

## Validity of the General Principles of Administration: A Framework for Management 4.0

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### ABSTRACT

This study addresses the gap in literature, which merely validates the theoretical validity of Fayol's principles without offering a pragmatic update for digital management. The objective was to develop a theoretical and practical framework that updates the fourteen principles to align with the demands of Management 4.0. The qualitative research employed a documentary approach, constructing a new conceptual framework through hermeneutic analysis of the literature. The main finding was that adaptive intelligence is the overarching principle that empowers the classical foundations to operate synergistically. The study concludes that Fayol does not require revision, but rather reinterpretation, transforming his principles into a programming language for management that is not only efficient but also perpetually adaptable.

**Keywords:** Adaptive intelligence, management principles, Management 4.0.

### INTRODUCTION

Over a century ago, in a context of rapid industrialization, the French engineer Henri Fayol laid the foundations of management theory with his work, *General and Industrial Administration*. His fourteen principles, conceived as a beacon of order in a world of empirical production, not only articulated a language for management but also offered a universal framework for leadership and organization. However, in the whirlwind of the Fourth Industrial Revolution, characterized by hyperconnectivity, artificial intelligence, and agility, the original rigidity of these postulates seems to clash with the demands of a dynamic and constantly changing environment.

The relevance of addressing this topic today lies in the need to bridge the gap between the wisdom of the past and the reality of the present. There is a significant knowledge gap in academic and business literature, which merely validates the theoretical validity of Fayol's principles without offering a pragmatic update that makes them operational in the daily practice of digital management. According to Sepúlveda Aguirre (2021), most analyses focus on the dichotomy between classical theory and modern methodologies, without offering an integrative framework that demonstrates how Fayol's foundations can be the basis for innovation rather than an obstacle. A framework has not been conceptualized that, instead of discarding classical approaches, uses them as a foundation for building truly adaptive management for the information age.

In this context, the following research question arises: How can the general principles of management, postulated by Henri Fayol, be reinterpreted and updated within a framework that facilitates agile and adaptable management in the digital age? The objective of this study is to develop a theoretical and practical framework, through a comprehensive review of the specialized literature, that updates the fourteen principles of management to engage coherently and effectively with the demands of Management 4.0. The aim is to provide a conceptual tool that not only demonstrates the continued relevance of the principles but also offers clear guidance for their effective application in contemporary organizations.

The literature review for this work is based on the use of both classic and current documentary sources and is structured as follows: (a) the foundations of classical management from the perspectives of Taylor and Fayol, representing the historical and theoretical basis of management. The contrast and complementarity of Taylor's vision (focused on bottom-up operational efficiency) and Fayol's (focused on top-down management structure) will be studied; (b) the contemporary relevance and challenges of modern management, focusing on the dialogue between classical theory and current practices. The adaptations of Fayol's principles in the era of modern business are explored, identifying which principles retain their essence and which have been modified or even superseded by new management methodologies. This paper will seek to justify why the rigid application of classical theory is insufficient in an environment that demands agility, collaboration, and flat structures, and (c) the theoretical framework of adaptive intelligence as the fifteenth general or transversal principle, in which the principle of Adaptive Intelligence will be conceptualized as a framework that integrates classical management with technology. It will examine how this principle, through the use of data, analytics, and digital technologies, not only makes Fayol's postulates viable today but also enhances them. Practical examples will be explored to illustrate how each principle of management can be modernized to create more effective and agile management.

## LITERATURE REVIEW

This section examines academic literature to contextualize the relevance of management principles in the digital age. Classical and contemporary theories are analyzed to establish a dialogue that justifies the emergence of adaptive intelligence as a cross-cutting principle, essential for Management 4.0.

### **The Foundations of Classical Management from the Perspectives of Taylor and Fayol**

Understanding the theoretical foundations of administration from the perspectives of Taylor and Fayol is crucial to grasping the evolution of the discipline and the principles that still influence modern management. (Agámez et al., 2015) point out the importance of administrative schools in contemporary administrative science, mentioning that it is in understanding classical administration from its postulates that the foundations of current scientific management emerge.

However, it is crucial to recognize the differences in their approaches. While Taylor focused on operational efficiency at the shop floor level, Fayol focused on managerial structure and administrative functions. According to Vilorio & Toro (2015), "Taylor viewed management from the bottom up, and Fayol from the top down." Similarly, Taylor proposed functional supervision, where a worker received orders from several specialized supervisors, while Fayol advocated unity of command, where each employee should receive orders from only one superior.

Additionally, Taylor prioritized economic incentives, such as piece-rate pay, while Fayol considered fair and equitable remuneration, including non-economic aspects. For Arcia (2021), it is important to highlight the formal order within hierarchical elements. However, in current practice, the rigid application of scientific management (Taylor) can lead to dehumanization and alienation, while an excessively structure-centered approach (Fayol) can limit flexibility and creativity. This study seeks to transcend the Taylor-Fayol dichotomy by reinterpreting their principles within a framework adapted to the digital age. In contrast to views that consider them obsolete (Velásquez Vásquez, 2002), this study aims to identify the current validity of their contributions, adapting them to the challenges of Management 4.0. According to Boada-Medina and Pérez-Medina (2025), Management 4.0 is characterized by the convergence of digital technologies (artificial intelligence, connectivity, and automation)

applied to optimize management processes and decision-making in organizations. Pardo-Ramos (2010) points out that “A renewed perspective is pertinent.”

Now, as a product of this framework, the following table presents an initial, eclectic frame of reference regarding the validity of general management principles for Management 4.0. This framework focuses on what each author contributed to the establishment of each principle:

**Table 1:** Comparative Analysis of Fayol's Principles and Taylor's Visions.

| <b>Fayol's Principle</b>  | <b>Contribution or Vision of Frederick W. Taylor</b>  | <b>Contribution or Vision of Henri Fayol</b>   |
|---|---|--|
| 1. Division of Labor  | Taylor took it to the extreme. He focused on specializing tasks for the worker, optimizing every movement for maximum efficiency and productivity. This was the heart of scientific management.                                     | It conceives of the division of labor as a specialization of managerial and operational functions, not just manual tasks, so that each department of the company works efficiently.                              |
| 2. Authority and Responsibility                                 | Authority is strictly functional and hierarchical. Management has absolute authority to plan, and the worker has the responsibility to execute without question. There is no link between formal authority and personal leadership. | Authority is a combination of formal authority (by virtue of position) and personal authority (intelligence, experience, and leadership). Responsibility is the natural counterpart of authority.                |
| 3. Discipline   | For Taylor, discipline is obedience to the scientific method imposed by management. It is based on strict supervision and total control to ensure that there are no deviations.   | It is based on respect for the company's rules and agreements. Fayol maintains that discipline is a consequence of good management and clear agreements between management and employees.                        |
| 4. Command Unit   | Taylor opposed this principle. His concept of functional supervision implied that a worker received orders from several specialized supervisors (one for time, another for repairs, etc.), which Fayol directly criticized.         | This is a fundamental pillar of his theory. He states that each employee should receive orders from only one superior to avoid conflicts and confusion, and to maintain clarity in the chain of command.         |
| 5. Management Unit  | He did not address it directly, as his focus was on individual efficiency rather than the coherence of large-scale organizational goals.  | It posits that there should be a single plan and a single leader for a set of activities that pursue the same objective. It focuses on coordination and cohesion across the entire organization.                 |
| 6. Subordination of Individual Interest to the General Interest | Taylor applied it implicitly. He believed that maximum individual productivity (through high wages) directly benefited the company and society.   | It explicitly argues that the interest of an employee or group should not prevail over the higher interest of the organization.  |
| 7. Remuneration   | His approach was piece-rate pay, a purely economic incentive. He believed that the worker's primary motivation was money and that a higher wage guaranteed greater production.  | Compensation should be fair and equitable for both parties. Their vision is broader and includes both salary and other types of rewards and benefits.  |
| 8. Centralization   | His theory is inherently centralized, since all planning, work study, and methods control are concentrated in management.   | Centralization is a matter of degree. Fayol argues that decision-making authority should be optimal for the organization, neither totally centralized nor totally decentralized.                                 |
| 9. Hierarchy  | For Taylor, hierarchy is a chain of control to ensure efficiency. It is a system of strict supervision to guarantee the execution of the scientific method.   | Hierarchy is the formal chain of command that runs from the highest to the lowest level. He defended respect for it as the means of communication but also advocated for the use of "gateways" to be more agile. |
| 10. Order   | Taylor focused on the physical arrangement of tools and equipment in the workshop. His time and motion studies aimed to eliminate unnecessary steps to optimize work.   | He distinguishes between material order (a place for everything) and social order (a place for every person). The right person should be in the right position.  |
| 11. Equity  | It wasn't an explicit principle. His system was fair in the sense that higher   | It refers to fairness and kindness in the treatment of employees. A good leader  |

|                     |   |   |
|---------------------|---|---|
|                     | production led to higher pay, but it didn't address fairness in personal treatment or labor justice.  | must treat their subordinates fairly to foster loyalty and respect.   |
| 12. Staff Stability | Staff turnover was seen as a failure in the selection and training system, but talent retention was not focused on as a pillar of management.                           | He believed that a high employee turnover rate was inefficient and costly for the company. Therefore, job stability is a key factor for an organization's success.  |
| 13. Initiative      | It didn't exist in their theory. All initiative, innovation, and thought were the sole responsibility of management. The worker was only supposed to obey instructions. | He advocated giving employees the freedom to propose and execute plans, even if they might make mistakes. He saw this as a source of strength for the organization. |
| 14. Team Spirit     | He did not consider it a pillar. His focus on individual productivity and piece-rate wages did not promote teamwork, but rather competition among workers.              | He emphasizes the importance of harmony, unity, and cohesion among employees. This is summarized in his famous phrase: "Unity is strength."                         |

**Note:** Research and critical comparison of literature.

The principles of management, as formulated by Fayol and Taylor, far from being obsolete, have been transformed into a fundamental conceptual framework for Management 4.0. These principles form the basis upon which an organizational structure adapted to the challenges of the digital age can be built, where technology and the human factor coexist. The division of labor today has become more sophisticated than the specialization on Taylor's assembly line. It is now a specialization of knowledge. Instead of workers, we have multifunctional teams and experts in areas such as cybersecurity, data analytics, and artificial intelligence, collaborating to achieve a common goal.

Regarding authority and responsibility, these have evolved beyond the traditional hierarchy. Today, a leader wields authority not only through their position but also through their experience, knowledge, and ability to influence and guide distributed and autonomous teams. Responsibility is shared and crucial in an environment where projects are complex and information is decentralized. Equally important is the rise of discipline as a principle that is no longer about strict obedience to a method, but rather about commitment to and adherence to the organization's values and objectives. In the digital age, self-regulation and individual responsibility are encouraged, as it is impossible to supervise every action.

Regarding the principles of unity of command and unity of direction, these remain essential in the complexity of today's projects. Even though teams are autonomous, they need clarity in their objectives and a well-defined reporting line to avoid conflicts and redundancies. Order has been digitized and refers to the organization of data, files, and workflows on virtual platforms. Meanwhile, the subordination of individual interest to the collective good is more relevant than ever in a collaborative economy. The idea is promoted that the success of the team and the company ultimately benefit all its members. Compensation has also expanded. In addition to salary, incentives such as flexible work arrangements, professional development, and recognition are included, which are key to motivating and retaining talent in today's market.

Regarding hierarchy, it is clear that it coexists with flatter, more agile structures, and centralization is a strategic decision adapted to each situation. Important decisions are centralized, but teams are empowered to make operational decisions. In addition, equity, staff stability, team spirit, and initiative are principles that have become pillars of talent management. Equity relates to diversity and inclusion, stability to talent retention, team spirit to creating a collaborative culture, and initiative to promoting innovation and proactivity among employees at all levels of the organization.

### **Challenges and Adaptations of the General Principles of Administration in Management 4.0.**

This section addresses the relevance and limitations of classical principles in today's dynamic and complex environment. It is essential to analyze how these principles can be adapted to the demands of Management 4.0, characterized by hyperconnectivity, artificial intelligence, and agility. The principles of order, discipline, and hierarchy, fundamental in classical administration, can be rigid in an environment that demands flexibility and adaptability. Agüero (2021) points out that "excessive bureaucracy can hinder innovation and creativity," preventing swift action for decision-making. Likewise, the centralization of power and decision-making, present in classical models, can limit the responsiveness and autonomy of employees in a changing environment, where Vilorio & Toro (2015) highlight the importance of power distribution for adaptation.

Strict supervision and total control, as proposed by Taylor, can generate distrust and limit employee motivation and commitment. Maresca (2020) argues that trust and autonomy are essential in a digital work environment, provided employees have autonomy, as the proverb states, "If you want to go fast, go alone; if you want to go far,

go together.” While it is important to consider these principles in their proper context, according to Quintana (2020), companies should take into account the following aspects: “Efficiency, effectiveness, and quality, especially ensuring that quality is comprehensive.”

This study proposes transcending the limitations of classical theory by integrating adaptive intelligence as a cross-cutting principle, as well as strategic management. Instead of discarding classical principles, it seeks to reinterpret and update them within a framework that facilitates agile and adaptable management in the digital age. Therefore, in order to address and understand the organizational context (Suárez, 2004), flexibility and agility are fundamental to this system. Hence, the following table presents a second framework that addresses the challenges and adaptations. of the general principles of administration in Management 4.0, focusing on those that maintain the classic essence and those that modified their context to incorporate themselves into the digital age.

**Table 2:** Update and validity of the Principles of Administration in Management 4.0.

| <b>Principles that Remain</b>                                | <b>Why do they persist?</b>   | <b>Principles that have been modified</b> | <b>Why did they change?</b>  |
|--|---|---|--|
| Division of Labor  | Specialization remains the foundation of efficiency. Today, this manifests itself in specialized roles and departments (e.g., digital marketing, data analysts).                            | Unit of Command                           | Rigid hierarchical structures have given way to matrixes or agile structures. An employee can report to a project manager, in addition to a functional manager, which breaks the one-superior rule.            |
| Authority and Responsibility                                 | The concept of delegation and accountability is fundamental. A modern leader delegates decision-making authority and expects their team to take responsibility for the results.             | Hierarchy (Scalar Chain)                  | Communication is no longer strictly top-down. Organizational structures are flatter, and informal, horizontal communication (between teams) is as important as, or even more important than, formal hierarchy. |
| Subordination of Individual Interest to the General Interest | It remains crucial to an organization's success. Employees must understand the company's vision and mission to align their personal goals with corporate ones.                              | Centralization                            | The trend in modern organizations is the decentralization of decision-making. The aim is to empower teams to respond more quickly and flexibly to market changes.  |
| Equity   | It is a cornerstone of modern management. It has expanded to include concepts such as inclusion, diversity, and workplace justice. Companies promote fair and impartial treatment for all.  | Remuneration                              | Salary is no longer the sole motivating factor. Companies are offering more holistic compensation packages that include benefits, work flexibility, professional development, and a positive work environment. |
| Staff Stability  | Talent retention is a priority. High recruitment and training costs make investing in the development and stability of current employees more valuable.                                     | Initiative                                | We've moved from a vision where initiative was a bonus to one where it's a core value. Leaders foster intrapreneurship and encourage their teams to propose ideas and innovate.                                |
| Team Spirit  | Collaborative work is the engine of innovation. Modern management focuses on creating high-performing, multidisciplinary teams and building a culture that fosters cooperation and synergy. |   |  |

*Note:* Pre-discovery of the critical contrast of literature.

The concept of management principles has evolved to serve as a second framework for management in the digital age. This isn't about starting from scratch, but rather a smart adaptation where classic and contemporary approaches intertwine to create more agile and effective management. Principles that remain unchanged, such as the division of labor, have taken on a different form. It's no longer about specialization in mechanical tasks, but about specialization in knowledge.

In this sense, a data analyst or an artificial intelligence expert embodies the essence of this principle, maintaining efficiency but at a cognitive and strategic level. Similarly, authority and responsibility remain a cornerstone, evolving from a hierarchical concept to one of delegation and accountability. A modern leader trusts their team's autonomy and empowers them to make decisions, fostering a culture of trust and ownership. Subordination of individual interest to the common good, fairness, staff stability, and team spirit have also remained fundamental, as collaboration, talent retention, and inclusion are more important than ever in an interconnected world.

On the other hand, principles such as unity of command and hierarchy have been modified, giving way to more flexible structures and a more horizontal flow of communication. Matrix and agile structures allow employees to report to multiple leaders, breaking down the notion of a single superior. This fosters collaboration and flexibility. Centralization has also been reevaluated, leading to the decentralization of decision-making, which allows teams to act more quickly and autonomously. Similarly, compensation is no longer purely financial but includes a more holistic compensation package with benefits, work flexibility, and development opportunities. Finally, initiative, which was previously the exclusive domain of management, has become a core value. Leaders now encourage intrapreneurship and motivate their teams to propose ideas and innovation.

### **Theoretical Emergence of Adaptive Intelligence as a Cross-Cutting Principle of Management.**

For the purposes of this study, the categorization of management principles in the digital age does not follow a linear or rigid logic, but rather the need to create a framework that captures the interconnected nature of contemporary organizations. As Hitt et al. (2006) point out, management is an interdisciplinary field, and its success lies in the ability to integrate different concepts into a coherent system. In this sense, the digital age demands a way of thinking that groups principles by their purpose and function, like pieces of a dynamic puzzle where linearity and sequentiality have no place.

Instead of viewing each principle in isolation, they were grouped into categories because current management operates as an integrated system, where efficiency, structure, leadership, and culture are interdependent components that must function synergistically. This grouping, as Ghemawat and Rivkin (2006) suggest, reflects the reality that a change in one part of the system affects all the others, underscoring the need for a holistic view of decision-making.

Thus, the category of efficiency and agile operations is a clear example of this interdependence. It is not limited to the division of labor or the order of tasks; its true strength lies in its integration with initiative. In digital management, efficiency is achieved when specialization in roles is combined with the ability of teams to constantly propose improvements, thereby driving innovation and adaptability.

Similarly, the category of organizational structure and authority is justified because the principles of unity of command, unity of direction, centralization, and hierarchy are not dogmas, but rather tools of organizational design. Grouping them together allows us to understand that a company's flexibility and agility depend on how these elements are combined. As Chiavenato (2004) states, it is not about eliminating hierarchy, but about adapting it to be flatter and less bureaucratic, which allows for faster decision-making and more efficient strategic control.

In the leadership and talent management category, the principles were grouped to illustrate that a company's success is based on its human capital. Authority and responsibility are intertwined with equity, staff stability, and compensation because effective leadership is not imposed but earned through empowerment, fairness, and investment in employee well-being. The grouping of these principles reminds us that a culture of trust is the foundation for attracting and retaining top talent, a point that authors like Drucker (2001) considered crucial for productivity in the knowledge age.

The category of collaborative vision and culture is also highlighted as paramount in the digital age. Team spirit is a principle that, on its own, does not guarantee cohesion. However, when combined with the subordination of individual interest to the general interest and discipline (understood as a commitment to objectives), it creates a solid organizational culture. This grouping emphasizes that collective vision and collaboration are the true driving force of a modern company, demonstrating that management is not a science of separate parts, but a discipline that seeks harmony among its principles to achieve a common goal.

**Table 3:** Categorization of the general principles of administration as integrating axes.

The following table specifically shows the categorization being referred to

| <b>Category</b>                 | <b>Grouped Principles</b>                              | <b>Meaning in Modern Management</b>  |
|---------------------------------|--|--|
| Efficiency and Agile Operations | P1. Division of Labor<br>P10. Order<br>P13. Initiative | This category focuses on how work is optimized to achieve maximum productivity. Division of labor and order are the foundation of efficient workflows, while initiative becomes the engine of innovation and adaptability needed to operate in a |

|  |   |   |
|--|---|---|
|  |   | constantly changing digital environment.  |
| Organizational Structure and Authority | P4. Command Unit<br>P5. Management Unit<br>P8. Centralization<br>P9. Hierarchy                | These principles define the organization's architecture. In modern management, a balance is sought between hierarchical clarity (authority) and structural flexibility. This framework ensures that companies maintain clear direction and strategic control, even as they adopt more horizontal models.      |
| Leadership and Talent Management       | P2. Authority and Responsibility<br>P7. Remuneration<br>P11. Equity<br>P12. Staff Stability   | A company's success depends on its human capital. These principles address the relationship between leaders and employees. Authority is exercised through empowerment, compensation becomes holistic (including well-being), and equity and stability become pillars for attracting and retaining top talent. |
| Vision and Collaborative Culture       | P6. Subordination of Individual Interest to the General<br>P3. Discipline<br>P14. Team Spirit | This category focuses on the values and behaviors that drive a company's culture. Collective interest takes precedence over individual interests. Discipline is a commitment to the company's objectives, not mere obedience. And team spirit is the force that unites everyone to achieve the common vision. |

**Note:** *Interfinging of the critical contrast of literature / P: Principle.*

To introduce the concept of adaptive intelligence as a cross-cutting principle of management, it is crucial to construct an argument that transcends simply listing examples and focuses on its academic and technical significance. Unlike previous frameworks that categorized principles according to their function, adaptive intelligence is not a category, but rather the driving force behind all others. This concept is not a linear function, but a cross-cutting principle that permeates all the categories we have defined. If general principles represent the fundamental components of management, adaptive intelligence constitutes the capacity that allows them to be articulated coherently and dynamically. This is understood as the organizational ability to collect, analyze, and apply information in an agile and continuous manner, facilitating timely decision-making, the ongoing adjustment of strategies, and the consolidation of sustained improvement cycles. In this context, adaptive intelligence is positioned as a central element for the development and strengthening of Management 4.0.

Now, from an academic perspective, this principle has three essential characteristics that give it the status of a theoretical concept:

1. ***The engine of connectivity and agility.*** Unlike classical principles based on linearity and hierarchy, adaptive intelligence is the principle that allows an organization to function as an interconnected system. It doesn't operate sequentially but rather acts as an engine that drives the flow of information. Its role is fundamental to Management 4.0, as it facilitates an organization's ability to collect data, analyze it, and make decisions in real time. In this sense, adaptive intelligence allows structure and hierarchy to become more fluid and reactive, breaking down the rigidity of traditional models. It is the principle that gives an organization agility, enabling it to respond instantly to changes in its environment.

2. ***The synergy between the human factor and technology.*** Adaptive intelligence is not a technological principle; it is a principle that redefines the interaction between individuals and digital tools. Its purpose is to create synergy, enhancing human capabilities through information. For example, instead of technology replacing the human factor, adaptive intelligence ensures that data analytics informs leadership so they can make better decisions. The value of this principle lies in its use of information to empower leaders and teams, fostering a culture of autonomy and informed accountability. It focuses on optimizing collaboration, ensuring that access to relevant data facilitates decentralized decision-making and prevents conflicts based on a lack of information.

3. ***The foundation of continuous improvement and organizational learning.*** Adaptive intelligence stands as the cornerstone of organizational learning. It is not a one-off action, but a constant cycle of feedback and improvement. This principle ensures that the company not only reacts to changes but also anticipates them. By continuously analyzing data, the organization can identify patterns, predict trends, and proactively adjust its strategies. This learning process extends to talent management, allowing the company to identify the factors that influence employee retention or team productivity. Therefore, adaptive intelligence is not just a theoretical concept, but a management philosophy that guarantees the organization's relevance and growth in a constantly evolving digital environment.

**Table 4:** Practical Application of Adaptive Intelligence: A Third Framework for Management.

| Category                               | Contribution of Adaptive Intelligence  | Practical Examples  |
|--|--|---|
| Efficiency and Agile Operations        | Data optimizes workflows, task allocation, and fosters a culture of constant innovation.   | <ul style="list-style-type: none"> <li>- Performance analytics for a development team identifies strengths and optimally allocates tasks.</li> <li>- A factory uses sensors to adjust its production line, efficiently dividing the work between robots and operators.</li> <li>- Access to market data allows teams to propose process improvements, validating their ideas with evidence.</li> </ul>  |
| Organizational Structure and Authority | Shared information and data-driven decision-making reduce rigidity, promote decentralization, and clarify the chain of command.    | <ul style="list-style-type: none"> <li>- A manager delegates the management of a digital campaign, giving the specialist access to the Google Analytics dashboard for real-time adjustments.</li> <li>- Marketing and sales teams access the same market information to make joint decisions and avoid conflicts.</li> <li>- The senior management of a chain of stores monitors total sales, while the managers of each branch use local data to make autonomous decisions.</li> </ul> |
| Leadership and Talent Management       | Data analysis fosters fairer and more equitable leadership, enabling personalized compensation and talent retention.               | <ul style="list-style-type: none"> <li>- A company uses customer satisfaction and efficiency data to reward employees.</li> <li>- A human resources system uses artificial intelligence to predict which employees are at risk of quitting and create retention plans.</li> <li>- Performance data analysis is used to make promotion decisions based on objective metrics.</li> </ul>  |
| Vision and Collaborative Culture       | Shared metrics and common goals fostered by transparency in information create a collective vision and a sense of self-discipline. | <ul style="list-style-type: none"> <li>- A shared Kanban board displays the progress of each member of a software team, creating a sense of collective accomplishment.</li> <li>- A customer service employee has access to satisfaction surveys, directly seeing the impact of their work on customer loyalty.</li> <li>- Transparency in performance data fosters individual accountability and team commitment, without the need for constant supervision.</li> </ul>                |

*Note:* Finding from the critical comparison of literature.

Adaptive intelligence has emerged as the guiding principle of management in the digital age, transcending the logic of the fourteen classical principles to become the driving force behind organizational transformation. Unlike traditional principles that operated linearly, this concept is the organization's metabolism, a dynamic and non-sequential process that absorbs information from the environment, processes it in real time, and transforms it into action. It is this principle that allows companies to abandon the rigidity of past structures and operate as an interconnected system, providing management with unprecedented fluidity and agility.

Furthermore, it is based on a cognitive symbiosis between the human factor and technology. Instead of digital tools replacing intuition and judgment, adaptive intelligence integrates them to enhance team capabilities. Data ceases to be a mere record and becomes a catalyst for collaboration and informed empowerment, preventing conflicts and promoting responsible autonomy. It is through this symbiosis that organizations acquire the capacity for proactive morphogenesis, not only reacting to market changes but anticipating them and reconfiguring their own form and function to consciously and strategically shape their future.

In essence, adaptive intelligence is the management philosophy that modernizes each of the classic principles. It transforms hierarchy into a conduct for information, physical order into a data ecosystem, and initiative into evidence-based proactivity. This cross-cutting principle ensures that the organization not only survives but also learns and evolves continuously, guaranteeing its relevance and growth in an environment of perpetual and accelerating change

## METHODOLOGY

This study employs a qualitative methodological approach, operating within a documentary and hermeneutic-dialectical research paradigm. Unlike empirical-quantitative methods, this approach focuses on interpretation and theoretical construction, a path advocated by authors such as Hernández et al. (2014) for social science research.

The methodology does not follow a linear design, but rather a process of reflection and critical synthesis that allows for a comprehensive examination of the relevance of management principles in the digital age. The relevance of this methodological choice lies in the need to intertwine classical wisdom with the demands of a contemporary environment, a task that, as Hernández, Fernández et al. (2014) point out, requires in-depth and transdisciplinary analysis.

The study was structured in three interconnected phases. The first consisted of a systematic compilation of academic literature, using specialized sources to identify the theoretical antecedents of modern management. This process was carried out from a transdisciplinary perspective, as suggested by studies such as Arcia's (2021), to enrich the analysis with contributions from organizational sociology, systems theory, and technology. In the second phase, a hermeneutic and content analysis of the documentary corpus was conducted. The texts were interpreted to identify patterns and divergences, which allowed us to transcend the dichotomy between classical and modern approaches and reveal the interdependence of the principles—an approach that reflects Taylor and Bogdan's (1998) thinking on qualitative research. This analysis was fundamental for the subsequent categorization of Fayol's principles along the axes presented in Table 3.

The third and final phase was synthesis and theoretical construction, where the findings served to develop the concept of adaptive intelligence as a cross-cutting principle. It was conceptualized as a force that is not a function, but rather the driving force behind organizational agility and proactivity—a concept that aligns with Drucker's (2001) ideas on knowledge as the company's primary resource. This phase culminated in the creation of Table 4, which illustrates how this new principle redefines and operationalizes the classic principles of Industry 4.0.

## FINDINGS AND DISCUSSION

The objective of this study is to develop a theoretical and practical framework, through a comprehensive review of the specialized literature, that updates the fourteen principles of management to engage coherently and effectively with the demands of Management 4.0. The findings demonstrate that their continued relevance is not merely a theoretical validation, but rather a profound paradigmatic reconfiguration. The initial question, "How can Fayol's principles be reinterpreted for Management 4.0?" is not answered by a simple update, but by the revelation of a cross-cutting principle: adaptive intelligence. This fundamental finding is the guiding thread that connects and gives meaning to the three phases of this work.

The preliminary categorization, presented in Table 3, was the first crucial step. By grouping the fourteen principles into four axes (Efficiency, Structure, Leadership, and Culture), the linear and fragmented view that has limited their application was transcended. This grouping is not random; it reflects the reality that, in a hyperconnected system, efficiency without initiative is sterile, structure without flexibility collapses, leadership without equity is dysfunctional, and culture without collaboration lacks cohesion.

The key finding was the realization that Fayol's categories, on their own, were insufficient to capture the fluid nature of Management 4.0. A framework was needed to allow them to move in harmony. A review of the literature and hermeneutic analysis revealed that the common denominator in cutting-edge management is the strategic use of information and the ability to learn from it. This is where adaptive intelligence emerges as the underlying principle that empowers each category. Like a central nervous system in a company, it is not a function, but a capability that allows all the principles to respond synergistically. This finding fills a gap in literature, which, until now, has only pointed out the dichotomy between classical and modern approaches without offering a theoretical-practical bridge.

The study's culminating finding, reflected in Table 4, is the consolidation of adaptive intelligence as a principle of proactive morphogenesis. It's not just about reacting to data, but about using it to reconfigure the organization before the environment demands it. Fayol gave us the foundation, but adaptive intelligence provides architecture for a structure that can change its form in real time. This principle updates the theory and, in turn, transforms it into an operational tool that allows companies to shape their own future. It is the answer to the initial question and the essence of a new management paradigm where relevance is measured not by survival, but by the capacity for constant evolution.

## CONCLUSIONS

This study began with the premise that Fayol's principles, far from being obsolete, possess a latent relevance that simply needs to be activated within the context of Management 4.0. The research question, "How can they be reinterpreted and updated?", found its answer beyond mere adaptation and culminated in a revelation: the future of traditional management lies not in its survival, but in its metamorphosis. The principles are not a static map of the past, but a timeless compass that, when calibrated with the rudder of adaptive intelligence, can navigate the

turbulent waters of the digital age.

The main conclusions of this research are that the value of Fayol's principles is enhanced when viewed as an interconnected system, not as a list of unrelated commandments. By grouping them along the axes of Efficiency, Structure, Leadership, and Culture, a more flexible and dynamic framework is achieved. This categorization demonstrates that discipline and hierarchy are not merely rules, but tools for efficiency, and that equity and initiative are pillars of a culture of innovation.

Furthermore, the knowledge gap in the literature was filled by adaptive intelligence, a cross-cutting principle that, unlike the original fourteen that describe the “what,” explains the “how” to do it with agility and awareness. This is not a mere addition, but rather the catalyst that reinterprets each principle for the digital age, transforming data into decisions and experience into knowledge.

Finally, the study's most profound conclusion is that adaptive intelligence elevates management to a state of proactive morphogenesis. This allows an organization, instead of merely reacting to changes, to use its intelligence to anticipate them, reorganizing its structures before external pressures demand it. Thus, Fayol's principles evolve from an operating manual into a programming language for management, where adaptive intelligence is the code that makes them flexible, scalable, and, most importantly, capable of evolving.

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