacher and the preference for research activity with scientific production, we can mention that 8% of teachers who have a service time of less than 2 years have zero production, the which decreases by 4%, then increases by 4% and is maintained in the following 3 study groups, while the 4% of teachers who have a service time of less than 2 years have a low production which increases in the following groups until reaching 12%, while no teacher who has a service time of less than 2 years has a high production which increases reaching up to 16% in the next study groups; Likewise, 48% of the teachers surveyed mentioned not having a preference for research activity compared to 52.0% who mentioned that they did prefer research activity, observing that in 20.0% of teachers who do not have a preference for the activity research activity, zero production, which decreases by 12.0% in teachers who do have a preference for research activity, while in the 20.0% of teachers who do not have a preference for research activity, production is low which decreases at 12.0 in teachers who do have a preference for

research activity, while in 8% of teachers who do not have a preference for research activity, production is high, which increases, reaching up to 36% in teachers who have preference for research activity.

When performing the same analysis of the Chi square test (χ^2 with a p-value of significance of 0.05) between the 6 proposed institutional factors and the publication of articles, using the statistical software SPSS v.26, it was obtained that 3 Institutional factors would be significant in the publication of the articles, among which we can mention the teaching dedication, the workload time assigned to the research and having received training to prepare and write articles. Teaching dedication is considered as the condition or employment situation that a person or worker has entered into with the institution where they will exercise their professional services and in relation to this, we can mention that the majority of universities contemplate at least two conditions, this based on to the assigned workload. Thus, we have: i) part-time teacher, who develops activities in working hours of less than 40 hours per week and ii) full-time teacher, who develops activities in working hours of 40 hours per week. Based on the above, the results obtained show that 24% of part-time teachers have low production, which decreased by 20% in full-time teachers, and 20% of full-time teachers. teachers with part-time dedication have a high production, which increases by up to 4% in teachers with full-time dedication; and the results coincide with those reported in Reference [27] where he mentions that full-time teachers have greater productivity than part-time teachers. Regarding the lack of time to research or to prepare and develop research, it is a determining factor in its final production and therefore in the publication of articles. The results obtained show that 56% of those surveyed consider the academic load as a limitation to carry out research, observing that among the teachers who do consider the academic load as a limitation to carry out research, 12% and 32% have low and high production respectively, this in reference to teachers who do not consider the academic load as a limitation to carry out research, where 16% and 12% have low and high production respectively. The statistical analysis shows that these results are significant, coinciding with what was reported in Reference [3], who mentions that the overload of activities such as teaching, tutoring and administrative management causes the teacher to have little time to carry out research in a satisfactory and effective manner. Finally, it is mentioned that training is a significant factor in the publication of articles. The results obtained show that 24% of the teachers who received training have low scientific production compared to 4% of the teachers who were not trained; while 44% of the teachers who received training have a high scientific production compared to 0% of the teachers who were not trained.

The results obtained are related to what was reported in Reference [18,35], who in their research found significance when they related the levels of trained human capital and the

degree of scientific production. This is based on the fact that updating and/or reinforcing teachers through continuous training increases the possibilities of increasing the number and quality of publications, since research is an activity that demands specific intellectual and cognitive skills that Teachers often do not develop due to lack of training and time [21].

V. CONCLUSION

The RENACYT category, the length of service as a teacher; the preference for research activity; Personal time dedicated to research are significant personal factors that directly influence the publication of articles by undergraduate professors of the Faculty of Engineering and Technology. Teaching dedication; The workload time assigned to research, as well as the training to prepare and write articles, are significant institutional factors that directly influence the publication of articles by undergraduate teachers of the Faculty of Engineering and Technology.

Age ($p=0.103$), use of the English language ($p=0.135$), teaching dedication ($p=0.255$) and academic load ($p=0.393$) are personal-institutional factors that are related to the development of educational projects. scientific research by teachers; This conclusion is reached after having analyzed the results using the Chi square statistical test, where the aforementioned factors obtained values of $p \geq 0.05$, accepting the initial hypothesis. Gender ($p=0.236$), use of the English language ($p=0.073$) and teaching dedication ($p=0.072$) are personal-institutional factors that are related to the publication of articles by teachers; This conclusion is reached after having analyzed the results using the Chi square statistical test, where the aforementioned factors obtained values of $p \geq 0.05$, accepting the initial hypothesis. Gender ($p=0.249$), use of the English language ($p=0.061$), teaching dedication ($p=0.556$) and having received training to edit books or book chapters ($p=0.672$) are personal-institutional factors that have relationship with the publishing of teachers' books; This conclusion is reached after having analyzed the results using the Chi square statistical test, where the aforementioned factors obtained values of $p \geq 0.05$, accepting the initial hypothesis

This research recommends that the authorities of private universities (deans and school directors) should seek and include new practices that seek to attract more teachers in order to encourage a research culture in them, through training in research methodology. scientific to increase the publication of scientific products in each teacher. Ask teachers to promote scientific culture among them in order to promote and develop research, with the ultimate objective of publishing the research in English and internationally. To future researchers, indicate that the research carried out is of a non-experimental nature, where it has been determined that personal-institutional factors are present in scientific production, for this reason, for subsequent research work, it is encouraged to propose and carry out experimental research that demonstrates the positive or

negative effect of personal-institutional factors on teaching scientific production.

ACKNOWLEDGMENTS

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