

ADJUSTMENT OF STUDENTS TO BE FUTURE RESEARCHERS: THE IMPORTANCE OF A SYSTEMATIC LITERATURE REVIEW METHODOLOGY FOR MSc STUDENTS

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Abstract

The systematic literature review is one of the first steps in any research work. However, MSc students present their limitations when begin conducting their own dissertation, mandatory to obtain the MSc certificate. These limitations are justified due to students are not completely conscientious of the importance of this previous work along any research. Introducing the literature review process from the very beginning is a key factor to its correct elaboration. Therefore, to initially guide students in this process is considered fundamental when performing both, work assignments and the final dissertation for obtaining MCs certification. On the basis of the work developed by Medina López et al. [1] this paper develops a guideline to help students to systematically perform the literature review phase. This paper will not only allow supporting MSc students but also doctorate students or future researchers.

Keywords: systematic literature review, MSc student, research work, dissertation, thesis development, education research.

1 INTRODUCTION

The main aim of a master degree (MSc) is to train professionals or researchers through giving more focused skills and knowledge in a specific field. Regardless if the motivation is professional or research, it is mandatory for scholars to develop a final dissertation in terms of a professional application or research work to solve a specific problem. In the meantime, it is very common to carry out small-scale dissertations in each of the subjects studied in the master degree. Besides this, another motivation among the MSc students is to continue with doctoral studies (PhD students) or become researchers.

In any dissertation, the literature review is the initial phase and involves a common and key section. However, MSc students have difficulties when conducting the literature review at the moment they start their research work, due to they are not fully aware of the importance of this section. Therefore, tutors are required to introduce this relevant topic, from the very beginning, in order to train MSc students when performing both, the work assignments along the course and the subsequent final dissertation, necessary for obtaining the certificate. Hence, the literature review process must have a higher dedication during the MSc studies.

In the light of the aforementioned, this paper is focused on giving a simple but complete methodology to support students on how to carry out a systematic literature review, regardless of the field of study; with the main aim to be applied to their final dissertation and further research works, such as the PhD thesis or research projects. The systematic literature review methodology guides the reviewing process from the initial phase to more complex and sophisticated stages, improving time efficiency while obtaining higher quality results.

1.1 The importance of an accurate Literature Review

Conducting a systematic literature review allows to deeply know a particular study area, in order to: (i) formulate appropriate hypothesis, (ii) raise proper research questions, as regards the topic to be analysed, (iii) identify the gaps that will allow to propose original contributions in the work developed, and (iv) justify the research work. According to this, it is considered that the systematic literature review is one of the first steps in any research, that will allow having a better knowledge on the field under study and identifying the work that has been developed so far in the studied topic, i.e. what are the models, methodologies and tools designed, so far, to address the topic under study. After all, analyse the current state of the topic under study.

The importance of the literature review, whatever the topic, gives the person who is conducting the research a broad knowledge of what other researchers are investigating at any given time. As well as allowing building a conceptual framework from which to start coherent and rigorous research activities [1]. At the end, the quality of research results largely depends on the accuracy in which the literature review work has been developed.

2 LITERATURE REVIEW GUIDELINE

The provided systematic literature review methodology is based on the work developed by [1], and consists of six phases:

- (i) Identifying the research area and the period of study,
- (ii) Selecting the information sources,
- (iii) Carrying out the research,
- (iv) Managing and treating the results through building a personalised database,
- (v) Analysing the results, and
- (vi) Writing the interesting features of the literature reviewed in a synthesis.

2.1 Identify the study area and the period

This phase allows detecting the research problem and defining the global and specific objectives, as well as precisely delimits the topic under study. The keywords definition enables to accurately delimit the field under study and the research criteria; hence, these keywords must be precisely defined. Besides this, the concrete definition of the temporal deep of research will allow to cover the period of time in which the literature review is performed.

2.2 Selection of the information sources

The nature and objectives of the research conducted will define the combination of sources used. Moreover, the variety of consulted sources will enrich the literature reviewed. The information sources identified to carry out the literature review are:

Journals: Scientific and professional journals provide a basic and updated source of knowledge. The journal's databases can be encountered via Internet, such as Econlit [2], IEEE [3], Taylor & Francis [4], Science Direct [5] and Scholar Google [6].

When selecting a journal, it must be taken into account the impact factor that has associated, computed according to the citations received and the number of published papers. The most internationally recognised impact index is given by the ISI Web of Knowledge [7], indexing the journals in the databases: Science Citation Index (SCI-EXPANDED) and Social Sciences Citation Index (SSCI). Nevertheless, there are other alternative indicators of quality, complementary to the impact factor given by the Web of knowledge, such as IN-RECS [8], SJR [9], ERA [10], RESH [11], DICE [12], CORE [13] that define the importance of each journal associating it a certain ranking level.

Conference proceedings: Particularly relevant due to they show almost in "real time" the current research lines that are being developed, defining and raising questions that will be hot topics in the near future. It is very useful when research agendas are made and future trends are sought, as well as when working in emerging areas on which there are no many research publications.

Thesis: Consist of an important source of information, which usually contains a detailed literature review and extensive information on a given area. In addition, doctoral dissertations in progress present clear evidences of the future research. Different repositories of thesis can be found: at the university context, i.e. Universitat Politècnica de Valencia [14], or at the European context [15].

Books: Allow obtaining relevant and comprehensive information on an area of interest. They can provide a useful starting point on a subject. However, the incorporation of burning issues is slower than in other sources, such as journals or conference proceedings. The analysis of textbooks normally provides the evolution of an area of study.

Internet: Information obtained via the Internet is huge and can be very useful as a first contact with the topic to address. However, sometimes this information cannot be validated and verified. Consequently, it may not always be appropriate.

Other sources: reports, studies, newspapers, government agencies, enterprises, etc. Newspapers provide real time information useful to know the situation of companies, sectors or industries.

2.3 Conduct the research

According to the aforementioned, the first thing to do is to establish the criteria that allow filter the relevant references that fill the pursued goal (field of study and period of analysis).

The criteria used to select one database or another are defined by [16]: (i) checking since when are indexed the references, (ii) confirming that the university has a signed access and (iii) identify if the database provides full-text references, such as IEEE [3], ScienceDirect [5], Business Source Premier [17], ABI/INFORM [18] and Emerald [19], or on the contrary only provides the "metadata" -Title, author, abstract and words key, such as in WOK [20]. Besides this, WOK [20] *contains the Science Citation Index* (information on the number of citations an article), *Journal Citation Reports (impact factor)* and *Essential Science Indicators*, (relevant information about the research state). Databases as regards enterprises information are also interesting, i.e. on the most popular provider of Spanish and Portuguese enterprises is SABI [21].

2.4 Management of results

In order to manage the references, the recommended procedure is to export the search results to a bibliography manager such as RefWorks [22], Reference Manager [23] or End Note [24]. Another option is to manage the results form a spread sheet or register tables (excel or access). Register tables are interesting when gathering references in order to properly arrange them in the collection process, compiling information for each particular reference, such as: database source, keywords, folder location, abstract, comments, debugging process criteria used, etc.

The management of results will definitely allow obtaining more flexibility to process the information obtained [16]. For example RefWorks [22] allows creating a database, managing references and bibliographies. Besides, it can be remotely accessed enhancing the flexibility to process all the references. The process is directly done from the databases, which provide different exportation formats, i.e. Scopus, IEEE Xplore, CSIC, Business Source Premier, ABI/INFORM Global or Science Direct. Another useful manager is EndNote [24] a standard software tool that allows managing bibliographies, citations and references on *Windows* and *Macintosh* desktop.

Despite having performed a search with extreme care, when collecting the references it should be ensured that there are completely suitable. Therefore, a debugging process is to be carried out. To perform this debugging process is not necessary to have the full text of the document, but it is desirable to have the abstract in addition to the title and keywords. The treatment process of the selected references can be performed through: (i) classifying of references found, (ii) analysing false positives, references that have been selected by the automatic search but did not really meet the objectives of the study and (iii) identifying and analysing false negatives, references missed by the search strategy established but that are interesting to the study. Through the execution of the debugging process the search strategy can be improved.

2.5 Analyse of results

The analysis performed with the finally selected papers depends on the purpose of the investigation. Systematic literature searches are often developed according to two purposes:

- (i) a first phase with a more complex research in order to know in depth a particular field of study to develop a theoretical framework, and obtain an adequate basis on which to focus the research, and
- (ii) a methodology to be used in an empirical study, where the main aim is the analysis of publications to establish the state of the art in a particular subject (bibliometric study).

In any case, the review and analysis of each of the selected papers is to be conducted. This process will be more efficient if the analysis of each work is accompanied by a data sheet. This data sheet will be designed depending on the arena of study, but will be always characterised by outlining the main points to analyse the selected works. Some of the key points that may be interesting to gather and analyse when performing the literature review are:

- Authors, source and publication year: number of authors, institutions of origin.
- Statement of the research problem and hypotheses.
- Theoretical framework in which the specific paper is developed.
- Characteristics of the research conducted:
 - Geographical scope of the study conducted.
 - Variables analysed
 - Type of research conducted: descriptive or explanatory; quantitative or qualitative; longitudinal or cross; experimental or non-experimental.
 - Sources of data used: primary, secondary or tertiary.
 - Techniques used to gather information: observation, questionnaire or interviews
 - Data analysis techniques employed: descriptive, explanatory.
- Research Issues
- Research Approach
- Relevant Research Results
- Conclusions.
- Research Considerations: benefits, drawbacks, future research lines
- References: how many and which ones from which the person how is carrying out the review can give an idea of what jobs are considered by the authors as a reference.

2.6 Write the results from the research

The sixth phase is characterised by integrating the ideas that were previously dispersed and turn them into a coherent text, clarifying concepts, introducing new ones into the subject and giving a personal perspective. Finally the gaps in the area under study are to be identified in order to fill them and provide original contributions.

The references obtained from the literature reviewed, considered relevant to the performed study, are to be organised and summarised in order to reveal the current state of the topic under study. To facilitate the writing process of results, some tips are given [25]:

- Report congruent points and contradictions found in the literature.
- Describe in detail the important research studies. Those that have not such a relevance should be only mentioned.
- Group and briefly summarise similar studies that yield comparable results.
- Conclude the review with a summary of the general state of the art regarding the analysed the problem or issue, identifying what has been studied, the appropriateness of the research work and unexplored areas of research.
- It is convenient not to express personal opinions or generalisations that may not be entirely true: "It is known that ..." "Studies have proven that ...".
- Be objective and accurate: "Some argue that (Author1, year) while others (Author2 et al., year)", "Previous studies have shown ... (Author3 and Author4, year)", "Studies of Author5 (year) suggest that ..." "according to Author6 et al. (year)".

Different types of bibliographic formats can be used: (i) if there is only one author: *Author (year)* or *(Author, year)*, (ii) for two authors: *Author1 and Author 2 (year)* or *(Author1 and Author2, year)* and (iii) for three or more authors: *Author1 et al. (year)* or *(Author1 et al., year)*.

3 EXAMPLE

This section shows a practical perspective of the six provided phases. An example is considered, in the field of collaborative supply networks, giving the readers a clear insight as regards the essential steps to follow in the development of a systematic literature review.

Phase 1

Topic under study: Identify what are the processes that enterprises should carry out collaboratively when willing to be members of a collaborative network.

Field of Study defined by the *Keywords*: collaborative network, SMEs, collaborative processes, enterprises collaboration.

Temporal Deep: from 2000 to 2012

If an historical evolution of a determined topic is done, we must go back to the starting date of the theories and concepts to analyse. If it is required a state of the art we can go back 5-15 years, it will depend on the nature, static or dynamic, of the concepts and the novelty of the subject.

Phase 2

The most accessible sources are located in journal articles and conference proceedings. Provided that the access is done from the intranet of a University, the students have to consider those references that are available as open access. For example, in the *Universitat Politècnica de València* the VPN enables the free access, to university community, to a wide range of journals, books and databases.

In order to collect the literature review references, ScienceDirect [5], Scholar Google [6] and WOK (2014) [20] databases are used. The introduction of the keywords will allow us to obtain the set of papers related with the topic under study.

Phase 3

The research is carried out using the database providers previously selected [5, 6, 20]. In order to conduct the research, when performing an automatically search of references, it is necessary to convert the search criteria instructions into a specific language interpretable by search databases. This requires using a specific syntax (syntax of the search strategy). The basic syntax operators are (i) AND, combines search terms so that each reference contains all the selected terms, (ii) OR, combines search terms so that the selected references contain at least one of them, and (iv) NOT, excludes terms so selected references do not contain these terms. For example:

- *(collaborative AND networks) NOT services*: finds references containing both *collaborative* and *networks* terms, but excludes those containing *services* terms.
- *(collaborative OR networks) AND services*: find all the references where the word *services* is present along with the word *collaborative* or along with the word *networks*.

Phase 4

In order to manage the references, the tool: RefWorks [22] is used (Fig. 1); EndNote is also recommended due to its direct link with office applications, but is not open access. In the databases for publications, different types of bibliographic formats can be found (Fig. 2) making easier the process of writing the references section. Furthermore, in order to gather relevant information as regards the collected references, the spread sheets can be used (Fig. 3).

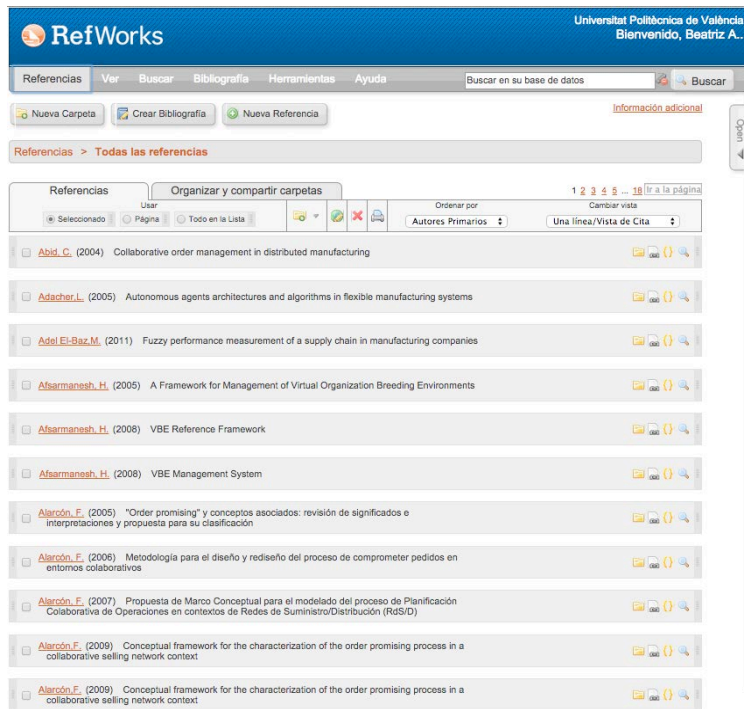


Fig. 1. RefWorks database.

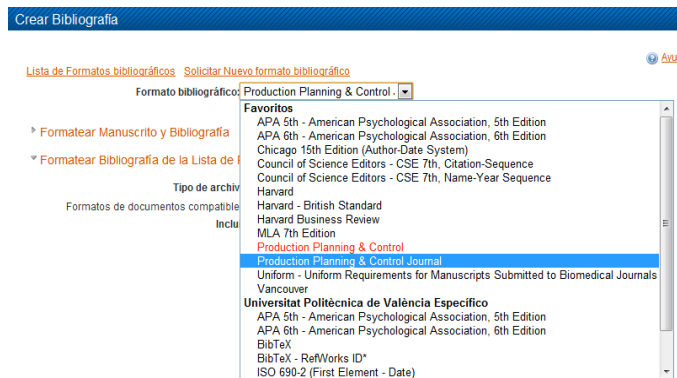


Fig. 2. References Type.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	
CÓDIGO	FILE NAME	PDF NAME	TÍTULO	TIPO	DESCRIPCIÓN	REV	TR	CM	NHM	NHM	Modelo	Revisión	Formato	HM2	NRW2	ANÁLISIS DE LA SOLUCIÓN	COMENTARIOS	
1	CIGIP COLLABORATIVE	2002 KLUVER Polder	Practices in Knowledge Management	Firms have	1	1	1	0	-	The present	-	-	-	-	-	0.25	UTILIZA IEGIP para gestionar	
2	CIGIP COLLABORATIVE	2003 E.T.F.A. Lario	SUPPLY CHAIN Collaborative Plan	Collaborative	1	1	1	0	-	IE-GIP Meet	DGRAY 2.0	1	1	1	1	0.75	Adapta la metodología a GRP	
3	CIGIP COLLABORATIVE	2003 E.T.F.A. Lario	SUPPLY CHAIN Decision Making	Collaborative	1	1	1	0	-	IE-GIP Meet	DGRAY 2.0	1	1	1	1	0.75	Permite plasmar el proceso	
4	CIGIP COLLABORATIVE	2008 CIO Alarcón	Metodología de Order Promising	Integración de	0	0	1	1	0	-	Describe un	-	-	-	-	0.6	Metodología para el diseño	
5	CIGIP COLLABORATIVE	2006 KSE Ohtz	Deriving ERM Enterprise Integrat	Improper co	1	1	1	0	-	ENTERPRIS	ENTERPR	1	1	1	1	0.75	Este artículo se centra en un	
6	CIGIP COLLABORATIVE	2006 SPRINGER Polder	An Interoperat Forecast Manag	Methodolog	0	1	1	1	0	-	Vendor Ma	CPFR (Coll	Forecastin	1	0	0.7	Este artículo se centra en un	
7	CIGIP COLLABORATIVE	2007 KCIEM Alarcón	Propuesta de Collaborative Plan	Considerar t	0	1	1	1	0	-	Marco Con	-	-	1	1	0.25	Marco Conceptual mediante	
8	CIGIP COLLABORATIVE	2007 KCIEM Alarcón	Predicción de Forecast Manag	Intensidad	0	1	1	1	0	-	Modelo de	CPFR (Coll	-	1	1	0.25	Este artículo sirve para conc	
9	CIGIP COLLABORATIVE	2008 DO Boza	La vista de in Collaborative Plan	Construcción	1	1	1	1	0	-	Modelo inf	-	-	1	1	0.75	Modelado del proceso inform	
10	CIGIP COLLABORATIVE	2008 WTM Polder	Collaborative Forecast Manag	Inesact inform	1	0	0	0	1	-	Supplier oc	-	0	1	0.75	Se definen cuatro escenarios		
11	CIGIP COLLABORATIVE	2008 PPC Alemania	Order promisi Order Promising	FP-OP (ord	0	0	1	1	0	-	A new three	ECOSELL	1	1	1	0.5	proceso de comprometer p	
12	CIGIP COLLABORATIVE	2008 PPC Hernández	A reference Collaborative Plan	Production	1	0	0	1	0	-	A reference	-	-	1	1	0.5	Modelo de referencia para el	
13	CIGIP COLLABORATIVE	2008 SCM Rodríguez	Collaborative Forecast Manag	Find a place	1	1	0	1	0	-	CFM	-	-	1	1	0.5	Uno de los escenarios que se	
14	CIGIP COLLABORATIVE	2008 SPRINGER Errasti	Engineer to in Interoperability	Redesign of	1	1	1	1	0	-	The GRAI	Metodolog	GRAI Grid	1	0	0.3	Se establece para una DEM	
15	CIGIP COLLABORATIVE	2009 PONS Kienast	Proactive val Order Promising	Missing del	0	0	1	1	1	-	Option priorit	Communit	0	1	0	1	0.75	Modelo conceptual de Planif
16	CIGIP COLLABORATIVE	2009 NIFE Alarcón	Conceptual in Order Promising	Support the	0	0	1	1	0	-	Conceptual	-	-	1	1	0.75	Alarcón et al. (2009) present	
17	CIGIP COLLABORATIVE	2009 INICOR Hernández	SCAMM-CP Collaborative Plan	Modelos bas	1	0	0	1	0	-	Metodolog	-	-	1	1	0.75	Metodología novedosa para	
18	CIGIP COLLABORATIVE	2009 JDL Gomez-Gazquez	A scheduler in Scheduling	Customers a	0	0	1	1	0	-	Authors are	Modeling	-	1	1	0.75	Se establece a nivel	
19	CIGIP COLLABORATIVE	2009 SB Franco	Modeling est Interoperability	The need to	0	0	1	0	1	-	Service-O	-	-	1	1	0.75	También se establece a nivel	
20	CIGIP COLLABORATIVE	2009 SPRINGER Hernandez 2	An Interoperat Collaborative Plan	Aspects act	0	0	1	1	0	-	Anteroperat	a) Protege	1	1	1	0.75	Metodología novedosa para	
21	CIGIP COLLABORATIVE	2009 PRO-VE 2009 Hernandez	A Suppl Cha Collaborative Plan	enterprise act	0	0	1	1	1	-	Novel sugg	Negotiatio	1	1	1	0.75	Metodología novedosa para	
22	CIGIP COLLABORATIVE	2009 SPRINGER Alarcón	Conceptual in Collaborative Plan	The design of	0	0	1	1	0	-	Conceptual	-	-	1	1	0.75	Modelo conceptual de Planif	
23	CIGIP COLLABORATIVE	2009 SPRINGER Alarcón	Conceptual in Collaborative Plan	The design of	0	0	1	1	0	-	Conceptual	-	-	1	1	0.75	Modelo conceptual de Planif	
24	CIGIP COLLABORATIVE	2009 SPRINGER Alarcón	Conceptual in Collaborative Plan	The design of	0	0	1	1	0	-	Conceptual	-	-	1	1	0.75	Modelo conceptual de Planif	
25	CIGIP COLLABORATIVE	2009 SPRINGER Alarcón	Conceptual in Collaborative Plan	The design of	0	0	1	1	0	-	Conceptual	-	-	1	1	0.75	Modelo conceptual de Planif	
26	CIGIP COLLABORATIVE	2009 SPRINGER Alarcón	Conceptual in Collaborative Plan	The design of	0	0	1	1	0	-	Conceptual	-	-	1	1	0.75	Modelo conceptual de Planif	
27	CIGIP COLLABORATIVE	2009 SPRINGER Alarcón	Conceptual in Collaborative Plan	The design of	0	0	1	1	0	-	Conceptual	-	-	1	1	0.75	Modelo conceptual de Planif	
28	CIGIP COLLABORATIVE	2009 SPRINGER Alarcón	Conceptual in Collaborative Plan	The design of	0	0	1	1	0	-	Conceptual	-	-	1	1	0.75	Modelo conceptual de Planif	
29	CIGIP COLLABORATIVE	2009 SPRINGER Alarcón	Conceptual in Collaborative Plan	The design of	0	0	1	1	0	-	Conceptual	-	-	1	1	0.75	Modelo conceptual de Planif	
30	CIGIP COLLABORATIVE	2009 SPRINGER Alarcón	Conceptual in Collaborative Plan	The design of	0	0	1	1	0	-	Conceptual	-	-	1	1	0.75	Modelo conceptual de Planif	
31	CIGIP COLLABORATIVE	2009 SPRINGER Alarcón	Conceptual in Collaborative Plan	The design of	0	0	1	1	0	-	Conceptual	-	-	1	1	0.75	Modelo conceptual de Planif	
32	CIGIP COLLABORATIVE	2009 SPRINGER Alarcón	Conceptual in Collaborative Plan	The design of	0	0	1	1	0	-	Conceptual	-	-	1	1	0.75	Modelo conceptual de Planif	
33	CIGIP COLLABORATIVE	2009 SPRINGER Alarcón	Conceptual in Collaborative Plan	The design of	0	0	1	1	0	-	Conceptual	-	-	1	1	0.75	Modelo conceptual de Planif	
34	CIGIP COLLABORATIVE	2009 SPRINGER Alarcón	Conceptual in Collaborative Plan	The design of	0	0	1	1	0	-	Conceptual	-	-	1	1	0.75	Modelo conceptual de Planif	
35	CIGIP COLLABORATIVE	2009 SPRINGER Alarcón	Conceptual in Collaborative Plan	The design of	0	0	1	1	0	-	Conceptual	-	-	1	1	0.75	Modelo conceptual de Planif	
36	CIGIP COLLABORATIVE	2009 SPRINGER Alarcón	Conceptual in Collaborative Plan	The design of	0	0	1	1	0	-	Conceptual	-	-	1	1	0.75	Modelo conceptual de Planif	
37	CIGIP COLLABORATIVE	2009 SPRINGER Alarcón	Conceptual in Collaborative Plan	The design of	0	0	1	1	0	-	Conceptual	-	-	1	1	0.75	Modelo conceptual de Planif	
38	CIGIP COLLABORATIVE	2009 SPRINGER Alarcón	Conceptual in Collaborative Plan	The design of	0	0	1	1	0	-	Conceptual	-	-	1	1	0.75	Modelo conceptual de Planif	
39	CIGIP COLLABORATIVE	2009 SPRINGER Alarcón	Conceptual in Collaborative Plan	The design of	0	0	1	1	0	-	Conceptual	-	-	1	1	0.75	Modelo conceptual de Planif	
40	CIGIP COLLABORATIVE	2009 SPRINGER Alarcón	Conceptual in Collaborative Plan	The design of	0	0	1	1	0	-	Conceptual	-	-	1	1	0.75	Modelo conceptual de Planif	
41	CIGIP COLLABORATIVE	2009 SPRINGER Alarcón	Conceptual in Collaborative Plan	The design of	0	0	1	1	0	-	Conceptual	-	-	1	1	0.75	Modelo conceptual de Planif	
42	CIGIP COLLABORATIVE	2009 SPRINGER Alarcón	Conceptual in Collaborative Plan	The design of	0	0	1	1	0	-	Conceptual	-	-	1	1	0.75	Modelo conceptual de Planif	
43	CIGIP COLLABORATIVE	2009 SPRINGER Alarcón	Conceptual in Collaborative Plan	The design of	0	0	1	1	0	-	Conceptual	-	-	1	1	0.75	Modelo conceptual de Planif	
44	CIGIP COLLABORATIVE	2009 SPRINGER Alarcón	Conceptual in Collaborative Plan	The design of	0	0	1	1	0	-	Conceptual	-	-	1	1	0.75	Modelo conceptual de Planif	
45	CIGIP COLLABORATIVE	2009 SPRINGER Alarcón	Conceptual in Collaborative Plan	The design of	0	0	1	1	0	-	Conceptual	-	-	1	1	0.75	Modelo conceptual de Planif	
46	CIGIP COLLABORATIVE	2009 SPRINGER Alarcón	Conceptual in Collaborative Plan	The design of	0	0	1	1	0	-	Conceptual	-	-	1	1	0.75	Modelo conceptual de Planif	
47	CIGIP COLLABORATIVE	2009 SPRINGER Alarcón	Conceptual in Collaborative Plan	The design of	0	0	1	1	0	-	Conceptual	-	-	1	1	0.75	Modelo conceptual de Planif	
48	CIGIP COLLABORATIVE	2009 SPRINGER Alarcón	Conceptual in Collaborative Plan	The design of	0	0	1	1	0	-	Conceptual	-	-	1	1	0.75	Modelo conceptual de Planif	
49	CIGIP COLLABORATIVE	2009 SPRINGER Alarcón	Conceptual in Collaborative Plan	The design of	0	0	1	1	0	-	Conceptual	-	-	1	1	0.75	Modelo conceptual de Planif	
50	CIGIP COLLABORATIVE	2009 SPRINGER Alarcón	Conceptual in Collaborative Plan	The design of	0	0	1	1	0	-	Conceptual	-	-	1	1	0.75	Modelo conceptual de Planif	

Fig. 3. Example of spread sheet database.

Phase 5

A data sheet is used to facilitate the analysis of the selected references when conducting the literature review process (figure 4):

KEY REFERENCE SUMMARY	
Title	Collaborative forecasting in networked manufacturing enterprises
Author(s)	Raul Poler, Jorge E. Hernandez, Josefa Mula and Francisco C. Lario
Source	Journal of Manufacturing Technology Management Vol. 19 No. 4, 2008 pp. 514-528
Year	2008
Research Issue(s)	
<ul style="list-style-type: none"> • Research Justification/Need: One of the processes which greatly influence decision making within a company is forecasting demand. Most companies know that their forecasts are inexact, but do not know how to solve this problem. Inaccurate forecasts forces companies to find ways to compensate for the uncertainty, and the most often used method to achieve this is by building inventory. • Problem(s) Description: The rate of successful forecasts depends on the company's capacity to obtain relevant information and to interpret it. On the other hand, both the information obtained and the variability of demand differ when the customer is the end-consumer and when the customer is a company of an enterprise network. With the latter, the demand pattern is influenced by the customer-company production planning decisions. • Research Aim and Objective(s): This paper initiates an analysis of the state-of-the-art of the collaborative forecasting concept with the objective of identifying the possible gaps which might exist in the research, and which may be responsible for its low applicability in practice. It then proceeds to propose an overall collaborative forecasting model for enterprise networks. 	
Research Approach	
<ul style="list-style-type: none"> • Research Method: Contributions by several authors to collaborative forecasting have been analysed from different viewpoints. A collaborative-forecasting model for networked manufacturing enterprises has been proposed and validated by means of a simulation study. • Tools & Techniques: Voluntary Interindustry Commerce Solutions (VICS) Collaborative Planning / Forecasting and Replenishment (CPFR) 	
Relevant Research Results	
<ol style="list-style-type: none"> 1. Analysing contributions <ul style="list-style-type: none"> ○ Most authors provide a definition of collaborative forecasting and describe the advantages it offers. ○ Most authors start with the customer-supplier configuration and they apply it (with varied success) to a supply chain or to an enterprise network. ○ Half the articles analysed propose a method to implement collaborative-forecasting processes and they also analyse this process in relation to other collaborative processes, especially the CPFR model ○ All the works analysed may be arranged into two large classes: <ul style="list-style-type: none"> ▪ those that analyse how collaborative forecasting is put into practice and which present the problems encountered, and may even propose solutions ▪ Those that propose methods to set up collaborative processes in the demand forecast sphere, which may be set up between two firms, in supply chains or in enterprise networks. 2. A collaborative forecasting model for industrial enterprise networks: Suppliers collaborate with their customers in forecasting their customers' demands. Customers collaborate with their suppliers by notifying them about their mid-term demand plans. 3. Simulation Experiments 4. A structured model has been proposed for the collaboration among firms of a network in the demand forecast and production planning settings. The collaborative forecasting model proposed may be applied node-to-node, since it is not necessary that the entire enterprise network participates in the process. This fact facilitates the implementation of the collaboration model and the progressive spreading across the non-collaborative firms. 5. The simulation experiments in a hypothetical enterprise network have allowed to quantitatively assessing the impact of collaboration on customer service and inventory levels. These experiments demonstrate that, even in an enterprise network with low-forecast errors, the communication of demand plans between clients and suppliers significantly reduce the safety stock levels and increase the customer service. 	
Research Considerations	
<ul style="list-style-type: none"> • Benefits: Accurate forecasts helps to improve in two of the most important parameters in an enterprise network: inventory levels and customer service. • Disadvantages / Limits: These kind of projects were not as simple as they seemed. Lack of trust Confidentiality of information • Future Research Lines: <ul style="list-style-type: none"> ○ Future research will include the simulation of more complex enterprise network scenarios with different characteristics. ○ Definition of both collaboration models and the tools required to implement them ○ The influence of specific demand forecasting methods which might be used by the nodes within the network has been avoided. Therefore, this has meant that all the nodes reach a specific level of success. This new dimension should be introduced in the next research work. 	

Fig. 4. Data Sheet Example.

Phase 6

The student must properly write the results derived from all the information gathered of the collected references to give the reader a global perspective of the researched topic. The main aim is not to name each of the authors and explain the work they have developed, the literature review goes further through exposing the analysis and conclusions derived from the research work and discussing the contributions derived from the published scientific reports.

Accordingly the results derived from the literature reviewed next example only name the authors and the work developed: “In the article of Boone and Ganeshan (2000) it is proposed the methodology of Collaborative Planning, Forecast and Replenishment (CPFR) to address the collaborative forecasting process. In the article of Poler et al. (2007b) a collaborative forecasting model where each node undertakes its local demand forecasts and takes into account both internal and external orders and internal demand plans. In the article of Rodriguez et al. (2008) it is proposed the Collaborative Forecast Management (CFM) approach using e-collaboration. In the article of Andrés and Poler (2013) a set of collaborative processes are identified including the collaborative forecast process.”

Hereafter the same example is properly rewritten: “According to Andres and Poler (2013), the forecast demand process is identified, amongst others, as a relevant process to consider by enterprises willing to take part in a collaborative network. Nevertheless, enterprises, especially SMEs, might find some difficulties when collaboratively develop the forecast demand process. In order to overcome these limitations, the Collaborative Planning, Forecast and Replenishment (CPFR) methodology was firstly proposed (Boone and Ganeshan, 2000). Afterwards, this methodology was extended by not only considering the external orders and the collaborative forecasting model was proposed (Poler et al., 2007) taking into account the internal demand plans to collaboratively carry out the local demand forecasts. Rodriguez et al. (2008) goes a step up beyond through including information technologies to deal with the collaborative forecast demand process through using e-collaboration in the Collaborative Forecast Management approach.”

In order to have a better insight of what are the journals, books, conference proceedings and thesis reviewed to conduct the literature review process, a table like the depicted in figure 5 can be generated for summarising the citations regarding the topic under study.

Source	N°	
	Citations	%
Journals		
Advanced Engineering Informatics	1	0,38%
Annual Reviews in Control	1	0,38%
Benchmarking: An International Journal	1	0,38%
Business Process Management Journal	2	0,75%
Chain and Network Science	1	0,38%
Compras y Existencias	1	0,38%
Computers & Chemical Engineering	1	0,38%
Computers & Industrial Engineering	3	1,13%
Computers in Industry	9	3,38%
Construction Informatics Digital Library	1	0,38%
Decision Sciences	1	0,38%
Design & Manufacturing IEEE Transactions	1	0,38%
Environmental Science & Technology	1	0,38%
European Journal of Operational Research	13	4,89%
Expert Systems with Applications	3	1,13%
IBM Systems Journal	1	0,38%
IEEE Transaction on Engineering Management	1	0,38%
IEEE Transactions	4	1,50%
IEEE Transactions Robotics and Automation	1	0,38%
....		
Books Chapter	36	13,53%
Deriverables	12	4,51%
Thesis	1	0,38%
Proceedings of Conferences	59	22,18%
Web	2	0,75%
TOTAL	1	100%

Fig. 5. Summary of sources used.

4 CONCLUSIONS

This paper aims to provide a guideline, addressed to students and researchers, for conducting systematic literature searches To this end six phases are identified to perform a literature review are, each one described in detail and exemplified.

The importance of establishing a systematic literature review allow students to be methodical in the literature review process as well as efficient in terms of time and quality of results. The proper monitoring of methodology is vital to keep the literature review document updated, and facilitates the justification of the literature review developed, simplifying the work of organisation of the collected references.

Apart from considering the methodology proposed, when introducing the literature review topic it is fundamental to look for and analyse examples of papers that develop it.

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