

## Leading Innovation through Speech: A Sentiment-Based Analysis of EU Innovation Strategies

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### Abstract

Innovation represents a cornerstone of competitiveness and growth in today's complex global landscape. While the European Union has positioned itself as a strong advocate for innovation, less attention has been paid to how its leaders communicate this agenda and frame strategies for fostering innovation. This study conducts a sentiment-based analysis of three key speeches: Ursula von der Leyen's 2021 inauguration speech of the European Innovation Council, Iliana Ivanova's 2024 Research and Innovation Week speech, and the Ekaterina Zaharieva's 2025 Research and Innovation Days speech. Using Python-based tools, the analysis applies keyword frequencies, polarity-subjectivity indices, and the NRC Emotion Lexicon to capture the tone and emotional framing of these speeches. Findings show consistently positive and future-oriented speech, with trust and anticipation as dominant emotions. Variation emerges by role: presidential speeches emphasize credibility, commissioners' speeches highlight inclusivity and inspiration, balance optimism with caution. The study demonstrates how sentiment analysis enriches understanding of innovation communication, positioning speeches as strategic tools for sensegiving, legitimacy-building, and EU identity construction.

**Keywords:** Innovation, sentiment analysis, European Union, python, speech.

**JEL classification:** A10, M00, O30.

### Introduction

Innovation is a driving force on which the evolution of humankind relies on. It represents a key aspect of the progress of numerous areas in society and in today's interconnected world, innovation has become more critical than ever. It fuels economic development to adapt to evolving needs. Innovation holds the key to shaping a brighter, more resilient future. As we face global challenges the importance of fostering a culture of innovation cannot be overstated. The European Union has recognized the vital importance of innovation in shaping its future and by prioritizing this topic, the Union not only will drive its economic recovery but also will position itself as an organization which embrace technological advancements.

Over the last decade, the EU has invested heavily in innovation programs, underscoring its ambition to position itself as a global leader in science, technology, and innovation. Yet beyond the material dimensions of funding and policy, the way innovation is communicated and framed by political leaders plays a critical role in shaping perceptions, mobilizing stakeholders, and legitimizing strategic initiatives. Political speeches are not only ceremonial acts, but they are also discursive tools through which leaders articulate visions, construct identities, and inspire collective action.

While the importance of innovation for economic and policy outcomes is widely acknowledged, less attention has been paid to the rhetorical and emotional dimensions of innovation speech in the EU. Political communication research has long established that tone, emotion, and framing influence public perception and policy legitimacy (Marcus et al. 2004); (Entman 2003). Leaders' speeches are understood as instruments of sensegiving, shaping how stakeholders interpret strategic priorities (Gioia and Chittipeddi 1991). Yet little work has

systematically examined how EU leaders frame innovation discursively, or how emotions such as trust, anticipation, and joy are mobilized to strengthen legitimacy and foster stakeholder engagement. The present study addresses this gap by analyzing three key EU speeches on innovation: Ursula von der Leyen's 2021 address at the inauguration of the European Innovation Council, Iliana Ivanova's 2024 opening speech at the European Research and Innovation Week, and the Ekaterina Zaharieva's 2025 European Research and Innovation Days opening speech. By applying sentiment analysis to these speeches, this study makes three contributions. First, it extends research on innovation management by showing how communication serves as a strategic resource, not only framing policies but also branding innovation as part of the EU's collective identity. Second, it contributes to leadership and speech theory by demonstrating how emotional framing functions as sensegiving, shaping legitimacy and stakeholder alignment around innovation agendas. Third, it advances methodological innovation in management and marketing research by applying sentiment analysis to promote political communication, offering an approach to studying how rhetoric and emotion combine to promote innovation. In political science, sentiment analysis has been used before to study parliamentary debates, electoral speeches, and media coverage, offering scalable insights into how leaders construct narratives and how these narratives resonate with audiences. Overall, the selected speeches represent a clear statement of Europe's intention to lead in innovation and position itself as a global hub for new technologies and sustainable solutions. It serves as both a declaration of ambition and a call to action, demonstrating the EU's dedication to fostering a thriving innovation culture through strategic investments and partnerships.

The paper is structured as follows: in the first part the literature review content is addressed by highlighting relevant authors, scientific articles and their relevant ideas and thoughts about the current topic of discussion. In the second part, the methodology of the research together with the analysis and the results interpretation are done. In the end, conclusions are summarized.

Hence, the current study focus primary on two research questions:

1. In what ways do EU leaders use sentiment and emotional framing in their speeches to construct innovation as a strategic priority and a collective European identity?
2. To what extent do patterns of tone, emotional emphasis, and rhetorical framing differ across institutional roles and event contexts within EU innovation speech?

## 1. Literature review

The concept of innovation creates a relevant topic in today's research environment which is researched by numerous authors. Besides the attractiveness of this subject, there is still a need to investigate deeper the connection between innovation and the European Union. Innovation is seen as "an outcome emphasizes output" (Kahn, 2018). In compliance with Oslo Manual (2018), innovation is defined as "a new or improved product or process (or combination thereof) that differs significantly from the unit's previous products or processes and that has been made available to potential users (product) or brought into use by the unit (process)" (Oslo Manual, 2018. p.20). This definition highlights that innovation can apply to products, services, or processes, and it must involve a significant improvement over what previously existed. It also emphasizes the necessity for implementation and the fact that an innovation must be put into use or made available for others. In the view of Jegerson et al. (2024), an innovation culture is represented by an organization ability to create an environment in which values, beliefs and practices foster innovation. Economic growth is affected by the development of innovation which creates the basis for long-time survival of any organization (Tsegaye, Su and Malik, 2020). In their papers, authors Hanifah et al. (2019) and Kuhn and Bhatiasevi (2024) concluded that there must be a continuous innovation environment. The

authors Pelkmans and Renda (2014) highlights that European Union should provide greater space for innovation through smooth policies for facilitating the development of innovation projects along with better interaction between innovation and regulatory frameworks.

In this context, the European Council represents the main European body delegated to deal with innovation which was launched on 18 March 2021 (European Commission, 2021). At the opening inauguration, the President of European Commission, Ursula von der Leyen highlighted the European Union's engagement to promote, support, and fund innovative activities.

European Innovation Council (2025) defines its activity as "Europe's flagship innovation program to identify, develop and scale up breakthrough technologies and game changing innovations". Moreover, it provides funding for individual companies through both grants and investments for fostering innovation related projects. According to European Association of Innovation Consultants (2021), European Innovation Council have a budget exceeding €10 billion for 2021–2027. This budget focuses on three primary funding schemes: Pathfinder, Transition, and Accelerator which are aimed to support high-risk, high-impact innovations. Based on The European Innovation Council Impact Report (2023), the council funded over 100 investments in deep tech companies which ended up in the creation of 1686 unique innovations generated from EIC research projects for start-ups and SMEs. In addition, the European Innovation Council Impact Report (2025) states that through the Council, it was completed over 150 investment rounds in start-ups and SMEs and generating new technologies in amount of over 1300 innovations.

The most recent document from the council, European Innovation Council Work Programme (2024) highlights the continuous support in 2025 for European Union members in relation to innovation. The main industries that are targeted to be funded in 2025 are: green and sustainable technologies, digital and deep tech, space industry, advanced materials and manufacturing, healthcare and life sciences. Besides funding schemes, the Council also focuses on mechanisms aimed at sustaining the development of innovation in the European Union through business acceleration services which includes coaching, mentoring, access to investors, and expertise as well as innovation prizes that recognize outstanding achievements, such as the European prize for women innovators.



*Fig 1. Funding sources of EIC*

Source: The European Innovation Council Impact Report, 2023.

From a theoretical standpoint, this study makes three contributions. First, it extends sensegiving theory Gioia and Chittipeddi (1991) to the context of innovation policy, showing how leaders employ positive emotions, particularly trust and anticipation, to legitimize strategic initiatives. Second, it supports insights from Affective Intelligence Theory Marcus et al. (2004), demonstrating how enthusiasm mobilizes support, while limited references to fear and risk introduce vigilance. Third, it contributes to place branding literature Anholt (2007); Kavaratzis and Hatch (2013), illustrating how EU innovation speech functions as a branding exercise that reinforces Europe's identity as a global innovation leader.

## 2. Methodology

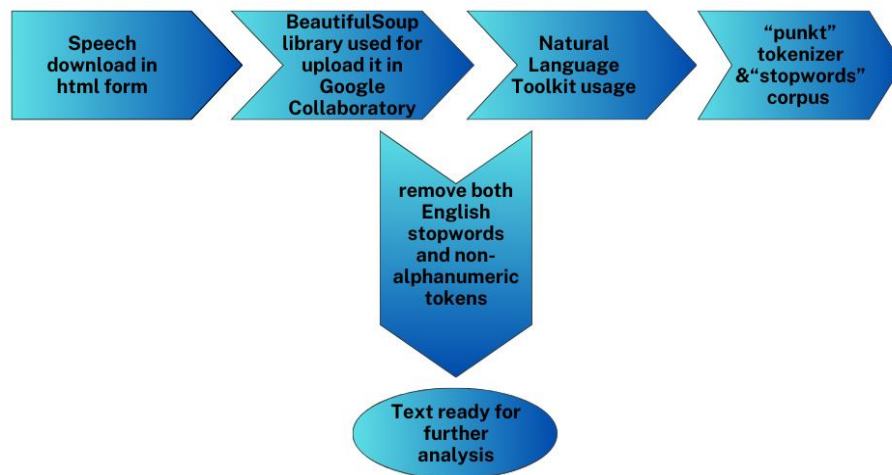
The primary goal of this study is to examine how EU leaders strategically employ sentiment and emotional framing in their speeches to construct innovation as a collective European priority, and to compare how these rhetorical patterns vary across institutional roles and contexts. In order to fulfil this aim, this study adopts a qualitative method approach, applying computational text analysis techniques to leadership speeches on innovation in the European Union. The design follows the logic of comparative speech analysis, in which speeches are treated as case studies of strategic communication, while sentiment analysis provides systematic quantification of tone, polarity, and emotional content. This combination allows for both interpretive depth and replicable measurement, consistent with recent calls for methodological innovation in management and marketing research. This approach enables the identification of variations linked to institutional roles and event contexts, thereby situating sentiment patterns within broader discursive practices of EU innovation communication.

The analysis is performed over three relevant speeches: speech of President of the European Commission, Ursula von der Leyen at the European Innovation Council Launching Ceremony from 18<sup>th</sup> March 2021, speech of Iliana Ivanova, European Commissioner for Innovation, Research, Culture, Education and Youth from the Research and Innovation Week 2024 and speech of Ekaterina Zaharieva, EU commissioner for Startups Research And Innovation from the Research & Innovation Days 2025. These speeches were selected based on three criteria: direct relevance to innovation policy and strategy, delivery by leaders with institutional responsibility for innovation, and official publication by the European Commission. All texts were retrieved from the European Commission's Press Corner and related archives to ensure accuracy and authenticity.

Sentiment analysis is seen as a part of a larger area of opinion mining which is aimed at creating a classification of texts according to the emotion that the text appears to generate (Tonkin, 2016). This kind of analysis classifies the text based on "positive, negative and neutral classifications" (Tonkin 2016). In order to achieve that, Python software is used as the main tool for conducting the analysis. Python illustrates a programming language which is viewed by many researchers, including Kaur and Sharma (2020) as a powerful tool for calculating polarity of sentiment and analyzing the emotional tone of the speech. Python code was generated using Google Collaboratory service.

Furthermore, certain steps were needed in order to prepare the text for further analyzation. The speeches were downloaded from the official webpage of the European Commission under the form of a html page. Under the Python code, the html pages were uploaded to the Google Collaboratory page and parsed its content using the BeautifulSoup library. Then, the textual content of all paragraph elements was extracted into a single string for future textual analysis. Afterwards, the Natural Language Toolkit was utilized to download and access essential linguistic resources, including the "punkt" tokenizer for segmenting text into words and sentences, and the "stopwords" corpus for identifying common, non-informative words. The last step was to remove both English stopwords and non-alphanumeric tokens, thereby isolating meaningful lexical items for further linguistic or computational

analysis. The remaining meaningful words were then analyzed by focusing on frequency distribution of words, polarity and subjectivity index and NLP libraries. Based on these steps, the text is ready for analysis as presented in Fig. 2.

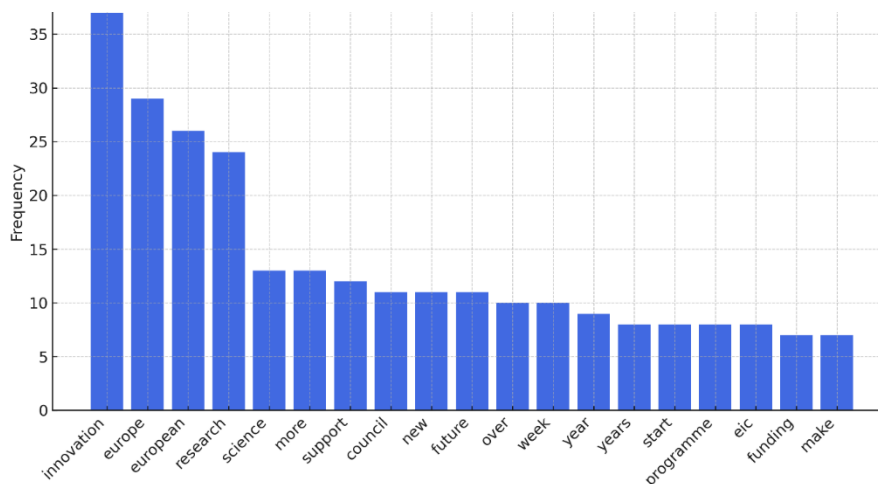


*Fig. 2. Speech processing*

Source: Author's own research.

### 3. Results and discussion

With the aim of answering the two research questions of this paper, the following analysis has been performed. The remaining meaningful words were analyzed through a frequency distribution computed by NLTK's FreqDist class. It was executed to find key themes and focus points on the three speeches based on frequency words.



*Fig.3. Frequency distribution of keywords*

Source: Author's own research based on Python generation.

The 20 most common words were visualized using a bar plot generated with Matplotlib, providing a quantitative representation of lexical prominence within the text. The x-axis lists the selected words, and the y-axis counts how many times each word appeared in the analyzed text. Based on Fig. the frequency distribution of keywords across the speeches confirms the centrality of “innovation,” “Europe,” “research,” and “European” as dominant terms. This lexical pattern reflects the linking of innovation to European identity and research capacity.

Moreover, terms such as “technology,” “digital,” “future,” and “together” reinforce both the strategic focus on digital transformation and the rhetorical framing of innovation as a collective European project. This strategy aligns with place branding theory of Anholt (2007); Kavaratzis and Hatch (2013) where speeches serve as branding instruments that construct Europe as an innovation hub. By repeatedly linking innovation with “Europe,” leaders contribute to shaping a collective identity and promoting the EU’s competitive positioning globally.

The sentiment analysis was conducted using Python-based NLP libraries (VADER, TextBlob, and the NRC Emotion Lexicon) to systematically assess polarity, subjectivity, and emotional tone in the speeches. The polarity index measures the positivity or negativity reference of the speech. The value ranges between -1 which means very negative and +1 which means very positive. The sentiment analysis revealed a predominantly positive and optimistic tone across all three speeches, consistent with the rhetorical function of innovation speech in the European Union. Average polarity scores ranged between 0.21 and 0.28, with Ursula von der Leyen’s 2021 inauguration speech exhibiting slightly lower polarity (0.21) compared to Iliana Ivanova’s 2024 opening address (0.28). The higher positivity in the latter reflects a celebratory framing of innovation as central to Europe’s recovery and future competitiveness.

Subjectivity scores ranged from 0.37 to 0.44, indicating a moderately subjective tone across speeches. Ivanova’s address showed the highest subjectivity, which aligns with her rhetorical emphasis on inspiration, encouragement, and the mobilization of young researchers and entrepreneurs. By contrast, von der Leyen’s speech demonstrated a more balanced style, combining visionary optimism with factual references to funding instruments and institutional commitments.

**Table 1. Polarity and Subjectivity Index**

Speech ID	Mean Polarity	SD Polarity	Mean Subjectivity	Trust Density	Anticipation Density	Joy Density	Fear Density
Speech1(von der Leyen)	0.21	0.11	0.37	0.42	0.38	0.18	0.05
Speech2(Ivanova)	0.28	0.14	0.44	0.40	0.41	0.20	0.04
Speech3(Zaharieva)	0.24	0.12	0.40	0.39	0.36	0.17	0.06

Source: Author’s own research based on Python generation.

Analysis with the NRC Emotion Lexicon highlighted trust and anticipation as the most dominant emotions in all three speeches. These emotions were reinforced through the repeated use of future-oriented verbs “will,” “shall” and collective pronouns “we,” “our Europe”, emphasizing unity and forward-looking vision. Trust densities were high in all speeches, with von der Leyen’s address recording the strongest concentration. This emphasis on trust resonates with her role in providing institutional credibility during the launch of the European Innovation Council. Ivanova and the Zaharieva speech also relied heavily on trust language, though in a more inclusive and community-oriented framing. Anticipation densities ranged from 0.36 to 0.41, underscoring the future-oriented character of EU innovation speech. Ivanova’s speech again scored highest, reflecting her effort to inspire forward-looking engagement, while the Zaharieva adopted a slightly more cautious optimism. Joy densities were most pronounced in Ivanova’s address, highlighting its motivational and celebratory style. By contrast, von der Leyen’s and Zaharieva maintained lower but still notable levels of joy, anchoring their optimism in institutional credibility and strategic vigilance. Fear density was low overall but most visible in the 2025 Zaharieva’s speech address. This subtle use of fear language reflects the acknowledgment of global risks and external competition, particularly from the United

States and China, thereby framing innovation not only as an opportunity but also as a strategic necessity.

Von der Leyen's speech reflects the concept of sensegiving developed by (Gioia and Chittipeddi 1991), in which credibility and forward vision are mobilized to legitimize the newly launched European Innovation Council as a cornerstone of Europe's technological future. Ivanova's speech reflects an enthusiasm-framing strategy consistent with Affective Intelligence Theory developed by (Marcus et al. 2004) designed to inspire and mobilize stakeholders such as young researchers, startups, and innovators. Zaharieva's speech is indicating a more cautious emotional tone. The muted profile suggests anxiety framing, highlighting innovation as both an opportunity and a necessary response to global risks, including competition from the U.S. and China. Taken together, these findings confirm that while trust and anticipation dominate EU innovation speech, the relative balance of emotions varies by institutional role and event context.

These findings are supported by the most recent reports of the European Innovation Council, more specifically The European Innovation Council Impact Report (2023) and European Innovation Council Work Programme (2024). In terms of innovation, total Budget for 2025 outlines a total of EUR 1.4 billion allocated for funding and support across the EIC's various schemes (Pathfinder, Transition, Accelerator, and STEP Scale-Up). Moreover, the Council is directly aligned with the European Union's goals for the green and digital transitions, aiming to enhance the European Union's strategic autonomy in critical technologies. Tackling the European policies, the Work Programme for 2025 includes several initiatives, such as the STEP Scale-up call, which provides larger investments in strategic technologies such as Artificial Intelligence, clean technologies, and biotechnologies. The policy also includes measures to encourage innovation from all European Union member states which align with broader European Union policies aimed at ensuring open strategic innovation.

## Conclusions

Due to the rapidly changing and challenging environment, innovation represents an essential topic nowadays which is seen as a foundation stone for future development of the European Union. There is a need to innovate and only by keeping up with the current trends and inventions it can be secured the long-time survival of the Union. European Union understood the relevance of the subject and in 2021 the creation of European Innovation Council was the primary step in fostering a European innovative environment.

This study has examined three EU leadership speeches through sentiment analysis to uncover how innovation is communicated as both a strategic priority and a collective identity project. The analysis shows that while all speeches share a predominantly positive and future-oriented tone, differences emerge across institutional roles: the first speech emphasizes credibility and policy grounding while the other two speeches foreground inspiration, inclusivity and balance optimism with caution in response to global competition. For policymakers, these findings suggest several actionable implications in the design and delivery of political speeches. First, positivity should be balanced with concreteness: visionary rhetoric is more persuasive when supported by references to funding instruments and specific programs. Second, collective language fosters engagement: repeated use of inclusive pronouns: "we," "our Europe" strengthens perceptions of unity and shared purpose in innovation strategies. Third, acknowledging challenges alongside opportunities enhances credibility: speeches that combine optimism with references to risks and external pressures appear more realistic and strategic. Finally, adapting rhetorical strategies to institutional roles and audiences can improve effectiveness: high-level leaders such as President Ursula von der Leyen may emphasize vision and credibility, while commissioners can employ more motivational and community-oriented framing.

Limitations of the research are mainly on the chosen speeches and on the speakers view innovation view as well as the chosen type of analysis, the sentiment analysis. Although sentiment analysis is a very useful tool, it may oversimplify its tone, missing the nuance of mixed sentiments and the emotional depth of the speaker's persuasive intent. Further research can focus on an in-depth analysis of the specific work of the European Innovation Council in fostering innovation and should expand the dataset and explore audience reception to further understand how speech design influences the legitimacy and adoption of innovation strategies across Europe.

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