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Intelligent Steering Triplet: Towards Proactive Management Through AI

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***Abstract*— Organizational performance management traditionally relies on the Objective–Indicator–Action Lever triplet, which structures the translation of strategic goals into operational decisions. However, in increasingly complex and uncertain environments, this classical framework exhibits significant limitations, including low adaptability, reactive decision-making, and limited ability to anticipate disruptions. To address these challenges, this paper proposes an intelligent management triplet that integrates Artificial Intelligence (AI) into the traditional framework. The proposed approach enhances the classical loop by enabling the prediction of performance indicators, the optimization of action levers, and the dynamic adjustment of objectives. As a result, the system evolves into a self-learning and adaptive framework capable of real-time decision support. The contribution of this research lies in transforming a descriptive and reactive management model into a predictive, proactive, and data-driven system. An illustrative application in hospital inventory management is provided to demonstrate the operational relevance of the proposed approach in complex environments characterized by demand variability. The results highlight the potential of the intelligent triplet to improve responsiveness, decision quality, and overall performance, while supporting flexible and efficient management.**

***Keywords*— intelligent management triplet, artificial intelligence, performance management, predictive analytics, decision-making.**

I. Introduction

Organizational performance management represents a major strategic challenge for modern organizations, requiring the effective translation of strategic objectives into operational actions and measurable outcomes. In the literature on performance steering, it is widely accepted that any evaluation approach relies on an interpretive model of the real system that establishes causal relationships between undertaken actions and achieved performance [1]. Traditionally, performance management is structured around the Objective–Action Lever–Performance Indicator triplet, which defines the relationship between organizational goals, deployed resources, and performance measurement [2]–[3] [4]. In this framework, the objective represents the desired system state, the performance indicator reflects the observed state, and the action lever constitutes the controllable variable used to reduce the gap between expected and actual performance. This approach enables organizations to monitor deviations and implement corrective actions in a structured feedback loop, and it remains widely used in industrial and logistics systems.

However, in increasingly complex, uncertain, and dynamic environments—such as supply chains —this classical approach reveals significant limitations, low adaptability to rapid changes, lack of responsiveness, and difficulty in anticipating emerging problems. These limitations can lead to delayed, ineffective, or poorly targeted decisions, directly affecting the overall performance of the organization. [5][6], [7]. Similarly, classical performance steering assumes stable cause–effect relationships, which are often violated in real-world complex systems [8]. Recent advances in big data analytics and artificial intelligence (AI) offer new opportunities to address these limitations by enabling predictive and prescriptive modeling capabilities [9], [7], [10] [19]. In particular, AI allows forecasting of key performance indicators, optimization of action levers, and dynamic adaptation of decisions in real time. In this context, intelligent performance steering emerges as an extension of the classical framework, integrating predictive analytics and optimization mechanisms. This evolution transforms the traditional feedback loop into a self-learning and adaptive system capable of anticipating system behavior, recommending optimal actions, and continuously improving overall performance in complex environments.

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The structure of the paper is as follows: Section II presents a literature review on performance management and the use of AI in this field; Section III describes the methodology and the concept of the intelligent triplet; Section IV presents an illustrative example in hospital inventory management; Section V discusses managerial implications; and finally, Section VI concludes and proposes directions for future research.

II. Literature Review

A. *Organizational Performance Management*

Organizational performance management is a fundamental process that consists of guiding, measuring, and continuously adjusting activities in order to achieve strategic objectives. It ensures coherence between strategic orientations and operational actions by translating organizational goals into measurable indicators and concrete decision levers [3], [11], [12]. This approach is rooted in classical frameworks developed in industrial engineering and supply chain management, where the alignment between objectives, indicators, and actions is central to system control and improvement. Traditional performance management systems rely heavily on performance indicators and dashboards, these tools enable organizations to identify deviations, analyze performance gaps, and implement corrective actions. However, recent studies emphasize that these approaches remain limited when dealing with dynamic and uncertain environments [6], [9].

Indeed, classical performance management is predominantly reactive, as decisions are triggered after deviations are observed, and it relies mainly on historical data, which limits its ability to anticipate disruptions and adapt in real time. With the increasing complexity of organizational systems and the exponential growth of available data, traditional approaches face challenges in responsiveness, scalability, and decision consistency [13]. Recent research highlights the need for more agile, data-driven, and forward-looking performance management systems, where evaluation evolves into a continuous process of learning, prediction, and adaptation [9], [14].

Such an evolution enables organizations to transition from reactive to proactive management, integrating predictive analytics and advanced decision-support tools. In this context, artificial intelligence plays a key role in enhancing performance management systems by enabling real-time analysis, forecasting capabilities, and dynamic decision-making, thereby improving overall organizational performance in complex and rapidly changing environments [14], [15].

B. *The Steering Triplet*

The steering of organizational performance is traditionally based on the Objective–Action Lever–Performance Indicator triplet, which constitutes a fundamental framework for structuring decision-making processes and ensuring alignment between strategy and operations [3]. Within this framework, objectives define the expected outcomes and reflect strategic priorities, while action levers represent the set of resources, processes, and initiatives implemented to achieve these objectives. Performance indicators, in turn, measure the effectiveness of actions and monitor progress, enabling the evaluation of system performance and supporting decision-making processes [4], [13], [14].

This triplet forms a coherent and structured management system that facilitates coordination between different organizational levels and ensures continuous performance evaluation [15]. As illustrated in Fig. 1, performance management systems are organized around interdependent decision centers connected through vertical subordination and horizontal coordination links, allowing for consistency and alignment across strategic, tactical, and operational levels [4], [14].

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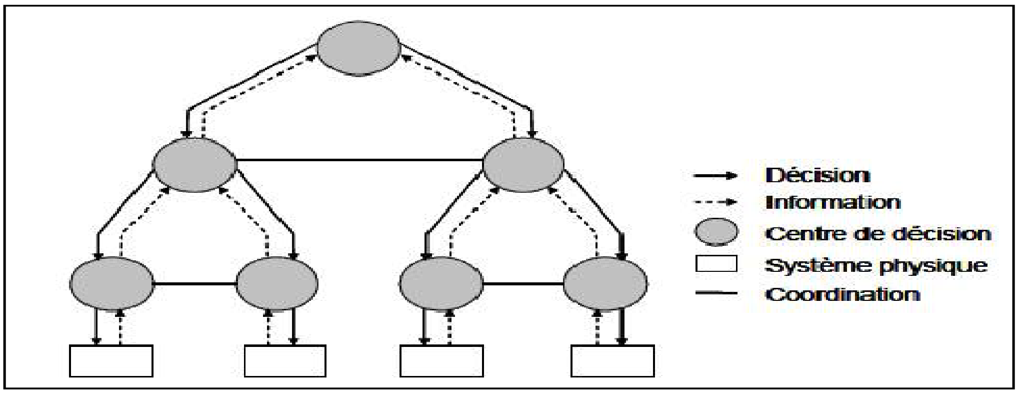

Fig. 1 Example of a steering structure [16]

Furthermore, the "golden triangle of management" (Fig. 2) highlights the strong interdependence between objectif, indicators and action levers, emphasizing that each performance measure should be associated with specific actionable decisions [2]. This relationship ensures that performance evaluation is directly linked to improvement actions.

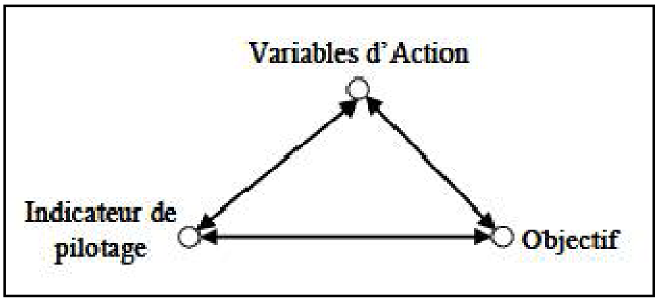

Fig. 2 The Golden Triangle of Management [17]

Despite its robustness and widespread adoption, the classical steering triplet presents several limitations, particularly in complex and uncertain environments. As summarized in Table I, this approach is mainly descriptive and reactive, as it relies on historical data and post-event analysis. Consequently, it offers limited capacity for anticipation and proactive decision-making. In addition, the increasing complexity of organizational systems and the growing volume of data make it difficult to identify the most appropriate action levers using traditional approaches, which often depend heavily on human expertise.

TABLE I

COMPARISON OF THE ADVANTAGES AND LIMITATIONS OF THE CLASSICAL TRIPLET

Triplet Element	**Advantages of Classical Management**	**Limitations of Classical Management**
Objectives	- Clear alignment with strategy - Structured and hierarchical vision(strategic→ tactical→ operational) - Facilitates internal communication	- Slow adaptation to changes - Based solely on historical data - Limited consideration of rapid or unforeseen variations

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Action Levers	- Concrete and well-defined actions - Clearly assigned responsibilities - Operational management easy to understand	- Late(reactive)adjustments - Difficulty in selecting the appropriate lever in complex situations - High level of expertise required for manual decision- making
Performance Indicators	- Objective and standardized measures - Ability to monitor deviations - Simple tools(dashboards)	- Post-event measurement(not predictive) - Too many indicators→ Information overload -Risk of fragmented and non- systemic management
Triplet as a Whole	- Strategic coherence - Robust and widely recognized management model - Solid foundation for structuring performance	- Descriptive vision only - Limited foresight - Does not manage uncertainty or complex interactions - Does not enable proactive management

These limitations highlight the need for more advanced and adaptive management approaches capable of handling uncertainty, complexity, and real-time decision-making. In this context, the integration of artificial intelligence represents a promising evolution, enabling the transition from a reactive steering model to a proactive and intelligent management system.

C. Artificial Intelligence and Organizational Management

The integration of artificial intelligence (AI) into organizational management represents a major evolution in performance steering, enabling organizations to overcome the limitations of traditional approaches. Unlike classical performance management systems, which rely primarily on historical data and reactive decision-making, AI introduces advanced analytical capabilities that support predictive and prescriptive management. Techniques such as machine learning, data mining, and predictive analytics allow organizations to forecast key performance indicators, simulate future scenarios, and identify optimal action levers under varying conditions [13], [14].

AI-driven systems enhance decision-making processes by enabling real-time data processing, continuous monitoring, and dynamic adjustment of actions. In this context, performance management evolves toward self-learning systems, where models continuously improve based on new data and feedback loops. This capability significantly increases organizational responsiveness, accuracy, and agility, particularly in complex domains such as logistics, production systems, and supply chain management [15], [7]. Moreover, AI contributes to the development of intelligent performance evaluation by enabling early detection of anomalies, predictive monitoring of key performance indicators, and proactive identification of potential risks [9], [14], [18], [19].

From a managerial perspective, AI augments traditional steering mechanisms by strengthening the coherence between objectives, action levers, and performance indicators. It supports a shift from descriptive dashboards to intelligent decision-support systems capable of recommending optimized actions and adapting strategies in real time. Consequently, performance management becomes a continuous, data-driven, and adaptive process, enhancing both operational efficiency and strategic alignment.

D. Summary and Identified Gaps

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The literature review highlights that traditional performance management approaches, particularly those based on the Objective–Action Lever–Performance Indicator triplet, provide a solid and structured foundation for organizational steering. However, these approaches remain inherently limited in complex and dynamic environments, as they primarily rely on descriptive and reactive mechanisms, with limited capabilities for anticipation and real-time adaptation [6], [9]. As a result, they struggle to effectively address uncertainty, rapid changes, and the increasing complexity of modern organizational systems.

At the same time, recent studies on artificial intelligence demonstrate its significant potential to enhance performance management through predictive analytics, real-time data processing, and decision optimization [14], [15]. Nevertheless, these contributions are often fragmented, focusing on specific applications such as demand forecasting, anomaly detection, or process optimization, without providing an integrated framework for overall performance steering.

This gap reveals the need for a comprehensive approach that combines the structural strengths of the classical steering triplet with the advanced capabilities of artificial intelligence. In this context, this research proposes the concept of an intelligent management triplet, which transforms the traditional Objective–Action Lever–Performance Indicator loop into a predictive, adaptive, and self-learning system. This approach aims to enable the anticipation of system behavior, the dynamic adjustment of action levers, and the optimization of decision-making processes, thereby supporting proactive and intelligent performance management.

III. Methodology: The Intelligent Management Triplet

A. Concept of the Intelligent Triplet

The intelligent management triplet builds upon the classical Objective–Action Lever–Performance Indicator framework by integrating artificial intelligence to enhance its capabilities. While the traditional triplet provides a structured approach for aligning strategy, actions, and performance evaluation, it remains inherently reactive and limited in handling uncertainty and dynamic environments.

The proposed intelligent triplet extends this framework by embedding predictive and adaptive functionalities, transforming it into a proactive and self-learning system. Its objective is to enable the prediction of key performance indicators, the optimization of action levers, and the dynamic adjustment of decisions in real time based on environmental changes. This approach allows organizations to anticipate potential disruptions, improve decision effectiveness, and maintain continuous alignment with strategic objectives.

B. Model Architecture

The proposed model is structured around three interdependent components: Objectives, Action Levers, and Performance Indicators. Objectives are derived from organizational strategy and define the expected outcomes. Action levers correspond to the processes, resources, and decisions that can be adjusted to achieve these objectives. Performance indicators measure the effectiveness of actions and provide feedback on system performance. The key contribution of the intelligent triplet lies in the integration of a self-learning feedback loop driven by artificial intelligence. As illustrated in Fig. 3, the system continuously collects and processes both historical and real-time data. AI models analyze these data to generate predictions, recommend optimal adjustments to action levers, and support decision-making. The outcomes of these actions are then measured through performance indicators, creating a continuous improvement cycle.

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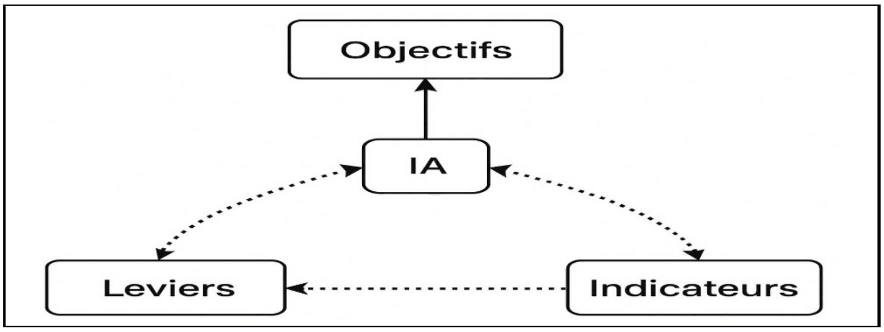

Fig. 3 Adaptive Flow Diagram of Objectives–Levers–Indicators with AI

C. Role of Artificial Intelligence

Artificial intelligence plays a central role in enabling the intelligent triplet. It operates at three main levels. First, it supports the prediction of performance indicators using machine learning algorithms or time series models, allowing organizations to anticipate future system behavior. Second, it contributes to the optimization of action levers by identifying the most effective decisions under given constraints. Third, it enables real-time adaptation by continuously comparing predicted and observed performance and adjusting actions accordingly.

These functionalities rely on advanced data processing and modeling tools, often implemented using programming environments such as Python, which facilitate the development, automation, and deployment of AI models. Through these capabilities, AI transforms the classical feedback loop into an intelligent, data-driven decision-support system

D. Advantages Compared to the Classical Model

Compared to the classical triplet, the intelligent triplet offers several significant advantages. It enables proactive management by anticipating potential issues before they occur, rather than reacting to observed deviations. It improves flexibility by allowing real-time adjustments of action levers based on continuously updated data. Furthermore, it supports faster and more informed decision-making by leveraging predictive insights and data-driven recommendations.

Another key advantage lies in its ability to simplify decision processes while handling complexity, as AI models can analyze large volumes of data and identify optimal solutions without requiring complex formal multicriteria methods. This makes the approach both powerful and operationally feasible for real-world applications.

To provide a clearer understanding of these improvements, Table 2 presents a detailed comparison between the classical steering triplet and the intelligent triplet, highlighting the transition from reactive and descriptive management to a proactive, predictive, and adaptive approach.

TABLE II
COMPARISON OF FEATURES AND OUTCOMES OF THE CLASSICAL TRIPLET VS. THE INTELLIGENT TRIPLET

Element	**ClassicalTriplet (Objectives–Levers– Indicators)**	**IntelligentTriplet(AI- driven)**
Nature of Decision	Deterministic, based on Human expertise	Data-driven, adaptive Learning
Information Sources	Historical data+ expert judgment	Big data(real-time), IoT, sensors, logs

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Objectives	Fixed, defined periodically	Dynamic, readjusted According to AI predictions
Action Levers	Standard processes, Corrective actions	Levers automatically optimized(AI optimization)
Indicators	Descriptive KPIs(rates, lead times, costs)	Predictive + prescriptive KPIs(anomalies, risks, recommendations)
Responsiveness	Reactive/preventive	Proactive/predictive
Type of Performance Evaluated	Past results(ex-post)	Anticipated future results (ex-ante)
Problem Detection	After deviations occur	Early detection before deterioration
Complexity Handling	Limited, depends on manual Analysis	High capacity to handle Complex interactions
Robustness and Accuracy	Average–depends on analytical model	High–automatically updated through learning
Performance Governance	Periodic, based on reports	Continuous, real-time, Autonomous dashboards
Final Outcome	Incremental improvement	Accelerated improvement, self-learning loop

As shown in Table II, the intelligent triplet significantly enhances decision-making by integrating predictive capabilities and real-time adaptability, thereby overcoming the limitations of traditional approaches.

E. Practical Implementation

The implementation of the intelligent triplet follows a structured process. First, organizations define the objectives, action levers, and performance indicators based on their strategic priorities. Second, relevant data are collected from various sources, including operational systems, sensors, and historical databases. Third, appropriate AI models are developed and trained to predict indicators and optimize decision variables.

Once deployed, the system continuously monitors performance, updates predictions, and adjusts action levers in real time. This iterative process creates a dynamic and adaptive management system that combines strategic rigor with predictive and prescriptive capabilities. As a result, organizations can enhance their responsiveness, improve decision quality, and achieve more efficient and sustainable performance management.

IV. Illustrative Application: Intelligent Hospital Inventory Management

This section provides an illustrative application designed to demonstrate the operational functioning of the proposed intelligent management triplet. Rather than presenting a real case study, it offers a conceptual and simplified scenario highlighting how the model can be implemented in practice. The hospital inventory management domain is chosen due to its inherent complexity, characterized by high demand variability, stringent service requirements, and the critical need to ensure the continuous availability of essential medical supplies.

Within the proposed intelligent management framework, the steering triplet can be defined as follows:

- Objective: Ensure the continuous availability of essential medicines in order to guarantee quality of care and avoid stock shortages.
- Performance Indicator: The medicine availability rate.

- Action Levers: Adjustment of inventory levels through dynamic stock management, including replenishment decisions, ordering from secondary suppliers to mitigate the risk of stockouts....

A. Dynamic Objective

In the classical management model, objectives are generally fixed and predefined, for example maintaining a medicine availability rate of 100%. While this approach provides a clear target, it lacks flexibility and does not account for the variability and complexity of real-world conditions.

In the intelligent management framework, the objective becomes dynamic and adaptive. Rather than being static, it is automatically adjusted based on several contextual factors, including the criticality of the medicine, the variability of demand, and operational constraints such as cost and storage capacity.

For instance, artificial intelligence can differentiate between categories of medicines and assign differentiated target levels of availability. Highly critical medicines may require a target availability rate close to 99% or higher, while less critical items may be managed with lower thresholds, such as 95%. This dynamic adjustment enables a more efficient allocation of resources while maintaining high service levels where they are most needed.

B. Predictive Performance Indicator

In the classical management model, performance indicators are typically measured ex post, providing a retrospective view of system performance. While this allows for the identification of deviations, it does not support anticipation or proactive decision-making. In the intelligent management framework, performance indicators become predictive. Artificial intelligence enables the forecasting of future performance levels by analyzing multiple sources of data, including historical consumption patterns, supplier lead times, and contextual factors such as seasonality or exceptional events.

For example, a predictive model may estimate that the availability rate of a specific antibiotic will decrease to 70% within the next three days. This early warning allows decision-makers to detect a potential stockout risk before it occurs and to take preventive actions in advance. As a result, performance indicators evolve from simple monitoring tools into proactive decision-support mechanisms.

C. Optimized Action Levers

In the classical management model, action levers are typically predefined and activated reactively based on observed deviations. Their selection largely depends on human expertise and predefined rules, which may limit responsiveness and effectiveness in complex situations.

In the intelligent management framework, action levers become optimized and adaptive. Artificial intelligence enables the simulation of multiple decision scenarios in order to identify the most effective actions under given operational constraints. These scenarios may include adjusting safety stock levels, placing orders with secondary suppliers, or redistributing inventory across hospital units.

Based on predictive insights, the system evaluates the potential impact of each action and recommends the most appropriate lever. Together, these three components illustrate how the intelligent management triplet transforms a traditional reactive system into a proactive, predictive, and adaptive decision-making framework, capable of improving performance and ensuring the continuous availability of critical resources.

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To further illustrate this transformation, Figure 4 presents the intelligent feedback loop underlying the proposed management triplet, highlighting the interaction between prediction, decision-making, action, and continuous re-evaluation.

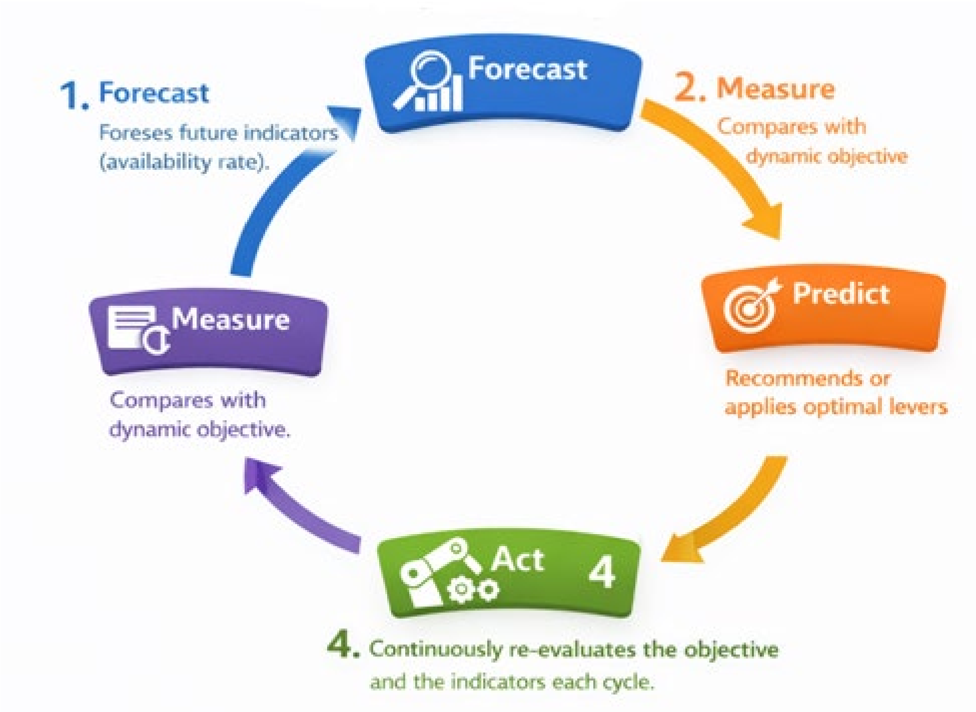

Fig. 4 Intelligent Management Triplet for Hospital Inventory Management

As shown in Fig. 4, artificial intelligence plays a central role in enabling a continuous and adaptive loop, where performance indicators are predicted, compared with dynamic objectives, and used to trigger optimized action levers. This iterative process ensures continuous learning and real-time adjustment, reinforcing the shift from reactive to proactive and intelligent performance management.

V. MANAGERIAL IMPLICATIONS

A. Transformation of the Management Role

The intelligent management triplet significantly transforms the role of managers in performance steering. Traditional approaches based on reactive adjustments are progressively replaced by anticipatory and adaptive decision-making processes. In this context, managers no longer focus solely on analyzing past deviations but rather on strategically supervising a self-learning system supported by artificial intelligence. Consequently, management evolves into a continuous process of learning, adaptation, and improvement, shifting from a control-oriented logic toward proactive and dynamic decision-making [9], [14].

B. Benefits for Managerial Decision-Making

The integration of artificial intelligence into the Objectives–Levers–Indicators loop provides substantial benefits for managerial decision-making. It enables faster and more informed decisions through real-time data processing and predictive analytics. By anticipating potential deviations, managers can take preventive actions rather than reacting to observed issues. Moreover, AI supports continuous optimization by learning from historical and real-time data, thereby improving decision accuracy and consistency. This approach also enhances

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collective performance by providing reliable indicators and actionable recommendations, fostering proactive, rational, and results-oriented decision-making [14], [15].

C. Conditions for Successful Implementation

The successful implementation of the intelligent management triplet depends on several organizational and technological conditions. First, the availability of high-quality and reliable data is essential to ensure the accuracy of AI models. Second, organizations must develop analytical and digital competencies to effectively interpret and use AI-generated insights. Third, an organizational culture that promotes innovation, trust in technology, and openness to change is required to facilitate adoption. Finally, human supervision remains crucial to validate, interpret, and, when necessary, adjust AI-driven decisions, ensuring alignment with strategic objectives and contextual constraints [14].

D. Limitations and Precautions

Despite its advantages, the intelligent management triplet presents several limitations that must be carefully considered. AI models may be affected by biases resulting from incomplete or poor-quality data, potentially leading to inaccurate recommendations. In addition, the implementation of such systems can be complex and requires advanced technical expertise. There is also a risk of over-reliance on technology, which may reduce critical thinking and managerial judgment. These challenges highlight the importance of adopting a hybrid management approach that combines artificial intelligence with human expertise to ensure robust, ethical, and sustainable performance management [13].

VI. CONCLUSION

This paper has proposed an intelligent management triplet as an evolution of the classical Objective–Action Lever–Performance Indicator framework. While traditional performance management approaches provide a structured basis for organizational steering, they remain limited by their reactive nature and reliance on historical data. In contrast, the proposed model integrates artificial intelligence to enable predictive, adaptive, and data-driven decision-making.

The intelligent triplet enhances performance management by transforming static objectives into dynamic targets, converting descriptive indicators into predictive tools, and evolving action levers into optimized and adaptive decisions. Through the integration of a continuous feedback loop, the model enables proactive management, improves responsiveness, and strengthens alignment between strategic objectives and operational actions.

An illustrative application in hospital inventory management is presented to demonstrate the operational relevance of the proposed approach. Rather than representing a real case study, this example provides a conceptual and simplified scenario that highlights how the model can be applied in complex environments. By anticipating demand, optimizing decisions, and enabling real-time adjustments, the intelligent triplet shows its potential to improve system performance and ensure the continuous availability of essential resources.

From a managerial perspective, this research highlights the importance of integrating artificial intelligence into performance management systems to enhance decision quality, flexibility, and operational efficiency. However, the successful implementation of such systems requires appropriate data infrastructure, analytical capabilities, and organizational readiness, as well as a balanced integration of human expertise and AI.

Finally, this study opens several avenues for future research. Further work may focus on validating the proposed model through empirical case studies, integrating advanced optimization and learning techniques, and exploring its application in other domains. Such developments would contribute to strengthening the robustness and generalizability of the intelligent management triplet.

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