LIA Method for the Application of Microsoft Excel in Data Tabulation in Systematic Reviews

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Abstract

The objective of this research was to design an office tool for data tabulation in systematic reviews with a quantitative approach. Therefore, in the methodological aspect, the research was applied, with a qualitative approach and a descriptive scope. A research/action design was used, which is a type of qualitative research that aims to solve everyday and immediate problems, and improve concrete practices, in this specific case, data management in systematic reviews. The results described the use of tables, dynamic tables, forms, code in Visual Basic, among other aspects. In that sense, a tool was designed in Microsoft Excel that was able to record research, process it orderly and extract information through graphs and tables for their respective bibliometric and content analysis. Finally, it was concluded that a computer solution based on Microsoft Excel is viable for the development of systematic reviews due to its low cost, flexibility and robust capacity for handling large amounts of data.

Keywords

Visual Basic, Systematic Review, Microsoft Excel, Macros

1. Introduction

Nowadays, it is well known that digitalization is allowing all information to be found with the help of technology, which in turn causes the need for modern tools that increase the efficiency of various processes or tasks. This need is present in systematic literature reviews. A systematic review is the explicit assessment of the literature, derived from a clear research question, along with a critical analysis according to different tools and a qualitative summary of the evidence [1]. In 1965, Derek estimated that after 30 or 40 papers were published in a specialty, a review was necessary and, in that sense, in 1986 Garfield examined the percentage of existing review articles with respect to the total number of articles indexed in the Science Citation Index (SCI) which was approximately 4.8 (about 30,000 review articles out of the 625,432 articles included in the index that year); while in the Chemical Abstracts (CA), it was 10.4 (approximately 40,000 out of 385,000) [2].

These approaches are analyzed through the arrival of the current world and its globalization process that have generated the increasing and constant emergence of new information, reflected in multiple articles and publications [3]; however, the number of systematic reviews published in Spanish journals has increased in recent years. In a quick attempt to support this statement, it has been estimated that there would be about 750 systematic reviews or meta-analyses published to date [4]. Systematic reviews are an integrative, observational, retrospective, secondary study, in which studies that examine the same question are combined. In turn, within the systematic review there are two forms: “quantitative or meta-analysis” and “qualitative or overview”. The differences are fundamentally given by the use of statistical methods, which allows the combination and quantitative analysis of the results obtained in each study that is

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carried out. The term meta-analysis was introduced by Glass in 1976, who defined it as follows: a statistical analysis of a large series of analyses of results from individual studies with the aim of integrating their findings. Although sometimes the two terms are used interchangeably, a systematic review is not the same as a meta-analysis [5]. In that sense, a systematic review will not always have a meta-analysis, in many cases it will depend on the information collected or on the specialty on which it is developed.

The realization of high-quality systematic reviews is not easy and, sometimes, they can be difficult to interpret, for this reason certain recommendations should be taken into account to avoid errors that affect the search for relevant studies for a systematic review. Therefore, it is very useful to use in this phase a software for the automated management of bibliographic citations such as, for example, ProCite that has a wide variety of input and output formats [6]. There are also methodological search filters, previously tested to locate the relevant literature within a database. To date, many search filters have been developed, operated and evaluated to identify studies and reviews in online databases. In this regard, in the field of medicine, the Prognosis group has identified prognostic and search strategies as a methodological priority for the development of this type of systematic reviews [7]. However, users suggest that various improvements in the models of production of Cochrane systematic reviews could come from improving clarity of roles and expectations, ensuring continuity and consistency of contributions, allowing active management of the review to create capacity and share information among authors and review groups [8].

On the other hand, when starting a systematic review, it is advisable to find out if there is any regional or specialized library in the subject, as well as specific databases that are relevant for your review topic. As its name indicates, specialized databases in subjects index studies on a particular topic [9]. That is, they provide a complete picture of the totality of the evidence on a given topic [10]. Systematic reviews of quality often have greater power and less bias than the individual studies they include, and the careful combination of treatment effects can provide the most accurate overall assessment of an intervention [11]. In that sense, in the field of Psychology, the arrival of Evidence-Based Psychology (EBP) has become a methodological tool by combining the best evidence with psychological practice. EBP advocates that professional practice be based on the best evidence obtained from psychological research [12]. On the other hand, there is also the PRISMA method, which is a checklist of requirements that a systematic review and meta-analysis of clinical trials must meet to present the information. It was published in 2009 with the aim of helping the authors of this type of documents to justify their research, to explain what they did and what they found.

Likewise, it should be taken into account that the realization of a rigorous systematic review requires careful scientific consideration in the search, as well as considerable attention in its methodology. Systematic reviews usually, but not necessarily, must apply meta-analysis to examine a research question, which generally provide a higher degree of precision compared to other types of research because the estimation of the combination of studies is based on a larger sample than any of the individuals [13].

In accordance with what has been mentioned, there are currently different methodological tools for the elaboration of systematic reviews. Generally, the available softwares are focused on the bibliographic management of the studies, but they do not generate the transformation of the available data into tables or figures that in turn allow an adequate bibliometric, content or traceability analysis of the information. At the other extreme, there is a great variety of computer packages focused on a specialized statistical analysis (meta-analysis) but not on the bibliographic management. There is also an availability of computer programs applied for the bibliometric analysis; however, these programs focus on the analysis of the information without the application of the inclusion and exclusion criteria that are considered in a systematic review.

As a consequence, there is a need for a computer tool that allows to record the information of the studies analyzed in a systematic review for their subsequent tabulation based on inclusion and exclusion criteria, with the purpose of automating the generation of tables and figures that present the bibliometric and content information in a logical and concise way. These tables and figures should be a primordial part of the results of a systematic review and their automation should facilitate the writing of this type of articles. In that sense, Excel offers the ability to create pivot tables that allow users to analyze large data sets efficiently. Therefore, it could be a very useful tool for conducting a systematic literature review, especially for those who are just beginning to explore and know the possibilities of data analysis.

The use of Microsoft Excel as an office tool for systematic reviews would present various benefits in the processing of the data. First, Excel has a large storage capacity, that is, a large amount of bibliographic information could be included without any limitation. Likewise, Excel offers the possibility of mechanizing the entry of information through tables, macros or filters which in turn would facilitate the labeling of key concepts and the organized classification of the information. In the same way, Excel's pivot tables and graphs offer an efficient alternative for the presentation of results.

Based on the above, the following research question was raised: Is it possible to apply Microsoft Excel for data tabulation in systematic reviews with a quantitative approach?

2. Methodology

The research had a qualitative approach by considering in detail each of the characteristics and qualities of a tool in Microsoft Excel for data tabulation in a systematic review; however, no indicators, data or quantitative values have been presented that empirically demonstrate a hypothesis, on the contrary, it has been possible to articulate results based on schemes or figures that answer the research question about the feasibility of designing an office tool for data tabulation in systematic reviews with a quantitative approach. Therefore, the study presented a descriptive scope, as it described the use of tables, pivot tables, forms, code in Visual Basic, among other aspects, to obtain a spreadsheet capable of processing all the necessary information for a systematic review. In addition, the design of the study was of the research/action type, as it focused on a specific diagnosis to propose the solution to a research problem associated with information management in the specific processes of collection, tabulation and transformation [14].

The tool designed was named as: "LIA Method for data tabulation in systematic reviews using Microsoft Excel". Regarding the population, it is defined as a set of units, usually, people, objects, transactions or events; on which there is an interest of study. In that sense, the population of the study was structured considering all the processes of a systematic review. However, it is not possible to design an office tool that can be applicable to all the processes of a systematic review, considering the limitations of the study; that is why a sample was used, which is a portion or part of the population of interest. The sample was represented by the processes of collecting studies, tabulating bibliometric data and classifying findings or empirical results [15]. In the same way, due to the fact that the sample was not selected under any statistical method, the sampling used was a non-probabilistic sampling by convenience; that is, the sample was chosen arbitrarily [16].

3. Results

The results of the study show each of the stages executed during the development of the office tool for the support of the construction of systematic literature reviews (SLR). In Fig. 1, the tables designed for the functioning of the spreadsheet can be observed.

3.1. Tool design in Microsoft Excel

The table 1 had the function of collecting primary information that would later feed tables 2, 3 and 4. All the tabulated information would allow generating graphs and dynamic tables. Table 1 contained descriptive information of each of the articles consulted, such as the name of the authors, research title and its respective URL (link). Likewise, it allowed verifying the compliance of inclusion and exclusion criteria which can be modified by each researcher or according to the methodology of the study.

Likewise, Table 2 was created, also called Bibliometrics, with the purpose of extracting the complete information of the included articles such as the year of publication, the country, keywords, name of the journal, the database, the type of document and the main affiliation. All this information would generate tables and graphs of bibliometrics.

In the case of Table 3, the tools used in the included articles are identified, which in turn are classified by groups or types. This information would generate a dynamic table with a count of the studies according to the classification made. The same procedure is carried out in Table 4 but identifying and classifying the findings of the included studies, specifically the effects obtained on a variable. These findings or effects are also grouped by types. The name of the authors and the research title of each study are automatically transferred by macros and formulas generating a relationship between the tables for the generation of queries and reports.

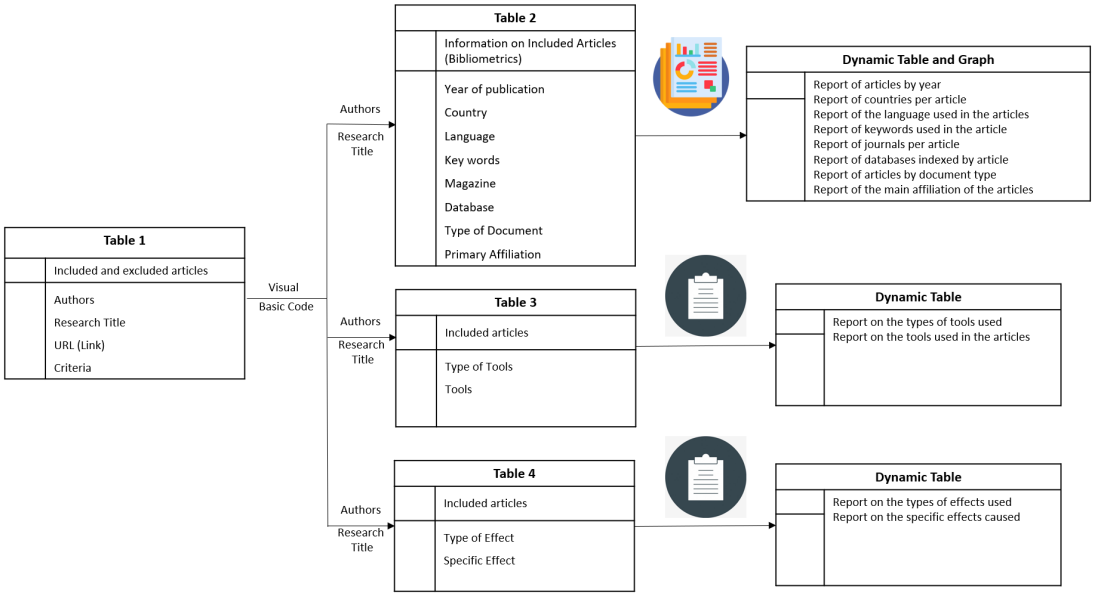


Figure 1: Relationship of Tables in Microsoft Excel for the tabulation of data in Systematic Reviews

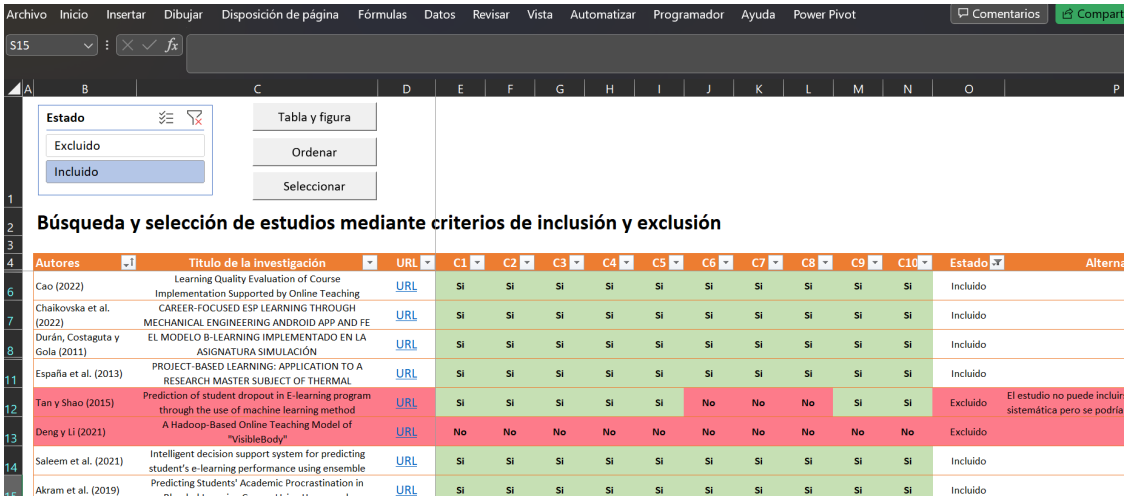
3.2. Entering information for systematic review

Corresponding to Fig. 2, the functioning of Table 1 is referred to. As can be seen, there are 6 columns that are distributed as follows: Authors, research title, URL, inclusion/exclusion criteria, article status and alternatives for excluded studies. First, the names of the authors of each article will be placed, then the research titles follow; consequently, the URL or link of the database where these are located will be placed. Next, the 10 criteria that will allow the inclusion and exclusion of the articles that will be used in the systematic review are evaluated. On the other hand, the status and alternatives will depend on the compliance of criteria.

If the 10 criteria are met, it means that the article will have a status of "Included" and in the alternative there is a blank space. If the criteria are partially met, the status of the study will be "Excluded", while the alternative will show a note: "The study cannot be included in the systematic review, but it could be included in another section"; this section could be part of the

introduction of the article. Finally, if the compliance of criteria is less than 4, the status of the research will be “Excluded” and in the alternative column only a blank space will appear.

The importance of this table is to separate the included articles that meet all the criteria, the studies that could be used in the introduction and those that are totally excluded. This process can be done collaboratively and then join the work of different members of the research team. Likewise, the criteria can be customized according to each study.

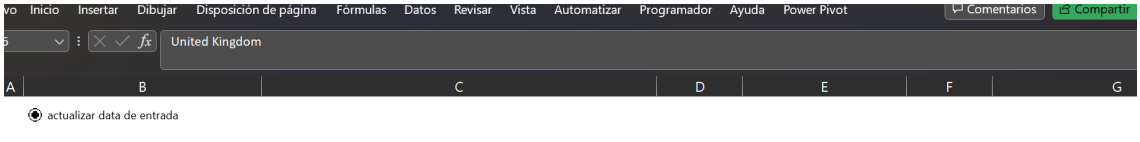


Autores	Titulo de la investigación	URL	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	Estado	Alterna
Cao (2022)	Learning Quality Evaluation of Course Implementation Supported by Online Teaching	URL	Si	Si	Si	Si	Si	Si	Si	Si	Si	Si	Incluido	
Chaikovska et al. (2022)	CAREER-FOCUSED ESP LEARNING THROUGH MECHANICAL ENGINEERING ANDROID APP AND FE	URL	Si	Si	Si	Si	Si	Si	Si	Si	Si	Si	Incluido	
Durán, Costaguta y Gola (2011)	EL MODELO B-LEARNING IMPLEMENTADO EN LA ASIGNATURA SIMULACIÓN	URL	Si	Si	Si	Si	Si	Si	Si	Si	Si	Si	Incluido	
España et al. (2013)	PROJECT-BASED LEARNING: APPLICATION TO A RESEARCH MASTER SUBJECT OF THERMAL	URL	Si	Si	Si	Si	Si	Si	Si	Si	Si	Si	Incluido	
Tan y Shao (2015)	Prediction of student dropout in E-learning program through the use of machine learning method	URL	Si	Si	Si	Si	Si	No	No	No	Si	Si	Excluido	El estudio no puede incluir sistemática pero se podría
Deng y Li (2021)	A Hadoop-Based Online Teaching Model of "VisibleBody"	URL	No	No	No	No	No	No	No	No	No	No	Excluido	
Saleem et al. (2021)	Intelligent decision support system for predicting student's e-learning performance using ensemble	URL	Si	Si	Si	Si	Si	Si	Si	Si	Si	Si	Incluido	
Akram et al. (2019)	Predicting Students' Academic Procrastination in	URL	Si	Si	Si	Si	Si	Si	Si	Si	Si	Si	Incluido	

Figure 2: Table for selection of articles according to inclusion and exclusion criteria

For the case of Table 2, the name of the authors and the research title of each included study are extracted. For this, macros are applied. The objective of this table is to collect all the bibliometric information of the articles included in the systematic review. It is distributed in 10 columns: Authors, Research Title, Year, Country, Language, Keywords, Journal, Database, Document Type and the Main Affiliation of each of the studies.

As can be seen, the first 2 columns are columns previously registered in Table 1. As shown in Fig. 3, there is a button called “update input data” that has the function of copying all the articles included according to Table 1. This task is done at the beginning and then the bibliometric information is registered. It should be noted that a study can have several keywords. In that sense, the same row of the study should be copied and pasted, but only modifying the keyword. In this way, the dynamic tables will work correctly when generating reports or queries.



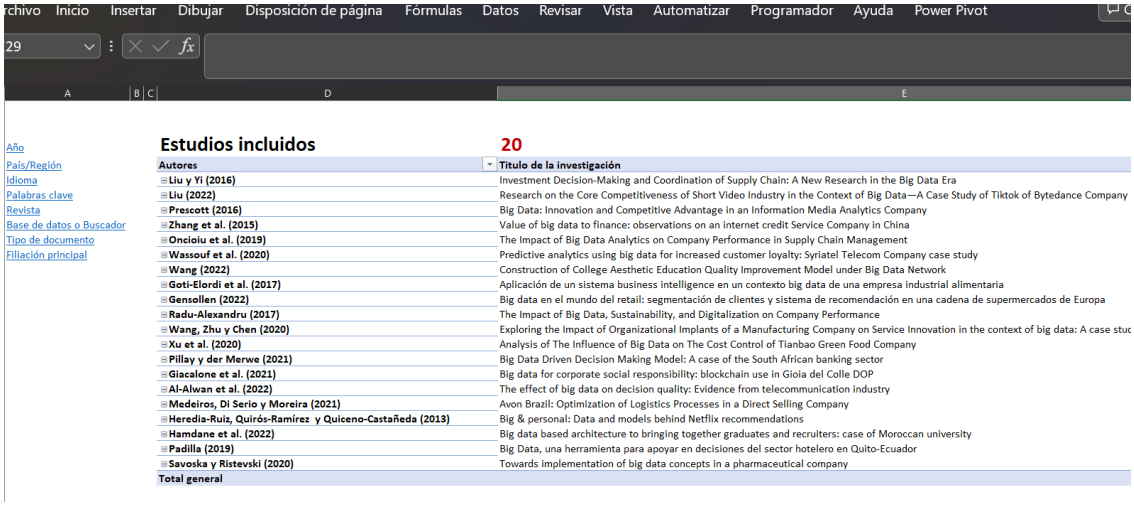
Autores	Titulo de la investigación	Año	País/Región	Idioma	Palabras clave
Cao (2022)	Learning Quality Evaluation of Course Implementation Suppor	2022	Tailandia	Inglés	Correlation methods
Cao (2022)	Learning Quality Evaluation of Course Implementation Suppor	2022	Tailandia	Inglés	Engineering education
Cao (2022)	Learning Quality Evaluation of Course Implementation Suppor	2022	Tailandia	Inglés	E-learning
Cao (2022)	Learning Quality Evaluation of Course Implementation Suppor	2022	Tailandia	Inglés	Quality control
Cao (2022)	Learning Quality Evaluation of Course Implementation Suppor	2022	Tailandia	Inglés	Machine Learning
Chaikovska et al. (2022)	CAREER-FOCUSED ESP LEARNING THROUGH MECHANICAL EN(	2022	Ucrania	Inglés	M-learning
Chaikovska et al. (2022)	CAREER-FOCUSED ESP LEARNING THROUGH MECHANICAL EN(	2022	Ucrania	Inglés	exam
Chaikovska et al. (2022)	CAREER-FOCUSED ESP LEARNING THROUGH MECHANICAL EN(	2022	Ucrania	Inglés	technical vocabulary
Chaikovska et al. (2022)	CAREER-FOCUSED ESP LEARNING THROUGH MECHANICAL EN(	2022	Ucrania	Inglés	ESP
Chaikovska et al. (2022)	CAREER-FOCUSED ESP LEARNING THROUGH MECHANICAL EN(	2022	Ucrania	Inglés	profession-based tasks
Durán, Costaguta y Gola (2011)	EL MODELO B-LEARNING IMPLEMENTADO EN LA ASIGNATURA	2011	Argentina	Español	B-Learning
Durán, Costaguta y Gola (2011)	EL MODELO B-LEARNING IMPLEMENTADO EN LA ASIGNATURA	2011	Argentina	Español	aprendizaje colaborati
Durán, Costaguta y Gola (2011)	EL MODELO B-LEARNING IMPLEMENTADO EN LA ASIGNATURA	2011	Argentina	Español	educación superior

Figure 3: Bibliometric table compiling information from the articles included in the systematic review

3.3. Bibliometric Reports

As a result of Table 2, all the bibliometric information of each of the included studies is collected. That is why different Dynamic Tables and Graphs are obtained to show information about: Authors, Research Title, Year, Country, Language, Keywords, Journal, Database, Document Type and Main Affiliation.

For example, in Fig. 4 you can see the dynamic table that consolidates the authors of the included articles and the research title. On the other hand, in Fig. 5 you can see each of the automatic graphs generated by the spreadsheet on the basic bibliometric information of the articles included in the systematic review.



Año
País/Región
Idioma
Palabras clave
Revista
Base de datos o Buscador
Tipo de documento
Filiación principal

Estudios incluidos	20
Autores	Titulo de la investigación
Liu y Yi (2016)	Investment Decision-Making and Coordination of Supply Chain: A New Research in the Big Data Era
Liu (2022)	Research on the Core Competitiveness of Short Video Industry in the Context of Big Data—A Case Study of Tiktok of Bytedance Company
Prescott (2016)	Big Data: Innovation and Competitive Advantage in an Information Media Analytics Company
Zhang et al. (2015)	Value of big data to finance: observations on an internet credit Service Company in China
Oncioiu et al. (2019)	The Impact of Big Data Analytics on Company Performance in Supply Chain Management
Wassouf et al. (2020)	Predictive analytics using big data for increased customer loyalty: Syriatel Telecom Company case study
Wang (2022)	Construction of College Aesthetic Education Quality Improvement Model under Big Data Network
Goti-Elordi et al. (2017)	Aplicación de un sistema business intelligence en un contexto big data de una empresa industrial alimentaria
Gensollen (2022)	Big data en el mundo del retail: segmentación de clientes y sistema de recomendación en una cadena de supermercados de Europa
Radu-Alexandru (2017)	The Impact of Big Data, Sustainability, and Digitalization on Company Performance
Wang, Zhu y Chen (2020)	Exploring the Impact of Organizational Implants of a Manufacturing Company on Service Innovation in the context of big data: A case stuc
Xu et al. (2020)	Analysis of The Influence of Big Data on The Cost Control of Tianbao Green Food Company
Pillay y der Merwe (2021)	Big Data Driven Decision Making Model: A case of the South African banking sector
Giacalone et al. (2021)	Big data for corporate social responsibility: blockchain use in Gioia del Colle DOP
Al-Alwan et al. (2022)	The effect of big data on decision quality: Evidence from telecommunication industry
Medeiros, Di Serio y Moreira (2021)	Avon Brazil: Optimization of Logistics Processes in a Direct Selling Company
Heredia-Ruiz, Quirós-Ramírez y Quiceno-Castañeda (2013)	Big & personal: Data and models behind Netflix recommendations
Hamdane et al. (2022)	Big data based architecture to bringing together graduates and recruiters: case of Moroccan university
Padilla (2019)	Big Data, una herramienta para apoyar en decisiones del sector hotelero en Quito-Ecuador
Savoska y Ristevski (2020)	Towards implementation of big data concepts in a pharmaceutical company
Total general	

Figure 4: Pivot table report to consolidate information from the articles included in the systematic review

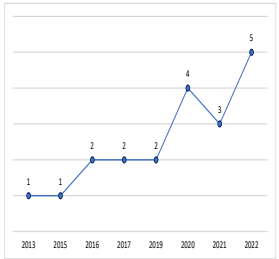


Fig. 5.1 Articles published by year

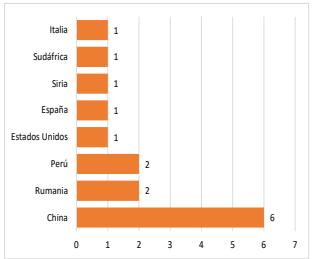


Fig. 5.2 Articles by country of publication

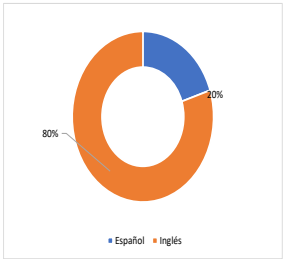


Fig. 5.3 Articles by language

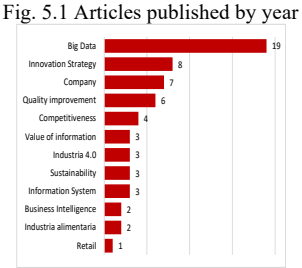


Fig. 5.4 Keywords of included articles

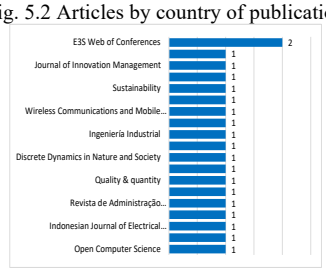


Fig. 5.5 Articles by Scientific Journals

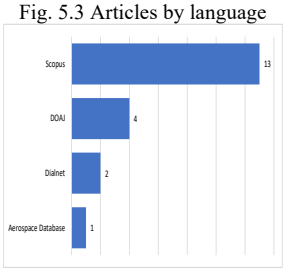


Fig. 5.6 Databases of included articles

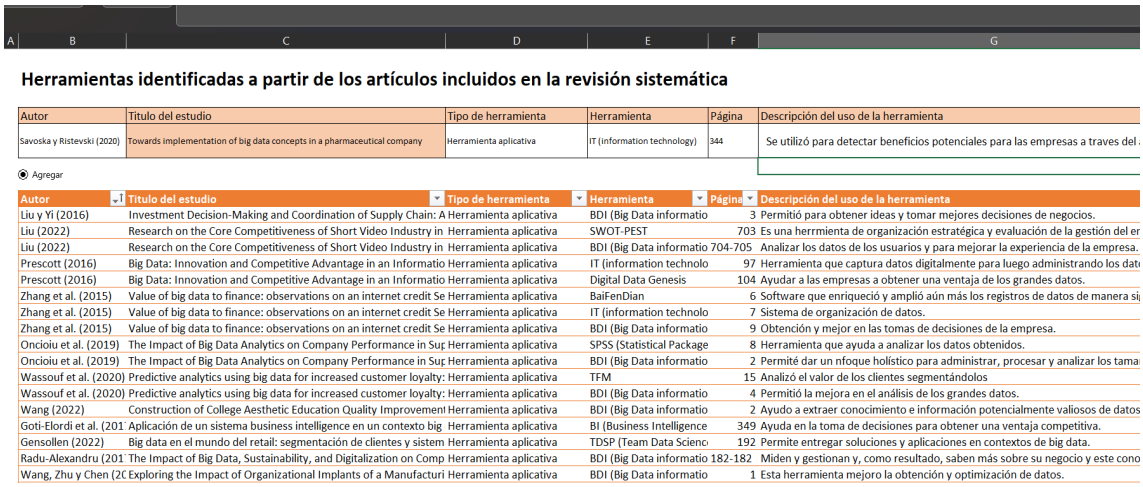
Figure 5: Graphical bibliometric reports according to the articles included in the systematic review

3.4. Entry of thematic or content information

On the other hand, Table 3 is divided into 6 columns that correspond to: Authors, Research Title, Tool Type, Tool, Page and Description of the use of the tool, as shown in Fig. 6. Likewise,

Table 2 was complemented by Table 1 in relation to the authors and research titles. This table has been designed with the purpose of identifying tools associated with the research variable.

For example, if a review is done on Big Data, a list of tools for its application could be relevant. In addition, to ensure a correct tabulation, the type of tool that serves as a label to group the data must be considered. Also, the page number where the indicated information is located must be identified and a detailed description of it must be provided. In this way, an adequate traceability of the information is ensured.



Herramientas identificadas a partir de los artículos incluidos en la revisión sistemática

Autor	Titulo del estudio	Tipo de herramienta	Herramienta	Página	Descripción del uso de la herramienta
Savoska y Ristevski (2020)	Towards implementation of big data concepts in a pharmaceutical company	Herramienta aplicativa	IT (information technology)	344	Se utilizó para detectar beneficios potenciales para las empresas a traves del

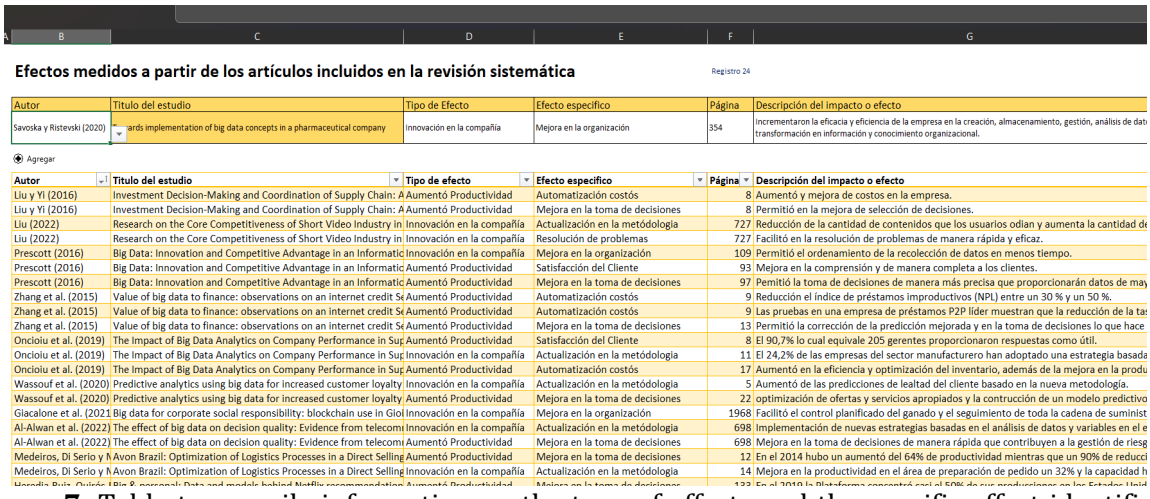
Agregar

Autor	Titulo del estudio	Tipo de herramienta	Herramienta	Página	Descripción del uso de la herramienta
Liu y Yi (2016)	Investment Decision-Making and Coordination of Supply Chain: A	Herramienta aplicativa	BDI (Big Data informatio	3	Permitió para obtener ideas y tomar mejores decisiones de negocios.
Liu (2022)	Research on the Core Competitiveness of Short Video Industry in	Herramienta aplicativa	SWOT-PEST	703	Es una herrmienta de organización estratégica y evaluación de la gestión del er
Liu (2022)	Research on the Core Competitiveness of Short Video Industry in	Herramienta aplicativa	BDI (Big Data informatio	704-705	Analizar los datos de los usuarios y para mejorar la experiencia de la empresa.
Prescott (2016)	Big Data: Innovation and Competitive Advantage in an Informatio	Herramienta aplicativa	IT (information technolo	97	Herramienta que captura datos digitalmente para luego administrando los dat
Prescott (2016)	Big Data: Innovation and Competitive Advantage in an Informatio	Herramienta aplicativa	Digital Data Genesis	104	Ayudar a las empresas a obtener una ventaja de los grandes datos.
Zhang et al. (2015)	Value of big data to finance: observations on an internet credit Se	Herramienta aplicativa	BaiFenDian	6	Software que enriqueció y amplió aún más los registros de datos de manera si
Zhang et al. (2015)	Value of big data to finance: observations on an internet credit Se	Herramienta aplicativa	IT (information technolo	7	Sistema de organización de datos.
Zhang et al. (2015)	Value of big data to finance: observations on an internet credit Se	Herramienta aplicativa	BDI (Big Data informatio	9	Obtención y mejor en las tomas de decisiones de la empresa.
Oncioiu et al. (2019)	The Impact of Big Data Analytics on Company Performance in Sup	Herramienta aplicativa	SPSS (Statistical Package	8	Herramienta que ayuda a analizar los datos obtenidos.
Oncioiu et al. (2019)	The Impact of Big Data Analytics on Company Performance in Sup	Herramienta aplicativa	BDI (Big Data informatio	2	Permité dar un nfoque holístico para administrar, procesar y analizar los tama
Wassouf et al. (2020)	Predictive analytics using big data for increased customer loyalty:	Herramienta aplicativa	TFM	15	Analizó el valor de los clientes segmentándolos
Wassouf et al. (2020)	Predictive analytics using big data for increased customer loyalty:	Herramienta aplicativa	BDI (Big Data informatio	4	Permitió la mejora en el análisis de los grandes datos.
Wang (2022)	Construction of College Aesthetic Education Quality Improvement	Herramienta aplicativa	BDI (Big Data informatio	2	Ayudo a extraer conocimiento e información potencialmente valiosos de datos
Goti-Elordi et al. (201	Aplicación de un sistema business intelligence en un contexto big	Herramienta aplicativa	BI (Business Intelligence	349	Ayuda en la toma de decisiones para obtener una ventaja competitiva.
Gensollen (2022)	Big data en el mundo del retail: segmentación de clientes y sistem	Herramienta aplicativa	TDSP (Team Data Scienc	192	Permite entregar soluciones y aplicaciones en contextos de big data.
Radu-Alexandru (201	The Impact of Big Data, Sustainability, and Digitalization on Comp	Herramienta aplicativa	BDI (Big Data informatio	182-182	Miden y gestionan y, como resultado, saben más sobre su negocio y este cono
Wang, Zhu y Chen (2(	Exploring the Impact of Organizational Implants of a Manufacturi	Herramienta aplicativa	BDI (Big Data informatio	1	Esta herramienta mejoro la obtención y optimización de datos.

Figure 6: Table to collect information on the type of tools and the tools used according to the articles included in the systematic review

In the same way, for the elaboration of Table 4, the same procedure is applied as in Table 3, but this time focusing on the findings or results of the study. A finding or result is considered as the effect obtained on the variable studied in a given population.

In Fig. 7 it can be seen that the following columns are considered: Authors, Research Title, Type of Effect, Specific Effect, Page and Description of the effect. Like the previous tables, this one was complemented by Table 1. To ensure a correct tabulation, the type of effect that serves as a label to group the data must also be considered. Likewise, it is necessary to identify the page number where the indicated information is located and provide a detailed description of it; in this way, an adequate traceability of the information is ensured.



Efectos medidos a partir de los artículos incluidos en la revisión sistemática

Registro 24

Autor	Titulo del estudio	Tipo de Efecto	Efecto especifico	Página	Descripción del impacto o efecto
Savoska y Ristevski (2020)	ards implementation of big data concepts in a pharmaceutical company	Innovación en la compañía	Mejora en la organización	354	Incrementaron la eficacia y eficiencia de la empresa en la creación, almacenamiento, gestión, análisis de dat transformación en información y conocimiento organizacional.

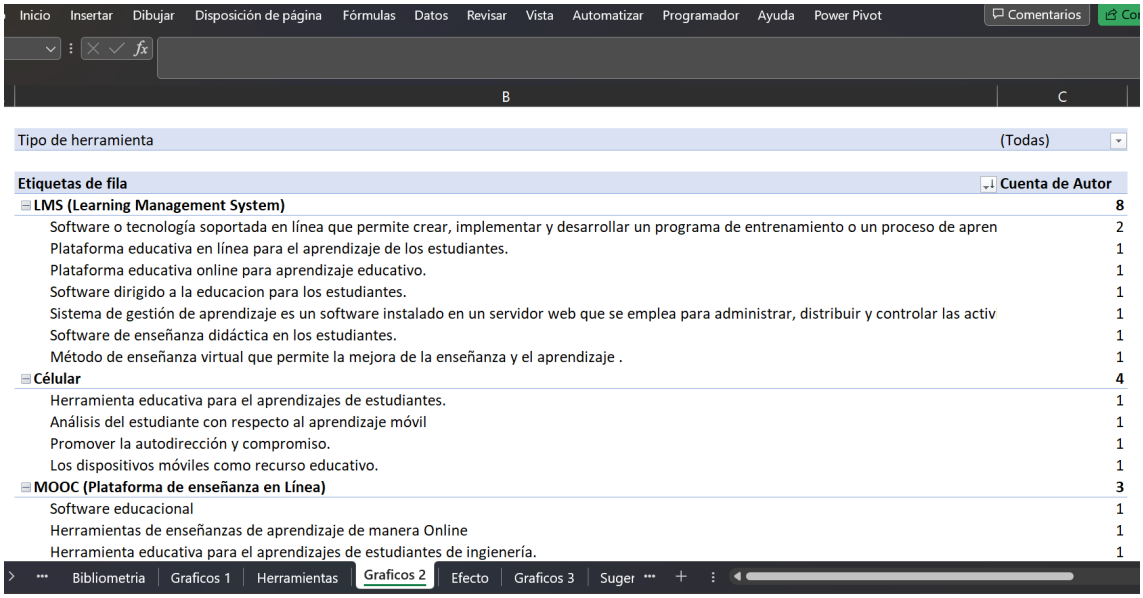
Agregar

Autor	Titulo del estudio	Tipo de efecto	Efecto especifico	Página	Descripción del impacto o efecto
Liu y Yi (2016)	Investment Decision-Making and Coordination of Supply Chain: A	Aumentó Productividad	Automatización costós	8	Aumentó y mejora de costos en la empresa.
Liu y Yi (2016)	Investment Decision-Making and Coordination of Supply Chain: A	Aumentó Productividad	Mejora en la toma de decisiones	8	Permitió en la mejora de selección de decisiones.
Liu (2022)	Research on the Core Competitiveness of Short Video Industry in	Innovación en la compañía	Actualización en la metódologia	727	Reducción de la cantidad de contenidos que los usuarios odian y aumenta la cantidad d
Liu (2022)	Research on the Core Competitiveness of Short Video Industry in	Innovación en la compañía	Resolución de problemas	727	Facilitó en la resolución de problemas de manera rápida y eficaz.
Prescott (2016)	Big Data: Innovation and Competitive Advantage in an Informatic	Innovación en la compañía	Mejora en la organización	109	Permitió el ordenamiento de la recolección de datos en menos tiempo.
Prescott (2016)	Big Data: Innovation and Competitive Advantage in an Informatic	Aumentó Productividad	Satisfacción del Cliente	93	Mejora en la comprensión y de manera completa a los clientes.
Prescott (2016)	Big Data: Innovation and Competitive Advantage in an Informatic	Aumentó Productividad	Mejora en la toma de decisiones	97	Pemitió la toma de decisiones de manera más precisa que proporcionarán datos de ma
Zhang et al. (2015)	Value of big data to finance: observations on an internet credit Se	Aumentó Productividad	Automatización costós	9	Reducción el índice de préstamos improductivos (NPL) entre un 30 % y un 50 %.
Zhang et al. (2015)	Value of big data to finance: observations on an internet credit Se	Aumentó Productividad	Automatización costós	9	Las pruebas en una empresa de préstamos P2P líder muestran que la reducción de la ta
Zhang et al. (2015)	Value of big data to finance: observations on an internet credit Se	Aumentó Productividad	Mejora en la toma de decisiones	13	Permitió la corrección de la predicción mejorada y en la toma de decisiones lo que hace
Oncioiu et al. (2019)	The Impact of Big Data Analytics on Company Performance in Sup	Aumentó Productividad	Satisfacción del Cliente	8	El 90,7% lo cual equivale 205 gerentes proporcionaron respuestas como útil.
Oncioiu et al. (2019)	The Impact of Big Data Analytics on Company Performance in Sup	Innovación en la compañía	Actualización en la metódologia	11	El 24,2% de las empresas del sector manufacturero han adoptado una estrategia basada
Oncioiu et al. (2019)	The Impact of Big Data Analytics on Company Performance in Sup	Aumentó Productividad	Automatización costós	17	Aumentó en la eficiencia y optimización del inventario, además de la mejora en la produ
Wassouf et al. (2020)	Predictive analytics using big data for increased customer loyalty	Innovación en la compañía	Actualización en la metódologia	5	Aumentó de las predicciones de lealtad del cliente basado en la nueva metodología.
Wassouf et al. (2020)	Predictive analytics using big data for increased customer loyalty	Aumentó Productividad	Mejora en la toma de decisiones	22	optimización de ofertas y servicios apropiados y la contrucción de un modelo predictivo
Giacalone et al. (2021	Big data for corporate social responsibility: blockchain use in Gio	Innovación en la compañía	Mejora en la organización	1968	Facilitó el control planificado del ganado y el seguimiento de toda la cadena de suminist
Al-Alwan et al. (2022)	The effect of big data on decision quality: Evidence from telecom	Innovación en la compañía	Actualización en la metódologia	698	Implementación de nuevas estrategias basadas en el análisis de datos y variables en el e
Al-Alwan et al. (2022)	The effect of big data on decision quality: Evidence from telecom	Aumentó Productividad	Mejora en la toma de decisiones	698	Mejora en la toma de decisiones de manera rápida que contribuyen a la gestión de riesg
Medeiros, Di Serio y M	Avon Brazil: Optimization of Logistics Processes in a Direct Selling	Aumentó Productividad	Mejora en la toma de decisiones	12	En el 2014 hubo un aumentó del 64% de productividad mientras que un 90% de reducci
Medeiros, Di Serio y M	Avon Brazil: Optimization of Logistics Processes in a Direct Selling	Innovación en la compañía	Actualización en la metódologia	14	Mejora en la productividad en el área de preparación de pedido un 32% y la capacidad h

Figure 7: Table to compile information on the type of effects and the specific effect identified according to the articles included in the systematic review

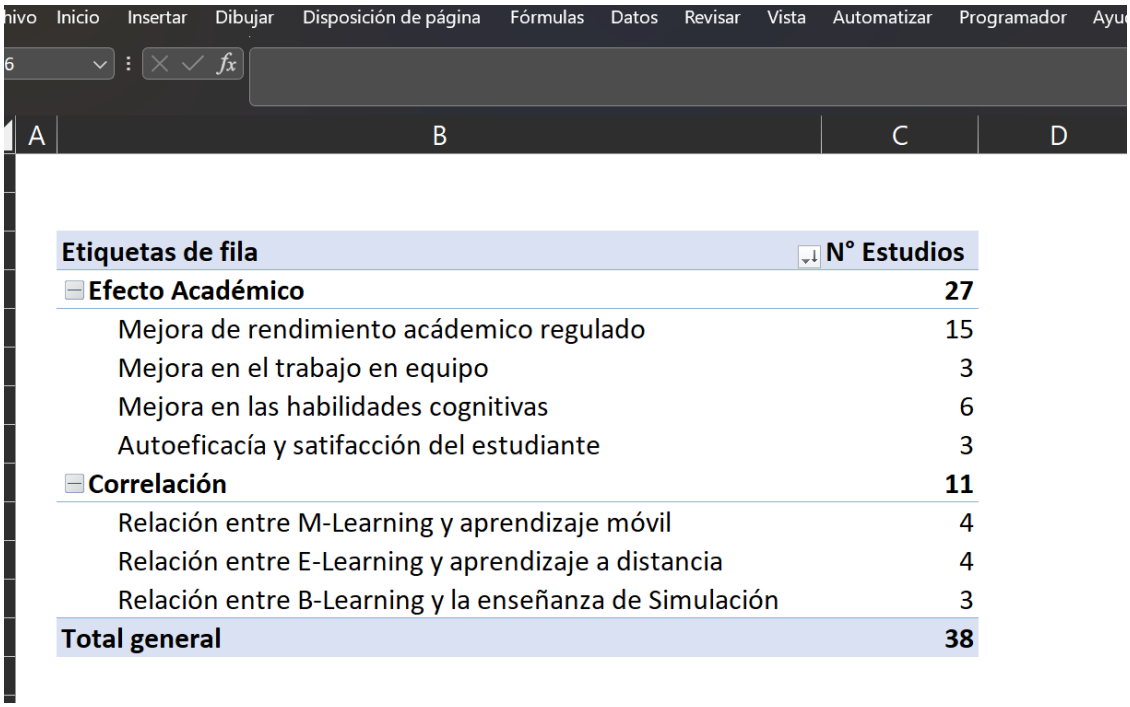
3.5. Content or thematic reports

For each table, a dynamic table is obtained as a report. Therefore, all the information obtained and classified in Table 3 allows obtaining a dynamic table with the count of articles for each tool identified. Each type of tool that is considered works as a label that groups the data. If the label is unique, no division is presented, as can be seen in Fig. 8. In the same way, all the information obtained and classified in Table 4 allows obtaining a dynamic table with the count of articles by effect identified. Each label allows grouping the data in an organized way, as can be seen in Fig. 9.



Tipo de herramienta	(Todas)
Etiquetas de fila	**Cuenta de Autor**
LMS (Learning Management System)	**8**
Software o tecnología soportada en línea que permite crear, implementar y desarrollar un programa de entrenamiento o un proceso de apren	2
Plataforma educativa en línea para el aprendizaje de los estudiantes.	1
Plataforma educativa online para aprendizaje educativo.	1
Software dirigido a la educacion para los estudiantes.	1
Sistema de gestión de aprendizaje es un software instalado en un servidor web que se emplea para administrar, distribuir y controlar las activ	1
Software de enseñanza didáctica en los estudiantes.	1
Método de enseñanza virtual que permite la mejora de la enseñanza y el aprendizaje .	1
Célular	**4**
Herramienta educativa para el aprendizajes de estudiantes.	1
Análisis del estudiante con respecto al aprendizaje móvil	1
Promover la autodirección y compromiso.	1
Los dispositivos móviles como recurso educativo.	1
MOOC (Plataforma de enseñanza en Línea)	**3**
Software educacional	1
Herramientas de enseñanzas de aprendizaje de manera Online	1
Herramienta educativa para el aprendizajes de estudiantes de ingienería.	1

Figure 8: Pivot table report on the tools used according to the articles included in the systematic review

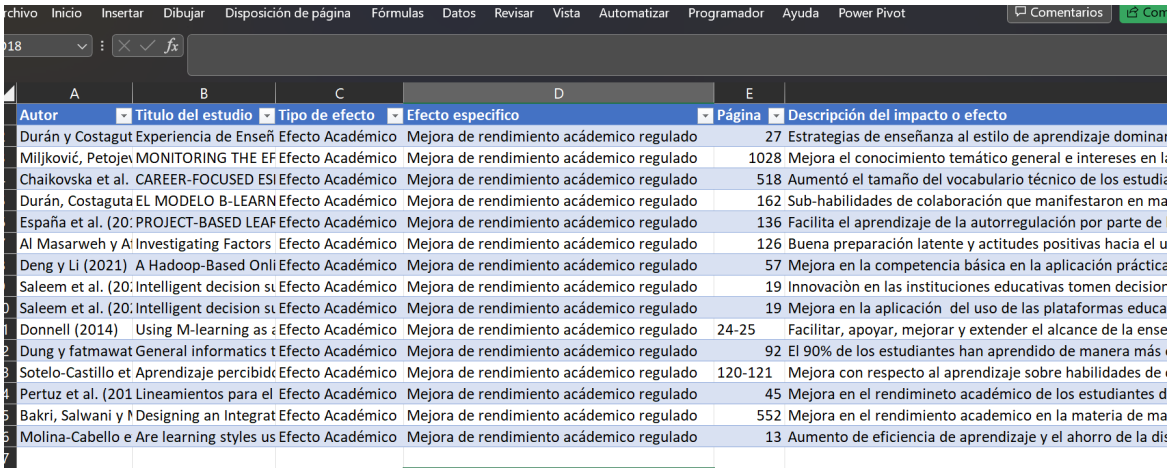


Etiquetas de fila	N° Estudios
Efecto Académico	**27**
Mejora de rendimiento acádemico regulado	15
Mejora en el trabajo en equipo	3
Mejora en las habilidades cognitivas	6
Autoeficacía y satifacción del estudiante	3
Correlación	**11**
Relación entre M-Learning y aprendizaje móvil	4
Relación entre E-Learning y aprendizaje a distancia	4
Relación entre B-Learning y la enseñanza de Simulación	3
Total general	**38**

Figure 9: Pivot table report on the findings/results in the articles included in the systematic review

3.6. Traceability of findings or results

The designed tool allows the traceability of the data tabulated in the dynamic tables (Fig. 10). Therefore, at the time of citation, you can double-click on the count and a report is generated only of the studies included in that count. In the same way, a teacher or principal investigator can use that option to verify or correct the recorded information.



Autor	Titulo del estudio	Tipo de efecto	Efecto especifico	Página	Descripción del impacto o efecto
Durán y Costagut	Experiencia de Enseñ	Efecto Académico	Mejora de rendimiento académico regulado	27	Estrategias de enseñanza al estilo de aprendizaje dominar
Miljković, Petojev	MONITORING THE EF	Efecto Académico	Mejora de rendimiento académico regulado	1028	Mejora el conocimiento temático general e intereses en l
Chaikovska et al.	CAREER-FOCUSED ESI	Efecto Académico	Mejora de rendimiento académico regulado	518	Aumentó el tamaño del vocabulario técnico de los estudia
Durán, Costaguta	EL MODELO B-LEARN	Efecto Académico	Mejora de rendimiento académico regulado	162	Sub-habilidades de colaboración que manifestaron en ma
España et al. (20	PROJECT-BASED LEAF	Efecto Académico	Mejora de rendimiento académico regulado	136	Facilita el aprendizaje de la autorregulación por parte de
Al Masarweh y A	Investigating Factors	Efecto Académico	Mejora de rendimiento académico regulado	126	Buena preparación latente y actitudes positivas hacia el u
Deng y Li (2021)	A Hadoop-Based Onli	Efecto Académico	Mejora de rendimiento académico regulado	57	Mejora en la competencia básica en la aplicación práctica
Saleem et al. (20	Intelligent decision su	Efecto Académico	Mejora de rendimiento académico regulado	19	Innovaciòn en las instituciones educativas tomen decisior
Saleem et al. (20	Intelligent decision su	Efecto Académico	Mejora de rendimiento académico regulado	19	Mejora en la aplicación del uso de las plataformas educa
Donnell (2014)	Using M-learning as a	Efecto Académico	Mejora de rendimiento académico regulado	24-25	Facilitar, apoyar, mejorar y extender el alcance de la ense
Dung y fatmawat	General informatics t	Efecto Académico	Mejora de rendimiento académico regulado	92	El 90% de los estudiantes han aprendido de manera más
Sotelo-Castillo et	Aprendizaje percibid	Efecto Académico	Mejora de rendimiento académico regulado	120-121	Mejora con respecto al aprendizaje sobre habilidades de
Pertuz et al. (201	Lineamientos para el	Efecto Académico	Mejora de rendimiento académico regulado	45	Mejora en el rendimineto académico de los estudiantes d
Bakri, Salwani y M	Designing an Integrat	Efecto Académico	Mejora de rendimiento académico regulado	552	Mejora en el rendimiento academico en la materia de ma
Molina-Cabello e	Are learning styles us	Efecto Académico	Mejora de rendimiento académico regulado	13	Aumento de eficiencia de aprendizaje y el ahorro de la dis

Figure 10: Traceability report on findings/results identified in the articles included in the systematic review

4. Discussion

There are various computing alternatives focused on systematic reviews. Health studies [18] tend to emphasize specific tools like Covidence and Rayyan, designed for efficient study selection. Conversely, tools in software engineering and social sciences [17][19][21] often emphasize text mining and online collaboration, reflecting these fields' unique needs. This implies that health prioritizes efficiency in managing large data volumes, whereas social sciences and engineering value flexibility and collaboration.

Covidence and Rayyan are prominent in the health field, offering functionalities tailored to systematic reviews. Covidence simplifies study selection, title and abstract review, data extraction, and bias risk assessment. It also enables efficient teamwork [18]. Rayyan offers efficient reference management, advanced filtering in title and abstract review, and a blind review mode to minimize bias [18]. These capabilities are vital in health, where managing large data volumes with precision and efficiency is crucial.

The 2015 [17] and 2014 [20] studies identified tools with functionalities like multiuser support and data extraction, valuable across disciplines.

However, despite their effectiveness in systematic reviews, Covidence and Rayyan have limitations affecting their research applicability. Covidence's cost can be prohibitive for individual researchers or budget limited institutions. Its interface, while generally intuitive, may pose a learning curve due to multiple functionalities. Though Covidence allows data extraction customization, it may lack the flexibility of an Excel spreadsheet for projects with unique data requirements. Its integration with other databases or reference management tools can be limiting. Being web based, it also requires a constant internet connection, a potential issue in areas with limited connectivity.

Rayyan, ideal for initial study selection, might lack tools for complex analyses. Its interface may seem less intuitive than others, potentially affecting initial efficiency. The support and documentation for Rayyan could be insufficient for new or less experienced users. Like Covidence, Rayyan's internet dependency could be problematic in areas with limited access.

These limitations are crucial when selecting research tools, especially in resource limited contexts or for highly specific research needs. Choosing between Covidence, Rayyan, and tools like Excel depends on the project's specific needs, available resources, and user familiarity with these platforms.

Another vital aspect is managing findings or results. Covidence focuses on study selection, title and abstract review, data extraction, and bias risk assessment. It allows efficient data organization from selected studies. However, its detailed table synthesis capability might be limited compared to a customized Excel spreadsheet. Covidence ensures data traceability, indicating the origin of each data point. Rayyan mainly aids in study selection and review. While it enables study tagging and filtering, its detailed data extraction and table synthesis functionalities are limited. Rayyan is useful for initial reference management and team collaboration but falls short in data synthesis depth compared to Excel. In this regard, Excel offers more flexibility and customization for detailed findings extraction, table grouping, information synthesis, and tracing each finding to its original study.

Furthermore, while Covidence and Rayyan excel in data management and analysis for systematic reviews, they aren't specifically designed for bibliometric table or chart generation. These platforms focus on study selection, data extraction, and bias analysis, unlike the proposed spreadsheet, which manages information and generates bibliometric tables and figures.

Collaboration is essential across disciplines. Tools like SLRTool [20] facilitate team collaboration in various research areas. However, Excel can also be effective for small teams or less complex social science and engineering projects.

Systematic review tools in health, social sciences, and engineering differ in approaches and functionalities, reflecting each field's needs. While health emphasizes data volume management efficiency, social sciences and engineering prioritize flexibility and collaboration. Excel, adaptable and accessible, can be valuable in social sciences and engineering, especially for specific requirement projects or those with limited budgets.

5. Conclusions

In conclusion, systematic reviews are an important tool for scientific research. This research model provides a systematic and objective method to synthesize the evidence from the scientific literature on a specific topic. Likewise, these must follow a set of established guidelines to ensure that they are reliable and reproducible. Therefore, the methods used must be transparent, so that readers can evaluate their validity. In addition, it should be noted that this helps researchers a lot, either to identify knowledge gaps or to evaluate the existing evidence.

Therefore, the construction of tools to assist in systematic reviews is essential, either for the collection of information or for data analysis. This will facilitate the construction of the systematic review, as well as its structure and writing, being done in a more dynamic way and in less time than working conventionally.

Therefore, an alternative as technological support for the elaboration of systematic reviews would be Microsoft Excel. This represents the opportunity to work orderly, separating the information in several stages: from the selection of the articles to the tools and effects that can be identified in the various studies. The power of Excel should be taken advantage of to work with a large amount of information and collaborate with other researchers, keeping the consolidation of the data in a single file. Likewise, Excel has powerful tools equivalent to complex databases, such

as dynamic tables or graph generation, especially if you want to maintain a quantitative approach through data counting and bibliometrics of the selected studies.

Finally, the proposed alternative does not replace any existing methodological procedure, but it does strengthen the data tabulation process in view of the scarcity of computer solutions that achieve the same objective.

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