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Digital transformation and competition policy: analysing EU's regulatory response to emerging technologies

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Abstract
This research explores the effectiveness of the European Union's (EU) competition policies and regulatory framework in the era of swift technology development, focusing on the nexus between digitalization, competition, and competitiveness. A novel content analysis was completed using QDA Miner for 30 official EU legislative documents issued between 1985 and 2024. The text was coded based on 10 major and 25 secondary themes. Key findings demonstrate that the most frequently used terms refer to market structure, business practices, and innovation, while the most frequent codes belong to the regulatory framework, competition policy, enforcement, and industrial strategy categories. The co-occurrence, link and proximity analyses show that digital transformation became one of the main concerns of EU in terms of regulations after 2010 and, after the pandemic, it was accompanied by a sustained interest towards sustainable development after the pandemic, which align well with the twin transition – digital and environmental – in the EU.

Keywords: digitalization, technology, innovation, EU, content analysis, legislation

Introduction

Considering that the EU is one of the world's largest and most integrated economies, economic competition among the EU member states is a topic of high relevance, both theoretically and practically. This competition, however, practically manifests at the sectoral and industrial levels among companies in the EU countries and is marked by rapid changes due to digitalization, the ecological transition, and geopolitical challenges, significantly accentuated after the COVID-19 pandemic. As technological advancements continue to disrupt traditional business models and reshape economic sectors and industries, understanding their impact on competition is essential for maintaining fair competition, promoting innovation, and ensuring

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consumer welfare (Layton, 2021; Petit & Teece, 2021). The EU has long recognized the essential role of technology and competition in stimulating economic growth, in promoting innovation, and increasing the region's global competitiveness. As the world rapidly transitions into the digital age, it becomes imperative for the EU to address the complex interface between technological advancements and economic dynamics, especially considering the technological gap it has compared to the United States and China (Giordano et al., 2024). These major economies, the EU's main global competitors, are heavily investing in emerging technologies to gain competitive advantages, pressuring the EU to prioritize strategies that promote innovation, attract talent, and support the growth of innovative companies (European Commission, 2020).

The existing literature reinforces the link between digitalization, innovation, and technology in stimulating competitiveness (Bourdin et al., 2023; Calderon-Monge & Ribeiro-Soriano, 2024), and case studies at the European and global levels strengthen it (Zangiacomi et al., 2020). Nevertheless, more studies are needed to assess the implication of the existing regulatory framework in the EU in addressing emerging challenges arising from current technological disruptions. This paper has a pioneering approach and covers the identified gap by analysing 30 legislative documents, relevant at the EU level, issued between 1985 and 2024, offering a long-term perspective on regulatory changes that address the competition-technology interplay. Specifically, the research uses content analysis to corroborate the effectiveness of the EU's legislation documents linked to competition, competitiveness, technology, innovation, and digitalization. The research questions are as follows: How effective is the EU regulatory framework in confronting the challenges caused by technological disruptions, and what is the implication of competitiveness? What are the primary actions taken at EU level to mitigate the technological gap compared to the world's most significant competitors?

The paper is structured into four main sections. The literature review section proposes insights into the scholarly papers related to the topic, the second section introduces the methodological approach, the third section maps out the main results and the last section wraps-up the conclusions and provides recommendations for further research.

1. Literature review

"National competitiveness is created, not inherited. It does not grow out of a country's natural endowments, its labour pool, its interest rates, or its currency's value, as classical economists insist" (Porter, 1985). In this famous statement, Porter asserts that national competitiveness is directly linked to productivity, which, in turn, is stimulated by digitalization, innovation, and technology – perceived as catalyst forces that transform economies, societies, and industries and redefine the way companies operate globally. This idea originates in 1970, in the neo-Schumpeterian

approach that perceives technological innovation as the foundation of economic growth and, implicitly, of competitiveness (Aghion, 2018; Henrekson et al., 2023; Lester & Lester, 2003; Radosevic, 2017).

Technology is the engine of the digital revolution and is driving the creation of cutting-edge systems and solutions that impact social life, business, and government operations. Since its initial conceptualization in Germany in 2011, the term Industry 4.0 has emerged to describe the fourth industrial revolution and information and communication technologies (ICT). Although there are more than 100 definitions and concepts related to the term (Culot et al., 2020), the nature of the technologies included under the umbrella of this concept is precise: Internet of Things (IoT), Big Data, robots, cybersecurity and cyber systems, cloud systems, augmented reality, 3D printing technology, blockchain (Suleiman et al., 2022; Vaidya et al., 2018).

As Mathieu Michel, Belgian Secretary of State for Digitalization, Administrative Simplification, Privacy, and Building Regulation, argues, "To improve EU's competitiveness (...), we should foster a common European approach to innovative digital technologies striking the right balance between innovation, regulatory burden, and protection of the Union's economic security." (Council of the EU, 2024). Although policies at the European level are focused on investments that are aimed at transforming the current period into the "Digital Decade", to boost competitiveness, it is necessary to develop a common direction that addresses innovative digital technologies with a balance between innovation, regulations, and the protection of economic security (European Commission, 2023).

Numerous scientific efforts dedicated to measuring the impact of technologies have been developed due to the increasing significance of citizen's well-being - often neglected by traditional indicators such as GDP or productivity (Brynjolfsson & Collis, 2019). The performance of the digital economy is correlated with national strategies for achieving economic growth and socio-economic development. One of the most widely used indicators at the EU level is the Digital Economy and Society Index (DESI index) – an annual composite index developed by the European Commission to monitor and compare the digital performance of EU member states (Malefaki, 2023). Other measurement approaches are the Global Innovation Index, the ICT Development Index proposed by the International Telecommunication Union (International Telecommunication Union, 2009), the Digital Intensity Index (Calvino et al. 2018), and the Digitalization Index – DiGiX (Cámara & Tuesta, 2017).

Laitsou et al. (2020) have examined digitalization as a source of competitiveness with a case study for Greece. In the same vein, Marti and Puertas (2023) have analysed European competitiveness in correlation with innovation capacity and digitalization. Other works focused on the EU have analysed the influence of consumption, purchasing power, and unemployment rate on DESI (Stavytskyy et al., 2019), while Başol and Yalçın (2020) have reiterated that DESI positively stimulates the employment rate, incomes of individuals at the EU level.

An interesting approach was proposed by Bota-Avram (2024) who studied the positive and negative impact of digitalization on preventing corruption. Regarding digitalization at company level, a positive relationship has been identified between entrepreneurship and productivity, and between digitalization and entrepreneurship (Ghazy et al., 2022).

According to the definition in the Oslo Manual, "An innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations" (OECD & Eurostat, 2005).

The nexus between digitalization and innovation has recently become a topic of interest in the specialized literature. Mostaghel et al. (2022) conducted a bibliometric analysis, selecting 170 scientific articles confirming the positive impact of digitalization in stimulating efficiency and innovation. Similarly, the integration of digital technologies and human capital (considering ICT specialists) for the digitalization of a country associated with innovation has been validated, and it has been emphasized that the integration of digital technologies must be an essential matter in the European Union's strategy and policies (Hernández de Rojas et al., 2024). Other country-level studies conducted in Central and Eastern Europe analysed technological progress. They concluded that the Czech Republic and Slovenia are leaders in business digitalization, while Romania and Bulgaria recorded the worst performances (Tutak & Brodny, 2024).

The current research is positioned in this framework of digitalization, innovation and development and uniquely explores the content of documents issued by the EU and its bodies to observe the interplay between technology, competition and competitiveness. This approach is valuable in shedding light on how digitalization is shaping the competitive dynamics within the EU. By analysing these documents, the strategies and policies implemented to foster innovation and drive economic growth are better understood and a deeper connection between technology, competition, and competitiveness in the EU is revealed.

2. Research methodology

To address the research objective aimed at analysing the effectiveness of competition policies and existing regulatory frameworks in the EU in tackling the emerging challenges posed by technological disruptions, we have followed the path of a content analysis of EU policy documents. This approach permits a good understanding of the EU's vision on competition in relation to technology and digitalization through the design of specific regulatory measures and actions. By examining the language and phrasing used in these documents and the strategies outlined, we can gain insight into how the EU is amending its competition policies to keep pace with the rapid advancements in technology.

Qualitative analysis programmes for investigating legislative documents, including regulations and directives, have been successfully used in various research, such as the effectiveness of parliamentary questions with a case study at the European Parliament and European Central Bank level (Maricut-Akbik, 2020), the creation and implementation of public policies in Slovenia (Kotnik & Stanimirovic, 2021), the evaluation of ESGs (Buchetti et al., 2025; Jain & Tripathi, 2023), or corporate narratives on technology (Shehadeh et al., 2024). Likewise, qualitative software has been employed for research on protecting consumer rights to be informed before acquisition (Bălan, 2014) and circular entrepreneurship across continents (Benita & Srinivasan, 2024).

The analysis was conducted using advanced qualitative data analysis software - Provalis Research QDA Miner 6.01.11. The necessity of using QDA-type software to create a digital research workflow has risen with data sources and research documents available in electronic format. The ability to organize and analyse all documents and media files in a single textual lab leads to a more transparent and systematic process that delivers high-quality results (Konopasek, 2008). The QDA Miner analysis tool can be used to analyse interview or focus group transcripts, legal documents, scientific articles, speeches, books, as well as drawings, photographs, or other types of visual documents. Provalis Research's QDA Miner was successfully used by other researchers, such as Ropret et al. (2018), to analyse the public governance models at the EU level, or Ogrean and Herciu (2022) for the evaluation of Romania's innovation performance within the EU. Horobeț et al. (2024) also used it to assess how artificial intelligence and intelligent manufacturing theories are reflected in the business strategy and performance of large industrial corporations.

The first step consisted of collecting 30 relevant documents reflecting EU policies and regulatory frameworks in competition and sectoral strategies related to technology and innovation. The aim was to cover a noteworthy perspective on the type of articles, issuing institutions, sector, and an extended period - see Appendix 1 for details. The structure of the documents is as follows: (i) by document type: regulations (7), directives (2), reports (10), articles or treaty articles (3), case studies (2), communications and guidelines (5), and Green and White Papers (1); (ii) by issuing bodies: European Commission and European Commission – Directorate-General for Competition and Energy (17), Court of Justice (1), European Investment Bank (1), Council of the European Union (3), European Union (1) and European Parliament & Council of the European Union (7); by sector considered: general (23), transport – air (1) and freight (1), agri-food (1), digital/technology (3), and energy (1). The selected documents cover 40 years, from 1985 to 2024.

Each document was recorded as a "case" in the analysis software. The documents were saved with an order number and imported into the analysis software. The following variables were defined for each "case": the year of issuance, the type of document, the sector, the issuing institution, and a serial number.

The second stage in the analysis process relied on using QDA Miner to generate the frequency of simple words (unigrams) and compound words (bigrams). Based on the obtained results, we defined 10 major reference themes – categories and 25 secondary themes (subcategories or codes), see Table 1. Since the collected documents were written in English, the coding was also performed in English.

Table 1. Categories, codes and words for analysis

Categories and codes	Coded bigrams
1. COMPETITION POLICY & ENFORCEMENT	
Competition law framework	competition law, competition policy, competition rules, EU competition, competition policy enforcement, competition concerns, antitrust rules, competition enforcement, rules on competition, competition authorities, national competition, national competition authorities
Enforcement actions and mechanisms	enforcement action, antitrust enforcement, enforcement proceedings, effective enforcement, enforcement priorities, enforcement of competition, leniency programme, statement of objections, fines, periodic penalty, immunity from fines, sector inquiry, market investigation, information requests, fact finding, evidence gathering, investigations, penalties, commitments, binding commitments
Market power assessment	dominant position, market power, market share, market dominance, dominant undertaking, dominant platform, dominant firms, market definition, relevant market, market concentration
Anti-competitive practices	anti-competitive, restrictive agreements, cartel, concerted practices, abuse of dominance, predatory pricing, exclusive dealing, tying, price fixing, anti competitive effects
2. REGULATORY FRAMEWORK	
Legal instruments	regulatory framework, legal certainty, legislative procedure, ordinary legislative procedure, special legislative procedure, legislative acts, implementing acts, delegated acts, regulation, directive, decision
Institutional structure	European commission, European parliament, council, European council, competition authority, Court of justice, general court, national authorities, competent authorities
Regulatory process	public consultation, impact assessment, compliance, notification, enforcement, monitoring, evaluation, reporting requirements, implementation, regulatory burden, administrative burden
3. TECHNOLOGICAL INNOVATION	
Digital transformation	digital markets, digital economy, digital platforms, digital transformation, digital services, digital technologies, digital skills, digital strategy, digital future, digital era, digital sector, platform economy
Emerging technologies	artificial intelligence, machine learning, quantum computing, clean technologies, advanced technologies, new technologies, innovative technologies, breakthrough innovation, disruptive innovation, technology development, technology transfer
Innovation framework	research and development, research and innovation, innovation fund, innovation potential, innovation performance, innovation hubs, European innovation, innovative solutions, technological development, research centres, research projects

4. INDUSTRIAL STRATEGY	
Strategic planning	industrial policy, industrial strategy, strategic autonomy, strategic priorities, strategic sectors, strategic technologies, industrial base, industrial competitiveness, industrial deployment
Market integration	single market, internal market, market access, market integration, cross border, free movement, market barriers, trade barriers, regulatory barriers
Growth & competitiveness	competitive advantage, global competitiveness, productivity growth, economic growth, scale ups, start-ups, SMEs, market opportunities, business models
5. SUSTAINABILITY & GREEN TRANSITION	
Environmental Goals	green deal, clean energy, renewable energy, sustainable development, climate neutral, climate action, emissions reduction, environmental protection, circular economy
Green Technologies	clean tech, green technologies, renewable hydrogen, sustainable solutions, energy efficiency, clean energy technologies, low carbon, energy transition, sustainable innovation
6. DIGITAL SINGLE MARKET	
Digital infrastructure	digital infrastructure, broadband networks, connectivity, cloud services, network infrastructure, digital networks
Digital regulation	digital markets act, digital services act, platform regulation, data protection, digital sovereignty, online platforms, digital policy
7. INTERNATIONAL DIMENSION	
Global relations	international cooperation, international agreements, trade policy, foreign direct investment, global markets, international trade, third countries, bilateral agreements
8. CONSUMER PROTECTION & RIGHTS	
Consumer interests	consumer protection, consumer welfare, consumer rights, consumer choice, end users, consumer harm, consumer goods, public interest
Market fairness	fair competition, fair trading, market transparency, consumer information, unfair trading, unfair practices
9. STATE AID & PUBLIC SUPPORT	
Aid framework	state aid, state aid rules, state aid control, state aid policy, state aid measures, block exemption, de minimis, aid granted
Public support mechanisms	public funding, public investment, public support, financial support, government support, public resources, financial instruments, public private partnerships, recovery and resilience
10. SECTORAL REGULATION	
Financial services	financial markets, banking sector, financial institutions, capital markets, financial services, credit institutions, financial regulation
Energy sector	energy markets, energy sector, energy policy, energy efficiency, energy infrastructure, energy supply, energy security, energy transition, energy costs
Digital & tech	tech sector, telecommunications, digital services, platform economy, data economy, online services, digital infrastructure

Source: authors' representation

Subsequently, the process of coding the "cases" followed. The codes were applied to the content of all documents, and the coding was done at the paragraph level. For each code, the text identified by the analysis software was manually checked, and the selections that were not relevant (e.g., titles, bibliography sources,

and others) were removed. The authors have revised the codes in pairs of two and, afterwards, the final coding was agreed upon.

Furthermore, the selected codes were analysed based on their frequency in codes and cases — how often they were mentioned in the documents — and similarity. The similarity between codes was analysed in the form of co-occurrence between any two codes and refers to the situation where two codes appear together in paragraphs for all selected cases. For this analysis, the Sørensen coefficient was used (Albuquerque et al., 2022). In comparison to the Jaccard coefficient, which assigns equal weight for determining co-occurrences in similar paragraphs, the Sørensen coefficient is a more suitable variant because it assigns double weight. The formula for calculating the Sørensen coefficient between two codes is as follows:

$$Sorensen's\ coefficient\ (SC) = \frac{2a}{2a+b+c} \quad (1)$$

Where *a* indicates the number of paragraphs where both codes are found, *b* designates the number of paragraphs where the first code is present alone, and *c* is the number of paragraphs where only the second code is found. The similarity between codes increases with the value of the coefficient, so the higher the coefficient, the more similar two codes are.

QDA Miner allows the use of a hierarchical clustering method with average links to generate clusters from a similarity matrix. Hierarchical clustering is performed using the Sørensen coefficient. The result is presented in the form of a dendrogram, or a tree-shaped diagram. In this type of graph, the vertical axis consists of codes, while the horizontal axis represents the clusters formed at each step of the clustering process and their similarity. This analysis represents an agglomerative approach that perceives each observation as its own cluster and merges the most comparable groups until all data combine into a single group. Codes that tend to appear together are combined at an early stage, while those that are independent of each other or do not appear together tend to be at the end of the agglomeration process. For each step and for each pair of groups, the Sørensen coefficients are calculated, and then, the groups with the highest coefficient are merged.

The 2D and 3D maps are two other correspondence analysis tools for evaluating the relationships between entries in high cross-tabulation frequency tables. When the numerical codes or the number of subgroups is less than four, only the 2D Map page can be accessed. The 2D map control chart, when more than two axes have been extracted, allows the selection of all possible combinations of axes that can be graphically represented on the two axes of the diagram. 2D and 3D map commands Code groups – select, display, or hide row points (i.e., code names). This checkbox shows or hides the column points (i.e., the subgroup labels).

Moreover, we performed a link analysis which is a powerful visualization of the connections between various codes. Its objective was to identify connections between codes within documents, associated to their weights or strengths (Olson &

Lauhoff, 2019). Second, we have obtained proximity plots for several pairs of codes, which show the distance between codes based on Sørensen's coefficient. Instead of a matrix, the distance from a code to the others is exhibited on a single axis, easing the comparison between codes. Since they are based on the Sørensen's coefficient, a higher distance points to a higher similarity between codes. The results section offers more details on each of the performed analyses.

3. Main results and discussion

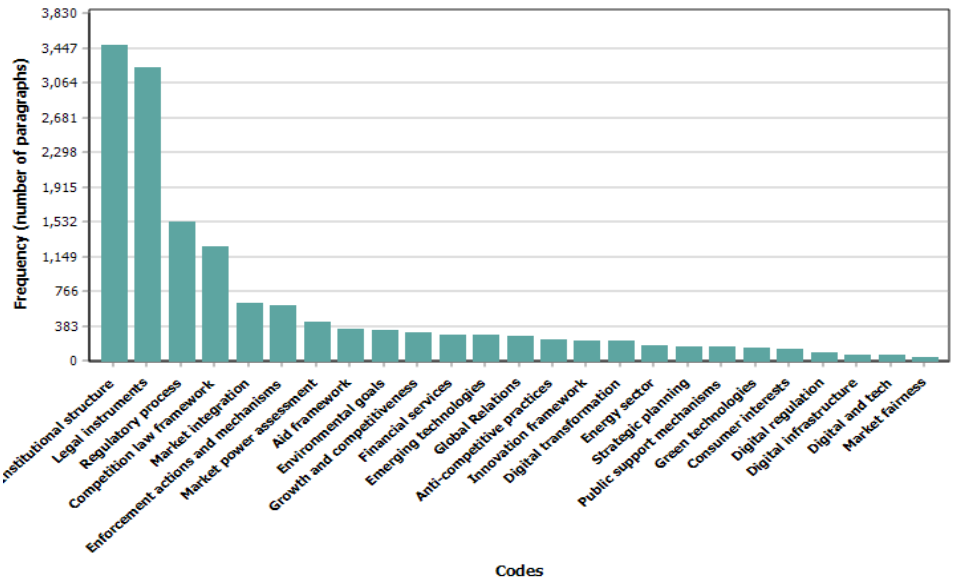
The word cloud presented in Figure 1 visually represents the most frequently used unigrams in the analysed documents, with more prominent words indicating higher frequency. The dominant unigrams are "EU" (rate of 59.4 peer 10,000 words), "European" (54.3 rate), "member" (49.9 rate), "Commission" (44.2 rate) and "article" (41.2 rate) but this is a normal result given the nature of these documents that are issued by EU bodies. "Competition" is another frequent word, with a rate of 30.8 per 10,000 words, again expected for documents focusing on regulating market dynamics and ensuring fair practices among EU entities. Furthermore, unigrams such as "market", "companies", "products", "data", and "patent" indicate attention to market structures, business practices, innovation and intellectual property. Also, the presence of "data" and "innovation" among the unigrams with high frequency indicates a growing focus of EU policy documents on digital markets and digital economy. The presence in the high-frequency category of terms like "energy", "products", "financial", "market", and "investment", which highlights competition issues across various sectors, potentially pointing to energy and financial sectors, considered as high-priority areas at EU level, is equally interesting.

Figure 1. Cloud of unigrams in documents

Source: authors' representation

Figures 2 and 3 are correlated and show which codes are the most frequently encountered as of the total number of codes, as well as the number of cases in which the codes appear. The codes related to the category Regulatory Framework are most frequently encountered in the coding process as follows: the Institutional Structure 3,485 times or paragraphs (23.7% of all codes), Legal Instruments (3,230 times or 22.0% of all codes), and Regulatory Process (1,532 times or 10.4% of all codes). The code Competition Law and Framework related to the category Competition Policy and Enforcement ranks fourth and appears 1,262 times, followed by the code Market Integration under the Industrial Strategy category with 639 appearances in all documents. On the opposite end, we observe the category Consumer Protection and Rights with its related code Market Fairness, registering the lowest frequency (38 times or 0.3% of all codes).

Figure 2. Frequency of codes in documents – number of paragraphs



Source: authors' representation based QDA Miner output

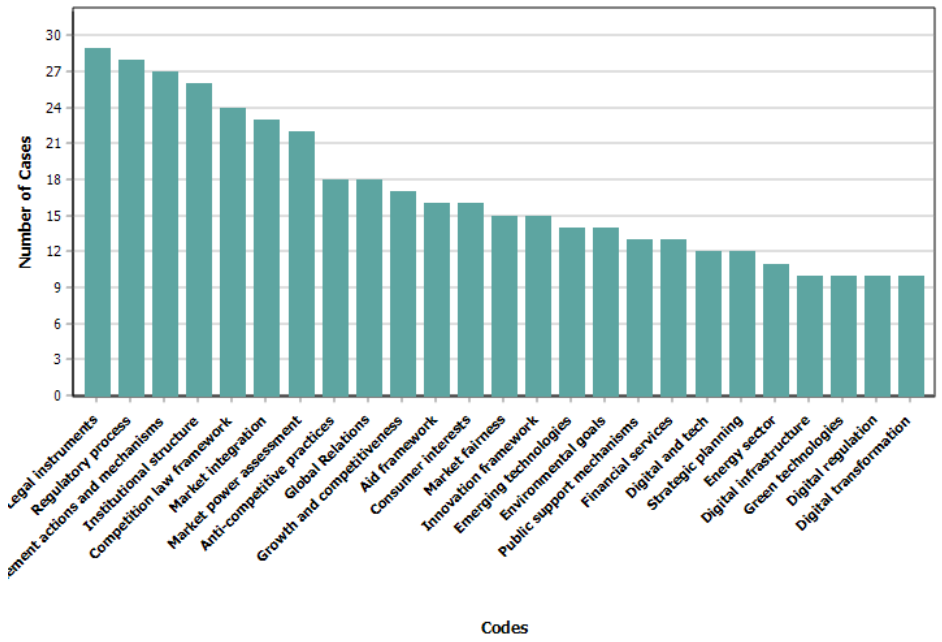
Additionally, the codes in the Sectoral regulation and Digital single market categories, appear very rarely in documents, with fewer than 100 times – Digital and tech (68 times, 0.5% of all codes), Digital infrastructure (69 times, 0.5% of all codes), and Digital regulation (89 times, 0.6% of all codes). Although this finding may be because only three out of the thirty selected documents pertain directly to the technology sector, it is concerning that EU competition policies and frameworks largely ignore technological advancements and their positive or negative role in influencing competition within the EU and in relation to third parties.

In the same line as the results illustrated in Figure 2, in Figure 3 it can be observed that almost all selected regulatory documents address challenges and directions related to the Regulatory Framework category, specifically for the codes Legal Instruments - found in 29 out of 30 cases, Regulatory process – in 28 cases, and Institutional structure – 26 cases. Besides, the Enforcement actions and mechanisms code, which belongs to the Competition and enforcement category, is present in 27 cases, while another highly frequent code in cases is the Competition law framework, found in 24 cases out of 30. Figure 3 also shows that 15 out of the 25 codes are found in more than half of the cases (at least 15); however, the codes related to the digital market are at the opposite end, being identified in approximately 10 of the cases.

The generated dendrogram (Figure 4) reveals the clusters formed among the 25 codes, based on the Sørensen coefficient (SC), as defined in Equation 1 – a measure of similarity between codes. The SC values indicate the formation of two general clusters – each represented by a different colour. The average Silhouette coefficient[1] is 0.247, varying between 0.017 and 0.415 among codes, and none of the codes is misclassified. The frequency corresponding to each code is displayed on the left side of the figure. The SC for codes ranges between 0.966 ("Legal Instruments" – "Regulatory Processes") and 0 ("Anti-competitive Practices" – "Digital Infrastructure" – "Green Technology"). The two clusters reflect the EU's approach to balancing traditional regulatory concerns with emerging challenges in technology, sustainability, and innovation. The upper cluster (in blue) groups codes that refer to traditional priorities and main aspects of competition policy. As such, it includes codes such as Aid framework, Consumer interests, Market fairness, and Anti-competitive practices, which highlight the EU's commitment to ensuring fair market conditions, protecting consumer rights, and fighting against monopolistic business behaviour. Additionally, the presence of codes such as Competition law framework, Legal instruments and Regulatory processes accentuate the institutional and procedural instruments used to enforce competition rules. Other interconnected codes, like Market integration and Global relations demonstrate the EU's interest in propelling cross-border trade, supporting internal markets, and enforcing its competitive presence on the global stage.

[1] The Silhouette coefficient is a well-known metric used to evaluate the quality of clustering. The coefficient measures how well a data point fits within its assigned cluster compared to other clusters (Rousseeuw, 1987).

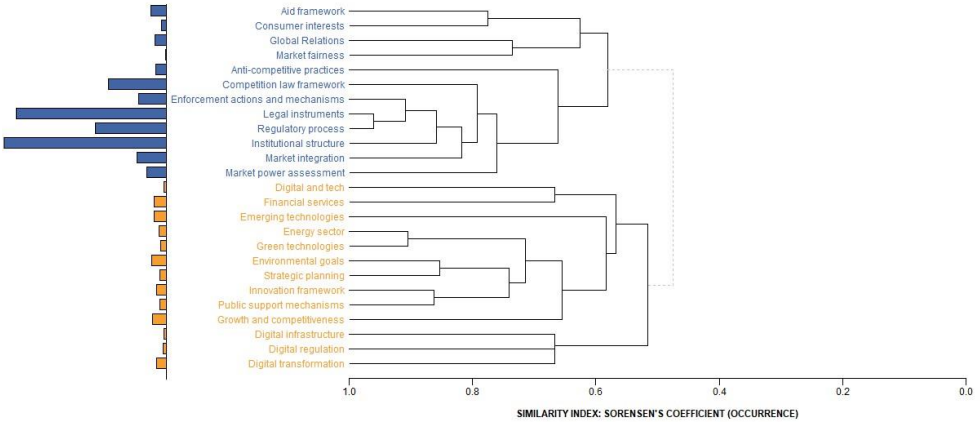
Figure 3. Frequency of codes in cases



Source: authors' representation with QDA Miner output

The lower (orange) cluster has a different focus, oriented towards forward-looking and sector-specific priorities, in particular related to technology and sustainability. In this cluster, codes such as Digital transformation, Digital regulation, and Emerging technologies are a sign of the EU's commitment to addressing the challenges posed by the digital economy, such as platform dominance, monopolies over data, and technological disruption. Moreover, the inclusion of Green technologies, Environmental goals and Energy sector as codes further emphasizes the connection of sustainability aims with competition policy, in the general framework of the EU's climate change objectives. Additionally, codes like Innovation framework and Strategic planning in this cluster underline the policy link between innovation, competition policy and long-term growth objectives set at the EU level. The clustering also points to the mechanisms evidenced by the Public support mechanisms code to support innovation while maintaining competitive market conditions.

Figure 4. Clustering of codes

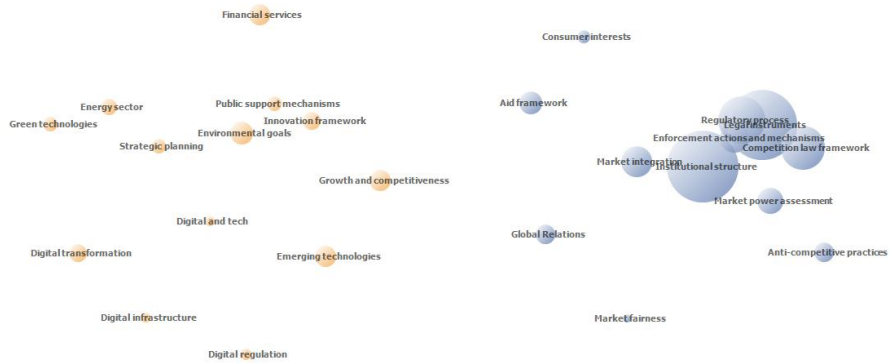


Source: authors' representation with QDA Miner output

Figure 5 complements the dendrogram showing two main groups where the codes are clustered (the size of the bubbles indicate the frequency of codes in documents). For example, "Public support mechanisms" are closely linked to the "Innovation framework" and "Environmental goals", while the "Energy sector" is involved in the transition to "Green technologies"; these two directions are based on strategic planning. It is necessary for the codes related to digitalization in the competition and competitiveness sector at the European level – "Digital transformation", "Digital infrastructure", "Digital regulations", "Emerging technologies", and the "Digital and tech" sector - to be included in the policy documents in such a way that they interweave and aim at a common objective. The regulatory framework, along with "Legal instruments", the "Competition law framework", and "Enforcement actions and mechanisms" are interconnected, and the competition sector is heavily regulated at the EU level. The assessment of market power is correlated with anti-competitive practices, while consumer interests require more support and assistance from the state.

Table 2 shows the co-occurrence statistics between codes – or the frequency at which two codes appear together in the same paragraph, which are marked on the lines and columns. Table 3 replicates Table 2 but depicts the values of the Sørensen coefficient between codes. The last line of both tables shows the averages of number of co-occurrences (Table 2) and Sørensen coefficient (Table 3) for the codes in the columns. The darker shades in both tables indicate higher co-occurrence and similarity between codes.

Figure 5. The 2D map of codes



Source: authors' representation with QDA Miner output

The most connected pairs of codes revealed by the statistics in Table 2, which indicate a frequent overlap in the documents, are "Legal instruments" and "Regulatory process" (28 occurrences), "Legal instruments" and "Enforcement actions and mechanisms" (27 occurrences), "Institutional structure" and "Legal instruments" (26 occurrences), and "Regulatory process" and "Enforcement actions and mechanisms" (26 occurrences). This signals the role of institutional frameworks in ensuring effective regulatory measures and promoting fair competition practices, as well as the strong relationship between legal tools and institutional mechanisms in enforcing competition policies. At the other end of the spectrum, the least connected pairs of codes are "Digital infrastructure" and "Anti-competitive practices", "Financial services" and "Digital regulation", "Green technologies" and "Anti-competitive practices", "Green technologies" and "Digital regulation", and "Green technologies" and "Market fairness" – all with 6 co-occurrences. These low co-occurrences point to a minimal interest of EU documents in linking digitalization and technology to competition, but they may also be thought of as unexplored areas that can be integrated into policymaking at the EU level.

"Institutional structure", "Legal instruments" and "Regulatory process" are the most connected codes to all the others (average of 16 co-occurrences), which is an expected finding given the nature of the documents included in the analysis. The least connected codes, with 8 average co-occurrences, are "Digital infrastructure" and "Digital regulation", indicating that technological developments and regulations represent a narrower theme in relation to competition. However, there are stronger co-occurrences (12 to 15) between codes related to technology or digitalization ("Digital and tech", "Digital infrastructure" and "Digital regulation") and competition-specific codes ("Competition law framework", "Market fairness" and "Anti-competitive practices"), which shows a good overlap between competition

policies and the regulation of technology use, as well as the EU's concerns about monopolistic or oligopolistic behaviour in digital markets.

Table 2. Co-occurrence statistics between codes

	Aid framework	Anti-competitive practices	Competition law framework	Consumer interests	Digital and tech	Digital infrastructure	Digital regulation	Digital transformation	Emerging technologies	Energy sector	Enforcement actions and mechanisms	Environmental goals	Financial services	Global Relations	Green technologies	Growth and competitiveness	Innovation framework	Institutional structure	Legal instruments	Market fairness	Market integration	Market power assessment	Public support mechanisms	Regulatory process	Strategic planning
Aid framework	16	13	15	14	11	8	8	8	12	9	16	12	10	14	8	13	13	16	16	12	16	14	12	16	10
Anti-competitive practices	13	18	18	12	9	6	8	7	9	7	18	9	7	12	6	12	10	17	18	11	17	16	9	17	8
Competition law framework	15	18	24	15	11	8	10	9	12	9	24	12	11	15	8	14	13	21	24	13	20	19	12	23	10
Consumer interests	14	12	15	16	9	7	7	7	11	9	16	11	10	13	8	12	12	15	16	11	16	13	11	16	9
Digital and tech	11	9	11	9	12	7	7	8	9	8	12	10	10	10	7	11	11	12	12	9	12	11	9	12	9
Digital infrastructure	8	6	8	7	7	10	8	8	8	7	10	8	7	10	7	10	8	10	10	8	10	9	8	10	8
Digital regulation	8	8	10	7	7	8	10	8	8	6	10	7	6	10	6	9	8	10	10	8	10	9	8	10	7
Digital transformation	8	7	9	7	8	8	8	10	9	8	10	9	7	9	8	10	9	10	10	7	10	8	8	10	8
Emerging technologies	12	9	12	11	9	8	8	9	14	8	14	11	10	12	8	12	12	14	14	9	14	11	10	14	9
Energy sector	9	7	9	9	8	7	6	8	8	11	11	11	8	10	10	11	11	11	11	7	11	9	10	11	10
Enforcement actions and mechanisms	16	18	24	16	12	10	10	10	14	11	27	14	13	17	10	17	15	24	27	14	23	22	13	26	12
Environmental goals	12	9	12	11	10	8	7	9	11	11	14	14	10	13	10	12	13	14	14	10	14	11	12	14	12
Financial services	10	7	11	10	10	7	6	7	10	8	13	10	13	10	7	11	11	12	13	8	12	11	9	13	9
Global Relations	14	12	15	13	10	10	10	9	12	10	17	13	10	18	9	14	13	18	18	14	17	14	13	18	11
Green technologies	8	6	8	8	7	7	6	8	8	10	10	10	7	9	10	10	10	10	10	6	10	8	9	10	9
Growth and competitiveness	13	12	14	12	11	10	9	10	12	11	17	12	11	14	10	17	14	17	17	11	17	15	12	17	11
Innovation framework	13	10	13	12	11	8	8	9	12	11	15	13	11	13	10	14	15	15	15	10	15	12	13	15	11
Institutional structure	16	17	21	15	12	10	10	10	14	11	24	14	12	18	10	17	15	26	26	15	22	20	13	25	12
Legal instruments	16	18	24	16	12	10	10	10	14	11	27	14	13	18	10	17	15	26	29	15	23	22	13	28	12
Market fairness	12	11	13	11	9	8	8	7	9	7	14	10	8	14	6	11	10	15	15	15	14	12	10	15	9
Market integration	16	17	20	16	12	10	10	10	14	11	23	14	12	17	10	17	15	22	23	14	23	20	13	23	12
Market power assessment	14	16	19	13	11	9	9	8	11	9	22	11	11	14	8	15	12	20	22	12	20	22	10	22	11
Public support mechanisms	12	9	12	11	9	8	8	8	10	10	13	12	9	13	9	12	13	13	13	10	13	10	13	13	10
Regulatory process	16	17	23	16	12	10	10	10	14	11	26	14	13	18	10	17	15	25	28	15	23	22	13	28	12
Strategic planning	10	8	10	9	9	8	7	8	9	10	12	12	9	11	9	11	11	12	12	9	12	11	10	12	12
Average number of co-occurrences	**12**	**12**	**14**	**12**	**10**	**8**	**8**	**9**	**11**	**9**	**16**	**11**	**10**	**13**	**9**	**13**	**12**	**16**	**16**	**11**	**15**	**14**	**11**	**16**	**10**

Source: authors' representation with QDA Miner output

In Table 3, a high Sørensen coefficient value ranging from 0.883 to 1.000 indicates that these concepts are frequently discussed together in the documents and suggests that they are interconnected topics. As in the case of co-occurrences, the highest values of the Sørensen coefficient are between "Regulatory process" and "Legal instruments" (0.966), "Enforcement actions and mechanisms" and "Legal instruments" (0.931), "Green technologies" and "Energy sector" (0.931), "Institutional structure" and "Legal instruments" (0.897), and "Regulatory process" and "Enforcement actions and mechanisms" (0.897). These highlight the importance

for EU institutions to connect the competition legislative framework to the enforcement of actions, mechanisms, and legal instruments. Moreover, there is an interesting high similarity between the energy sector and green technologies, which thus emphasizes the EU's strategy aimed at the transition to green energy.

Table 3. Similarity between codes - Sørensen coefficient

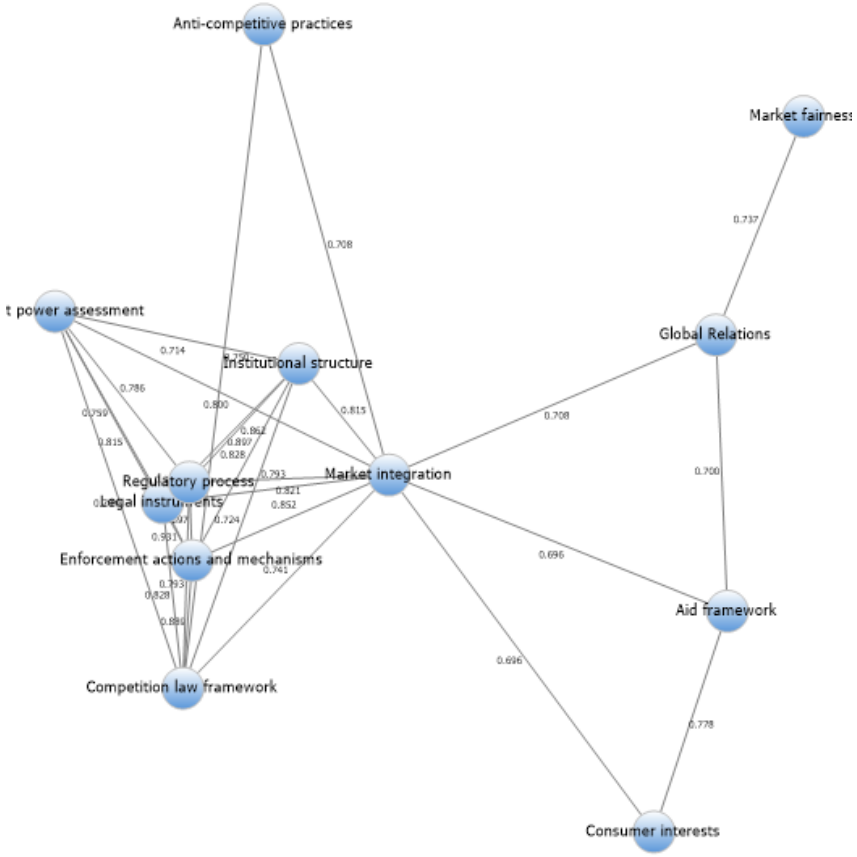
	Aid framework	Anti-competitive practices	Competition law framework	Consumer interests	Digital and tech	Digital infrastructure	Digital regulation	Digital transformation	Emerging technologies	Energy sector	Enforcement actions and mechanisms	Environmental goals	Financial services	Global Relations	Green technologies	Growth and competitiveness	Innovation framework	Institutional structure	Legal instruments	Market fairness	Market integration	Market power assessment	Public support mechanisms	Regulatory process	Strategic planning
Aid framework	1.000	0.619	0.600	0.778	0.647	0.444	0.444	0.444	0.667	0.500	0.593	0.667	0.526	0.700	0.444	0.650	0.722	0.615	0.552	0.632	0.696	0.583	0.706	0.571	0.556
Anti-competitive practices	0.619	1.000	0.750	0.545	0.429	0.273	0.400	0.333	0.391	0.318	0.667	0.391	0.292	0.500	0.273	0.522	0.435	0.630	0.621	0.500	0.708	0.667	0.409	0.586	0.364
Competition law framework	0.600	0.750	1.000	0.600	0.440	0.308	0.417	0.360	0.462	0.346	0.889	0.462	0.423	0.556	0.308	0.519	0.500	0.724	0.828	0.500	0.741	0.704	0.480	0.793	0.385
Consumer interests	0.778	0.545	0.600	1.000	0.474	0.368	0.368	0.368	0.579	0.500	0.593	0.579	0.526	0.619	0.444	0.571	0.632	0.556	0.552	0.550	0.696	0.520	0.611	0.571	0.474
Digital and tech	0.647	0.429	0.440	0.474	1.000	0.467	0.467	0.571	0.529	0.533	0.444	0.625	0.667	0.500	0.467	0.611	0.688	0.462	0.414	0.500	0.522	0.478	0.563	0.429	0.600
Digital infrastructure	0.444	0.273	0.308	0.368	0.467	1.000	0.667	0.667	0.500	0.500	0.370	0.500	0.438	0.556	0.538	0.588	0.471	0.385	0.345	0.471	0.435	0.391	0.533	0.357	0.571
Digital regulation	0.444	0.400	0.417	0.368	0.467	0.667	1.000	0.667	0.500	0.400	0.370	0.412	0.353	0.556	0.429	0.500	0.471	0.385	0.345	0.471	0.435	0.391	0.533	0.357	0.467
Digital transformation	0.444	0.333	0.360	0.368	0.571	0.667	0.667	1.000	0.600	0.615	0.370	0.600	0.438	0.474	0.667	0.588	0.563	0.385	0.345	0.389	0.435	0.333	0.533	0.357	0.571
Emerging technologies	0.667	0.391	0.462	0.579	0.529	0.500	0.500	0.600	1.000	0.471	0.519	0.647	0.588	0.600	0.500	0.632	0.706	0.538	0.483	0.450	0.609	0.440	0.588	0.500	0.529
Energy sector	0.500	0.318	0.346	0.500	0.533	0.500	0.400	0.615	0.471	1.000	0.407	0.786	0.500	0.526	0.909	0.647	0.733	0.423	0.379	0.368	0.478	0.375	0.714	0.393	0.769
Enforcement actions and mechanisms	0.593	0.667	0.889	0.593	0.444	0.370	0.370	0.370	0.519	0.407	1.000	0.519	0.481	0.607	0.370	0.630	0.556	0.828	0.931	0.500	0.852	0.815	0.481	0.897	0.444
Environmental goals	0.667	0.391	0.462	0.579	0.625	0.500	0.412	0.600	0.647	0.786	0.519	1.000	0.588	0.684	0.714	0.632	0.813	0.538	0.483	0.526	0.609	0.440	0.800	0.500	0.857
Financial services	0.526	0.292	0.423	0.526	0.667	0.438	0.353	0.438	0.588	0.500	0.481	0.588	1.000	0.476	0.438	0.579	0.647	0.444	0.448	0.400	0.500	0.458	0.529	0.464	0.563
Global Relations	0.700	0.500	0.556	0.619	0.500	0.556	0.556	0.474	0.600	0.526	0.607	0.684	0.476	1.000	0.474	0.667	0.650	0.692	0.621	0.737	0.708	0.538	0.722	0.643	0.579
Green technologies	0.444	0.273	0.308	0.444	0.467	0.538	0.429	0.667	0.500	0.909	0.370	0.714	0.438	0.474	1.000	0.588	0.667	0.385	0.345	0.316	0.435	0.333	0.643	0.357	0.692
Growth and competitiveness	0.650	0.522	0.519	0.571	0.611	0.588	0.500	0.588	0.632	0.647	0.630	0.632	0.579	0.667	0.588	1.000	0.778	0.654	0.586	0.524	0.739	0.625	0.667	0.607	0.611
Innovation framework	0.722	0.435	0.500	0.632	0.688	0.471	0.471	0.563	0.706	0.733	0.556	0.813	0.647	0.650	0.667	0.778	1.000	0.577	0.517	0.500	0.652	0.480	0.867	0.536	0.688
Institutional structure	0.615	0.630	0.724	0.556	0.462	0.385	0.385	0.385	0.538	0.423	0.828	0.538	0.444	0.692	0.385	0.654	0.577	1.000	0.897	0.577	0.815	0.714	0.500	0.862	0.462
Legal instruments	0.552	0.621	0.828	0.552	0.414	0.345	0.345	0.345	0.483	0.379	0.931	0.483	0.448	0.621	0.345	0.586	0.517	0.897	1.000	0.517	0.793	0.759	0.448	0.966	0.414
Market fairness	0.632	0.500	0.500	0.550	0.500	0.471	0.471	0.389	0.450	0.368	0.500	0.526	0.400	0.737	0.316	0.524	0.500	0.577	0.517	1.000	0.583	0.480	0.556	0.536	0.500
Market integration	0.696	0.708	0.741	0.696	0.522	0.435	0.435	0.435	0.609	0.478	0.852	0.609	0.500	0.708	0.435	0.739	0.652	0.815	0.793	0.583	1.000	0.800	0.565	0.821	0.522
Market power assessment	0.583	0.667	0.704	0.520	0.478	0.391	0.391	0.333	0.440	0.375	0.815	0.440	0.458	0.538	0.333	0.625	0.480	0.714	0.759	0.480	0.800	1.000	0.400	0.786	0.478
Public support mechanisms	0.706	0.409	0.480	0.611	0.563	0.533	0.533	0.533	0.588	0.714	0.481	0.800	0.529	0.722	0.643	0.667	0.867	0.500	0.448	0.556	0.565	0.400	1.000	0.464	0.667
Regulatory process	0.571	0.586	0.793	0.571	0.429	0.357	0.357	0.357	0.500	0.393	0.897	0.500	0.464	0.643	0.357	0.607	0.536	0.862	0.966	0.536	0.821	0.786	0.464	1.000	0.429
Strategic planning	0.556	0.364	0.385	0.474	0.600	0.571	0.467	0.571	0.529	0.769	0.444	0.857	0.563	0.579	0.692	0.611	0.688	0.462	0.414	0.500	0.522	0.478	0.667	0.429	1.000
Average similarity coefficient	**0.598**	**0.484**	**0.546**	**0.545**	**0.522**	**0.464**	**0.450**	**0.486**	**0.543**	**0.525**	**0.589**	**0.599**	**0.490**	**0.599**	**0.489**	**0.613**	**0.619**	**0.585**	**0.566**	**0.503**	**0.631**	**0.541**	**0.582**	**0.574**	**0.550**

Source: authors' representation with QDA Miner output

The lowest values of the Sørensen coefficient shown in Table 3 mimic to a large extent the results in Table 2: "Digital infrastructure" and "Anti-competitive practices" (0.273), "Green technologies" and "Anti-competitive practices" (0.273), "Green technologies" and "Competition law framework" (0.308), "Green technologies" and "Market fairness" (0.316) and "Financial services" and "Digital regulation" (0.353). At the same time, the analysed documents reveal that there are numerous topics in the implementation stage, thus moving beyond the strategic level. The category concerning actions and enforcement mechanisms, which is directly correlated with the institutional structure, legal instruments, market integration, market power assessment, and the regulatory process, is observed. Furthermore, environmental objectives are correlated with the innovation framework (0.813), public support mechanisms (0.800), and regulatory processes (0.857). Green technology, a subcategory belonging to the digital single market, is often associated with elements belonging to emerging technologies (0.909), indicating that the entire sector is undergoing transformation through the modernization and inclusion of emerging technologies, such as artificial intelligence (AI), the Internet of Things

(IoT), virtual reality, and blockchain. Another interesting observation is that the most connected codes to all the others are "Market integration" (average SC of 0.631), "Innovation framework" (0.619) and "Growth and competitiveness" (0.613), signalling the comprehensive approach taken on framing competition policies jointly with innovation and competitiveness.

Figure 6. Link analysis of codes



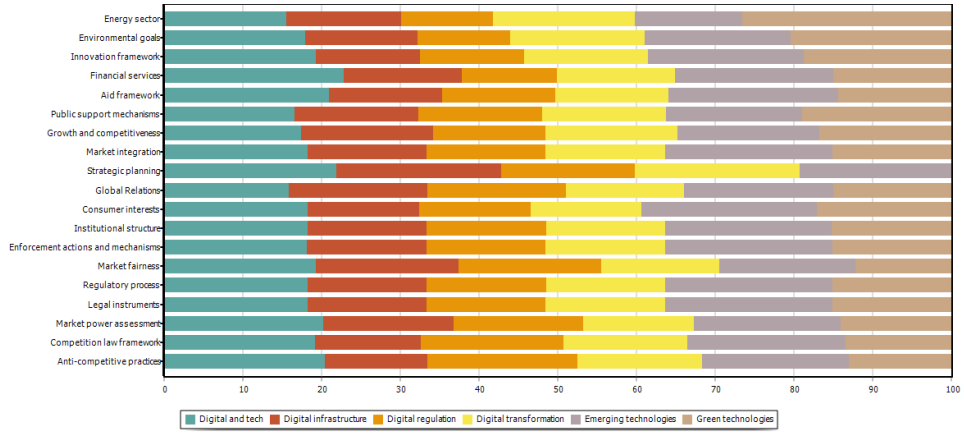
Source: authors' representation with QDA Miner output

The link analysis output presented in Figure 6 allows us to visualize the relationships between codes. The node size and lines reflect the strength of the links between the codes – the thicker lines denote a higher co-occurrence of codes in documents, while the proximity of nodes (codes) indicates a thematic closeness. The central node (code) is "Market integration", connected to many other codes through strong links. This result points to its integrative role for competition-related codes,

such as "Institutional structure", "Regulatory process", and "Market power assessment", and its importance in warranting the alignment of competition policies across sectors. "Institutional structure" emerges as another important node, closely tied to regulatory and legal mechanism and frameworks, which is also connected to "Market power" and "Competition law framework". These connections outline the critical role that institutional structures play in setting up competition structures and supporting the effectiveness of competition policies. The peripheral codes are "Consumer interests" and "Aid framework", with weaker links to the central themes, which suggests that consumer protection is less integrated in competition policies in the EU, while government aid is marginal to discussions on competition.

To gather insights on the specific links between technology and digitalization-related codes, Figure 7 presents the proximity analysis of these codes with all the others. In this figure, a higher size of the bars indicates a higher connection between codes. The sum of all bar values is 100 and this allows for an easy comparison among codes in terms of the relative importance of their connection with technology and digitalization codes.

Figure 7. Proximity analysis of technology and digitalization related codes

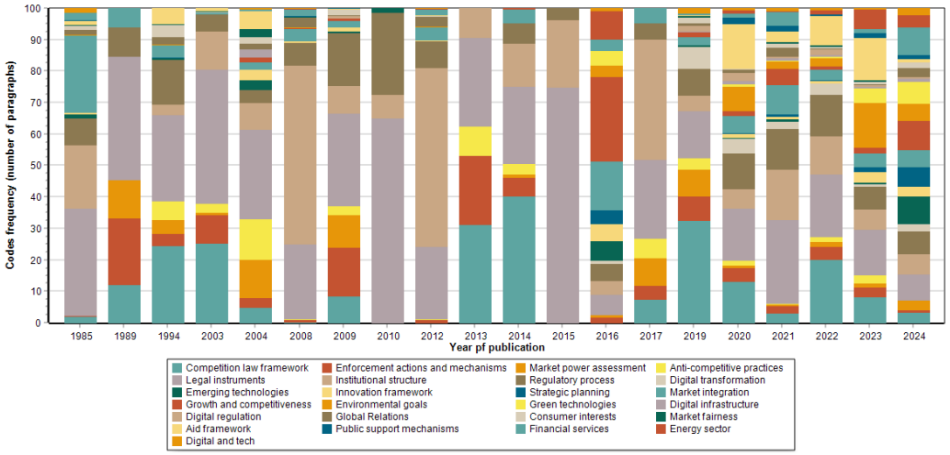


Source: authors' representation with QDA Miner output

Among the technology and digitalization codes, Figure 7 shows large proportions associated with "Emerging technologies" and "Digital transformation", which indicates that these themes are central in discussions on innovation, competitiveness, and competition policymaking. For example, codes like "Innovation framework", "Market integration", and "Strategic planning" are highly connected to emerging technologies, reflecting the later importance in shaping policies. Several bars, particularly "Environmental goals" and "Energy sector", show strong connections to "Green technologies", emphasizing the link between

sustainability and technological innovation at the EU level in the framework of its twin transition – digital and environmental (Gao, 2024). It is worth mentioning in this context that "Emerging technologies" and "Green technologies" are the codes with the highest average link to the other codes in our analysis (0.543 and 0.489, respectively), accompanied by "Digital and tech" with an average link of 0.522. Moreover, codes such as "Institutional structure" and "Regulatory process" have notable links to "Digital infrastructure" and "Digital regulation", outlining their importance for governance and market integration. The focus on regulating digital markets and promoting fair competition in sectors driven by technological developments is also observable in the links between codes like "Competition law framework", "Market power assessment" and "Enforcement actions and mechanisms", on the one hand, and "Digital regulation" and "Digital transformation" codes, on the other hand.

Figure 8. Relative importance of themes over time



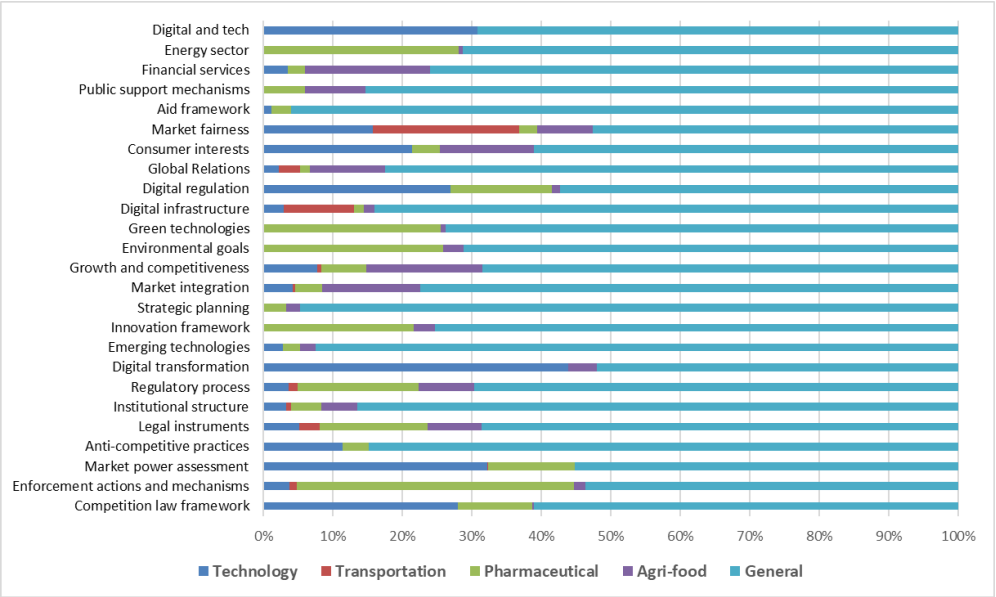
Source: authors' representation with QDA Miner output

We end the analysis by examining the temporal evolution of codes in documents between 1985 and 2024, and their association with specific sectors of the economy. Figure 8 illustrates the evolution of the thematic emphasis in EU competition-related documents, reflecting the evolving landscape of priorities of the European competition policy over time. In the years before 2000, the focus was on laying the foundations of competition framework in EU, as suggested by the high frequency of codes such as "Competition law framework", "Legal instruments", and "Institutional structure", which shows the EU efforts to create a solid regulatory framework and institutional capacity to address competition and discourage anti-competitive practices. In the early 2000s, however, codes such as "Market integration", "Aid framework", and "Enforcement actions and mechanisms" became

increasingly important, as the EU expanded towards Eastern Europe and aimed at a deeper integration of its internal markets. From the mid-2000s onward, the frequency of codes points to a growing emphasis on innovation and sustainability, with codes like "Innovation framework", "Environmental goals", and "Green technologies" becoming more important. The post-2010 period shows a rise in themes associated with digital transformation, such as "Digital and tech", "Digital regulation", and "Emerging technologies", as the EU was forced to respond to the rapid growth of digital markets in terms of volume and sophistication, including data-driven monopolies and platform economies such as Amazon, Airbnb, Microsoft and Google (Scott Morton, 2024). As we move beyond the pandemic years, the relative importance of codes is more balanced in documents; however, themes related to "Green technologies" and "Environmental goals" illustrate the EU's commitment to fight climate change and align policies to this objective.

Finally, in Figure 9, we present the association of thematic codes with specific economic sectors as reflected in EU documents related to competition. This figure illustrates the distribution of thematic codes associated with different economic sectors in EU competition-related documents.

Figure 9. The connection between codes and sectors



Source: authors' representation with QDA Miner output

While the highest frequencies are encountered for "General" – which indicates a document without a specific focus on an economic sector -, there are codes like "Digital and tech", "Digital transformation", and "Emerging technologies" that are

strongly linked to the Technology sector, reflecting the increased attention of EU to regulating competition, innovation and digital markets. The Transportation sector is connected the most with "Market fairness" and "Digital infrastructure", thus emphasizing the challenges of this sector in terms of potential anti-competitive practices and logistics. The Pharmaceutical sector is associated with codes addressing the enforcement of competition principles and innovation, while the for the Agri-Food we not a smaller but significant presence in codes related to "Public support mechanisms", "Market fairness" and "Consumer interest". Altogether, the chart in Figure 9 shows a balanced approach of the EU in relation to competition, as policy documents address both sector-specific priorities but maintain the broader relevance of competition-related practices to the entire economy.

Other research papers have echoed our primary outcomes. Skara et al. (2024) validated the EU's priority on readapting, from a legislative perspective, the digital market competition and on protecting the internal market and its actors, while Smit et al. (2022) acknowledged the key role of technology in strengthening the EU's global competitiveness. The authors suggest that the EU should assess strategies and budgets compared to the leading competitors worldwide. Moreover, Bauer (2023) and Holmes (2024) have both affirmed the EU's focus on integrating sustainability into competition policy through digital and environmental approaches, underscoring the EU's commitment to environmental responsibility.

Conclusions

This study presents a comprehensive analysis of the EU's evolving regulatory framework in addressing the challenges posed by technological disruptions for a long period of time, which starts in 1985 and ends in 2024. By examining 30 key legislative documents using content analysis, the research reveals how the EU has adapted its competition policies to adopt and promote innovation, technological advancement and competitiveness.

The main findings reveal a significant shift in the EU's approach to competition policy that increasingly integrates technology, digitalization, and innovation. The analysis shows that the EU has increasingly recognized the importance of addressing technological gaps as a catalyser of its global competitiveness against major players like the United States and China. The study's longitudinal perspective on the interplay between competition policies and technological progress within the EU represents its main contribution to the literature. Hence, this research fills a significant gap by methodically evaluating the effectiveness of the EU's regulatory responses to technological disruptions over nearly four decades.

The implications of these findings are various and extend to different areas and actors. For policymakers, the study points to the necessity of permanently being alert to rapid technological changes and updating regulatory frameworks in order to

keep pace with them. By so doing, its commitment to creating a supporting yet acknowledging environment for technological advancement and competitiveness can be demonstrated. For businesses and industry stakeholders, understanding how the regulatory framework evolves and adapts to technological advancements is essential for strategic planning, compliance, and identifying opportunities that arise from new policies aimed at fostering innovation.

The study has, inherently, several limitations. First, the reliance on legislative documents may not fully grasp the practical implementation and impact of these policies across different member states. Second, the study only encompasses a selection of 30 European legislative documents, and it does not specifically cover all sectors. Third, while systematic and methodical, the content analysis approach is subjective and may not account for all nuances of the legislative texts. Additionally, the focus on the EU-level legislation may overlook national laws and regulations which also play significant roles in managing technological challenges.

Further research should extend the number of analysed legal documents and include parallel comparisons with the legislative documents of the main competitors. Future work could also utilize mixed research methods combining text mining and video analysis (e.g., the content presented during an open conference/ discussion forum) with statistical analysis to depict the relationship between digital transformation and competition policies on competitiveness indicators. Moreover, the constraints specific to qualitative content analysis regarding the validity of the conclusions and the reliability of the digital-assisted coding process must also be considered.

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Appendix 1

Reviewed documents for the analysis of EU policies and regulatory frameworks in the field of competition and existing sectoral strategies related to technology and innovation

No.	Document	Year	Type	Sector	Issuing Institution
1	Regulation (eu) 2019/712 of the european parliament and of the council of 17 April 2019 on safeguarding competition in air transport, and repealing Regulation (EC) No 868/2004	2004	Regulation	Air transport	The European Parliament The Council of the European Union
2	Directive (EU) 2019/1 of the European Parliament and of the Council of 11 December 2018 to empower the competition authorities of the Member States to be more effective enforcers and to ensure the proper functioning of the internal market	2019	Directive	General	The European Parliament The Council of the European Union
3	Directive 2014/104/EU of the European Parliament and of the Council of 26 November 2014 on certain rules governing actions for damages under national law for infringements of the competition law provisions of the Member States and of the European Union Text with EEA relevance	2014	Directive	General	The European Parliament The Council of the European Union
4	Regulation (EU) 2021/690 of the European Parliament and of the Council of 28 April 2021 establishing a programme for the internal market, competitiveness of enterprises, including small and medium-sized enterprises, the area of plants, animals, food and feed, and European statistics (Single Market Programme) and repealing Regulations (EU) No 99/2013, (EU) No 1287/2013, (EU) No 254/2014 and (EU) No 652/2014	2021	Regulation	Ari-food	The European Parliament The Council of the European Union
5	Regulation (EU) 2015/477 of the European Parliament and of the Council of 11 March 2015 on measures that the Union may take in relation to the combined effect of anti-dumping or anti-subsidy measures with safeguard measures (codification)	2015	Regulation	General	The European Parliament The Council of the European Union
6	Regulation (EU) No 913/2010 of the European Parliament and of the Council of 22 September 2010 concerning a European rail network for competitive freight Text with EEA relevance	2010	Regulation	Freight/ Transport	The European Parliament The Council of the European Union

No.	Document	Year	Type	Sector	Issuing Institution
7	Communication from the commission to the european parliament, the council, the european economic and social committee and the committee of the regions	2021	Communication	General	European Commission Directorate-General for Competition
8	Competition: Antitrust procedures in anticompetitive agreements	2013	Article	General	European Commission
9	Regulations 1/2003 and 773/2004 set out the procedures for applying EU antitrust rules. These rules target companies abusing their market power and entering into restrictive agreements.	2022	Regulation	General	European Commission
10	Council Regulation (EEC) No 4064/89 of 21 December 1989 on the control of concentrations between undertakings	1989	Regulation	General	The Council of the European Union
11	Council Regulation (EC) No 1/2003 of 16 December 2002 on the implementation of the rules on competition laid down in Articles 81 and 82 of the Treaty	2003	Regulation	General	The Council of the European Union
12	Consolidated version of the Treaty on the Functioning of the European Union - part three: union policies and internal actions - title vii: common rules on competition, taxation and approximation of laws - Chapter 1: Rules on competition - Section 1: Rules applying to undertakings - Article 101 (ex Article 81 TEC)	2008	Treaty Articles	General	The Council of the European Union
13	Consolidated version of the Treaty on the Functioning of the European Union - part three: union policies and internal actions - title vii: common rules on competition, taxation and approximation of laws - Chapter 1: Rules on competition - Section 1: Rules applying to undertakings - Article 102 (ex Article 82 TEC)	2012	Treaty Articles	General	European Union
14	Completing the internal market: white paper from the commission to the european council (Milan, 28-29 JUNE 1985)	1985	Communications and Guidelines	General	European Commission
15	Communication on the Commission's policy in enforcing Article 82 of the EC Treaty (now Article 102 TFEU) (2005):	2009	Communications and Guidelines	General	European Commission
16	Guidelines on the application of Article 101(3) TFEU (formerly Article 81(3) TEC)	2004	Communications and Guidelines	General	European Commission
17	European Commission's "Competition Policy for the Digital Era" (2019)	2019	Communications and Guidelines	Digital Field	European Commission Directorate-

No.	Document	Year	Type	Sector	Issuing Institution
					General for Competition
18	Green paper on vertical restraints in en competition policy	1997	Green and White Papers	General	European Commission
19	Reports on competition policy	2023	Report	General	European Commission
20	Reports on competition policy	2022	Report	General	European Commission
21	Reports on competition policy	2020	Report	General	European Commission
22	The future of European competitiveness – A competitiveness strategy for Europe	2024	Report	General	European Commission
23	Annual activity report 2023 - Competition	2024	Report	General	European Commission Directorate-General for Competition
24	Restoring EU competitiveness 2016 updated version	2016	Report	General	European Investment Bank
25	The future of European competitiveness	2024	Report	General	European Commission
26	Structural reform support Growth and business environment	2020	Report	General	European Commission
27	Clean energy competitiveness	2023	Report	Energy	European Commission, Directorate-General for Energy
28	Pharmaceutical Sector Inquiry Final Report	2009	Report	General	European Commission
29	Intel v. European Commission (2017)	2017	Case	Technology	Court of Justice
30	Google Shopping Case (2021)	2021	Case	Technology/ Digital	The European Parliament The Council of the European Union

Source: authors' representation