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The structure and infrastructure of Mexico's science and technology☆

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Abstract

The structure and infrastructure of the Mexican technical literature was determined. A representative database of technical articles was extracted from the Science Citation Index for the year 2002, with each article containing at least one author with a Mexican address. Many different manual and statistical clustering methods were used to identify the structure of the technical literature (especially the science and technology core competencies). One of the pervasive technical topics identified from the clustering, thin

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films research, was analyzed further using bibliometrics, in order to identify the infrastructure of this technology.
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Keywords: Mexico; Science and technology; Bibliometrics; Computational linguistics; Core competencies; Research evaluation; Factor analysis; Concept clustering; Document clustering; Data compression; Network analysis; Leximancer; CLUTO; Greedy string tiling

1. Background

1.1. Country technology assessments

National science and technology (S&T) core competencies represent a country's strategic capabilities in S&T. Knowledge of country core competencies is important for myriad reasons:

a) priority technical areas for joint commercial or military ventures,
b) assessment of a country's military potential,
c) knowledge of emerging areas to avoid commercial or military surprise.

Obtaining such global technical awareness, especially from the literature, is difficult for multiple reasons:

a) Much science and technology performed is not documented.
b) Much documented science and technology is not widely available.
c) Much available documented science and technology is expensive and difficult to acquire.
d) Few credible techniques exist for extracting useful information from large amounts of science and technology documentation [1].

Most credible country technology assessments are based on a combination of personal visitations to the country of interest, supplemented by copious reading of technology reports from that country. Such processes tend to be laborious, slow, expensive, and accompanied by large gaps in the knowledge available. The more credible and complete evaluation processes will focus on selected technologies from a particular country, and provide in-depth analysis.

For the past half century, driven mainly by the Cold War, a large number of country technology assessments were performed [2–14]. The last decade has seen an expansion in focus to technologies of major economic competitors. Over the past two decades, some of the most credible of these country technology assessments have come from two organizations: World Technology Evaluation Center (WTEC—Loyola Univ) and Foreign Applied Sciences Assessment Center (FASAC—SAIC). In conducting their studies, both of these organizations would gather topical literature from the country of interest, assemble teams of experts in the topical area, have the teams review the literature as well as conduct site visitations, and have the teams brief their findings and write a final report. The studies performed by these groups remain seminal approaches to country technology assessments.

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