

Measuring Innovation Using Bibliometric Techniques The Case of Solar Photovoltaic Industry

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In this paper, we propose a suite of novel feature extraction and data analysis techniques for the elucidation of patterns and trends in technological innovation. In studying innovation, we focus on the role of public research institutions (research universities and national laboratories) in the development of new industries. More specifically, we are interested in measuring innovation through research collaborations between these institutions and the private sector.

The proposed methods are primarily drawn from the field of bibliometrics – i.e. the analysis of information and trends in the publication of text documents, rather than the contents of these documents. In particular, we seek to explore the relationship between joint publication patterns and trends, R&D funding, technology development choices, and the viability and effectiveness of industry-university collaborations.

To focus the discussions and to provide concrete examples of their applicability, this study will have an initial emphasis on the solar photovoltaic (PV) sector in the U.S., though the techniques and general approach devised here will be applicable to a broad range of industries and situations.

While our investigations are still preliminary, we believe that the results, which are presented and discussed in detail, indicate that interesting information and conclusions (from a technical and policy perspective) can be derived from this line of analysis. In particular, there appears to be an association between collaborative research (university-industry, national research laboratory-industry) on solar PV technologies and R&D spending on renewable energy research, though further studies will be needed to validate and confirm these findings. Nevertheless, this outcome is already useful in improving our general understanding of the efficacy of R&D spending on innovation. The results obtained using our data extraction techniques, will also help to identify early technology focus in different areas within solar PV technologies, and to determine potential technology pathways, which are critical for innovation policy in the renewable energy domain. In addition, in-depth analysis will identify whether there is a geographical or

institutional concentration of collaborative research, with important implications for regional innovation systems and economic development.