



SciVal

Mapping VTT's publications and activity regarding SDGs

Using SciVal to help measure impact and VTT's contribution to solving the world's largest challenges.

VTT Technical Research Centre of Finland (VTT) is on a journey to solve our world's largest challenges. For a number of years, VTT has focused on strategic lighthouses representing our understanding of the large missions needing to be solved to ensure a sustainable future. The Quantitative Science and Technology team have expanded the understanding of Finland's technological and knowledge production patterns. Utilizing advanced analytical methods such as natural language processing and network analysis, national level historical, technological and scientific work was clustered into major topics of interest (see Figure 1).

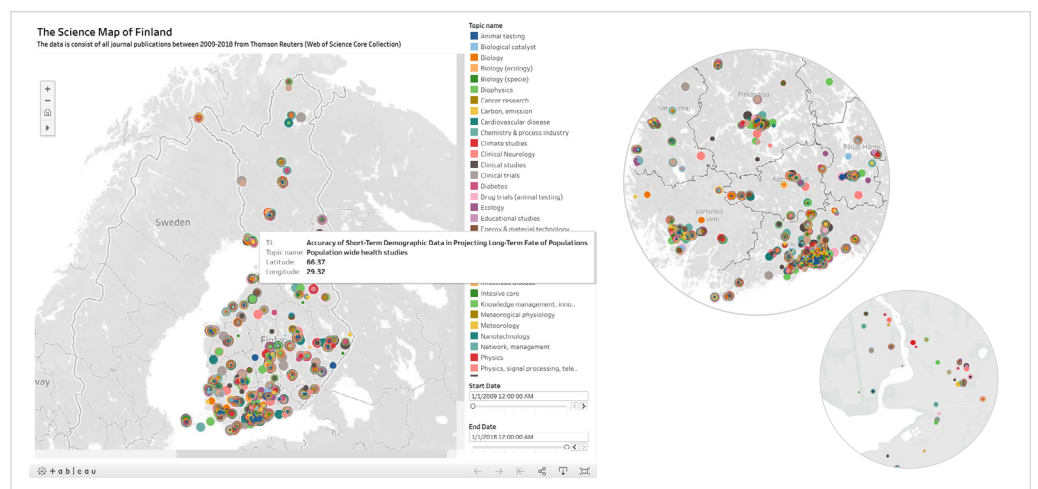


Figure 1: Example illustration from Finland's Science and Technology map. Nodes represent a scientific or technological invention a Finland-based author was involved in (1997–2018)

While the national science and technological map helps to benchmark various regions and perform comparisons longitudinally and across disciplines, a bigger picture was still needed for larger scale comparative international studies.

Furthermore, while it is possible to highlight individual success stories, research is often a slow process and we need to measure success more broadly. For this, VTT chose to look at the United Nations (UN) Sustainable Development Goals (SDGs) and turned to Scopus and SciVal to help to get a broad perspective.

Background

There are many SDG indicators and indices already developed and new metrics will certainly continue to appear. While most of the indicators are on a country (macro) level, we are advancing the practice of identifying individual organizations and their contributions to SDGs (micro level). There is a bold emphasis on scientific excellence in the form of research and development or science, innovation and technology activities addressing the SDG goals and targets expressions. This implies the necessity to get an idea that to what extent the research

and technology developed in our societies is contributing to the goals.

One of the main ways to scientific and technological excellence is happening through scholarly written works and academic peer reviewed literature.

There are databases that index and host these scholarly outputs at a global scale. At VTT we have advanced on mapping regional and national science topical formation. Yet the perspective over a large sample for comparative purposes is always an advantage.

“The pre-defined SDG Research Areas in SciVal allowed us to identify who was doing what with regard to the SDGs.”

—Dr Arash Hajikhani, Senior Data Scientist, VTT



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In this study, we used Scopus as one of the leading databases in the market, and SciVal, an analytical solution which has achieved data harmonizations and normalization on a large scale through being built on a foundation of high-quality Scopus data. In particular, we utilized the pre-defined SDG Research Areas in SciVal to identify who is doing what in regard to SDGs and explored VTTs relative national activity related to SDG goals and targets.

Challenge

In research, one of the main outcomes of activities is scientific publications, which can therefore serve as a natural proxy for the contributions of organizations to areas such as the SDGs. Publications are a practical proxy, particularly in the case of Research and Technology Organizations (RTOs) such as VTT as publications serve as reports of intermediary steps towards the application and later commercialization of research.

VTT plays a key role in national and international innovation partnerships and has for years been the most active Finnish participant in EU-funded research projects. But how has the research by VTT contributed to progress around the SDGs?

Solution and results

The team at VTT turned to Scopus and SciVal to help map and understand the trends in SDG related outputs over the past decade and VTTs contribution. **Figure 2** illustrates the output activity rate for each SDG category where the rates are normalized to show the general activity trend.

It is evident from the figure that overall activity by scholarly output measure was decreasing since 2010 and moderately started to increase after 2015 (dotted line represents the average activity).

Turning attention to VTT, the overall number of publications between 2009–2018 is about 9,200 records of which 1,700 can be categorized as being relevant to SDGs. **Figure 3** illustrates the distribution of these publications across the SDGs.

Without adjustments on organizational size, VTT's position on some of the SDGs is among the top seven positions nationwide (e.g. SDG 7 3rd, SDG9 4th, SDG 11 7th, SDG 12 4th).

Looking at the trends in VTT's publication activity related to SDGs (**Figure 4**), we observed a cyclical behavior with a sharp increase in activities in the most recent years, particularly around SDG 8 and SDG 15 (bold line shows overall average activity for all VTT SDG related publications).

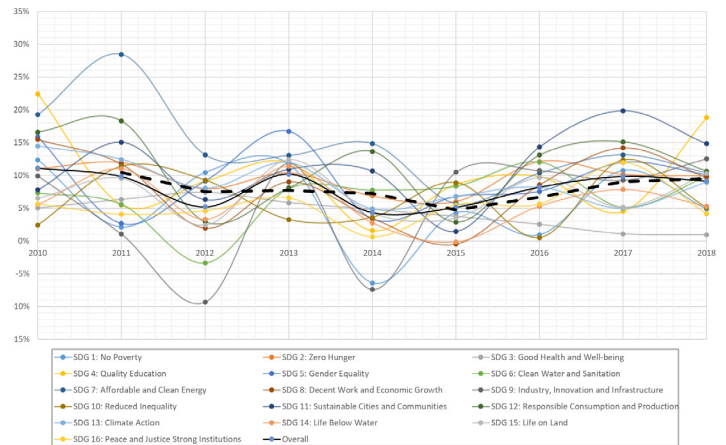


Figure 2: Growth rate of outputs related to 16 SDGs (2010–2018)

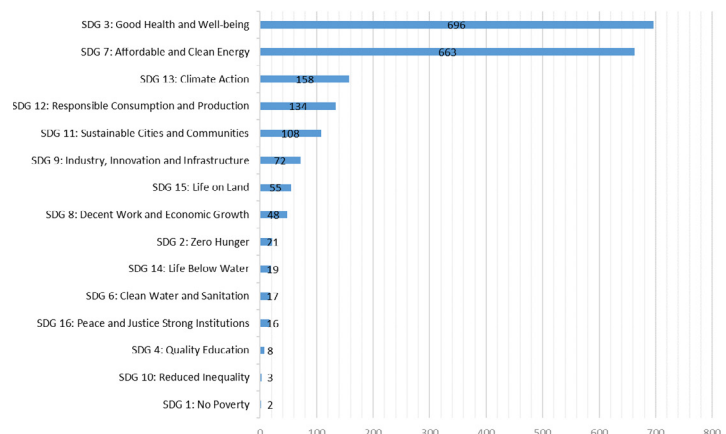


Figure 3: Distribution of VTT's publications (2009–2018) across the SDGs

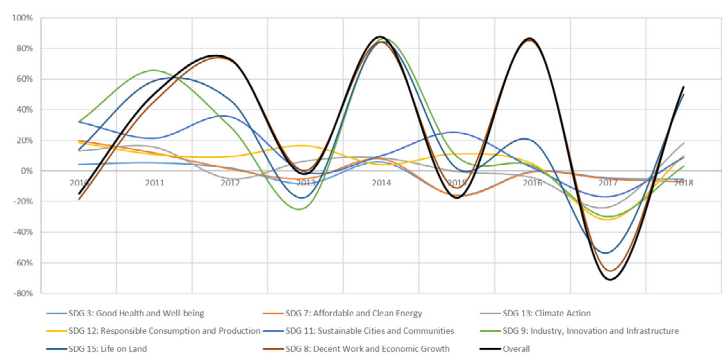


Figure 4: Trends in VTT publications activity related to SDGs



"SciVal is supporting us with the comprehensive use of our Science, Technology and Innovation metrics and validates our contribution on a wider scale."

—Dr Arash Hajikhani, Senior Data Scientist, VTT

Using SciVal Topic Prominence in Science to gain another view of SDG related research

Looking across the entire citation network of Scopus from 1996 onwards, SciVal breaks the network into roughly 96,000 Topics* and 1,500 Topic Clusters. Figure 5 shows the almost 600 Topic Clusters VTT contribute to. On a macro level, Topic Clusters indicate the breadth and depth of scientific activities across disciplines.

Topic Clusters can however, also offer insights into micro level analysis when combined with comparisons on institutional, national and global perspectives.

The detail and granularity of research Topics is inspiring in many ways with one of them being the ability to aggregate articles in new ways to different subjects (SDGs being one example subject area) in order to get valuable insights.

The Sustainable Development Goals are the blueprint to achieve a better and more sustainable future for all. SciVal is helping us to understand and use our Science, Technology and Innovation metrics and validates our contribution on a wider scale.

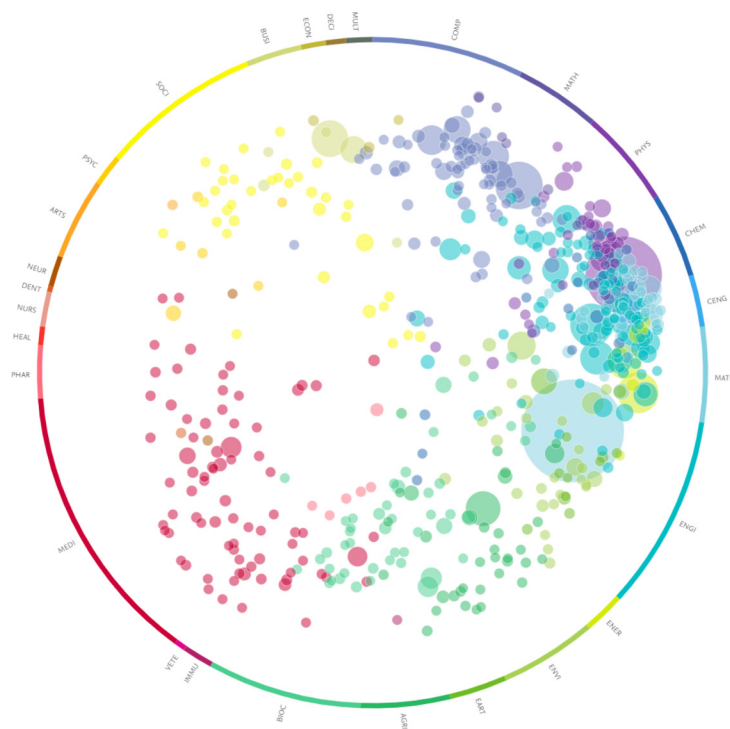


Figure 5: Overview of the Topic Clusters VTT contribute to

*A Topic in SciVal is a collection of Scopus publications with a common, focused intellectual interest. We take the entire citation network – over 1 billion citation links between 48+ million Scopus-indexed documents from 1996 forward and an additional 20+ million non-indexed documents that are cited at least twice. A Topic is then created where the linkages within the citation network are strong and the linkages outside these Topics are weak. Only the indexed documents are included in Topics and there are roughly 96,000 Topics and 1,500 Topic Clusters.

More Information

See Arash Hajikhani's presentation "VTT's scientific publication and its activity regarding SDGs" online. [View webinar](#)

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