Digital Transformation in Spain: The Role of Government in Digitalization Strategies[1]

Submitted: 16 June 2025
Reviewed: 5 August 2025
Revised: 15 August 2025
Accepted: 25 August 2025

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Article submitted to peer blind review

DOI: https://doi.org/10.26512/lstr.v17i2.58652

Abstract

[Purpose] This article examines the evolving role of the Spanish government in national digital transformation strategies, especially in the context of post-COVID-19 recovery and European digital policy frameworks.

[Methodology/approach/design] The study employs a mixed-methods, single-case study design that integrates qualitative content analysis with semi-automated quantitative content analysis using the R programming language. It systematically analyzes national strategy documents to uncover the government's role in digitalization policies over time.

[Findings] The findings reveal a marked evolution in Spain's digitalization strategies from early infrastructure-oriented initiatives toward a more comprehensive, cross-cutting approach led by central government institutions. Recent strategies, such as Digital Spain 2025 and 2026, reflect a growing emphasis on public investment and multi-level governance and a shift from hierarchical control to collaborative public-private frameworks. The government increasingly assumes a dual role as both regulator and innovation facilitator.

[Practical implications] The study provides actionable insights for policymakers, highlighting how state-driven strategies can integrate public-private collaboration,

[1]This research was made possible thanks to the research project at Universidad de La Sabana: 'Digital transformation as a tool to foster sustainable peace and development' (DER-65-2024).

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prioritize digital inclusion, and align with broader EU objectives. It also illustrates the utility of content analysis tools in digital policy evaluation.
[Originality/value] This research contributes to the literature on digital governance by offering a longitudinal analysis of Spain's digital strategies and proposing a conceptual framework for understanding government roles in digital transformation. It reveals how the Spanish state combines hierarchical mechanisms with networked governance models to drive national digitalization.

Keywords: Digital transformation. Digitalization Strategies. Entrepreneurial State. European Union. Public-Private Collaboration. Spain.

INTRODUCTION

The COVID-19 pandemic, an unprecedented global crisis, affected the economy, businesses, governments, and individuals, but it also precipitated a sweeping transformation in our very way of life (ALMEIDA et al., 2020; WHITELAW et al., 2020; FARAJ et al., 2021). The COVID-19 crisis has inspired new paradigms of cooperation and co-creation, fostering public-private collaboration in addressing public health challenges and problems across diverse contexts (WITTKA, 2020; AR & ABBAS, 2020; CRIADO & GUEVARA, 2021; NOLTE & LINDENMEIER, 2023) and leveraging digital technologies in public service and policy delivery across different scenarios (Xiong et al., 2019; NOLTE & LINDENMEIER, 2023; WITTKA, 2020).

In 2010, the European Commission endorsed the Digital Agenda, an initiative to foster a transition to a more sustainable and digital economy. Between 2011 and 2020, more than twenty-five national strategies and plans focused on Industry 4.0 were developed (TEIXEIRA & TAVARES-LEHMANN, 2022). COVID-19 accelerated this tendency. In 2020, the European Commission launched the 'Digital Decade' policy program, which defined concrete targets and objectives for 2030 in four domains: skills, digital transformation of businesses, secure and sustainable digital infrastructures, and digitalizing public services. After the COVID-19 pandemic, the EU approved 'NextGenerationEU,' a substantial recovery aid package for member countries. As part of this aid package, €250 billion was allocated to boost the digitalization of the economy and society.

Spain exemplifies this commitment to digital transformation. Since 2005, the government has made significant advances and approved an ambitious digitalization roadmap. However, although the country has made significant advances, there is still room for improvement in the private sector, especially in human capital and digital technology integration, where Spain ranks below the

EU average. Despite lagging in digitalization compared to other European countries, Spain ranks 7th out of 27 in the Digital Economy and Society Index (2022). Additionally, digitalization could increase GDP by 1.5 to 2.5 percentage points each year until 2025 and improve business productivity by 15% to 25% (DELOITTE, 2019). Spain has adopted five fundamental strategies, including the Plan Avanza, in two different versions: one from 2006-2010 and another from 2011-2016. Since 2020, Spain's government has approved "Digital Spain 2025" and, more recently, an update, "Digital Spain 2026," along with the National Artificial Intelligence Strategy.

In the context of Europe, a recent study conducted a qualitative content analysis of the digitalization strategies of the public sector in eight European countries: Estonia, France, Germany, Italy, the Netherlands, Norway, Spain, and the United Kingdom, focusing on the paradigms in digitalization reforms in Europe (HAMMERSCHMID et al., 2023). Digital transformation policies across Europe reveal diverse strategic approaches shaped by each country's administrative structure and economic context. Estonia's centralized e-governance model exemplifies a top-down implementation strategy, enabling streamlined digital service delivery and citizen engagement (HAMMERSCHMID et al., 2023). In contrast, countries like Germany have prioritized Industry 4.0 initiatives, focusing heavily on the digitalization of manufacturing sectors to boost industrial competitiveness (TEIXEIRA & TAVARES-LEHMANN, 2022). While many post-COVID strategies are closely aligned with EU-level frameworks such as the Digital Decade, significant disparities remain in private sector involvement across member states. Notably, Nordic countries lead in fostering public-private partnerships to accelerate innovation, offering replicable models for other European nations seeking to enhance the agility and impact of their digital transformation efforts (ALMEIDA et al., 2020; WHITELAW et al., 2020).

The Spanish approach to public administration and the digitalization process supports the idea of an emerging network governance-oriented approach whilst relying on centralized steering by government organizations, which still reflects the weight of the traditional public administration paradigm (CRIADO, 2016; HAMMERSCHMID et al., 2023). Despite significant advances in the field of public administration, digital transformation, and digitalization (LATORCAI et al., 2025), there is a notable absence of comprehensive studies that analyze digitalization strategies in Spain in depth, especially regarding the most recent transformations in the technological dimension of public administration, and that address the changing role of government in managing these digitalization processes. This lack of detailed research leaves a gap in understanding how current policies and strategies address the challenges and opportunities of the digital era. This article analyzes Spain's Digital Transformation Strategy and

seeks to answer the question: What is the role of government in the digital transformation process? This research examines the roadmap to Spain's digitalization and provides crucial insights into how the government manages the digitalization process.

The article is structured into four main sections. The first section offers an overview of Spain's digital transformation roadmap, focusing on the role of government and public-private collaboration in driving digital transformation. The following section elaborates on the detailed aspects of our single case study analysis. It focuses on a mixed approach that integrates the depth of qualitative analysis with a semi-automated quantitative analysis, aiming to understand policy documents effectively. The third section develops the findings of our study. The fourth section discusses our results on the role of the Spanish government in digital transformation in the broader framework of the literature on digitalization. Finally, in the last section, we summarize the article's main conclusions.

SPAIN'S ROADMAP FOR DIGITAL TRANSFORMATION

The Lisbon Strategy (2000) was the starting point for developing policies to promote a knowledge-based economy in the European Union. The strategy contained a set of guidelines rather than binding commitments and encouraged elements of benchmarking and the exchange of best practices between member states. The strategy required Member States to create national strategies to work towards the common goals of the Lisbon Strategy. The turning point for these strategies came in 2010 with the publication of an integrated digitization strategy (DIGITAL DECADE 2030). This initiative presents a detailed roadmap for digital transformation for the private sector, skills development, digitization of public administration, and improvement of infrastructure and connectivity, promoting collaboration between Member States to achieve common goals.

Following European guidelines, Spain approved several national strategies. The first national digitization strategy was the Avanza Plan, published in 2005 (2005-2010), and its corresponding update was approved in 2010 (2011-2015). Following the reforms of the European strategy, in February 2013, the Spanish government approved the Agenda Digital strategy. Finally, aligning with the European guidelines for 2030 and the post-pandemic economic recovery funds (NextGenerationEU), the Spanish government approved a new digitalization strategy (España Digital). The first version was approved in 2020, with the second version to be approved in 2022. This new strategy aims to respond to the rapid digitalization prompted by the COVID-19 pandemic, capitalizing on this new economic package of measures. This strategy includes specific measures to establish a data economy, focusing on boosting AI and other disruptive technologies, such as blockchain, the Internet of Things, and Big Data, which are

recognized as drivers of innovation. It promotes strategic projects, emphasizing public-private collaboration and governance involving autonomous communities. Table I contains the policy documents outlining the Spanish digitalization strategies since 2005.

THEORETICAL BACKDROP: KEY FRAMEWORKS IN DIGITAL TRANSFORMATION

Digitalization is the "driving force in the 21st century" (PENMETSA & BRUQUE-CAMARA, 2021: 283). Digitalization is a complex socio-technical phenomenon of the adoption and use of digital innovations by individuals, organizations, and society at large (BESSON & ROWE, 2012; SONY & NAIK, 2020). Digital transformation could be understood as a strategic response to digital technology trends and disruptions, and it involves significant societal and industry changes driven by digital technology applications. This complex process supposes clear strategic guidance to coordinate, organize, and guide the implementation of related activities to meet the desired digital transformation goals (ZHANG & SOUISSI, 2023). It requires the involvement of governments and other stakeholders in developing strategies (ZIOZIAS & ANTHOPOULOS, 2022). Both elements, strategic guidance and public-private collaboration, are at the heart of innovation policies. Innovation policies aim to generate innovations and guide their diffusion and use in government, the economy, and society (MAZZUCATO, 2018; BORRAS & EDLER, 2020). Effective innovation policies define clear and specific objectives (missions), a long-term strategic vision, and a focused approach to guide technology development, diffusion, and adoption. Mission sets concrete directions that are chosen strategically, "directions provide a focusing device from the different actors and sectors to collaborate to achieve it […] concretely require picking the willing: those organizations across the economy (in different sectors, including both the public and private spheres) that are 'willing' to engage with a societally relevant mission" (MAZZUCATO, 2018: 805-806).

The COVID-19 pandemic affected people, the economy, and the functioning of our governments, causing profound transformations. On the one hand, it generated a remarkable acceleration in the digitalization of much of every aspect of our lives (ALMEIDA et al., 2020; WHITELAW et al., 2020; FARAJ et al., 2021). On the other hand, the pandemic inspired new paradigms of cooperation and co-creation, fostering public-private collaboration in addressing public health challenges and problems across diverse contexts (WITTKA, 2020; AR & ABBAS, 2020; CRIADO & GUEVARA, 2021; NOLTE & LINDENMEIER, 2023), particularly, leveraging digital technologies in public

service and policy delivery across different scenarios (XIONG, 2019; NOLTE & LINDENMEIER, 2023; WITTKA, 2020).

Recent literature has focused on digital transformation's strategy, design, and development (GOBBLE, 2018; ZAOUI & SOUISSI, 2020; MARIENFELDT, 2021; SCHALLMO & TIDD, 2021; PATERGIANNAKI & POLLALIS, 2024; XHIXHO et al, 2025). A national strategy is defined as "A general plan to achieve one or more long-term or overall goals under uncertain conditions" (SANDOVAL, et al., 2022: 1). One of the main issues about the governance of socio-technical systems is the change of the role of government in the network governance in digitalization strategies (WANG, 2021; LI., 2022; DJEFFAL et al., 2022). National strategies are essential in analyzing innovation policies because they usually inform the key actors involved in governance, formulation, adoption, and implementation. In other words, national strategies allow us to understand the process of designing and formulating digitalization in a country and the role of governments and public administrations (BRYSON & GEORGE, 2020). Additionally, national strategies would have a performative function as definers of sociotechnical governance insofar as they define the mobilization, legitimization, orientation, coordination, and sense-making among innovation and/or policy actors (SCHUBERT et al., 2013; VAN DER DUIN et al., 2014; JASANOFF & KIM, 2015; KONRAD & BÖHLE., 2019), to the point of envisioning and shaping concrete governance arrangements.

Implementing digital transformation strategies requires significant financial, time, human, and technological resources (PATANAKUL & PINTO, 2014; RAJ et al., 2020). Thus, the public sector plays a crucial role in creating regulatory frameworks for digital transformation and addressing threats arising from the digital revolution (SACHS et al., 2019). In partnership with the private sector, it can ensure these frameworks support innovation while safeguarding public interests. The private sector typically possesses technical expertise, innovative technologies, and the agility to adapt quickly to changes (CANKAR & PETKOVSEK, 2013; DYAGILEVA et al., 2022; HARSMAN, 2023; HE et al., 2020). The government not only provides regulatory support but also offers access to public resources. In the context of digital transformation, combining these strengths can lead to more robust, effective, and efficient solutions, maximizing the social impact of these technologies (RODON & SILVA, 2015; LI et al., 2022; ZYZAK et al., 2024).

The governance of digitalization processes can be approached in four different ways, depending on whether governments are proactive or passive in regulating the potential risks of disruptive technologies (enclosure and control approach) and developing technologies (stimulation approach). Governments can take a more passive role, allowing the private sector as much freedom of self-

determination as possible; on the contrary, they can adopt a more active role in these two dimensions. Based on these dimensions, we can identify four ideal governance regimes: the entrepreneurial state, the market-oriented state, the regulatory state, and the self-regulatory state (DJEFALL, 2019; DJEFALL et al., 2022).

The entrepreneurial state invests in innovation and technology, and the government takes an active role in funding and promoting innovation, creating "a highly networked system of actors harnessing the best of the private sector for the national good over a medium to the long-term horizon" (MAZZUCATO, 2011: 19–20). On the contrary, the market-oriented state relies on minimal state interference with soft regulation and views private actors and companies as the main drivers of technological innovation. The state does not intervene unless there is a severe market failure. The regulatory state is characterized by a state that designs an "ex-ante mechanism in a pro-active manner" (DJEFALL et al., 2022: 5), regulating innovations and technologies. The concept of the self-regulation-promoting state suggests that the private sector and other stakeholders should work together to regulate themselves to establish self-imposed restrictions. The role of government in this approach is limited to facilitating, observing, or certifying private initiatives to regulate rather than directly engaging in regulation. Government intervention is based on "soft regulatory instruments" (DJEFALL et al., 2022: 5), such as codes of conduct, quality standards, and ethics committees/commissions.

Based on this approach, we developed a dictionary of categories. The first dimension encompasses terms associated with public sector activities and the utilization of financial mechanisms. The "public" category comprises terms related to activities in the public sector that relate to funding innovation, promoting research and development, and taking a leadership role to steer efforts toward desired outcomes. The "private" category contains terms that pertain to stimulating and accelerating innovation activities, prioritizing efforts, creating favorable conditions, and facilitating private investments.

The second dimension integrates terms related to the government's role in the strategy. The "hierarchical" category encompasses terms associated with a top-down structure, such as setting and enforcing standards, conducting audits and assessments, and establishing preventive measures. Conversely, the "governance" category contains terms that indicate an approach valuing coordination and cooperation, possibly among different levels of government or between government and the private sector. This approach emphasizes a more collaborative, flexible, and potentially decentralized management model among the various actors within an ecosystem (see Table II).

METHODOLOGY

National strategies offer insights into the objectives and play an essential role in shaping the interactions between innovation and policy actors and their understanding of their actions (SCHUBERT et al., 2013; VAN DER DUIN et al., 2014). This paper aims to examine Spain's digitalization strategies and employs a case study approach to analyze the role of government in these policy documents.

For this purpose, this research employs a mixed approach that integrates a qualitative analysis and a semi-automated quantitative content analysis using the R programming language to analyze the national strategy documents (HUSSY et al. 2010). This combined approach's strength lies in its ability to integrate the depth of qualitative analysis with the scope of quantitative analysis, providing a robust tool for understanding complex textual materials. Qualitative content analysis aims to understand the overall structure and the differences and similarities among the documents. The quantitative aspect offers a more general overview through the analysis of category frequencies, the presence of specific terms, and the categorization of text into concepts. Quantitative content analysis helps uncover hidden patterns and trends within the documents, thus reducing the human bias associated with qualitative research (BLEI, 2012; GRIMMER & STEWART, 2013; YANG, 2017), facilitating subsequent inferential and correlational queries (RAIMONDO & NEWCOMER, 2017). Meanwhile, the qualitative method is beneficial for structuring and understanding textual data (BERG, 2004).

Quantitative content analysis involves several steps: data collection, preprocessing, and analysis (HASE, 2022). Data collection consists of gathering large text corpora and adding contextual information (metadata) about the texts. It allows for information aggregation according to different characteristics, facilitating consistent and uniform data management and allowing comparisons and subsequent cross-analysis. Data preprocessing or cleaning involves various techniques and strategies to transform textual data into a format more suitable for automated analysis.

In Spain, the Ministry of Economy and Digital Transformation is currently responsible for developing the digitalization strategy. Its website provides the most up-to-date information on the digitalization roadmap, including all the relevant policy documents for the period analyzed by the Spanish government. We have analyzed the comprehensive national digitalization strategies; separate documents that detail the more specific aspects of these overarching strategies are not included.

We categorized the texts by the publishing institution, the year the policy document was approved, and a set of descriptive variables: the document file name (doc_id), the official name of the strategy, and the counts of types and tokens. "Types" refers to the number of unique words and symbols in the document, and "tokens" denotes the total number of words and symbols.

Our data analysis begins with an inductive process. This approach "oscillates between concept development, sampling, data collection, data analysis, and interpretation [rather than adhering to] a rigid set of procedures with strict parameters" (ALTHEIDE et al., 2008, p. 127). Such a method allows research findings to emerge naturally from the dominant or significant themes in the raw data, providing a holistic view of the text's themes. Initially, we employ a word frequency analysis that produces a list of all words appearing in a text and their frequency of occurrence. In addition, we use the Bigram technique, which is beneficial for exploratory text analysis because it considers the positional relationship between words. Bigrams, which form a fixed sequence of words, can represent a single concept (CHURCH & HANKS, 1990; KILGARRIFF & TUGWELL, 2001). This analysis yields a list of concepts frequently associated with our strategies, offering a global perspective on the essence of the digitalization strategy and the government's role.

The second step involves a deductive text analysis using a dictionary (refer to Table 3). By "dictionary," we refer to the correlation between a set of words or phrases and a term; the term serves as the label of a noun category, and the set includes the words or phrases that indicate the category's name in the text. This step draws upon the text's reading, a literature review, and the conclusions from the inductive analysis. We have previously applied lemmatization, which accounts for context and transforms words into their meaningful base forms, or lemmas, essential for accurate thematic coding and classification in our deductive text analysis. Creating a dictionary is an iterative process involving extensive reading, selection for thematic coding, and numerous revisions, during which codes and categories are identified within the data (VEARS & GILLAM, 2022). This reading guides the coding and classification process, grouping terms into categories and facilitating the emergence of more abstract concepts. The initial coded dictionary consists of fifty-five words categorized into two binomial groups of categories: public/private and hierarchy/government.

In the subsequent section, we will present the findings from the semi-automated content analysis concerning Spain's digitalization and the state's role.

GENERAL TRENDS IN THE THEMES OF DIGITALIZATION STRATEGIES

Table III presents the metadata extracted from the documents with a set of descriptive variables: *doc_id*, which contains the official name of the document; types and sentences. A careful reading shows some critical findings. The analysis of Spain's national digitalization strategies reveals a clear evolution in their importance within the national policy, how they are managed, and their thematic orientation. First, there is a growing institutionalization. Digitalization has gained relevance and recognition for needing a dedicated and specialized entity for its management and development. This process has been accompanied by increased specific resources, political attention, and administrative structure dedicated to its management. Initially, the strategy depended on a Secretariat of State, reflecting an essential but limited governmental role. Subsequently, the matter was elevated to ministerial rank, led directly by the presidency. Secondly, the initial focus on industry and the information society emphasized infrastructure and the digital economy, which became a priority to digitalize public services, emphasizing modernization and administrative efficiency under the Ministry of Public Administration. Over time, the leadership of the strategy shifted to the Ministry of Economy. It reached its high point under the Presidency, demonstrating a move towards a more centralized and holistic approach, integrating digitalization as a cross-cutting strategy across all government areas. This evolution underscores the recognition of digitalization as a strategic and cross-cutting element of government policy. Thirdly, there is an increase in the complexity of these strategies, indicated by the growing number of "tabs" or keywords in the strategic documents, which suggests greater depth and detail in policies and action plans, reflecting digitalization's growing importance and complexity.

Graph I illustrates the weighting of word frequencies based on their occurrence across all documents. However, rather than using whole words, we utilize their lemmas. This methodological approach enables us to identify, examine, and categorize recurring themes and patterns emerging from our data, thereby facilitating an unbiased interpretation of policy topics.

The analysis of the key themes through frequencies of lemmatized words in the documents shows a predominant focus on a holistic digital transition, integrating public administration, society, and the economy. Terms such as "digital," "services," "administration," "development," and "technology" are frequent, highlighting the emphasis of the strategies on the modernization of public services. In addition, the frequent mention of "economy," "enterprise," "sector," and "drive" indicates a drive to transform various economic sectors through digital technology, intending to accelerate digital adoption and

innovation, including terms such as "citizen" and "public" points towards an inclusive approach, ensuring broad societal benefits from digitalization. An analysis of the Spanish digital strategy using N-grams also reveals this approach (Table IV). On the other hand, terms such as "*administraciones_publicas*" and "*comunidades_autonomas*" illustrate an emphasis on the strategy for intergovernmental coordination, while bigrams such as "*puesta_marcha*" and "*millones_euros*" underline the importance of financial planning and investment in these strategies.

Following the essential elements of the digitalization model proposed by Europe and structuring the national digitalization proposals, we structure our comparative analysis in six different areas: skills, digital transformation of business, connectivity, and the digitalization of public services. We included three additional domains to address implementation strategy: collaboration and participation, scope, and temporal context. Table V provides a comparative summary of various dimensions of the ICT strategic documents in Spain from 2006 to 2026. It shows the evolution from Plan Avanza to Digital Spain 2026, highlighting advances in connectivity with a current focus on 5G integration and improving rural and business areas. Business digitalization strategies have moved towards boosting e-commerce and sustainable integration of digital technologies. Digitalization of public services has moved towards modernization with user-centric projects. Skills development emphasizes digital inclusion across demographics and regions. There is a shift towards multi-stakeholder involvement and long-term planning to give continuity, depth, and specificity to initiatives, aligning with EU guidelines and focusing on emerging technologies.

Financial Support for Digitalization

Table VI illustrates the frequency of terms indicating private investment or public financial support for digitalization in our strategies. Voronoi Tree map (Graph III) identifies relationships, patterns, and outliers in the data, providing insights that might be less apparent with traditional data visualization methods (TUA et al., 2021). The two visual representations — Table VI and Graph II — provide insights into the emphasis on private versus public financial support in various digital plans and strategies. Plan Avanza2 shows a balanced distribution of 'private' and 'public' mentions, suggesting equitable discussion or involvement of both sectors in this plan. Like the first version, Plan Avanza2 also shows a relatively balanced mention of both terms, with a slight increase in 'public' frequency. Agenda Digital displays a dense occurrence of both 'private' and 'public' categories. However, with the latest documents, there is an essential change in orientation. The Digital Spain 2025 strategy has a higher concentration

of 'public' references than 'private,' suggesting a focus on public sector involvement. Similarly, the Digital Spain 2026 document also mentions 'public' rather than 'private,' aligning with a public-oriented strategy for that year.

The graph indicates that the discussions in these texts frequently refer to private and public groups, with a general trend towards more frequent mentions of "public," especially in the texts related to Spain's digital plans for 2025 and 2026, which could imply a more significant emphasis or detail in the participation of the public sector in these plans. The Digital Agenda and the Digital Spain texts for 2025 and 2026 show a denser presence of the "public" category, indicating a significant focus on the public sector. Plan Avanza and Plan_Avanza2 show a more balanced distribution of both categories, suggesting an equal discussion on the participation of both sectors. In summary, although all plans show some level of public and private financial support, the most recent digital plans prioritize public funding of the programs.

Exploring Government's Role in Digitalization Strategies

Graph III and Table VII provide a detailed analysis of the balance between direct state regulation (hierarchical control) and cooperation/collaboration with private entities (governance) in Spain's strategic plans. They offer insights into how the categories "governance" and "hierarchical" are distributed across the texts and their relative significance within each document. Specifically, the table indicates the frequency of the categories "governance" and "hierarchical" in each digitalization strategy, giving us a gauge of each topic's importance to the plan. The graph compares the occurrence of the categories "governance" and "hierarchical" across the different strategies. Terms describing "governance" are prevalent in almost all documents, whereas those about "hierarchical" show more variation in their distribution. This pattern suggests a deliberate effort by the government to integrate governance practices into the planning and execution of digital agendas.

Table VII presents the frequencies of the specific categories "governance" and "hierarchical," multiplied by 1000, within our strategies. "Governance" achieves the highest frequency in the "Digital Agenda" document at 6.55, followed by "Digitalization Plan 2025" at 6.99. However, it is least frequent in "Plan Avanza 2" at 1.08. Conversely, the terms under the code "hierarchical" display more consistent frequencies compared to "governance," with the lowest value in "Plan Avanza" at 4.03 and, paradoxically, the highest in "Digitalization Plan 2026" at 5.58, which could reflect a relative increase in discussions about hierarchical structures within this strategy.

The analyses provide a quantitative measure of the emphasis placed on different concepts. A high frequency in the "governance" category indicates extensive discussion within the plan about how the government should manage or oversee digitalization. A lower frequency suggests that governance is mentioned but is not as central as other topics. Conversely, the consistent figures for "hierarchical" imply that the notions of how people and tasks should be organized within these plans are stable, with slight variation in how hierarchies are discussed from one plan to the next, which could indicate a consensus on the power and organizational structures in the digitalization process. In contrast, the implementation methods of each plan or project are more variable and likely adapted to specific needs.

DISCUSSION

This research has analyzed Spain's digitalization roadmap and the role of the government in the digital transformation process. Digitalization, described as "a driving force of the 21st century" (PENMETSA & BRUQUE-CAMARA, 2021: 283), is a complex socio-technical phenomenon that involves the adoption of digital technologies (BESSON & ROWE, 2012; SONY & NAIK, 2020). Literature has been focused on the strategic planning, creation, and advancement of digital transformation (GOBBLE, 2018; ZAOUI & SOUISSI, 2020; SCHALLMO & TIDD, 2021). A national strategy is a broad roadmap designed to reach one or more extensive or overarching objectives, particularly in situations of uncertainty.

Studies on the governance of digitalization emphasize the role of government in network governance (WANG, 2021; LI et al., 2022; DJEFFAL et al., 2022) and the importance of national strategies in shaping digital transformation processes (BRYSON & GEORGE, 2020; SCHUBERT et al., 2013; VAN DER DUIN et al., 2014; JASANOFF & KIM, 2015; KONRAD et al., 2019). Mission-oriented policies strategically set concrete directions, fostering collaboration among public and private actors, and actively need an entrepreneurial government to fund and promote innovation (MAZZUCATO, 2018).

The European Union has addressed digitalization through regulatory strategies, investment, innovation promotion, and research. These actions have been carried out with a holistic approach focusing on significant investment in digital infrastructure, fostering innovation and digitalization in the private and public sectors, and developing digital literacy and inclusion. Spain's policies contrast with Estonia's more centralized e-governance model, highlighting how

Spain's federal structure necessitates stronger regional coordination for effective implementation (HAMMERSCHMID et al., 2023). Compared to Germany's Industry 4.0 focus on manufacturing digitalization, Spain's emphasis on public services and inclusion in Digital Spain 2026 offers a more holistic approach, potentially serving as a model for other Southern European nations facing similar economic challenges (TEIXEIRA & TAVARES-LEHMANN, 2022; CRIADO & GUEVARA, 2021). While Spain's post-COVID strategies align closely with EU frameworks like the Digital Decade, they lag behind Nordic countries in private sector involvement, suggesting opportunities for Spain to adopt hybrid public-private models to enhance innovation speed (ALMEIDA et al., 2020; WHITELAW et al., 2020).

Spain implemented national strategies such as Plan Avanza (2005-2015) and Digital Agenda (2013), promoting ICT use to enhance economic growth, social equality, and citizens' welfare. In 2020, aligning with European guidelines, Spain launched the Digital Spain Strategy 2025, updated in 2022, focusing on data economy, AI, blockchain, IoT, and Big Data to address rapid digitalization accelerated by COVID-19 and leveraging the EU's NextGenerationEU funds.

While previous strategies - Plan Avanza and Plan Avanza 2 - made balanced mentions of public and private financial support, recent strategies - Digital Agenda, Digital Spain 2025, and Digital Spain 2026 - show a higher concentration of mentions related to the public sector. The role of the public sector is increasingly prominent and detailed, possibly indicating a shift towards prioritizing public funding and policy development compared to previous strategies.

Similarly, there has been a noticeable evolution in the focus of Spanish strategic plans from a predominance of direct state regulation (hierarchical control) to fostering greater cooperation with private entities (governance). The analysis reveals an increased frequency of the category governance in most documents, indicating its prominence and potential centrality in digitalization strategies, which suggests a conscious government effort to incorporate governance practices in the planning and execution of digital agendas. Conversely, the category hierarchy shows consistent frequencies across strategies, indicating a sustained state role as a regulator, particularly in designing "ex-ante mechanisms proactively" (DJEFALL et al., 2022: 5), especially relevant to innovations and disruptive technologies. This trend indicates a consensus on the state's regulatory role in digitalization, while the governance approach is more prominent in innovation development and fostering. The analysis highlights the government's nuanced approach to managing digitalization, balancing state regulation and collaborative governance.

CONCLUSIONS

National strategies are crucial for understanding innovation policies as they offer insights into the performative function of key actors involved in governance and the role of governments. This article analyses Spain's Digital Transformation Strategy, focusing on the government's role in the digital transformation process. It examines the Spanish digitalization roadmap through a case study analysis.

Our analysis has revealed a significant change in the scope and role of digitalization in national policy over this extended period. On the one hand, there is an increasing importance of digitalization, evident not only in the shift of direction and coordination within the government structure from being initially managed by a Secretary of State to falling under the direct purview of the presidency but also in the transition from a specific measures-focused approach to a more comprehensive and strategic approach in promoting digitalization. On the other hand, there has been a shift from top-down implementation strategies to a focus on collaboration and participation involving public and private actors. This shift is evident in the latest strategy update, Digital Spain 2026, and the structuring of cross-sector collaboration around project implementation.

This study provides an in-depth understanding of Spain's approach. It contributes to the literature by offering insights into the government's role in designing and developing digitalization strategies and public-private collaboration. To strengthen Spain's digital transformation, policymakers should foster multi-level governance through closer cooperation between the central government, regional authorities, and the private sector, accelerating infrastructure deployment in underserved rural areas (HAMMERSCHMID et al., 2023). Additionally, prioritizing public investment in digital skills and inclusion programs is essential to bridge the digital divide and ensure equitable access to emerging technologies like AI and 5G across all societal segments (TEIXEIRA & TAVARES-LEHMANN, 2022; CRIADO, 2016). Finally, integrating sustainability metrics into digital strategies—such as eco-friendly data centers and green procurement policies—will align the country's efforts with EU environmental goals (FARAJ et al., 2021; ALMEIDA et al., 2020).

Future research could build on this study by investigating the role of government in digital transformation strategies in other European countries, allowing for comparative analysis and the discovery of different approaches to digitalization.

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FIGURES AND CAPTIONS

TABLE 1: POLICY DOCUMENTS OUTLINING THE SPANISH DIGITALIZATION STRATEGIES

PLAN	YEAR OF APPROVAL
Plan Avanza 2006-2010	2005
Plan Avanza 2 (Strategy 2011-2015)	2010
Digital Agenda for Spain	2013
Digital Spain 2025	2020
National Artificial Intelligence Strategy	2020
Digital Spain 2026	2022

Source: own elaboration

TABLE II: DICTIONARY OF CODES ENTREPRENEURIAL STATE

Code Category	Terms
Public	"financi","subvenc","lider", "transfer", "foment", "potenci", "impuls", "fortalec","despleg", "I+D+i"
Private	"promocion","aceler","gener","prioriz","favorec", "incentiv","complement","incub","inversion", "privad","clust"
Hierarchical	"regul","aprob","reglament","legisl","regulat","ley", "certific","estand", "audit", "verif","salvaguard","vel", "eval", "habilit", "simplif"
Governance	"coordin","cohesion","vertebr","alin","articul","homogeneiz", "armoniz","colabor","cooper","catedr","dialog","gobernanz","cogobernanz","descentr","dih","sinergi","ecosistem", "cadena de valor","sandbox"

Source: own elaboration based on exploratory quantitative content analysis and Djeffal 2022.

TABLE III: METADATA EXTRACTED FROM THE STRATEGIES

Doc_id	Official Name	Year	Institution	Types	Tokens
plan_avanza.txt	Plan Avanza. Plan 2006-2010 para el desarrollo de la Sociedad de la Información y de Convergencia con Europa y entre Comunidades Autónomas y Ciudades Autónomas	2005	Secretary of State for Telecommunications and the Information Society (Ministry of Industry and Commerce)	1820	8931
Plan Avanza2.txt	Estrategia 2011-2015. Plan Avanza2	2010	Secretary of State for Telecommunications and the Information Society (Ministry of Industry and Commerce)	2057	10398
Agenda_Digital.txt	Agenda Digital para España	2013	Ministry of Industry, Tourism and Energy, and Ministry of Finance and Public Administration	2747	23347
EspanaDigital_2025.txt	España Digital 2025	2020	Vice-presidency and Ministry of Economic Affairs and Digital Transformation	3640	27021
EspanaDigital_2026.txt	España Digital 2026	2022	Presidency	4468	49109

Source: own elaboration

TABLE IV: N-GRAMS

N-Grams	**Frequency**
españa_ digital	292
transformacion_ digital	199
competencias_ digitales	126
millones_ euros	124
inteligencia_ artificial	111
banda_ ancha	107
agenda_ digital	76
sociedad_ informacion	74
plan_ avanza	74
administraciones_ publicas	66
servicios_ publicos	63
plan_ recuperacion	63
comunidades_ autonomas	55
sector_ audiovisual	53
contenidos_ digitales	49
sector_ tic	47
puesta_ marcha	46
emprendimiento_ digital	45

Source: own elaboration

TABLE V: COMPARISON OF DIGITALIZATION STRATEGIES

Domains	**Avanza Plan - 2006-2010**	**Avanza2 Plan 2011-2015**	**Digital Agenda for Spain**	**Digital Spain 2025**	**Digital Spain 2026**
Connectivity	Operational details of connectivity improvement	Specific plans for digital infrastructure	A comprehensive strategy for digital networks and services	Focus on expanding connectivity nationwide, especially in rural and less developed areas.	It advances connectivity, integrating technologies such as 5G and improving connectivity in rural and business areas.
Digitalization of business	Specific measures for competitiveness and digital innovation	Strategies for economic transformation through ICTs	Focus on competitiveness and internationalization	The digital economy is a key pillar, with initiatives to boost e-commerce and the digitalization of companies.	It delves into digital integration in various economic sectors, focusing on sustainability and the green economy.
Digitalization of Public Services	Detailed plans for developing specific digital services.	Detailed plans for developing specific digital services.	Strategic framework for efficient delivery of public services.	Modernization of public services through digitalization, improving efficiency and accessibility.	Continues with the digital transformation of public services, adding more innovative and user-centric projects.
Skills	Details on digital literacy and accessibility	Focus on technological inclusion and training	Promoting inclusion and digital literacy.	Addresses digital inclusion by focusing on bridging the digital divide, especially in marginalized	Strengthens digital inclusion with specific projects for different demographic groups and regions, ensuring

				and rural communities.	equitable access to technology.
Scope	Emphasis on ICT development and application.	Specific details on ICT integration. Continuity and evolution of Plan Avanza.	A comprehensive and strategic framework is based on alignment with EU guidelines.	Establishes a framework for digital transformation that emphasizes infrastructure and capabilities in emerging technologies (data economy).	Continuity and evolution of Digital Spain 2025. Greater depth and specificity in the initiatives, plans, and programs.
Participation and Collaboration	Measures are executed directly by the General State Administration. State.	Measures are executed directly by the General State Administration. State and emphasis in regional governance.	Emphasis on cross-cutting collaboration and multi-level governance (EU-regions)	Promotes the participation of various stakeholders, including the private sector, to develop the digital economy.	Mission-oriented policies. Expand collaboration, including more actors such as educational entities created around specific projects and initiatives (PERTE and RETECH)
Temporal Context	Represents an early stage in ICT policies	Reflection of recent challenges and opportunities	Adaptation to current contexts and challenges	It establishes a more immediate time frame with short- and medium-term objectives.	Extends the time horizon, planning for long-term sustainability and development.

Source: own elaboration

TABLE VI: FREQUENCY AND BINOMIAL CODE PUBLIC VS. PRIVATE FINANCIAL SUPPORT BY PLAN/STRATEGY

Group	Dimension	Frequency *1000
Plan Avanza	Private	4.96
Plan Avanza 2	Private	4.21
Agenda Digital	Private	6.15
Digitalization Plan 2025	Private	6.25
Digitalization Plan 2026	Private	4.76
Plan Avanza	Public	5.42
Plan Avanza 2	Public	5.19
Agenda Digital	Public	13.72
Digitalization Plan 2025	Public	10.29
Digitalization Plan 2026	Public	12.97

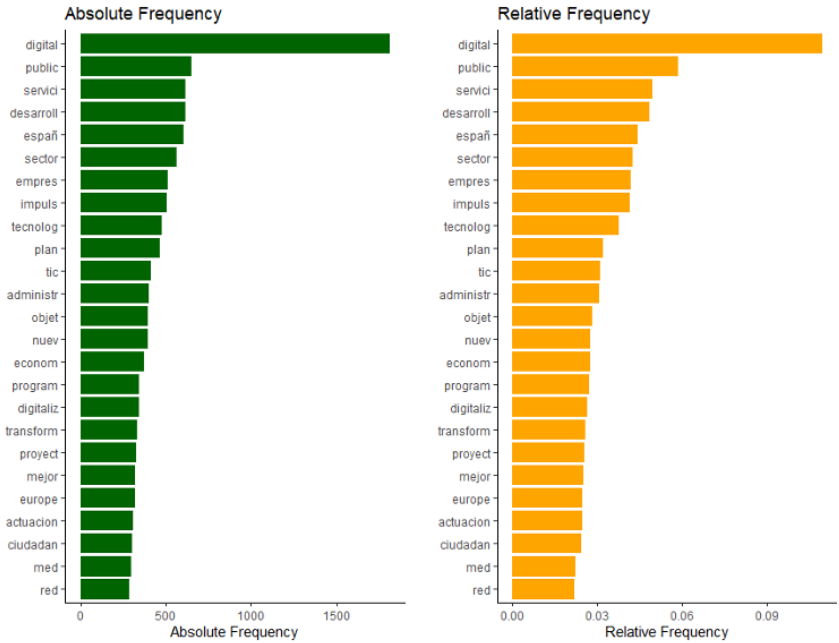
Source: own elaboration

TABLE VII: FREQUENCY AND BINOMIAL CODE HIERARCHICAL VS. GOVERNANCE BY PLAN/STRATEGY

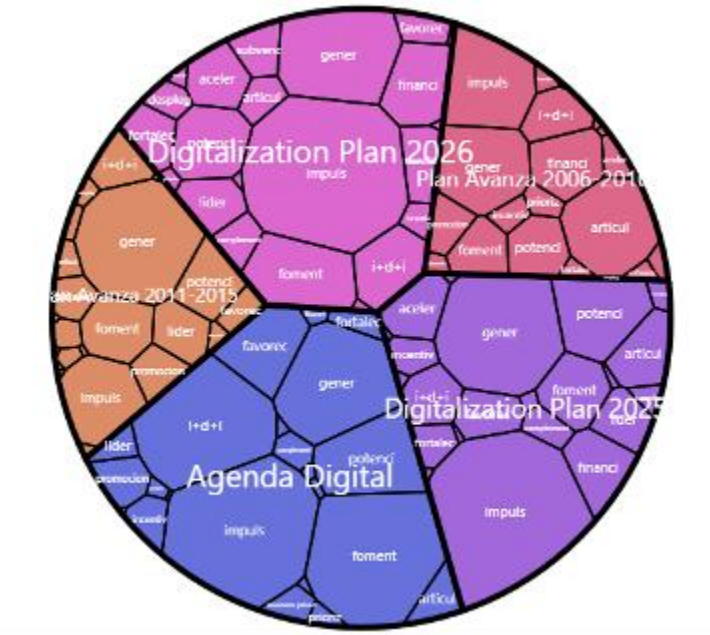
Group	Dimension	Frequency *1000
Plan Avanza	governance	5.30
Plan Avanza 2	governance	1.08
Agenda Digital	governance	6.55
Digitalization Plan 2025	governance	6.99
Digitalization Plan 2026	governance	4.93
Plan Avanza	hierarchical	4.03
Plan Avanza 2	hierarchical	5.19
Agenda Digital	hierarchical	6.06
Digitalization Plan 2025	hierarchical	5.33
Digitalization Plan 2026	hierarchical	5.58

Source: own elaboration

GRAPH I: FREQUENCY-LEMMAS



GRAPH II: VORONOI TREE MAP PUBLIC-PRIVATE DIMENSION



GRAPH III: VORONOI TREE MAP GOVERNANCE-HIERARCHICAL DIMENSION