Identification of information sources and citation patterns in the field of reciprocating internal combustion engines

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Processes and technology of reciprocating internal combustion engines (ICE) constitute a research field whose characteristics regarding information production and diffusion are determined by multidisciplinarity, the existence of pseudo-technical literature and the influence of confidentiality on the presentation of research outputs. The objective of this study is to provide a quantitative and objective basis for the evaluation of research in this field. This has been accomplished by identifying the most productive journals and the most cited sources, using the SCI and citation analysis. From this analysis, core journals have been identified, showing that their importance in this research area does not correlate with their impact factor. Moreover, conference proceedings (particularly those published by the Society of Automotive Engineers) are shown to be the most important information source in this field.

Introduction

According to Van Raan and other authors, 1-4 competition is one of the key mechanisms of the science system. Scientists and institutions compete to be the best, for scientific reward and for allocating resources. Accordingly, researchers try to gain prestige in the scientific world by publishing their work in those journals they consider of greater quality, that is to say, those in which their research can achieve extensive diffusion and high impact. 5 For this reason, journals in each discipline or scientific sub-area must be ranked according to their importance, for both research output evaluation and academic promotion and application for research funds. 6 However, the identification of the core journals from any scientific area has been and continues to be a problem for the field expert and the bibliometrician alike.

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The first problem is to determine what is understood as a core journal since, although this can be roughly assimilated to the concept of “a journal of major importance”, the question lies in deciding objectively which parameters should be used to measure the importance of a journal, given that this importance can be evaluated from different points of view: productivity, number of citations received, impact factor, prestige of the publisher, survival, etc.\textsuperscript{7-15} This problem becomes even more critical in specific areas or fields of knowledge which, due to the fact that they are not sufficiently consolidated (emerging fields), or are comparatively small thematic areas, lack their own means to diffuse information. Even if these means exist, they do not usually have adequate visibility and diffusion and, therefore, they may not be included in citation indexes such as the Science Citation Index (SCI), nor do they appear in the journal impact rankings as the Journal Citation Reports (JCR).\textsuperscript{16-18} Research and development in the processes and technology of reciprocating internal combustion engines (ICE) are not an exception to the previous comments. This field presents, nevertheless, some singular characteristics that also influence the way in which information diffusion takes place, and therefore the access to information. In general terms, the main characteristics of this field are determined by its close links with the automotive industry. This industry has great economical importance, is highly competitive, and has a considerable social resonance. This last aspect determines the existence of abundant pseudo-technical literature, intended for automotive enthusiasts. While this specific and characteristic literature is worth investigating, it comprises not only of engine-related issues, but also other topics related to the automotive industry. Therefore, such an investigation is not within the scope of this paper, and thus not addressed here. On the other hand, the strongly competitive character of this market means that, even in publication forums which could a priori be considered as more selective or specialized, work with a clear commercial orientation and with limited scientific or technical information is published (good examples may be found, among others, in recent FISITA – Fédération Internationale des Sociétés d’Ingénieurs des Techniques de l’Automobile-Congresses\textsuperscript{19}). The reason is clear: in such cases the intention is not to share the information, but to demonstrate an advantageous position without disclosing too much information.

One of the most noticeable characteristics of research in the field of ICE is its clear multidisciplinary character, which produces certain dispersion in the information of interest for those who work in this field. In fact, there is not one journal, among the sources included in the SCI, which specifically covers the scientific literature related to this field. Even considering sources not included in the SCI, there are only two journals