



## Output distributions and topic maps of safety related journals



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### ARTICLE INFO

#### Article history:

Received 6 February 2015

Received in revised form 24 June 2015

Accepted 10 September 2015

#### Keywords:

Safety science

Safety journals

Topic visualization

Text analysis

VOSviewer

### ABSTRACT

This paper presents topic maps of six core safety journals, based on analysis of 13,028 articles published in those journals as downloaded from the Web of Science. Bibliometric mapping methods were used to visualize the map of the topics covered in each journal. Analysis was also made of the changes in topics over time. The results show that safety science research in those journals has grown very rapidly over the last half century, with USA as the most productive in total and also in each year in the period. The topic clusters of these journals reveal the focus of each journal, which may be determined by the dominant methodologies used, the activity whose safety is studied or the object of study (e.g. workplace, safety management, regulation, etc.). The different journals also show regional differences in the papers they attract. The field in total is highly multidisciplinary. The topics of *Safety Science* have been focused on major hazard, transportation and work safety; *Journal of Safety Research* divides its attention between work and traffic safety, with a smaller cluster on statistics; *Accident Analysis and Prevention* is concerned almost exclusively with road safety; *Injury Prevention* is concerned mainly with injury mechanisms, but includes topics not treated by the other 5 journals, such as violence, suicide and other intentional injury and child safety at school and in the home. *Reliability Engineering and System Safety* and the *Journal of Loss Prevention in the Process Industries* focus mainly on major hazard, with the latter most concerned with the technology of failure mechanisms and the former on quantitative risk assessment.

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## 1. Introduction

It is important for (potential) authors to know what are the main topics or research themes accepted by a certain journal, so that they can pick which journal to submit a paper to. They can get guidance from what is printed on the journal homepage about its aims and scope. But even with this guidance it is sometimes hard to determine whether a candidate paper will fit into the scope of a certain journal, since this scope will also be changing as the discipline it covers changes. Andrew Hopkins in a recent paper in *Safety Science* (Hopkins, 2014) remarks that he found one of the papers he was sent for review to be outside the current community of interest of *Safety Science*, but other reviewers accepted the paper and the journal finally published it. This suggests that the issue of the scope and focus of a journal, or a set of journals, serving a research area or community is an interesting one for analysis. This paper presents bibliometric mapping analysis of a set of journals serving the broad area of safety science, a multidisciplinary area

of research and practice. It aims to add to the discussion of journal scope some descriptive analysis of what the topics have been of 6 of the core journals serving that area.

In recently years there have been a number of articles which have mapped topics of research published in journals. Some examples are the paper of Mane and Börner (Mane and Börner, 2004) who collected 47,073 papers published in the *Proceedings of the National Academy of Sciences* (PNAS) in the USA in the years 1982–2001. Using knowledge domain visualization, they identified the 50 most important topics in PNAS. They also used software to detect sudden increases in topics, so-called ‘topic bursts’ (Kleinberg, 2003) over a short period of time in the journal. In 2011, Linton (2011) the Editor-in-Chief of the journal *Technovation* used the visualization technique to reveal the topics of that journal, and answer the question: ‘What does journal fit and focus look like: A visual representation’. Saravanan and Dominic (2014) analysed the data of the *Review of Palaeobotany and Palynology* (2003–2012) from the Web of Science, to assess the publication output, exponential growth rate and authorship patterns, etc. of the journal. Other works in the journals of bibliometric research related to our research include (Kumar et al., 2008; Ramos-Rodríguez and Ruíz-Navarro, 2004; Saravanan and Dominic, 2014; Wang et al., 2010).

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In the safety science area, Hale, using a simple classification of the topic area of journal articles, suggested the main focus of 9 safety related journals (Hale, 2014, 2006). The classification in Hale's research was largely subjective, but, based on his research, Li used a data-download from the journal *Safety Science* (SS) over the period 1991–2012 to draw the map of the topics of SS (Li et al., 2013), together with the annual distribution of the publications, authors, institutions, and keywords. Similar methods have also been applied to draw a knowledge map of safety culture (Li and Guo, 2014) and patient safety (Rodrigues et al., 2014). In a more recent article Li and Hale (2015) have used co-citation analysis to show the relationships between SS and other journals in the area of safety science and how knowledge flows between them. That flow depends on how certain topics are distributed between the journals, cluster across them or differentiate between them, but does not make explicit what those topics are. On the basis of that research Li published a book named “*Introduction to Knowledge Map of Safety Science*”. The contents include publication output, the cooperation network responsible for the publications (including authors, institutions and countries/territories), and also a preliminary study of the dominant topics and frontiers of research of safety science (Li, 2015).

The distribution of outputs of the publications are also important. Hence, in this paper two aspects will be discussed: (1) the distribution of outputs of the six journals over time and by geographical region; (2) we use advanced bibliometric mapping methods (from CWTS)<sup>1</sup> to make explicit how the topics and themes distribute themselves within each of the selection of six core safety-related journals.

## 2. Data and methodology

### 2.1. Data sources

Within the constraints of our study we had the capacity to analyse six journals. These were chosen partly on the basis of our earlier study (Li and Hale, 2015). We took the five broad safety science journals which had emerged from our co-citation analysis based on SS, as being the most prolific sources of citations from SS and to SS. These were *Safety Science* itself (SS), the *Journal of Safety Research* (JSR), *Accident Analysis and Prevention* (AAP), *Reliability Engineering and System Safety* (RESS) and the *Journal of Loss Prevention in the Process Industries* (JLPPI). To these we added *Injury Prevention* (IP) as another less closely related journal according to the co-citation study, but still one with a stated scope covering safety in a wide range of situations. This was included to see whether our analysis would reveal an explanation for that lower relationship in the topics of IP compared to the other five journals. The basic information about each of these six journals is given below.

SS is a monthly journal in the field of safety, published formerly under the title of the *Journal of Occupational Accidents* (1976–1990). It is published by Elsevier Science BV in the Netherlands. The subject categories in the Journal Citation Report (JCR) Science Edition for 2013 to which SS is assigned are currently “Industrial Engineering”, where it is ranked 12th out of a total of 43 journals in that category on impact factor (IF) and “Operations Research & Management Science”, where it ranks 20th out of a total of 79 on IF. On the homepage of SS, Elsevier categorizes it in both their Safety and Transportation portals.

JSR is a bimonthly journal published by Pergamon-Elsevier Science Ltd in the United States. The subject categories to which it is assigned in the JCR Social Sciences Citation Edition 2013 are “Ergonomics” (ranked 4th of 16 journals), “Public, Environmental

& Occupational Health” (ranked 72th of 143 journals), “Social Sciences, Interdisciplinary” (ranked 14th of 93 journals) and “Transportation” (ranked 16th of 29 journals). By Elsevier it is listed under both their Safety and Transportation portals.

AAP is a monthly journal, published by Pergamon-Elsevier Science Ltd in England. It is affiliated to the Association for the Advancement of Automotive Medicine. The subject categories to which AAP is assigned in the JCR Social Sciences Citation Edition 2013 are “Ergonomics” (ranked 1st out of 16 journals), “Public, Environmental & Occupational Health” (Ranked 18th of 143 journals), “Social Sciences, Interdisciplinary” (ranked 4th out of 93 journals) and “Transportation” (ranked 2th out of 29 journals).

IP is a bimonthly journal published by BMJ Publishing Group in England, which is indexed in both the Science and Social Science Editions of JCR. The subject category assigned to IP in the JCR Social Sciences Citation Edition 2013 is “Public, environmental & occupational health (ranked 38th out of 143 journals)”. It is categorized under a heading of the same name in the Science Citation Edition 2013, (ranked 63th out of 162 journals), the only one of the 6 journals studied to be included in both indices.

RESS is a monthly journal, published by Elsevier Science in England. RESS is assigned in the JCR Science Citation Edition to the subject categories of “Engineering, Industrial” (ranked 6th out of 43 journals) and “Operations Research & Management Science” (ranked 8th out of 79 journals).

JLPPI is a bimonthly journal published by Elsevier Science in UK. In the JCR Science Citation Edition JLPPI is assigned to the subject category “Engineering, Chemical” (ranked 66th out of 133 journals).

We were interested, in this paper, only in journals with a broad range of topics in several safety areas, rather than in narrower journals focused on safety in one specific area, such as drug safety, fire safety, food safety or structural safety. We wanted to focus on broadly competing journals where an analysis of the topics covered might throw more light on their differential focus and strengths.

The data in our research were retrieved and downloaded on 17th March, 2014 from the online version of the Thomson Reuters' Web of Science (for the instructions on *how to download Web of Science data* see this article's webpage<sup>2</sup>). The Web of Science database not only has a long history with large amounts of scientific data, but also has selected the records of the world's most impactful and high quality journals into its database.<sup>3</sup> In this sort of research work, researchers almost always choose the Web of Science as their data source.

The retrieval was guided by the following search terms:

Publication Name = “full title of the journal name”,

(e.g. Publication Name = “*safety science*”)

Document Type = “article”

Timespan = 1900–2013 (This use of 1900 was because we were not certain of the timespan of availability of all the journals in the database and we wanted to get all of the data relating to them that were to be found there. In fact the earliest year found was 1969).

In total 13,028 records were obtained from the target journals; the detailed information about our data is shown in Table 1. The timespans are the periods for which the journals are indexed in Web of Science. SS did start publication as the *Journal of Occupational Accidents*<sup>4</sup> earlier than 1991, but it was not possible to merge those data with those under the SS title.

<sup>2</sup> <https://sites.google.com/site/mappingsafety/appendix>.

<sup>3</sup> For a short introduction to the Web of Science™ Core Collection see: [http://wokinfo.com/products\\_tools/multidisciplinary/webofscience/](http://wokinfo.com/products_tools/multidisciplinary/webofscience/) If a link does not work from the paper directly, please copy the link and paste into your explorer.

<sup>4</sup> There are in total 334 records, including 277 articles published in *Journal of Occupational Accidents* from 1977 to 1990. For the annual distribution of JOA publications visit <http://blog.sciencenet.cn/blog-554179-865155.html>.

<sup>1</sup> Advanced Bibliometric Methods. <http://www.cwts.nl/Advanced-Bibliometric-Methods>.

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