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Economic Theory and History

FROM ANTICIPATION TO ADAPTATION: THE MISSING FEEDFORWARD LOGIC IN BULGARIA'S ECONOMIC GOVERNANCE

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Abstract. The article analyzes the strategic planning process in Bulgaria through the prism of feedforward logic – an approach that includes predicting future scenarios, analyzing early signals and adapting before crises occur. Over 300 strategic documents (2007 – 2025) were studied using an interdisciplinary methodology grounded in systems theory, cybernetics, and strategic planning. The results show a predominant dependence on feedback logic – management through reporting and post-factum correction. National strategies are short-term, fragmented and often subordinated to external (mostly European) frameworks. Feedforward elements are found in areas such as climate and digitalization, but remain isolated. Recommendations are offered for institutionalizing foresight functions, introducing scenario thinking and expanding time horizons, to transition to future-oriented management.

Keywords: strategic planning; feedforward logic; anticipatory governance; systems theory; cybernetics; scenario planning; policy design; national strategies

Introduction

In a world of global transformations – accelerated digitalization, climate change, demographic challenges and geopolitical uncertainty – economic management cannot be limited to reacting to events that have already occurred (World Economic Forum 2023; United Nations, 2019). An approach is needed that not only considers the past and the present, but also actively projects the future. In cybernetics, this approach is known as feedforward – a system that acts proactively by including forecasts, scenarios and early signals of upcoming changes in management decisions. However, Bulgaria has traditionally operated in a catch-up mode, in which strategic documents and public policies are oriented towards absorbing external resources and implementing indicators set externally, rather than creating visionary frameworks for long-term development. The lack of institutionalized mechanisms for feedforward planning places the country in a vulnerable position – reactive, dependent and with limited capacity to manage its future (Boyd & Juhola 2014).

This article is based on an interdisciplinary research approach that unites ideas from systems theory, cybernetics and strategic planning. The main objective is to identify to what extent Bulgarian management practice includes proactive logic in the development of strategic documents and policies, and what its absence means for economic growth. To achieve this objective, the study operationalises the concept of feedforward in the context of economic management and conducts a critical analysis of key national strategies and plans for the period 2007 – 2025.

In this way, the article fills an existing gap in Bulgarian academic and management practice: the lack of a critical view of the absence of anticipatory mechanisms in economic management. It offers an analytical framework for assessing the degree of strategic readiness of the national economy and lays the foundation for a debate on the transition from management by catching up to management by anticipating.

1. Theoretical framework

The concept of feedback control appears in the theory of cybernetics, developed by Norbert Wiener, who in 1948 defined the science of "control and communication in the animal and the machine" (Wiener 1948, pp. 11 – 12). In the classical formulation, control is based on feedback – a reaction to an already occurred event or deviation from the set goal. William Ross Ashby (1956, pp. 20 – 22) builds on this framework with the concept of "variety" – the ability of the system to respond adequately to the diversity of the environment. From here comes the idea that the more complex the external environment, the higher the adaptability of the management system should be.

In later research, the cybernetic approach was transformed into a management theory. Stafford Beer (1981, p. 71), for example, introduced the "brain of the company" model, in which organizations are viewed as self-regulating systems capable of learning and predicting. These ideas form the basis of critical systems thinking (Jackson 2019, p. 17), which emphasizes that governance cannot be reduced to linear responses, but requires complex, multi-level models of interaction with the future.

The concept of feedforward appears as a counterpoint to feedback. If feedback is reactive and retrospective, then feedforward is a preventive mechanism that includes forecasts and scenarios in management decisions. As early as the late 1970s, D. Bogart (1980, pp. 238 – 240) proposed a distinction among three types of information flows – feedback, feedforward, and feedwithin. According to him, only through feedforward can organizations anticipate negative deviations, instead of reacting to crises that have already occurred. In the modern literature, Veliyath (2025, p. 7) proves that the feedforward orientation provides competitive advantages in conditions of disruption, as it allows for the integration of early signals and building organizational readiness before the onset of shocks. Glassey-Previdoli, Metz & Fragnieri (2018, p. 131) propose a specific model for

"weak signals" in drug distribution, based on Ansoff's logic, which demonstrates the practical applicability of feedforward even in highly regulated sectors.

It is key that feedforward is not just a technological prediction but a management philosophy that transforms thinking from reactive control to visionary management. In the strategic context, feedforward is associated with the ability to build long-term visions and manage uncertainty through scenarios. Rittel and Webber (1973, pp. 161 – 167) describe organizations facing "wicked problems" – complex, unstructured and interconnected challenges – that cannot be solved through classical planning approaches. The only sustainable response is a strategy that uses feedforward logic: projecting future opportunities and adapting the organization before change occurs. In this sense, feedforward is at the core of dynamic capabilities (Helfat & Peteraf 2014, p. 836) – the skills of managers to anticipate, rethink and transform resources in accordance with future scenarios. Without this orientation, strategies remain fixed and doomed to lag behind the environment (Teece 2007, p. 1323).

Systems theory views the economy as an open system, subject to constant external influences (Knyazeva 2020, pp. 6 – 8). In this context, feedforward mechanisms can be thought of as channels for early adaptation of the system, including scenarios for demographic changes, climate risks, technological breakthroughs, and geopolitical crises, as outlined in management documents.

Bulgaria is characterized by a predominant feedback management, in which strategies are used as tools for accountability to external donors and institutions. National plans, including Bulgaria 2030 and the Recovery and Resilience Plan, have functioned mainly as instruments for resource absorption and compensation for existing deficits, rather than as frameworks for anticipating future scenarios, as the historical analysis of strategic documents for the period 2007–2025 demonstrates. This deficit places the country in a permanent position of a catch-up economy, dependent on external priorities and vulnerable to disruptive changes. This is where the scientific contribution of this study is found: it proposes to analyze Bulgarian strategic management through the prism of feedforward, which has not been systematically done so far.

2. Methodological framework

The present study is based on an interdisciplinary approach that combines elements of systems theory, cybernetics, and strategic management. Such a choice is not accidental – the topic of feedforward implies thinking beyond the classical framework of political analysis, since it is not only about the content of documents, but also about the culture of management. The approach is qualitatively oriented. The object of the study is the institutional mechanisms for strategic management of the Bulgarian economy. The subject is the presence (or lack thereof) of feedforward logic in strategic documents and policies for the period 2007 – 2025 – the time from Bulgaria's accession to the EU to the present.

The article aims to answer the following vital questions related to the management logic and practice:

– Is there a visionary logic in Bulgarian strategies, or are they mainly a reporting tool?

– Do the documents contain scenarios, alternative development paths, and early signals of risks?

– What adaptation mechanisms are envisaged and how are they linked to performance indicators?

The analysis is based on officially published national strategic and academic literature – studies on feedforward, systems theory and foresight management (Veliyath 2025, p. 3; Jackson 2019, p. 12; Scoblic 2020, p. 3).

Each document is considered not only a set of goals and indicators but also a textual construction that reflects a specific management logic (Bowen 2009, pp. 29 – 30). The analysis pays attention to: the formulation of the vision and priorities; the presence (or absence) of scenarios and alternatives; the presence of a systemic view of the interrelationships between sectors; the degree of integration of adaptation and learning mechanisms.

The texts of the strategic documents are assessed based on: vision and horizon (clearly defined future state); scenario-based thinking (variants and alternatives); early signals (identification of potential risks); systematicity (links between policies and sectors); adaptability (mechanisms for changing course). Documents were assessed not only for the formal presence of vision, scenarios or indicators, but also for their substantive integration and operationalization in practice.

The selection of the five analytical dimensions (criteria) is grounded in the theoretical foundations of cybernetics and strategic planning. These criteria follow the logic that strategic documents, by definition, are future-oriented. Therefore, they must articulate a clearly defined strategic goal, connected to an overarching vision for development, along with a time horizon within which this vision can realistically be achieved. The emphasis on scenario-based thinking derives from classical and contemporary strategic planning theory, which stresses that the future develops in terms of turbulence and uncertainty. For this reason, strategic documents need multiple scenarios that outline alternative developmental pathways, depending on the external conditions under which the economic system operates.

The criterion of early signals reflects core cybernetic assumptions. Early warning signals (whether feedback- or feedforward-oriented) enable timely detection of deviations, risks or emerging trends. Strategically, the earlier such signals are identified, the more adequate and precise the managerial response becomes. The inclusion of systematicity is justified by the need of the logic of system theory in strategic planning, which indirectly views coherent, interconnected policy design as a prerequisite for effective governance. A strategic document that does not reflect

interdependencies between elements cannot claim to be future-oriented. Finally, adaptability is a fundamental requirement for every strategic document. A strategy, plan or programme must function as a "living document", capable of adjusting to new conditions, risks or opportunities. Adaptability ensures that strategic frameworks remain relevant and operational in a dynamic environment, rather than becoming static administrative texts.

Taken together, these five dimensions operationalize the core principles of anticipatory governance and provide a structured and theoretically coherent basis for evaluating the presence or absence of feedforward logic in Bulgarian strategic documents.

The study encounters two major limitations:

– Strategies are often highly formalized, making it difficult to distinguish a real vision from declarative texts;

– There is no access to internal management processes where feedforward may be present informally.

Nevertheless, the methodological framework allows for a reliable picture of the extent to which the Bulgarian economy functions with or without feedforward mechanisms.

3. Results and Discussion

The analysis is structured along several dimensions related to the main characteristics of the strategic documents under consideration.

General profile of the strategic environment in Bulgaria

The results and conclusions of the analysis are based on a reviewed set of 300 current national strategic documents (as of September 2, 2025). This significant number is a clear signal of the presence of an extremely dense, but at the same time fragmented management environment. At first glance, this creates the impression of a high degree of strategic activity – almost every sector or policy is bound by a framework document, accompanied by an action plan, a report, or an implementation program. Such a situation could be interpreted as strong institutional planning capacity if considered only quantitatively. However, a more in-depth qualitative analysis shows that a large part of these documents operates in a feedback mode, rather than a feedforward logic.

Documents of a reporting, executive and monitoring nature dominate Bulgarian strategic practice. The list highlights dozens of "action plans", "reports" and "reports" on already adopted programs – for example, the "Action Plan for the Implementation of the National Development Program Bulgaria 2030" (2024 – 2026), regular annual reports on individual strategies, as well as numerous decisions of the Council of Ministers (CoM) approving changes or specific measures. Thus, strategic management primarily serves as a mechanism for administrative accountability rather than a tool for visionary foresight.

Time horizon

The second feature studied concerns the time horizon of the strategic documents. Most of them are limited within the framework of the programming and budget cycles of the European Union – usually until 2025 or 2030. For example, the "National Development Program: Bulgaria 2030" sets a horizon synchronised with the long-term vision of the EU, and a number of other documents, such as the operational programs and the Recovery and Resilience Plan, are directly tied to the terms of European funding.

However, there are also positive exceptions that indicate the potential for the development of feedforward logic: "Long-term Strategy for Climate Change Mitigation" (until 2050), "National Strategy for Management and Development of the Water Sector" (until 2037), "National Disaster Protection Plan" (until 2040). Despite their presence, they fail to impose a culture of long-term thinking (planning). In other words, while some industries (e.g. energy) naturally require an extended time window, in others the prevailing management practice continues to operate in short and medium-term cycles. These shares are indicative and based on qualitative coding of all 300 documents according to their stated time horizons. While not representing exact statistical measurement, the distribution provides a reliable picture of the dominant short-term orientation. Theoretically, this leads to a serious problem of "diversity" (Ashby 1956, p. 202). The more complex and unpredictable the environment, the greater the diversity of management responses must be. A limited time horizon reduces this ability, as it blocks the development of scenarios and learning cycles, which by definition require a long-term perspective.

Fragmentation and duplication of documents

The systematic analysis of the documents also shows another characteristic phenomenon – duplication and fragmentation. The list reveals repetitions of the same documents (for example, two versions of the "Digital Transformation of Bulgaria 2024 – 2030" or duplicate reports on youth), as well as numerous separate annexes, implementation plans and interim reports to the same framework strategy.

At first glance, this can be interpreted as a desire for detail, but from the standpoint of systemic logic, it leads to an increase in the internal entropy of the management environment. Instead of a single scenario developing in different sectors, we observe parallel and often unrelated lines of action. This violates the basic principle of systems thinking, according to which effective management requires integrated and coordinated policies (Knyazeva 2020, p. 9). As a result, strategic documents become a collection of texts with limited interconnection, rather than a systemic framework capable of predicting and modelling the future. This also contradicts the concept of anticipatory governance, which implies coordination and collective learning from the future (Tõnurist & Hanson 2020, pp. 11 – 13).

Accountability culture

One of the most pronounced characteristics of the Bulgarian strategic environment is the culture of accountability. The corpus contains dozens of annual and interim reports, reports on equality, demography, Roma integration, youth policies, etc. This is a valuable infrastructure for transparency and monitoring, but essentially represents feedback logic – measuring and adjusting for results that have already occurred (Bogart 1980, p. 238). However, feedforward mechanisms are absent, such as: systematic horizon scanning; scenario exercises; "policy wind-tunnels" (testing policies against alternative future scenarios); early-signal panels with indicators of impending change (Wilkinson, Kupers & Mangalagiu 2013, p. 705). Instead, adaptation is reactive primarily and ex post facto, which limits the state's ability to anticipate crises or identify new opportunities (Veliyath 2025, p. 3).

Despite the dominant feedback and reporting logic, several areas stand out in the set of documents that, by definition, require a longer horizon and a higher degree of visionary thinking. Documents such as the "Long-term Strategy for Climate Change Mitigation until 2050" and the "National Strategy for Climate Change Adaptation" (until 2030) contain elements that approach feedforward thinking. They imply working with uncertainty and scenarios, since climate change is inherently unpredictable and nonlinear. In this sense, climate policy is one of the few sectors where the Bulgarian state is forced to work in a long-term and precautionary mode (Magruk 2017, p. 48). Another example is the energy sector, where documents such as the Integrated Energy and Climate Plan 2021 – 2030, critical raw materials strategies and the development of the hydrogen economy assume working with technological breakthroughs and long investment cycles. Such documents require anticipatory adaptation, because decisions made today (e.g. on nuclear energy or renewables) have an effect decades in the future (Camillus 2016, p. 14).

A third area where elements of feedforward logic are encountered is digitalization. "Digital Transformation of Bulgaria 2024 – 2030" and "Concept for the Development of Artificial Intelligence by 2030" include terms related to technological trends, infrastructure readiness, and scenarios for introducing new technologies. Although these documents do not include systematic actions for scenario planning, their thematic content suggests the need for horizon scanning and the analysis of weak signals (Glassey-Previdoli, Metz & Fragnieri 2018, p. 132; Cuhls 2019, p. 4).

What these three directions have in common is that feedforward appears not as an institutionalized practice, but as an externally imposed requirement – either from the nature of the problems (climate, technology) or from international organizations (EU, UN).

Dependency on external loops and frames

The last important characteristic concerns the strong dependence on external cycles and frameworks, primarily those of the European Union. Many documents are

directly linked to the programming periods and initiatives of the EU – for example, the Convergence Program 2024 – 2027, the National Recovery and Resilience Plan (until 2026), the European Child Guarantee (until 2030).

This creates an "imported" planning logic, in which national priorities often follow externally set frameworks rather than being preceded by a vision for their own development. This testifies to the limited cognitive flexibility of managers and institutions (Helfat & Peteraf, 2014, p. 835). Instead of "learning from the future" (Scoblic 2020, p. 3), they adapt to external requirements. As a result, Bulgaria's strategic preparedness remains dependent on the European context rather than built on internal mechanisms for anticipation and adaptation.

The analysis of the full corpus of 300 national strategic documents (2007 – 2025) confirms the preliminary hypotheses about the lack of feedforward mechanisms. The summarized assessment is presented in Table 1.

Table 1. Assessment of Bulgaria's strategic documents (2007 – 2025) according to the five dimensions of feedforward logic

Dimension	Overall score	Share of documents	Comment
Vision and horizon	**Medium to Low**	≈80% limited to 2020/2030; ≈15% with a horizon to 2050 (mainly climate/energy); ≈5% without a clearly formulated horizon.	A "cyclical" horizon, synchronized with EU programs, prevails. Long-term visions are an exception.
Scenario thinking	**Low**	<10% of documents contain elements of scenarios (mainly in the "energy" and "climate" sectors).	A linear logic with fixed indicators prevails. Scenario matrices and alternative trajectories are missing.
System approach	**Medium**	≈40% contain references to "interestedness" or "systematicity", but real interdisciplinary logic is present in <15%.	There is an attempt at horizontal integration in "Bulgaria 2030", but the multitude of sectoral strategies leads to fragmentation.
Adaptation mechanisms	**Low to Medium**	≈25% envisage mechanisms for updating (reviews every 3 or 5 years). In the rest, adjustments are formal or completely absent.	Post factum reporting dominates. Early warning indicators are almost completely absent.
Indicators and external assessment	**Medium**	≈70% contain indicators; ≈50% are tied to external indices (EU, UN, World Bank).	Indicators are mainly "compliance-driven" (accountability to an external donor), not "future-driven"

Source: Own table

Political, institutional and economic implications of feedback-based strategic documents

The dominance of feedback logic also produces several structural consequences for Bulgaria's governance system. Politically, it reinforces short-termism. Strategies aligned with annual or mid-term reporting cycles limit the capacity of governments to articulate long-term visions. As a result, policy continuity becomes vulnerable to political change, and strategic goals are often reformulated or replaced before they mature into coherent long-term trajectories.

Institutionally, feedback-based planning strengthens administrative proceduralism. Ministries focus on compliance, reporting, and the execution of preset indicators, which reduces incentives for inter-ministerial coordination, experimentation, and collective learning. This leads to governance structures in which each institution optimises for its own reporting obligations rather than for shared national outcomes, which does not align with the logic of strategic planning.

Economically, the predominance of feedback logic constrains Bulgaria's long-term competitiveness. Instead, the planning system reacts to crises ex post facto, resulting in higher adjustment costs and missed opportunities for positioning the economy ahead of regional or global trends. The strong alignment with EU programming cycles further reinforces economic dependency, as national priorities tend to follow external conditions rather than anticipate future domestic needs.

4. Recommendations for improvement

The analysis of over 300 current strategic documents clearly shows that Bulgarian management practice operates primarily in the logic of feedback – reporting, correction and implementation of externally set goals. This limits the country's capacity to manage its future. To overcome this structural deficit, institutional and methodological changes are needed to introduce and sustainably strengthen feedforward mechanisms.

First, it is necessary not only to establish specialised units for strategic foresight within the Council of Ministers and key line ministries, but also to ensure that the professionals are responsible for the development of strategic documents. These structures should have a clear mandate to conduct horizon scanning, scenario exercises, and weak signal analysis (Cuhls 2019, p. 4; Tõnurist & Hanson 2020, p. 12). The international experience shows that institutionalizing foresight is a critical condition for building a national culture of foresight (Kuosa 2011, p. 56).

Second, each national strategy should contain not only a vision and indicators, but also at least two alternative development scenarios. This will allow for flexibility and adaptability in the face of uncertainty (Voros 2017, p. 7; Cairns & Wright, 2011, p. 1155). The scenarios should be tested through policy wind-tunnels that assess how specific policies would function under different future conditions (Scoblic 2020, p. 4).

Thirdly, it is advisable to develop supra-programme visions with a horizon of 2050 and even 2070, which would frame national development in a longer-term perspective.

Climate and energy policy already show that such horizons are possible. Expanding the time frame will provide the necessary diversity of management responses to the complex external environment (Ashby 1956, p. 202; Beer 1981, p. 115).

Fourth, alongside existing performance indicators, it is important to build panels of early warning indicators that warn of impending structural changes – demographic, technological, and environmental. They should be integrated into strategic documents as a mandatory element, not as an additional analysis. Such a system would transform indicators from an accountability tool into a predictive tool (Bogart 1980, p. 239).

Fifth, it is advisable to move towards more integrated strategic frameworks that unify sectoral policies and create a coherent vision. Currently, duplication and parallel strategies increase the system's entropy and make it difficult to manage (Jackson 2019, p. 54). A single strategic register and coordination mechanism would reduce this fragmentation.

Sixth, while European frameworks provide funding and discipline, Bulgaria must also develop its own visions and priorities that precede and build on external requirements. This means using EU programming periods not only as administrative frameworks, but also as an opportunity for experimentation and adaptation based on national specificities (Helfat & Peteraf 2014, p. 835).

Seventh, the change is not only institutional, but also cultural. The governance system must move from a culture of accountability to a culture of experimentation, mistakes and learning from the future. This implies a wider introduction of methods such as participatory foresight, which involve citizens, business and academic communities in the design of future scenarios (Miller 2019, p. 114).

Conclusions

The study showed that the strategic environment in Bulgaria is characterized by high documentary activity, but with limited ability to anticipate and adapt. The analysis of over 300 current national strategies and plans reveals a clear dominance of feedback logic: an emphasis on accountability, monitoring, and responding to events that have already occurred.

The lack of feedforward mechanisms – scenario thinking, horizon scanning, early warning systems – places the country in a vulnerable position to disruptive changes. While international examples such as Finland, Estonia or Singapore show how anticipatory governance can be an institutionalized tool for sustainable development, Bulgarian practice remains oriented mainly towards absorbing external resources and implementing short-term priorities. This dependence on external cycles and frameworks reduces the country's strategic autonomy and limits its ability to formulate its own visions beyond the European programming periods. Even when "islands" of long-term thinking exist – such as climate or energy policy – they remain isolated and do not become part of a comprehensive national foresight system.

In summary, Bulgaria functions as a catching-up economy: strategic documents are numerous but fragmented; visionary horizons are limited; and adaptation mechanisms

are mostly ex post facto. This makes it a reactive rather than proactive actor in the context of accelerating global uncertainty. In this context, the recommendations for institutionalizing foresight units, introducing scenario thinking, building early warning systems, and extending time horizons acquire not just an applied but a strategic nature. They are a condition for a transition from managing the past to managing the future – from a catching-up economy to an economy capable of predicting, modelling, and utilising the opportunities of the dynamic environment. Only through such a transformation can Bulgaria overcome its systemic deficit and build a strategic culture that does not simply react to changes, but actively anticipates them.

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