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Re-writing management control philosophy

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Abstract: This paper explores the enigmatic relationship between management control and technological innovation, offering valuable insights. First, it aims to clarify the fundamental components of traditional management control (TMC), such as the cybernetic philosophy, the diagnostic use of control systems, financial information, the top-down approach, and positivist theory. Additionally, the paper seeks to highlight the paradoxical connection between these elements and the stochastic nature of innovation. Second, by emphasizing the necessity of shifting the paradigm that underpins contemporary management control (CMC), this approach steers the research toward a comprehensive analysis of its key components. These include the interactive use of control systems, the integration of non-financial information, a bottom-up approach, and the positioning of management control tools within the framework of instrumental theory. Such a configuration fosters innovation by promoting interactive communication, creativity, the development of new strategies, and the reduction of uncertainties. Third, the literature identifies two distinct typologies of innovation: incremental and radical. Each requires a unique process, which is further divided into phases, each with its own set of requirements. These requirements necessitate specific levers of control, which not only rethink and rehabilitate the role of traditional management control but also emphasize the importance of both TMC and CMC in supporting the innovation process.

Keywords: Traditional management control, contemporary management control, levers of control, cybernetic regulation philosophy, dynamic change and learning philosophy, innovation processes, innovation typologies.

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Introduction

The proliferation and unpredictable behavior of competitors, along with the constantly evolving needs of customers, are undoubtedly key factors contributing to environmental complexity. In response, modern companies position themselves at the heart of Darwinian metatheory, aiming to activate subsistence mechanisms based on learning and innovation, which significantly contribute to the development of innovative products. However, the implementation of innovation remains a challenging issue, justifying the adoption of a project-based organizational structure and necessitating the management of various types of uncertainties and risks. As a result, the informational aspect of management control places this discipline at the center of an informed and vigorous debate. ***Within this framework, how does management control ensure the direction of the innovation process?*** **An analysis of the literature on the relationship between management control and innovation reveals three distinct streams that shape this connection** (Benslimane, 2023).

The **first stream** emphasizes that traditional management control, rooted in cybernetic philosophy, hinders the innovation process, as innovation has a purely stochastic nature. Several authors have reviewed the various motivations driving the antagonistic nature of this relationship, which total five: (1) The control of creativity and innovation is a paradoxical matter. (2) The traditional approach to management control is antithetical to the current environmental requirements. (3) Cybernetic philosophy is primarily based on pre-established norms that contradict the fundamental principle of innovation (stochasticity). (4) Financial information often fails to reflect the actual performance achieved by companies. (5) Innovation requires communication and interaction; however, diagnostic use is characterized by formal communication channels and meticulous control of operations[1] (Pfister, 2014; Davila et al., 2009; Amabile et al., 1996; Hofstede, 1978; Johnson & Kaplan, 1987; Weir, 2014; Chenhall, 2003; Simons, 1994; Otley, 1994; Henri, 2006; Langfield-Smith, 1997; Haustein et al., 2014).

The **second stream** legitimizes and rehabilitates the role of management control, particularly following the publication of Robert Simons' model, which marked a significant departure from the ideas widely disseminated by previous scientific work. From this perspective, contemporary management control is based on the subsequent postulates: (1) The adoption of various types of indicators (both financial and non-financial) can reveal the actual performance achieved by organizations while promoting a vision that encompasses the short, medium, and long terms. (2) The use of non-financial information stimulates the innovation process. (3) Interactive use fosters communication across all hierarchical levels to find logical explanations for the concerning information gathered by management control tools. (4) The interactive use of control systems stimulates individual creativity. (5)

[1] *Which involves sophisticated control systems.*

Contemporary management control is not limited to strategy implementation; it also contributes to the emergence of innovation strategies.

The findings from studies by Davila et al. (2009), Simons (1994), Henri (2006), Bisbe and Otley (2004), and Abernethy and Brownell (1999) suggest that most researchers who argue that management control negatively impacts innovation have primarily focused on a single control lever—specifically, the diagnostic use of control systems—while overlooking other potential levers. In contrast, scientific publications that acknowledge the substantial contribution of management control to supporting innovation focus particularly on interactive control systems and/or the simultaneous use of both interactive and diagnostic modes (Simons, 1994).

The **third stream** examines the relationship from a processual perspective, emphasizing that management control plays a vital role in validating each stage of the innovation process. Nevertheless, the diversity of innovation typologies continually calls for the use of various control systems. From this angle, Davila et al. (2009) expanded the discussion with the idea that: *'Innovation is not a monolithic phenomenon but rather a collection of processes that coexist in parallel, each requiring different types of control systems.'* To date, the academic world has a limited and insufficient understanding of the metamorphosis, design, and use of control systems during innovation processes. As Davila et al. (2009) highlight, radical and incremental innovations require different types of control systems. Finally, it is important to acknowledge the ambiguity inherent in the interaction between these systems and informal control.

In light of the above, this study seeks to analyze the nuanced relationship between management control and technological innovation. The structure of the study is as follows: The first section examines the components of traditional management control, outlines their paradoxical relationship with the requirements of Schumpeterian discipline[2], and stresses the urgent need for a paradigm shift. The second section explores the main features of contemporary management control, demonstrating their coherence and role in assisting technological innovation. Finally, the last section addresses both incremental and radical innovations from a processual lens, illustrating the role of traditional and contemporary management control in standing by each phase of the innovation process.

1. Moving beyond conflict to consensus

1.1 Critical components of traditional management control systems

[2] *Joseph Schumpeter is widely recognized for his pioneering contributions to economic theory, particularly in elucidating the role of innovation in economic development and the dynamics of capitalism. His theories, notably the concept of creative destruction, have become foundational to the fields of innovation and entrepreneurship. Consequently, Schumpeter is regarded as one of the foremost scholars in these areas.*

According to scholars, the so-called *'traditional'* management control, which stems directly from the key characteristics of the measurement paradigm, first emerged in leading American corporations such as DuPont and General Motors (Bouquin and Fiol, 2007). During this period, standardization was seen as the key to competitiveness, and from this standpoint, the compartmentalized organizational structure largely outweighed any approach based on transversal or process-oriented organization (Chauvey, 2010). Given this, management control was directed at overseeing the execution of tasks performed by operational staff to identify potential deviations. This suggests that any violation of established norms was subject to sanctions. Through this lens, employees were viewed as victims or slaves to the norms and standards that had to be adhered to. To put it differently, initiative and involvement in decision-making were seldom promoted and were more likely to lead to sanctions (Benslimane and Benjelloun, 2023).

Against this backdrop, the professional and academic worlds witnessed the establishment of the first theoretical foundations by proponents of the rational approach, notably Frederick Winslow Taylor, Henri Jules Fayol, and Max Weber. These foundations were profoundly consolidated and further developed through the joint efforts of advocates of the systemic and contractual approaches. This undoubtedly laid the groundwork for the traditional aspect of Newtonian discipline[3], which covers the following characteristics: ***Firstly***, the interpretation of actors is not a primary concern for managers, as the tools are designed to accurately reflect reality. Consequently, these instruments are situated within the framework of positivist theory. ***Secondly***, traditional management control is a corollary of cybernetic philosophy, primarily relying on the diagnostic use of management tools and the exclusive use of purely financial information. ***Finally***, the measurement paradigm is synonymous with the deliberate and systematic use of formal control, embracing the most visible aspects of control systems, such as procedures, rules, and standards.

1.1.1 Management control tools through the lens of positivist theories

Building on the work of rationality theorists, management control adopted a normative and objective character (Rabardel, 1995). As a result, the process of knowledge construction does not involve the interpretation of actors, as the primary objective of the tool is to concentrate its efforts on the objectification of reality. This instrumental perception aligns with the framework of positivist theory

[3] *The founding father of management control systems, Anthony was born in Orange, Massachusetts, to Charles H. and Grace Newton Anthony in 1916. He skipped a grade in elementary school and attended high school in Haverhill, Massachusetts, where he played the saxophone in the school band and graduated in 1933 at the age of 16. In 1938, Anthony graduated from Colby College and, in 1942, received his master's degree in business administration from Harvard. In 1952, he earned his Doctor of Commercial Science degree. Anthony was a faculty member at Harvard Business School from 1940 to 1982. In 1942, he became a research assistant to Ross G. Walker (1891–1970), Harvard Professor of Business Administration since 1936. After serving in the US Navy from 1943 to 1946, he returned to Harvard, where he was appointed a full professor in 1956. In 1965, he took a leave of absence to serve as Under Secretary of Defense under his friend, Defense Secretary Robert McNamara. In 1973 and 1974, he served as president of the American Accounting Association.*

or the techno-centric approach, which accentuates the intrinsic or endogenous characteristics of the instrument. In his *article L'appropriation des outils de gestion et ses effets sur les dynamiques organisationnelles* and drawing on Lorino's (2002) work, Grimand (2012) restates the fundamental postulates underlying this conception of tools:

***Firstly**, the effectiveness of the tool depends on its ability to replicate reality and penetrate the real. In other words, the tool's intrinsic properties and the quality of its design are sufficient to define it. **Secondly**, the management tool is said to directly influence actions or the reasoning patterns that lead to them. It serves as a vector for rationalization and the normalization of behaviors. **Thirdly**, the tool possesses an autonomous force, asserting itself on the actor and making its contextualization largely irrelevant. In this context, appropriation is seen as unproblematic. **Lastly**, the actor maintains a purely external relationship with the tool: it is a disembodied entity, devoid of desires, strategies, goals, or identity.*

After outlining the key principles that support the representationalist framework, the author also addressed its limitations, which are summarized as follows: *'Moreover, by endowing the tool with an autonomous force in this way, there is a significant risk of underestimating the importance of the social context in which it operates, as well as the power dynamics it inspires.'* Indeed, Professor Philippe Lorino repeatedly points out that positivist theory decontextualizes management tools and instills in them a specific form of action or behavior. In addition, positivist approaches are an irreversible cause of the standardization of accounting and financial tools (Perez et al., 2005).

1.1.2 Fundamentals of cybernetics philosophy of (MCS)

Robert Anthony Newton (1965) argues that traditional management control is based on formalized systems guided by cybernetic philosophy. In this light, Hofstede describes cybernetics as relying on feedback loops, which unfold in a process that includes: (1) setting objectives, (2) measuring outcomes, and (3) providing feedback on negative deviations. Based on these points, it appears that traditional management control represents a deliberate effort to meticulously scrutinize small details. Eve Chiapello (1997) adds *that 'anything that falls outside of control is not considered control.'*[4] The emblematic figure of management control in France, Henri Bouquin, a professor at the Sorbonne, situates himself at the heart of this approach by stating that traditional management control is closely tied to compliance and stability. He notes that increasing attention is being given to explaining past results, while the future is associated with obscurantism (Bouquin and Pesqueux, 1999).

Referring to one of the most well-known and widely read publications in the field of management, namely *Administration Industrielle et Générale: Prévoyance, Organisation, Commandement,*

[4] *Tout ce qui échappe au contrôle n'est pas du contrôle pour la pensée en gestion* (Chiapello, 1997).

Coordination, Contrôle, control is identified as one of the primary functions of management, ensuring that actions taken comply with established plans, issued instructions, and predefined principles. The excerpt below from Henri Jules Fayol's masterpiece illustrates the points made: *'In a company, control involves checking whether everything is proceeding according to the adopted program, the given orders, and the accepted principles. The aim is to identify faults and errors so that they can be corrected and avoided in the future… To ensure effective control, it must be carried out in a timely manner and accompanied by sanctions… It is important to always be able to answer this question regarding any operation: "How is control carried out?" Applicable to operations of all kinds and to agents at all levels, control is exercised in a thousand different ways.'* (Henri Fayol, 1917)

An exploration of the literature reveals that traditional management control lies at the crossroads of a mechanistic and repressive approach, implying that any potential deviations from the standards are subject to coercive measures. Additionally, it is important to note that cybernetic control relies on two key elements: the diagnostic use of management control tools and exclusive reliance on purely financial information.

1.1.2.1 A conceptual clarification of the diagnostic use of control systems

The complexity of operations within organizations, along with the large number of decisions that must be made, forces senior management to delegate tasks to subordinates. In this regard, leaning on diagnostic control systems is crucial to ensure that decisions are perfectly consistent with the organization's objectives (Ahrens and Chapman, 2004). According to the author of *Levers of Control: How Managers Use Innovative Control Systems to Drive Strategic Renewal*, diagnostic use is defined as: *'Official information systems that managers use to closely monitor expected outcomes and correct any deviations from established standards'* (Simons, 1995). The diagnostic control system is essentially characterized by: (1) the ability to measure the outcomes of the process; (2) the existence of predetermined standards against which actual results are compared; and (3) the ability to correct any deviations from the established standards.

As stated by Henri (2006), diagnostic control systems are 'feedback systems' that endeavor to ensure the implementation of strategy. However, this mode of use represents a profoundly negative force, as it targets mistakes and negative deviations. By conforming to the logic of diagnostic control, it is not surprising that the *'top-down'* approach strongly prevails in the effort to implement the strategy initially developed by top management, where superiors make decisions and subordinates carry them out. Indeed, the use of tools can take two forms—interactive or diagnostic—and this depends on the managers' objectives.[5] These statements are strongly defended by Simons (1994): *'All large and complex*

[5] Which relates to the formulation or execution of strategy.

organizations have similar management control systems... but there are differences in the way these management control systems are used. '

From the above, it is clear that these systems play a decisive role in implementing strategy by using tools from different logics (financial, non-financial, and hybrid) to identify errors, evaluate performance, uncover root causes, foster organizational learning, update objectives, track subordinate performance, allocate resources, and provide early warning signals. ***The highlighted elements are intended to ensure that everything functions smoothly and remains under control.*** Still, the surprise caused by an unpleasant event is a formidable foe due to its insidious nature. Despite the advantages of using diagnostic control systems, they are difficult to apply to activities characterized by high novelty and are inappropriate for monitoring nebulous concepts (Simons, 1994).

1.1.2.2 The financial dimension of management control systems

Hugues Poissonnier's contribution, titled *Les outils de pilotage des performances, révélateurs des destinataires de la valeur créée par l'entreprise,* outlines the evolution of the philosophy behind management control tools in a chronological and coherent manner. This evolution has consistently developed based on the needs of the most prominent stakeholders, particularly shareholders, managers, customers, and employees. At the beginning of the 20th century, greater attention was given to standardization and the need to produce large volumes to meet growing demand. As a result, companies were encouraged to embrace economies of scale, driven by their expanding size. Consequently, investors became vital for meeting financing needs. Their pivotal role made them a priority for companies, prompting specialists to develop tools specifically designed to closely monitor the creation of shareholder value. Management control during that period was grounded in a quantitative and financial approach, limiting its priority to a short-term outlook, as reliable performance evaluation required the simultaneous use of both financial and non-financial indicators (Poissonnier, 2017).

1.1.2.3 Formal control, the corollary of traditional management control

But what does 'control' actually mean? In her article *Les typologies des modes de contrôle et leurs facteurs de contingences: un essai d'organisation de la littérature,* Chiapello stresses these considerations: *« Control influences the creation of order, meaning it is associated with a certain degree of regularity. According to this definition, a situation of control occurs when a person's behavior is influenced by something or someone. Thus, control reduces the degree of freedom allowed to individuals within organizations, either by preventing certain actions or expanding the scope of others. »* (Chiapello, 1996)

In the same way, Merchant and Van (2007) proclaim that the goal of management control is to provide answers to the upcoming questions: *Do employees behave appropriately?* [6] *This question is subdivided into several sub-questions: Do employees truly understand what is expected of them? Do the actions taken by employees align with the company's expectations? In other words, are they able to implement the company's strategy as planned?*[7] *Are employees able to do good work?*

The literature has called attention to the coexistence of several typologies of controls, namely: (1) Formal and informal control (Anthony et al., 1989), (2) Results and behavioral controls (William G. Ouchi, 1977), (3) Market control, clan control, and bureaucratic control (William G. Ouchi, 1979), (4) Administrative and social controls (Hopwood, 1976), (5) Control through results, actions, and personnel (Merchant, 1984), and (6) Levers of control (Robert Simons, 1995).

The current paper focuses on analyzing the specific features of the first typology, as the traditional dimension of management control is, in any case, a corollary of formal control. In the view of the founding father of the discipline, Professor Anthony (et al., 1989), formal control is essentially composed of a set of rules, procedures, and budgeting systems. Consequently, formal control is an objective, visible system that is easy to study (Smith, 1997). Similarly, Jaworski acknowledges that formal control is synonymous with the written mechanisms implemented by management and is further defined by its three subcomponents: input control, process control, and output control[8].

1.2 Conflictual relationships between (TMCS) and innovation

A close examination of the features of traditional management control, rooted in cybernetic philosophy, shows why this classical approach may obstruct the innovation process (Ouchi, 1979; Amabile et al., 1996). This conclusion also comes from the unique nature of the Schumpeterian discipline, which has long been associated with various uncertainties. That said, the near-perfect prediction of events during the innovation process is an illusion, making it more difficult to perceive the final results (Jalonen, 2012). Yet, this viewpoint varies depending on the type of innovation.

[6] *« If all employees could always be relied to do what is best for the organization, there would be no need for management control system. But employees are sometimes unable or unwilling to act in the organization's best interest, so managers must take steps to guard against the occurrence, and particularly the persistence, of undesirable behaviors and to encourage desirable behaviors. »* (Merchant, 1982)

[7] *« Several employees achieve poor results because they do not fully understand what the organization truly wants. Consequently, the lack of direction results in behaviors that are undesirable to the organization. Ultimately, management control aims to raise awareness and inform employees about the best ways to maximize their contribution to achieving the organization's objectives. »* (Merchant, 1982)

[8] *« Output control is exercised when performance standards are set, monitored, and the results evaluated. In the case of "complete" outcome control, the firm does not need to know the causal mechanism to steer the worker back on course because responsibility for cause-effect knowledge has been delegated to the worker. For example, when management notifies a sales manager to improve his or her sales volume without specifying the process, complete outcome control has been exercised. »* (Jaworski, 1988)

In general, scholars unanimously agree on the existence of two levels of innovation: radical and incremental (Norman & Verganti, 2014). The first typology results from an exploratory logic, compelling companies to acquire new knowledge to bridge the gap between the known and the unknown. Furthermore, these higher-order innovations foster the creation of groundbreaking technologies, ensuring that attempts to enhance existing technologies do not impede the progress achieved in the research and development process (Leifer et al., 2001; Koberg et al., 2003).[9] In contrast to radical innovations, lower-order innovations arise from an exploitative logic, encouraging organizations to face a relatively low level of uncertainty, as the technology being improved has already proven itself and revealed its limitations in both technical and commercial aspects. In other words, making gradual modifications to an existing product does not engage employees in a learning process that involves acquiring sophisticated technical knowledge, since the product has already undergone substantial research and development efforts, and customer feedback is increasingly well understood (Valle and Bustelo, 2009; Koberg et al., 2003).

Nevertheless, this should not overlook the key variables that can impede the advancement and success of incremental innovation. A close analysis of the target costing method indicates that this tool plays an active role in reducing technological and market uncertainties through effective collaboration between marketers and research and development engineers. Moreover, nothing prevents the commercialization of new technology by rival companies during the development phase from dramatically impacting customer needs and experiences, which could result in the rejection of the newly developed product (Ax et al., 2008).

1.2.1 Diagnostic use under examination: the stochastic phenomena viewpoint

By exploring the various facets of innovation, its stochastic nature becomes more prominent, challenging its coherence with traditional management control, which stipulates that results should be known with precision, similar to the prior setting of standards. This leads the current research to consider the question: ***In the realm of technological innovation, can companies set standards or accurately predict the forms of outcomes?*** This reflection lends meaningful legitimacy to the ideas outlined by George Hofstede, who claims that: *"The ineffectiveness of many management control systems is attributed to the cybernetic philosophy on which they are based. If phenomena are completely determined, cybernetic control is obviously superfluous. It becomes useful for moderately stochastic phenomena. When phenomena are severely stochastic, cybernetic control becomes either technically or economically unfeasible. In many organizational situations, the basic assumptions necessary for the*

[9] *The case of the first airplane's production serves as a clear illustration of the unique aspects of the innovation being examined. At the beginning of this technology's development, several questions emerged: Are the technologies needed for airplane development available in the market? Do we have the necessary technical expertise? What risks are associated with this endeavor? How complex is this innovation? What effects will its implementation have on the daily lives of potential customers?*

validity of the cybernetic model are not justified: standards do not exist, accomplishment is not measurable, and feedback information cannot be used. The three assumptions—the presence of a standard, the measurability of accomplishment, and the usability of feedback—are most justified for routine, industrial-type processes."

In this context, many researchers have underscored that diagnostic control systems do not meet the requirements for technological innovation. Jean François Henri's article, titled *'Management control systems and strategy: a resource-based perspective,'* presents the idea that: *" Diagnostic use is associated with tight control of operations and strategies through sophisticated control systems. These systems include action plans derived from strategies, detailed financial targets, comparison of actual outcomes with targets, and explanation of variances. This formal use of PMS provides a mechanistic approach to decision making resulting in organizational inattention to shifting circumstances and the need for innovation. Furthermore, diagnostic use of PMS is associated with highly structured channels of communication and restricted flow of information." (Jean-François Henri, 2006)*

1.2.2 The poverty of financial information philosophy

After clarifying the antagonistic relationship between diagnostic control systems and technological innovation, it is also crucial to recognize that the second component of cybernetic control—financial information—has faced extensive criticism from both academics and professionals.[10] As customer power grows exponentially, a long-term orientation is becoming increasingly prevalent, legitimizing the development of a new category of indicators. In their book *'Relevance lost: the rise and fall of management accounting,'* Kaplan and Johnson note: *"today's management accounting information, driven by the procedures and cycle of the organization's financial reporting system, is too late, too aggregated, and too distorted to be relevant for managers' planning and control decisions"* (Johnson and Kaplan, 1987).

Weir (2014) asserts that the rise of Japanese companies has been marked by extraordinary accomplishments, sparking numerous questions and reactions from American economists and managers. These concerns are increasingly directed toward the future of major American economic players, driving them to consider the ensuing question: ***What factors have contributed to the decline in competitiveness of American firms relative to their Japanese counterparts?*** The response to this question led Johnson and Kaplan to conclude that the accounting system is the primary source of this deterioration, as

[10] *Disregarding the present context, significant changes have occurred on the organizational front. Initially, management control was established based on an operational model that is now largely obsolete. Today, the survival of businesses depends on flexibility, adaptability, and continuous learning, yet these elements are not fostered or supported by traditional management control systems. Indeed, management accounting and management control systems typically focused on short-term activity-based control. As a result, traditional tools do not allow managers to accurately evaluate actual performance.*

Japanese companies employed non-financial performance measures, whereas American firms viewed them as a management philosophy, given that they do not stem from financial logic.

Robert Chenhall supports the previously mentioned points by presenting the subsequent argument: *'Organizations producing highly specialized, non-standard, differentiated products are likely to employ complex unit/batch technologies. These will tend to involve processes that have low analyzability of processes and many exceptions. Also, managers are likely to have imperfect knowledge of processes and low ability to measure outputs. A need for flexible responses to specific customers increases interdependencies across the value chain involving reciprocal interactions with customers, suppliers and functional units such as marketing, production, purchasing and research and development. It might be expected that these types of technologies would require controls to encourage flexible responses, high levels of open communication within the work force and systems to manage the interdependencies. Traditional, mechanistic MCS based on financial controls would not seem to suit these circumstances.'*

1.2.3 Control-Creativity Paradox

By thoroughly investigating the key determinants of traditional management control, which lie at the heart of cybernetic philosophy, it is understandable that Newtonian discipline hinders innovation (Davila et al., 2009). The innovation process is indeed initiated by the birth of a ***creative idea***. Nevertheless, professionals from all corners of the globe unanimously recognize the paradox between ***'control'*** and ***'creativity.'*** The article authored by Amabile et al. (1996), named *'Assessing the Work Environment for Creativity,'* published in the prestigious *Academy of Management Journal*, states that promoting creativity within innovative projects is linked to the combination of several factors, particularly: (1) Organizational encouragement,[11] (2) Supervisor encouragement,[12] (3) Workgroup support,[13] (4) Autonomy and freedom,[14] (5) Sufficient resources,[15]and (6) Pressure[16].

The results of the study show, on one hand, that the most creative innovation projects meet nearly all the criteria mentioned earlier. These projects continually strive to counteract factors that hinder creativity, such as excessive pressure from workload overload, as well as organizational impediments like ***conflicts***, ***conservatism***, and ***rigid***, ***formal management***.[17] On the other hand, less creative projects

[11] Which revolves around: 'risk-taking, awareness of creativity, evaluating project members by *"supporting rather than criticizing,"* rewarding, and participative management'.
[12] Which focuses on: 'clarity of objectives, interaction between superiors and subordinates, idea stimulation, and team support'.
[13] Which concerns itself with 'open-mindedness, the cultural diversity of team members, and commitment to the project'
[14] Aim to ensure 'task completion, the management, and control of work'.
[15] Are related to 'resource allocation'.
[16] That is accompanied by a sense of challenge that gives meaning to the tasks performed.
[17] *In Amabile's words, these factors kill individual creativity because individuals are likely to perceive each of these factors as controlling. They may lead to increases in individuals' extrinsic motivation and corresponding decreases in the intrinsic motivation that is necessary for creativity (Amabile et al., 1996).*

tend to exhibit a greater number of paralyzing factors compared to catalyzing factors. **In conclusion**, **it is clear that formal control negatively impacts creativity**, **as it directly results from formal management**. **Consequently**, **since formal control is an essential component of traditional management control systems** (**TMCS**), **as previously demonstrated**, **TMCS limits employees' autonomy and freedom**, **thereby negatively affecting innovation**.

Otley (1994) adds that traditional management control systems reinforce conservatism. As a result, managers are expected to identify areas that tolerate a certain level of experimentation and risk-taking. In simpler and more expressive terms, formal and bureaucratic controls substantially limit employees' autonomy, including their capacity for creativity. In his contribution, *'Controlling Creativity and Innovation: Paradox or Necessity?'*, Pfister pointed out that: *'Controlling creativity and innovation is primarily a paradox if the term "control" is associated with a negative and narrow connotation. If control is seen as constraining and leaving very limited autonomy to employees, it is incompatible with the creation and execution of new ideas outside existing patterns. '*

1.3 Rethinking traditional management control systems to innovate

All the previous research confirms that the traditional version of management control hinders the innovation process. However, it is determinative to note that this position, which we describe as *'**radical**,'* is largely rejected by both the academic and professional communities. Davila's research, *Accounting and control, entrepreneurship and innovation: venturing into new research opportunities,* states that the traditional dimension of management control conflicts with the requirements of today's environment, which is characterized by complexity, uncertainty, and rapid change. From this analytical viewpoint, control should not be static and formal; rather, it is expected to evolve into a more social form, granting employees greater autonomy, which requires communicating the company's vision and objectives to them. In response to these critiques, a paradigm shift has occurred, strengthening the role of management control in innovation and entrepreneurial processes. (Davila et al., 2009)

Also, it should not be overlooked that traditional management control is not always considered a barrier to innovation. In this regard, a growing body of literature has reexamined the role of traditional management control, addressing the innovation process, the types of innovation, and the nature of organizational learning. This gives rise to the following inquiries: Is it accurate to assert that the classical dimension of management control negatively affects every stage of the innovation process? Additionally, does this impact vary across different types of innovation? Lastly, does traditional management control promote or impede organizational learning in both types?

Certainly, to answer these questions, it is essential to distinguish between radical and incremental innovation. As a matter of fact, the relationship between traditional management control and innovation

is paradoxical, as the Schumpeterian discipline is ultimately considered stochastic. That said, it is necessary to acknowledge that the stochasticity of incremental innovation is minimal compared to that of radical innovation, implying the possibility of setting standards. Notably, although radical innovation represents a true journey into the unknown and is therefore unpredictable, it still follows a process aimed at its implementation. At the outset, this process is characterized by high uncertainty, which often precludes any form of formal control. Yet, as the vision becomes clearer throughout the process, is there a way to integrate traditional management control practices? In other words, is traditional management control unsuitable for the various phases of the radical innovation implementation process?

1.4 Essential requirements for paradigm shifting

The uniformity of management control systems has attracted the attention of contingency theorists, who argue that no universal model can be applied to all organizations. This is because of the variety of contingency factors that strongly influence the nature of the management control system. By positioning itself at the core of Porter's *Competitive Advantage: Creating and Sustaining Superior Performance,* the company should adopt either a cost leadership strategy or a differentiation strategy. In addition, the strategic choice influences the nature of management control.

Through this lens, differentiation is a corollary of an exogenous approach to management control, as stakeholders crucial to the development of new products are located outside the organizational boundaries, such as competitors, customers, and suppliers. Based on this, management control must gather the necessary information from external sources. In contrast to the differentiation strategy, the cost leadership strategy is based on a purely endogenous approach, where the foundation of competitiveness lies within the organization.

Apart from strategy, another contingency factor—size—exerts an important influence on management control. In a small company, the manager is always in direct contact with employees, and this becomes even more pronounced because decision-making power is rarely delegated. In such a structure, the primary coordination mechanism is mutual adjustment, which relies on informal control over workers. However, as an organization grows, it is accompanied by the emergence of autonomous and independent sub-entities that require the delegation of decision-making power, facilitating the development of their own operating rules and specific control mechanisms. Ultimately, the diversity of organizational structures leads to various control mechanisms.

The arguments presented by Burns and Stalker point out that structure is a contingent variable, dependent on exogenous factors such as environmental uncertainty and complexity. On the one hand, a company operating in a stable environment opts for a mechanistic structure, which exhibits these characteristics: standardized tasks, specialized procedures, strategic decisions made by top management,

and a prioritization of respecting hierarchy. On the other hand, a high degree of complexity and uncertainty requires the adoption of an organic structure, which is based on non-repetitive tasks and necessitates reassessing the roles of actors, granting them greater independence and autonomy.

The final contingency factor discussed in this subsection is technology. In the view of Joan Woodward, a company's structure does not depend solely on its size, history, or industry sector; rather, it is shaped by the technology employed, which takes three forms: unit production, mass production, and continuous production. Moreover, each production system requires a specific control system.

A brief overview of contingency theory revealed these points: First, bureaucratic control is not always effective; second, there is no one-size-fits-all management control system; and third, management control is an information system that encompasses two dimensions: technical and social. The technical dimension uses purely quantitative indicators, while the social dimension adopts qualitative indicators. Fourth, management control ensures communication and coordination between different actors and departments. In light of the above, contingency theory has challenged the relevance of traditional management control in many organizations, thereby legitimizing the shift toward a new paradigm commonly referred to as the 'piloting' paradigm.

2. The end of a conflictual relationship

2.1 An overview of contemporary management control systems components

Organizational theories represent a continually evolving area of research focused on gaining a thorough understanding of how organizations operate. Traditional management control, which was originally based on classical approaches, has now been enhanced by insights from human relations, decision-making, and evolutionary schools of thought. Each of these schools has made major contributions to management control, effectively countering the dominance of classical approaches. As a result, contemporary management control has emerged to address diverse contextual requirements.

Departing from the viewpoint of classical school proponents, employees do not merely adhere to their superior's authority through strict obedience. Rather, they seek autonomy and freedom by taking various initiatives to showcase their virtues. These developments have prompted employees to become active participants in interpreting information and responding to new events, leading to an inevitable evolution of their needs. Consequently, the mechanisms of motivation and control have evolved to emphasize a social dimension of control and a goal-oriented approach.

Apart from this dimension, the concept of bounded rationality, developed by Herbert Simon, has had a meaningful impact on management control. According to Simon, decision-makers do not always seek the most optimal solution, but rather a satisfactory one, due to their limited cognitive capacities and lack of information (Tran, 2018). This reflection has greatly influenced the decision-making

process, information systems, and management control. Today, the Newtonian discipline is viewed not as a 'stick,' but as an effective means of advancing communication and mediation among stakeholders, while also supporting actions both a priori, a posteriori, and in the present.

Ultimately, the perception of organizations in the age of Darwinism has led to profound changes in the roles assigned to management control. From now on, management control (MC) is seen as a tool for monitoring and feedback, aimed at ensuring a continuous process of organizational learning (Tran, 2018; Liu and Dooren, 2013). As noted in the article *'Management Control Systems and Organisational Learning: The Effects of Design and Use'* by S. Hai Wee et al., published in the *Accounting Research Journal* in 2014, the learning capacity of organizations is strongly influenced by their management control system. Similarly, Kloot (1997) argues that the fundamental aspects of organizational learning—such as knowledge acquisition, information distribution, information interpretation, and organizational memory—are inextricably linked to the management control system.

In summary, contemporary management control, situated within the piloting paradigm, gains its legitimacy from a blend of three approaches rooted in organizational theories: the social approach, the decision-making approach, and the evolutionary approach. The revitalization of management control is primarily defined by the following: ***First***, the interactive use of management control systems. ***Second***, the involvement of all hierarchical levels through a bottom-up approach. ***Third***, the use of both qualitative and quantitative indicators to meet contextual requirements. ***Fourth***, the adoption of new control types, such as informal control, which consists of unwritten mechanisms arising from employee initiatives. This category of control takes various forms, including social, personal, and cultural. ***Lastly***, the information provided by management control tools (MCTs) does not constitute a reality in itself, as the interpretation by actors plays a pivotal role in constructing valid knowledge. Therefore, MCTs are grounded in the framework of instrumental theory.

2.1.1 The interpretation of management control tools under instrumental theory

The shift in the management control paradigm has been accompanied by a constructivist and subjective approach. Thus, the process of knowledge construction is central to the interpretation of the actors, as the representations provided by the tools do not constitute the ultimate reality. In *Comptes et récits de la performance*, Philippe Lorino states: *"The shift from control to piloting is marked by a related and simultaneous transition: from the measurement paradigm, which is a corollary of control, to the interpretation paradigm, which is a corollary of piloting."* In this spirit, management control tools are inherently pragmatic, as they *'do not carry knowledge or rationality by themselves.'* Lorino further explains: *"Knowledge can only be constructed by a subject engaged in action and personal experience. That said, a faithful representation of reality becomes secondary, giving way to a meticulous*

understanding of the interpretations of the representations provided by the tools that guide the actions and behaviors of the actors."

In this regard, Pierre Rabardel maintains: *"A technique only exists when it is practiced, meaning it is carried out by someone who, having learned or invented it, implements it effectively. There is no technique without the effectiveness and the human skills it entails. It is therefore where these skills are produced that one must observe the techniques. However, this setting is always on the scale of one or a few individuals. The observable reality of the technique pertains to a single person or a small group."*

In his paper "*Vers une théorie pragmatique et sémiotique des outils appliquée aux instruments de gestion,*" Lorino asserts that there are four functions of management control tools: (1) "To instrument the coordination necessary to carry out collective action processes"; (2) "To instrument the routinization of action schemes"; (3) "To instrument the identification of gaps"; (4) "To instrument the mobilization of repertoires of meanings, frameworks for interpretation, glossaries, and references to interpret these gaps."

Finally, the pragmatic nature of management control tools makes them a lever for individual learning through the process of *'signal-interpretation-response,'* as well as for collective learning through *'the construction of a shared framework that leads to information management, which is based on codified representations and involves the organization of meetings around these representations.'* Moreover, the instruments are a means of reflexivity that significantly facilitate the questioning of actions and the role of the actor within the organization, as well as *increasing exchanges in a socialized context understood by all actors and transforming initial egocentrism into "objectivity."*

2.1.2 On the interactive use of control systems

The review of traditional management control indicated that diagnostic control systems hinder both innovation and the pursuit of opportunities, as they concentrate exclusively on achieving the objectives set to implement the strategy. In contrast to diagnostic control systems, other systems—particularly interactive control systems—generate opposing effects by driving exploration and learning, thereby allowing new strategies to emerge from actors' responses to opportunities and threats. This means that senior executives rely on interactive control systems to create internal pressure by moving away from narrow research routines, stimulating the search for opportunities, and spurring initiatives that catalyze the emergence of new strategies. This control lever targets strategic uncertainties and enables the renewal of the strategy.

As outlined by Robert Simons in his writings, interactive control systems are primarily defined by these elements: First, the information provided by the system is critically important, necessitating the creation of a detailed program by upper management. Second, interactive control systems require

ongoing and frequent attention from managers at various hierarchical levels within the organization. Third, the data produced by the system is interpreted and discussed face-to-face during meetings organized by senior management for subordinates and peers. Fourth, the system consistently raises awareness of addressing challenges and reinforcing discussions based on data, hypotheses, and action plans.

It is important to underscore that the unit of analysis for the proposed ideas is the system itself, not the degree of interaction among participants. At lower hierarchical levels within the organization, similar interactive processes may emerge. Even so, these interactions are not an integral part of Simon's analysis, as they are, by definition, confined to a single system that necessitates the implementation of a comprehensive program by upper hierarchical levels. In conclusion, the control system selected by senior management for interactive use directs the attention of the entire organization to the area deemed most critical (Simons, 1994).

2.1.3 Clarifying the non-financial dimension of (MCS)

Nowadays, the equation that governs the world’s economies has changed. Demand is no longer systematically greater than supply, customers can no longer be marginalized, and the number of competitors continues to grow exponentially. These recent developments open a new avenue of thought, supporting the critique of the endogenous approach to management control, which has traditionally prioritized managing and reducing costs, while shifting towards an exogenous approach that addresses external challenges and strives to create value for various stakeholders.

In a similar context, management control experts have shown considerable resistance to the tools proposed by the Newtonian discipline, urging both academic and professional communities to generate managerial innovations. In response to this call, the field of management control systems has seen a surge of global contributions, including target costing, activity-based costing, activity-based management, value analysis, value engineering, and the Kaizen philosophy, among others. These tools have been developed to address the needs of clients, who remain at the center of managers' concerns (Weir, 2014).

Following the emergence of customer power, shareholders regained significance in the early 1990s. Still, this trend was short-lived, as an intense debate emerged between advocates of shareholder value and those supporting stakeholder value. In the United States, shareholder value has prevailed for many years, driven by the belief among academics and professionals that a company should not set out to serve all of its stakeholders, but rather focus increasingly on its shareholders. Proponents of this view contend that investors have more legitimacy than other stakeholders because the absence of investors can lead to the company's collapse.

Opposing this angle, various authors and practitioners have raised objections by questioning the sole sovereignty of shareholders and advocating for a shift toward stakeholder value. They claim that, while shareholders are indispensable for financing the company's activities, other stakeholders are also crucial to its survival. For example, the absence of employees may paralyze everyday tasks, just as the absence of other stakeholders (such as suppliers and the government) can. This position has prompted a radical shift, leading to the development of new tools, including the balanced scorecard and the performance prism, among others (Poissonnier, 2017).

2.1.4 Towards new typologies of control

Previously, bureaucratic organizations relied on retroactive cybernetic control to maximize the profit generated. Nonetheless, the evolution of organizational theory has proposed that this view is outdated, necessitating a shift toward an approach that incorporates social, psychological, and behavioral aspects, as well as informal control—primarily clan control and value-based control—which should be implemented in the most flexible organizations (Bedford, 2015).

The different types of organizational control affect management's commitment to innovation and, ultimately, the company's performance. In general, financial, bureaucratic, or behavioral controls strongly reduce managers' commitment to innovation. In contrast, the use of strategic and informal behavioral controls tends to increase managerial commitment to innovation (Hitt et al., 1990).

In the same vein, many authors have emphasized the importance of categorically abandoning management control in favor of adopting various control typologies, such as control through the environment, the market, culture, procedures, regulations, and more recently, structure. Notwithstanding, other researchers believe that the simultaneous adoption of management control (M.C.) and these control categories serve the interest of companies seeking innovation and flexibility.

2.2 Contemporary management control systems at the service of innovation

2.2.1 Interactive use as facilitator of innovation

Robert Simons, the Charles M. Williams Professor of Business Administration at Harvard Business School, challenges the widely popularized views of the discipline's founding figure, Anthony Robert Newton, which suggest that management control solely contributes to the implementation of strategy. Furthermore, Simons contends that the Newtonian discipline is a true catalyst for the emergence of new strategies, but this necessarily involves the interactive use of control systems.

While the information provided by management control instruments is indispensable, it is the interpretations of the individuals involved that truly matter, as these can inspire innovative proposals and suggestions. In times of turbulence, strategy development should not be the exclusive domain of top

management; employees at all levels of the hierarchy can also contribute considerably. Similarly, Simons contended that the interactive use of control systems enables the emergence of new strategies through a bottom-up approach. As a result, employees from various disciplines are guided to take the initiative in solving problems and seize unexpected opportunities. It is important to note that some actions taken by employees are vital from a tactical perspective, while others are not. In turn, successful experiences will be preserved, repeated, and expanded.

The interactive use of control systems is not solely limited to stimulating the emergence of novel innovation strategies; these systems also have an invaluable impact on promoting individual creativity. The ideas presented by Sitepo et al. (2020) in their article *'How Does Interactive Use of Budgets Affect Creativity?'* reinforce this viewpoint, suggesting that spurring intensive communication and interaction is beneficial for generating new, creative, and useful ideas. In this context, the interactive use of budgets offers an invaluable opportunity for experimentation and learning, facilitating proactive responses to environmental threats and opportunities.

Indeed, the interactive use of budgets is characterized by the interpretation and discussion of data generated by this system during meetings organized by supervisors for their subordinates and peers. This approach develops an environment conducive to information sharing and provides insights into strategic uncertainties, which can trigger revisions to action plans. Numerous studies have shown that supervisors who empower interactions between employees contribute to creating a work environment that nurtures creativity. Additionally, the interactive use of budgets motivates and inspires employees in a non-invasive, facilitative manner.

The interactive use of management control tools, such as budgets and the Balanced Scorecard, is widely recognized for its positive effects on collaboration and performance. According to Abernethy and Brownell, the interactive use of budgets stimulates exchanges among actors from diverse backgrounds, enhances continuous communication across hierarchical levels, and improves performance during strategic changes. In this regard, Naro and Travaillé demonstrate that the interactive use of the Balanced Scorecard facilitates exchanges among actors to collaboratively define objectives and strategies, while also supporting organizational learning, fostering new ideas, and developing innovative strategies. Henri (2006) goes further by stating that this interactive use promotes inter-departmental collaboration, thereby strengthening the creation and dissemination of new knowledge. However, as noted by Essid and Berland, this interactive mode of use can also lead to cognitive overload, resulting in a transformation of how control systems are used.

2.2.2 The value of non-financial information in innovation process

It is possible that the financial dimension of performance can assess the creation or destruction of value for shareholders, but can it do the same for other stakeholders, particularly customers? While an increase in sales may occur when a new product is launched, it does not necessarily guarantee customer satisfaction. In other words, the arrival of a new technology is likely to generate substantial revenue, but these gains may diminish if the company does not pay close attention to feedback and the concerns raised. Therefore, relying exclusively on financial information does not accurately reflect a company's actual performance and fails to provide managers with the necessary information to continuously spark the initiation of the innovation process.

Viewed in this way, the non-financial dimension strives to address the needs of stakeholders who have long been marginalized and who play a central role in fueling and implementing innovation. Certainly, measuring the dimension of customer satisfaction[18]offers numerous advantages, as it provides insights that align perfectly with the objective of innovation. A brief overview of the functioning of the balanced scorecard reveals that the principle of the cause-and-effect relationship lies at the heart of this managerial innovation, linking four key areas: internal processes, organizational learning, the customer perspective, and the financial dimension (Poissonnier, 2017).

3. The roots of complementarity between (TMCS) and (CMCS)

3.1 The roots of complementarity — from an innovation typology point of view

Management control plays a critical role in validating each step of the innovation process. Nevertheless, the diversity of the innovation typologies (both radical and incremental innovations) continually calls for the use of different control systems. Seen from this angle, Davila et al. (2009) furthered the discourse by putting forward the idea: *'Innovation is not a monolithic phenomenon but various processes that coexist in parallel, each one requiring different types of control systems.'* So far, the academic world has a very limited and insufficient understanding of the metamorphosis, design, and use of control systems during innovation processes. In addition to the ambiguity surrounding the interaction between these systems and informal control, it is important to reiterate that, as noted by Davila et al. (2009), both radical and incremental innovations require different types of control systems.

From this position, David Bedford conducted a remarkable study named *'Management control systems across different modes of innovation: implications for firm performance,'* using Simons' levers of control to examine how managers combine paradoxical activities, such as exploitation and

[18] *Non-financial indicators provide valuable insights into customers' needs, preferences, and behaviors, which significantly facilitate the identification of innovation opportunities. Indeed, assessing customer satisfaction consistently encourages companies to innovate by providing them with a clear goal to achieve. Furthermore, if these indicators reveal an anomaly, companies will seek new technologies to improve their products or services in order to increase satisfaction levels. By monitoring this indicator before and after the introduction of the innovation, companies can determine whether these new technologies have benefited their customers and significantly improved their experience.*

exploration. Indeed, the initial research results indicate that the interactive use of control systems leads to a major improvement in the performance of organizations engaged in exploratory activities. Even so, this lever of control (interactive use) has no impact on the performance of organizations operating under an exploitative philosophy.

The findings also suggest that the diagnostic use of control systems is associated with a notable improvement in the performance of organizations focused on exploiting existing technological capabilities and markets. Furthermore, in organizations prioritizing the development of exploratory activities, Bedford confirms that the adoption of diagnostic control systems and boundaries is independently related to performance, as each is temporally and spatially distinct from the other. Yet, this does not categorically exclude the possibility of an interrelationship between these systems.

Ultimately, David Bedford argued that the combination of interactive and diagnostic levers has a powerful impact on the performance of ambidextrous organizations. This suggests that reconciling these two levers plays a key role in generating the dynamic tension necessary for managing contradictory types of innovation (Bedford, 2015).

3.2 The roots of complementarity — from an innovation process point of view

In a similar manner, Chiesa et al. (2009) state that the degree of novelty in innovative projects has a significant impact on the nature of management control. In reality, a higher level of radicality implies an increasingly broad use of social controls, such as interactive and boundary systems, to address various uncertainties that have an extremely high degree of extension. Regardless of the most suitable control system for an innovative project, each phase of the innovation process has its own specificities, requiring diverse control systems.

The conclusions drawn by Chiesa et al. (2009) in their publication *'Exploring management control in radical innovation projects'* highlight the following reality: It is generally accepted that the first phase, which involves generating a unifying concept, is characterized by impressive uncertainty and low task analyzability. This justifies the predominance of 'soft control systems,' such as belief systems and boundaries, which support creativity and innovation, as well as the interactive use of control systems to address uncertainties. Once the actors choose and establish the concept, companies gradually begin to design standardized procedures for development, with the expected outcome being that interactive use is increasingly replaced by the diagnostic use of control systems. Finally, in the commercialization phase, the presence of various uncertainties is minimized, and the tasks carried out become analyzable. Consequently, the overdependence on interactive control reduces significantly, giving priority to diagnostic control.

Thus, by drawing attention to the processual aspect of innovation, the vitality of control systems is expressed in order to meet the requirements of each phase. In this regard, the renowned article *'Accounting and control, entrepreneurship and innovation: venturing into new research opportunities'* by Davila et al. (2009) pointed out that innovation is a process divided into eight stages, namely: *"intelligence gathering, idea recognition, idea selection, execution, transition to manufacturing, commercialization, value capture."* Furthermore, each of these stages needs to be actively managed through the use of control systems.

In the same vein, Cooper and Kleinschmidt stated in their publication *'An investigation into the new product process: steps, deficiencies, and impact'* that the development of a new product follows a structured process comprising thirteen steps, namely: *"initial screening, preliminary market assessment, preliminary technical assessment, detailed market study/market research, business/financial analysis, product development, in-house product testing, customer tests of product, test market/trial sell, trial production, pre-commercialization business analysis, production start-up, market launch."* Indeed, the validation of each phase is contingent upon the adoption of multiple management control tools.

Conclusion

An examination of scientific studies focusing on the relationship between management control and innovation has revealed that traditional management control hinders innovation, as it is rooted in cybernetic philosophy. Several authors have explored the reasons behind the antagonistic nature of this relationship, including: (1) Control, in its traditional form, is inadequate for meeting the requirements of creativity. (2) The use of financial information does not accurately reflect the true performance of organizations, as it is based on a short-term outlook. (3) Cybernetics relies on setting standards, whereas innovation is a purely stochastic phenomenon. (4) The diagnostic use of performance measurement systems is closely linked to highly structured communication channels and a very limited flow of information. However, innovation depends on inter-functional processes that require open communication channels to facilitate the flow of information.

This perception, which views the control of innovation in a paradoxical light, is completely overlooked by both academics and practitioners. Ultimately, the publication of Robert Simons' book has reinstated the role of management control in the innovation process because: (1) The adoption of various types of indicators (both financial and non-financial) can reveal the actual performance achieved by organizations, taking into account short-, medium-, and long-term dimensions. (2) The use of non-financial information triggers the innovation process. (3) Interactive use encourages communication across all hierarchical levels, helping to provide logical explanations for the alarming information gathered by management control tools. (4) The interactive use of control systems stimulates individual creativity. (5) Contemporary management control is not limited to the implementation of strategy; it

also contributes to the emergence of new innovation strategies. (6) The interactive use of control systems places particular emphasis on strategic uncertainties.

Ultimately, by analyzing incremental and radical innovation from a processual point of view, it becomes clear that these innovations are distinct processes that coexist in parallel. Each of these processes consists of numerous stages, and each stage has its own specificities and requirements, thus necessitating the use of a well-defined control lever. This implies the need to reinstate the role of traditional management control while accentuating the necessity of using it simultaneously with contemporary management control.

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