



# Mapping research trends in Bioeconomy: Insights from bibliometric analysis

Amangeldiyeva Birganym\*, Bilan Svitlana  
\*Al-Farabi Kazakh National University  
Rzeszów University of Technology

## Introduction

In recent years, the concept of bioeconomy has emerged as a pivotal driver for sustainable development, offering a pathway towards a more resilient and environmentally friendly economy. Bioeconomy encompasses the sustainable production, conversion, and utilization of biological resources to meet societal needs while minimizing environmental impact. This transition towards a bio-based economy holds promise for addressing global challenges such as climate change, resource depletion, and food security, while also fostering economic growth and innovation.

In this study, we employ bibliometric analysis as a powerful tool to comprehensively examine the landscape of bioeconomy research. Bibliometric analysis offers a systematic approach to mapping and analyzing scientific literature, providing insights into the trends, patterns, and dynamics within a specific field. By leveraging open-source bibliometric tools, we aim to conduct a thorough examination of the scholarly literature related to bioeconomy, enabling us to identify key themes, influential authors, and emerging areas of interest.

The research questions are the following:

RQ1: To identify key themes and topics within bioeconomy research.

RQ2: To analyze patterns of collaboration among researchers and institutions in the field.

RQ3: To assess the impact and visibility of bioeconomy research through citation analysis.

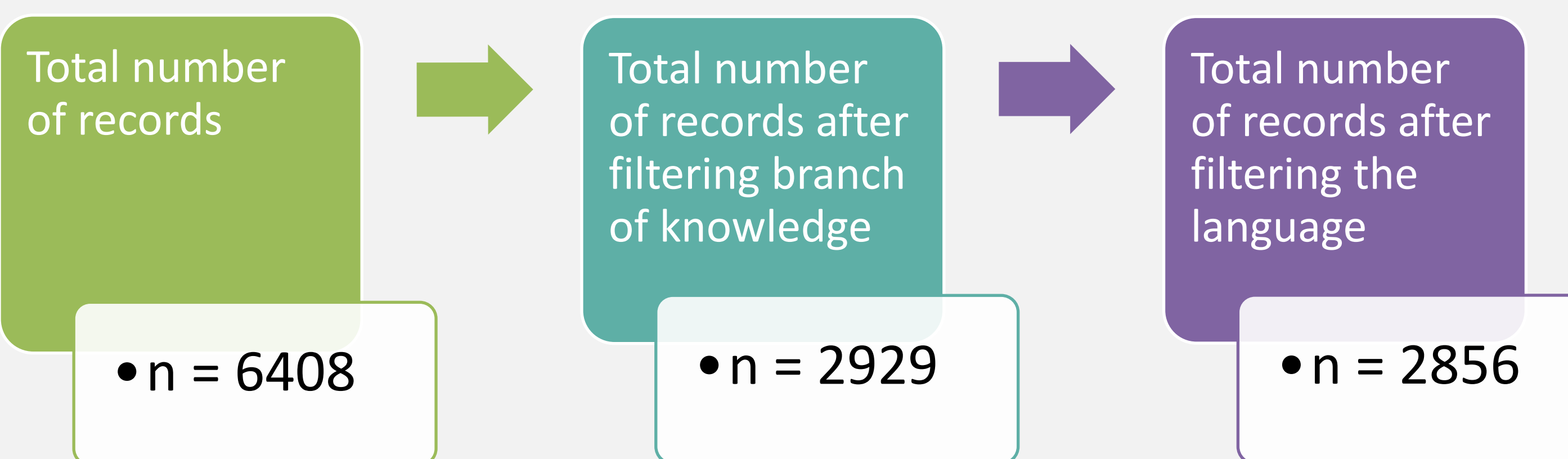
The bioeconomy, a sustainable economic model, is being implemented globally through the use of green technologies to convert biomass into biofuels, biochemicals, and biomaterials (Sillanpää, 2017). This paradigm is based on the balanced and sustainable use of renewable biological resources, with biotechnology playing a central role (Aguilar, 2019). The development of the bioeconomy is underpinned by investment in biological capital, organizational trends, and policy configuration (Keswani, 2020). It is a key component of the circular economy, aiming to minimize waste and maximize local added value (Jokinen, 2020). Also, the bioeconomy model is seen as a key component of future sustainable development, with the potential to address urgent problems such as resource competition and climate change (Ipate, 2015). However, the pursuit of rapid economic growth in developing nations may lead to unsustainable levels of consumption and pressure on natural resources (Ufrj, 2008). The UN Sustainable Development Goals (SDGs) are proposed as a valuable platform for advocating for a basic income, which could provide security in an increasingly unstable world (Smith-Carrier, 2024). Bibliometric analysis provides a systematic and quantitative approach to examining scientific literature, enabling researchers to identify trends, assess the impact of research outputs, and uncover emerging areas of interest (Miao et al., 2022).



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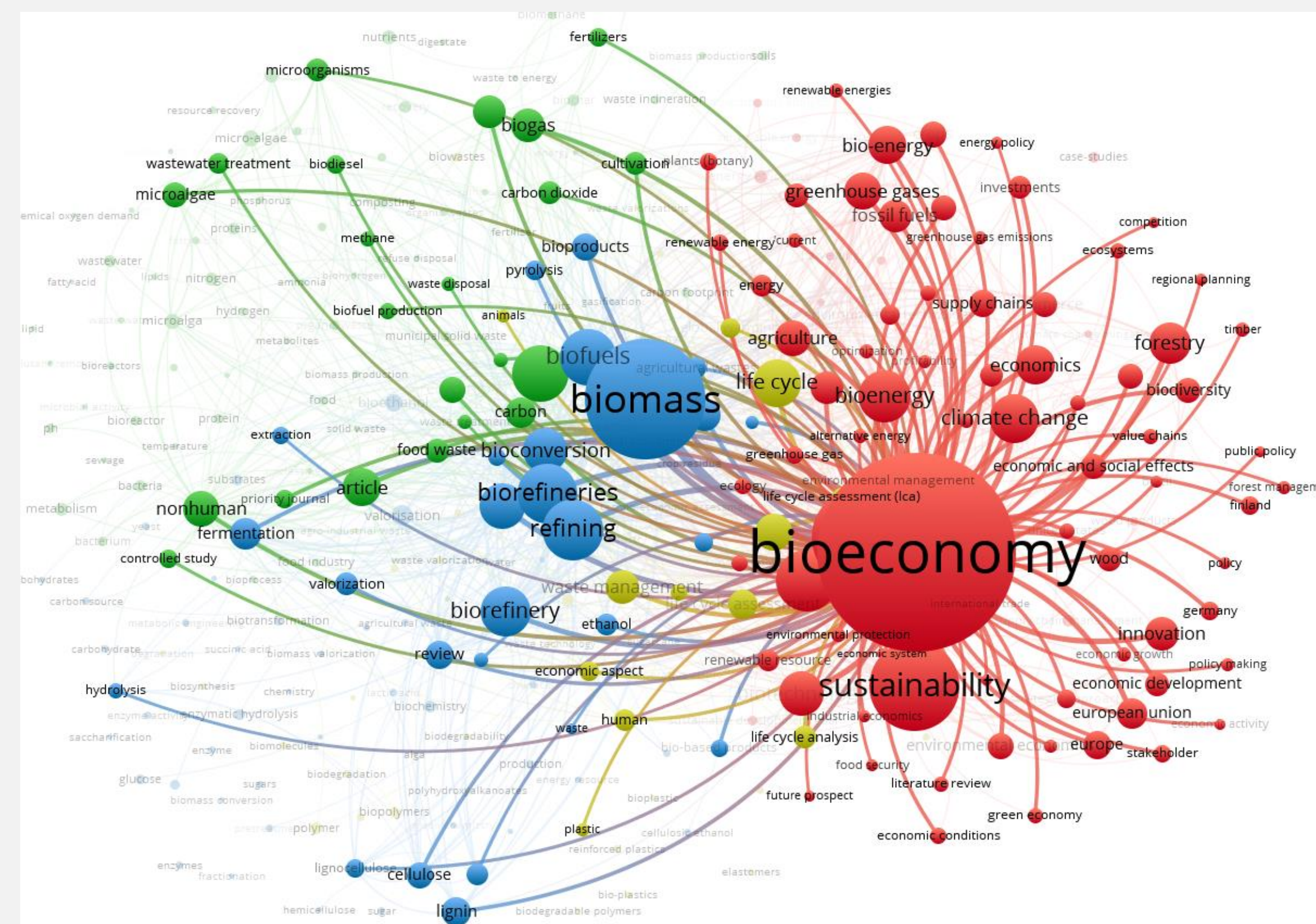
## Methodology

We conducted a bibliometric analysis using the Scopus database to map research trends in the bioeconomy domain. The search was conducted using one primary keyword: "bioeconomy". We utilized VOSviewer, a bibliometric analysis software tool, to analyze the retrieved dataset. VOSviewer enabled us to visualize and explore the co-occurrence patterns of terms within the literature, identifying clusters of closely related research topics. Limitations: It's important to acknowledge potential limitations, such as the scope of the chosen keywords and the reliance on Scopus database, which may not encompass the entirety of bioeconomic research. Nonetheless, the methodology provided valuable insights into the current state and trends of research in the bioeconomy domain.

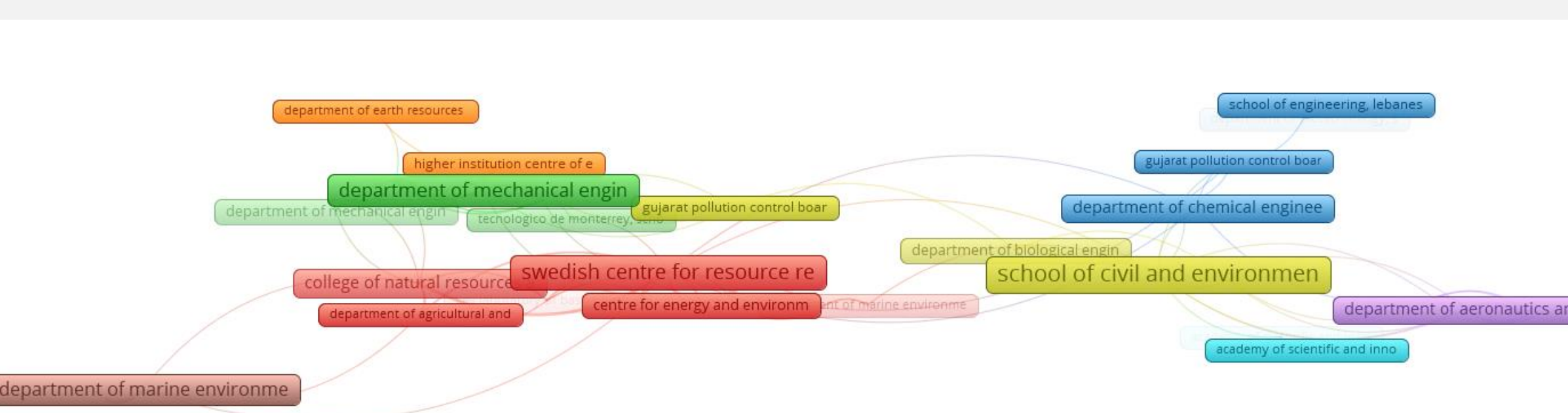
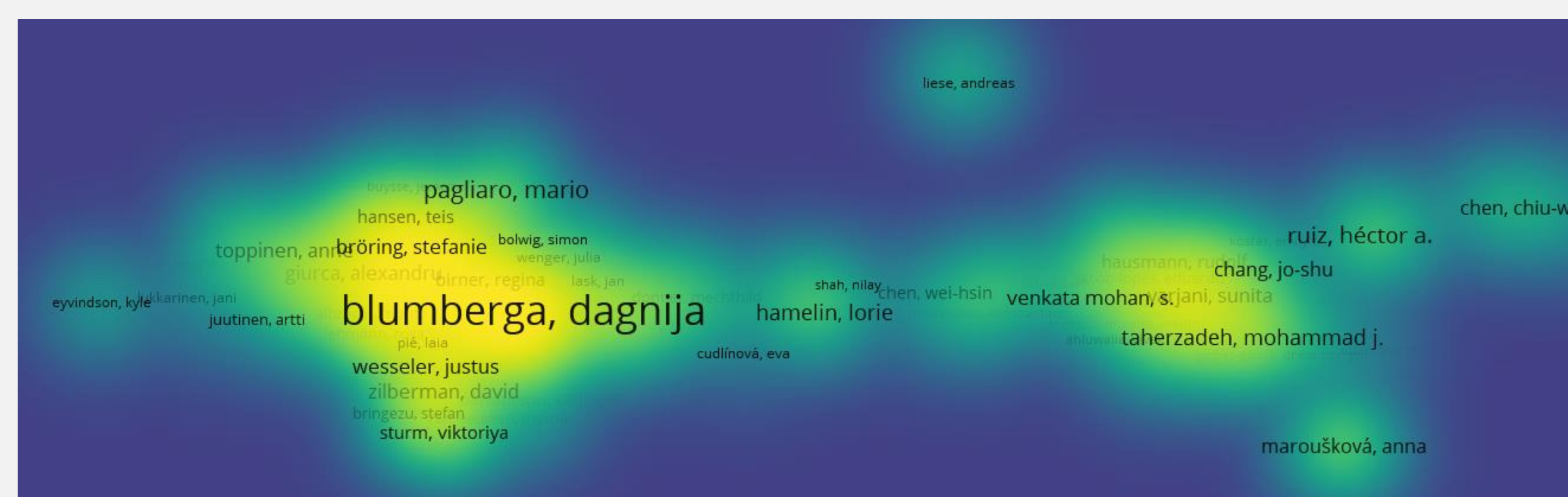


## Findings:

RQ1:

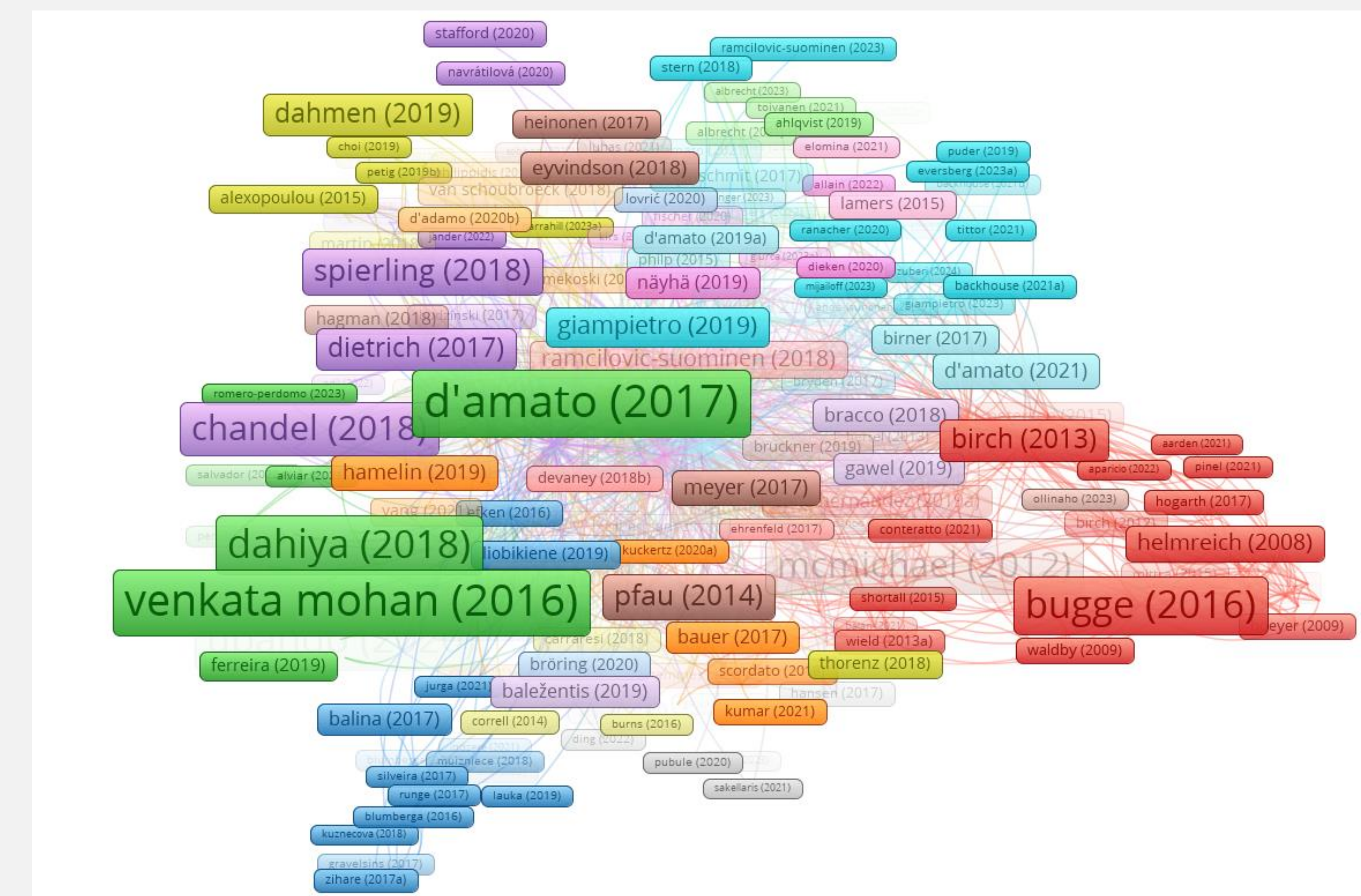


RQ2:



## Results

RQ3:



## Main conclusions

After conducting a comprehensive analysis using VOSviewer, we gained valuable insights into the landscape of bioeconomy research. Through bibliometric analysis, we identified key research themes, concepts, and trends within the bioeconomy domain.

The cluster of keywords revealed a strong emphasis on biomass utilization, sustainability, circular economy, and renewable energy, reflecting the multifaceted nature of bioeconomic studies.

Furthermore, the examination of collaboration patterns among authors and institutions shed light on the global network of research partnerships and highlighted prolific contributors to the field. Institutions such as the College of Natural Resources and Environment, Northwest A&F University, and the Department of Aeronautics and Astronautics, National Cheng Kung University emerged as leaders in bioeconomy research, garnering significant citation counts and recognition for their contributions.

Lastly, the citation analysis demonstrated the impact and visibility of bioeconomy research through highly cited papers authored by scholars such as D'Amato, Venkata Mohan, and Scarlat.

These findings collectively underscore the importance of bioeconomy research in addressing pressing environmental and economic challenges and highlight the need for continued investment and collaboration in this critical field. In conclusion, our analysis emphasizes the interdisciplinary nature and global significance of bioeconomy research. It provides valuable insights to researchers, policymakers, and industry stakeholders striving towards a sustainable and resilient future.