

Governance Trend Of Information Technologies In Public Sector Higher Education Institutions: A Systematic Review

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Summary

The government of Information Technology (IT) is one of the areas of knowledge that has aroused interest in Higher Education in the public sector today. In this sense, the present study intends to contribute to the general knowledge on this subject by mapping scientific research. The article aims to review the IT Governance literature in public HEIs, identifying the number of publications, their seminal authors, and the sub-themes with which more work has been done in this type of organizations on the basis of Scopus data from the years 2000 to 2022. The study is characterized by being descriptive, the results of which were the product of documentary analysis on the relationship between IT Governance and Higher Education Institutions. At the end, the contributions, limitations and the agenda for future studies are presented.

Keywords: Information technologies; higher education institution; public sector; systematic analysis

Introduction

Information Technology (IT) turns out to be a fundamental component in institutions that promote good planning and organization practices, ensuring that the processes and technological tools used support the strategic organizational objectives (Scupola & Zanfei, 2016; Torres et al., 2014; Vega-Sampayo et al., 2022).

Organizations and governments currently depend on IT for their institutional development, making great efforts and investments in IT in order to fulfill their mission and be more efficient and effective in their strategic planning. Despite this, many times these areas are found as silos, isolated from each other, without communication between them and with no shared efforts (Diefenbach, 2009; Henk & Scapens, 2012; Muñoz & Ulloa, 2011; Osborne, 2006).

IT governance arises from the evolution of organizations, as a subject of analysis and research by the scientific and academic community, requiring the identification of the way in which senior management manages it. We can not only consider IT as hardware and software resources, but also as an effective support in the development of organizations according to Marulanda et al., 2017. There are IT governance models for universities such as GTI4U under ISO 38500 standards., taking the framework of the Control Objectives for Information Technology (COBIT) that helps communication between the institution and the IT area according to Torres et al. (2014), becoming a fundamental element for organizations to sustain themselves and sustain themselves over time (Scalabrin & Dinis de Sousa, 2015).

For Sarkar (2012), IT governance establishes new processes ensuring institutional

efficiency, based on the fact that the knowledge society can anticipate changes, determining strategies based on the contexts according to Cortada et al. (2008). Since the COVID-19 pandemic, Universities have undergone substantial changes in the administrative and academic areas, generating new technological supports for teaching and research (Coen & Kelly, 2007; Hernández-Ortega & Álvarez-Herrero, 2021).

This study aims to contribute to the general knowledge of IT, specifically, by addressing the following questions: what are the most influential authors, papers, journals, institutions, and countries in literature? what is the knowledge structure of this area?, and what are the research trends on the subject?.

As a result of this, the objective of the research was established to review the scientific production of the IT Government trend in Higher Education Institutions of the public sector in previous investigations, carrying out a systematic analysis of the information in the Scopus database. A scientific mapping of IT in Higher Education Institutions was carried out presenting a holistic vision of this topic by exploring the evolution of the field. To meet this objective, Coreofscience and Microsoft Excel were used as tools that allow visualizing the trends and behavior of the scientific production registered so far.

For the development of the proposed objective, this document is organized into four sections including this introduction. In the second section the methodology is presented in detail and it explains the selection of material and the tools used. Thirdly, the statistical analysis of the results of the consultation is exposed, together with the systematic analyzes of the documents, authors, journals, and countries. Finally, the conclusions generated from this research are presented.

Methodology

Data source

This article contains a Systematic Review of the literature, in English Systematic Literature Review (SLR), that is, an evaluation and interpretation of all the research available in the Scopus database, selected for its wide recognition and scope, in addition, for being world leader Zhu and Liu (2020), aimed at answering a certain research question Kitchenham (2004). For Budgen and Brereton (2006), this process is rigorous and is based on mastering the topic to be investigated, considering the quality assessment of previous studies and identifying research gaps, which serves to adequately position new research (Kitchenham et al., 2011).

Systematic mapping is used transversally in the SLR method, which helps in the search and categorization of the available studies on IT in Higher Education Institutions according to Fernández and Llorens (2011). For the execution of the SLR method, the recommendations given by Budgen and Brereton (2006) are applied, which is made up of the activities of planning, carrying out and reporting.

Research questions

The search in data sources is based on the research questions and may be metadata from specific electronic libraries according to Juristo et al. (2006), these being a set of journals or conference proceedings. We have formulated three questions of interest related to IT in public sector Higher Education Institutions and the type of automated search is applied. The motivations that guided their formulation of the questions in Table 1 are defined.:

Table 1 Research questions

Questions	Motivation
P1: ¿ Which are the main authors, countries, years and languages that have published IT governance articles in higher education institutions in the public sector?	Determine the main authors, countries, years and languages where studies have been carried out on the implementation of IT governance in higher education institutions in the public sector.
P2: ¿ What is the structure of knowledge related to IT governance in Higher Education Institutions of the public sector?	Identify how the investigations related to IT Governance are structured in Higher Education Institutions of the public sector.
P3: ¿ What are the trends in IT Government research?	Identify trends that follow the investigations around IT Governments.

Source: self made.

Search strategy

The review intends to establish the search strategy process, considering two fundamental components such as the initial search string and the bibliographic source, from an iterative

approach and the one focused on the Kitchenham and Brereton (2013) protocol. Within the criteria considered for the search, the phrase "Higher Education Institutions" was replaced by "University", in order to achieve what was expected, the detail is reviewed in Table 2.

Table 2 Search criteria

Database	Scopus
Search terms	"IT governance" AND "university" AND "public sector"
Space of time	2000-2022
Consultation period	September 27, 2022
Document types	Article, book, book chapter, conference paper
Magazine type	Any kind
Search field	Title, abstract, keywords
Idiom	English, Spanish, Portuguese
Results	289

Source: self made

After the review process, a total of two hundred eighty-nine records were obtained in the Scopus database. The applied search was automatic, in order to include the largest number of sources according to Guirao (2015) and in the search string logical operators with terms in English were used, as it is the international language used in the research (Kitchenham & Brereton, 2013).

For the systematic review of these records, a quantitative approach was used Zupic and Cater (2015), which allows for rigor, objectivity, and reduces the bias of the researchers; In addition, it is aligned with previous research in the area of management (Deroncele-Acosta et al., 2021; Gómez-García et al., 2012; Mohammad et al., 2021; Rey-Domínguez et al., 2019).

Data extraction

Filters were applied to extract the information from the Scopus database, using the search criteria defined in Table 2, evaluating compliance with the defined criteria. The objective is to answer the research questions considered in Table 1, using the criteria in Table 2, as an instrument to record the necessary information from previous studies that allows addressing the review questions and the inclusion and selection

criteria. Budden and Brereton (2006). The data extraction criteria allowed obtaining information from each document, based on a first approach to obtain a general conception of research on IT Governance and a second approach related to obtaining answers to research questions (Benet et al. , 2015).

The first approach to obtain a general conception of research on IT Governance in public Universities is described in Table 3.

Table 3 Criteria for obtaining Information from Research on IT Governance in Public Universities.

identifier	Criterion	Approach
ID1	Year of publication.	Identify the publications carried out between the years 2000 and 2022 and how these studies on IT Governments have contributed to public universities.
ID2	Technique for obtaining data.	Identify the data collection techniques used in previous studies and relate them to the research objective.
ID3	Bibliographic Source	Quantitatively determine data sources of IT Governance studies in public universities. The database used is Scopus.
ID4	Research Method.	Recognize the techniques that allowed the development of a rigorous study in the investigations carried out.

Source: self made

In the second approach to extract the information, the criteria in Table 4 are considered, which responds to the research questions. This includes the public sector, the standards referenced in

previous studies and the use of computer tools in IT Government. The labels in English are considered in Table 4, which optimizes the search results.

Table 4 Criteria for Obtaining Information Related to the Research Questions

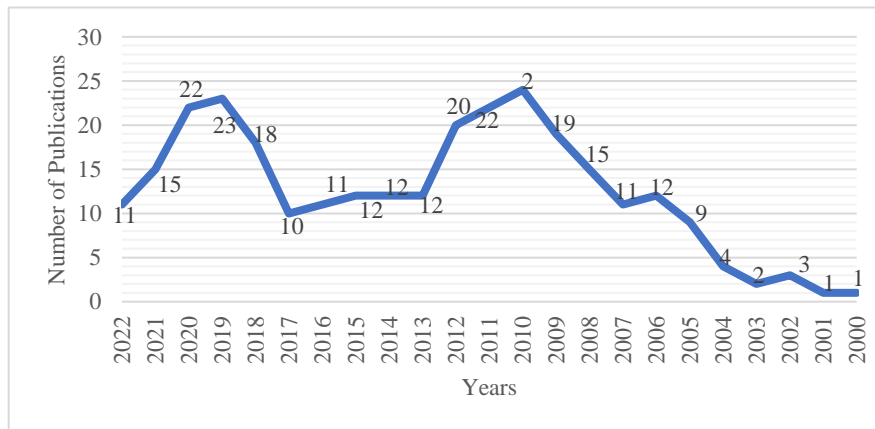
Identifier	Criterion	Approach	Tags
ID5	Thematic area where the research is applied.	Consider the area of knowledge where research related to IT Governance has been carried out in public universities.	Computer's science Social Sciences Engineering Business, Management and Accounting Decision Sciences Math

			Economics, Econometrics and Finance
ID6	Work models referred to in the studies carried out.	Identify the models and standards used in previous studies.	Models, Standards, ISO, COBIT, ITIL,
ID7	Software used in the implementation of IT Governments in Public Universities.	Identify the computer systems that refer to the research carried out and its scope in the implementation of IT in public universities.	Software, Program, Logical, System, Tool, Computing, Programming.

Source: self made.

Once the information was extracted, it was recorded in a document prepared in Microsoft Excel with the purpose of organizing and classifying the information, and thus facilitating the analysis of the review carried out. Additionally, the generated data was exported in bibTex format and the metadata loaded into the Coreofscience software used to solve difficulties in finding articles relevant to a research topic and facilitate the writing process (Mathewson, 2005).

Figure 1 Publication history



Source: self made.

However, from 2004 it began to grow continuously until 2010 with 24 publications, then it gradually decreased until 2017 with 10 publications. As of this year, the publications increased again until 2019 with 23 publications and began to decrease and in this year 2022 there

Development and results

Post Trend.

In the analysis carried out, it can be seen that the evolution of IT Governance studies shows that a summary of its trend is shown in figure 1. In the graph we can see that in 2000 an article was published in this area by Mork (2000). In 2001, a publication appears the same with only the publication of Gulland.

are 11 publications on this topic of study. It is also observed that 38% of the publications (110 of 289) were published from 2016 to 2022; This demonstrates the novelty of the research.

Most relevant authors

Table 5 lists the ten authors who have contributed the most research on this topic. To generate this list, indicators such as the number of citations and

h index were incorporated, an indicator proposed by Hirsch (2005) and that allows measuring the scientific productivity of each researcher..

Table 5 Top Ten Authors with Greatest Contribution in the Area

Author	No. of publications	No. of summons	Index h
Andresani, Gianluca	2	454	5
Bután, Amlán	2	1	1
Bleiklie, Ivar	2	938	15
Cristóbal, Joe	2	305	8
Dossou-Yovo, Angelo	2	13	2
Ferlie, Ewan	2	8087	44
Gambarotto, Francesca	2	166	6
Goastellec, Gaële	2	418	10
Jongbloed, Ben WA	2	1120	12
Jung, Hildegarda Susana	2	13	2

Source: self made.

According to the information obtained, all the authors have the same number of publications in Scopus and the author Ferlie, with his publications in 2009, has the highest h-index.

Most relevant authors.

Table 6 shows the ten organizations with the largest number of publications registered in this

systematic analysis, which have contributed more research on this subject (30 of 289). It is distinguished that 2 of the 10 organizations on this list are from the United Kingdom, which contribute 37% of the scientific production in IT Governance at public Universities.

Table 6 Top Ten Institutions with the Highest Number of Registered Publications

Institution	Number of publications	Country
Manchester University	4	United Kingdom
Bristol University	4	United Kingdom
Aveiro University	4	Portugal
Universita Degli Studi Di Padua	3	Italy
Amsterdam University	3	Holland
Hong Kong University	3	Hong Kong
Lagos University	3	Chile
King’s College de Londres	3	London
Università degli Studi di Torino	3	Italy
City University of Hong Kong	3	Hong Kong

Source: self made.

Emerging Research Trends.

This perspective focuses on the link between IT Governance and public Universities, using the

Coreofscience tool that, according to Zuluaga et al. (2022), the knowledge tree generated from the 289 documents of the Scopus databases, product of the criteria considered in Table 2, is

analyzed. As a result of the analysis, we find in Table 7 the subfields classified into 3 groups of documents that generate their word clouds related to the studies carried out.

Table 7 Subfields

Research trends

Research topic	Subfields	documents	word cloud
IT Governance and Public Universities	Cluster 1	Christopher (2020)	
		Reis et al. (2020)	
		Sułkowski, et al. (2019)	
		Hyndman y McKillop (2019)	
IT Governance and Public Universities	Cluster 2	Fonseca y Nieth (2021)	
		Bellandi et al. (2021)	
		Costa y Joao (2020)	
		Unger et al. (2020)	
IT Governance and Public Universities	Cluster 3	Heinzel y Liese (2021)	
		Valverde y Llorens-Largo (2021)	
		Scalabrin et al. (2021)	
		Ferro y Tarazona (2015)	

Source: self made.

In group 1 it can be observed that the research tendencies go towards the public, government and learning administration and are related to the cited documents. In group 2 it can be seen that based on the cited documents, the trends towards government, university, innovation, region, systems, as the most visible. In group 3 we finally see that the trends go towards health, regulation, education, government, university.

It can be seen in Table 7 that most of the research in group 3 analyzes IT Governance practices or models, among which we can cite COBIT, ISO/IEC 38500, ITIL (Ferro and Tarazona, 2015; Scalabrin et al., 2021; Valverde-Alulema and Llorens-Largo, 2021).

Conclusions

Higher Education Institutions face a digital transformation, incorporating IT as a strategic

partner to meet organizational objectives and the development of academic teaching, learning and research activities (Liu et al., 2020; Wilmore, 2014).

After the COVID 19 pandemic, we have inherited many factors that are influencing the adoption of IT in universities, trends and complexities arise in this context, which have led in recent years to make adjustments to plan and deliver education derived from opportunities and the possibilities of IT.

From the Scopus database it was possible to obtain that 38% of the publications (110 of 289) were generated in the last 5 years. The author Ferlie with his publications in 2009 has the highest h-index with a weighting of 44 and the United Kingdom contributed 37% of the scientific production in IT Governance at public Universities.

Finally, this systematic review shows that there is development of research related to IT Governance, and specifically works oriented towards Universities. The authors mention the evaluation and application of reference models such as COBIT and ISO/38500, considered as the best practices for IT governance processes.

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