

Configuration of Management Control Systems as a Package: A Systemic Approach

Reinaldo Guerreiro

<https://orcid.org/0000-0002-6507-5965> | E-mail: reiguerr@usp.br

Abstract

Objective: This study aimed to discuss a theoretical framework that contributes to the establishment of analytical controls for management control systems (MCSs).

Method: The research method employed two procedures: first, a literature review, and second, a case study of an MCS model structured around the concept of subsystems.

Results: The first result demonstrates the relevance and contribution of a systems approach to configuring the analytical controls of MCSs. The second presents and discusses a concrete and conceptually robust proposal for MCSs designed from a systems perspective. The third result involves a critical evaluation of Malmi and Brown's (2008) model in light of the systemic approach.

Contributions: This study offers meaningful contributions to the academic field by adding new knowledge to MCSs research. It also contributes to business practice by presenting conceptual and practical guidelines that support professionals involved in implementing MCSs in organizations.

Keywords: Management Control Systems, MCSs, Subsystems, Package, Controls.

1 Introduction

Studies on management control systems (MCSs) have evolved through the conceptual contributions of several authors, notably Otley (1980), Simons (1995), Malmi and Brown (2008), Ferreira and Otley (2009), Grabner and Moers (2013), and Merchant and Otley (2020), among others.

Merchant and Otley (2020) emphasized the need for more field studies conducted by researchers who are closely connected to professional practice. Such studies are essential for developing more robust and reliable theories on the design and use of MCSs, enhancing their relevance and usefulness to practitioners. In this context, several MCS models have emerged from practice while maintaining strong conceptual foundations, including the Balanced Scorecard (Kaplan & Norton, 1996; Hoque, 2014), the Gecon Model – Economic Management System (Catelli, 1999; Pereira et al., 2020), the Amoeba Management System (Inamori, 2013; Adler et al., 2020), and the Business Management System (Arantes, 1994).

This study presents and examines the Business Management System (Arantes, 1994), with the main objective of proposing conceptual contributions based on systems theory to the design of analytical controls that compose the management control system from a package perspective.

The starting point of this study is the model proposed by Malmi and Brown (2008), which examines MCSs from a control package perspective characterized by five dimensions. This work was developed in light of the observations made by Malmi and Brown (2008), who encouraged further research on MCSs from a package perspective. They argue that, once the parameters defining MCSs are established, key questions emerge: What conceptually constitutes an MCS package? What is included, what is excluded, and why? (Malmi & Brown, 2008, p. 288). Malmi and Brown also highlight the need for an analytical framework that is sufficiently broad, yet parsimonious to support the study of empirical phenomena. Hence, this study seeks to address that need through a literature review and a case study of a management control system model conceptualized as a package structured from a systems theory perspective.

The study developed by Grabner and Moers (2013) proposes two perspectives for examining management control packages, distinguishing between the concepts of a control package and a control system. They argue that management control practices form a system when they are interdependent and when design choices account for these interdependencies. In contrast, a management control package represents the complete set of control practices in place that operate independently of one another. This implies that a management control package may consist of several management control systems and/or independent control practices that address unrelated control issues.

A fundamental premise of this study is that the design of analytical controls within MCSs should not rely on mimetic processes; rather, it should be grounded in solid conceptual foundations to justify the selection of the packages comprising the MCSs. Another underlying assumption is that adopting a systemic view of the organization and its subsystems can offer valuable contributions in this regard (Arantes, 1994; Grabner & Moers, 2013).

Considering the call made by Malmi and Brown (2008), this study is guided by the following research question: How can the analytical controls within an MCS package be characterized from a systems perspective? The objective of this study is to discuss a theoretical framework, grounded in systems theory, to contribute to the establishment of analytical controls within MCSs, in line with the propositions of Grabner and Moers (2013).

The development of this study is guided by the conceptual lens of systems theory, specifically by the systemic view of the organization and its subsystems (Bio, 1989; Guerreiro, 1989; Guerreiro et al., 2023). In this approach, the organization is characterized as a classical system with inputs, processes, and outputs, structured from various integrated subsystems whose interactions generate a set of processes and activities that contribute to achieving the organization's primary objective—fulfilling its mission. From this perspective, the organizational system can be divided into six subsystems, the analysis of which enables a comprehensive understanding of the organization's internal environment.

Based on this brief theoretical characterization, two constructs serve as references for the development of this study: the management control system as a package and systems theory. Reflections on the relationship between these constructs underpin the analysis of the case study, which examines a management control system model developed in Brazil known as the Business Management System (Arantes, 1994).

Following this introduction, Section 2 presents the theoretical framework, which addresses the management control system from a package perspective, systems theory, and a systemic view of the organization. Section 3 describes the methodology employed in the study; Section 4 discusses the case of a management control system structured from a systemic perspective, and Section 5 presents the study's conclusions.

2 Theoretical Framework

2.1 MCSs as a “control package”

From a pragmatic management perspective, the management control system (MCS) is designed to ensure that individuals' behaviors and decisions align with organizational goals and strategies (Merchant & Van der Stede, 2017). The literature on performance management and managerial control frequently advocates a holistic approach to studying MCSs, rather than adopting simplistic conceptions that overlook the important interrelationships among control system elements (Pfister et al. 2023).

Malmi and Brown (2008) observe that, broadly speaking, a management control system package comprises a set of controls and control systems. Individual control systems may include traditional accounting controls, such as budgets and financial indicators; administrative controls, such as organizational structure and governance systems; and social controls, such as values and culture. Organizations often have multiple controls in place, and all of them can be used, to some extent, to align individual activities with organizational objectives. Malmi and Brown's (2008) original model conceptualizes MCSs as a package composed of five types of analytical controls.

Cultural Controls

The cultural controls dimension proposed by Malmi and Brown's (2008) model is grounded in the concept of organizational culture developed by Flamholtz et al. (1985, p. 158), who define it as “the set of values, beliefs and social norms which tend to be shared by its members and, in turn, influence their thoughts and actions.” Malmi and Brown's (2008) model identifies three analytical elements that constitute the cultural control subsystem. The first refers to value-based controls, inspired by Simons (1995). The second element is symbol-based controls, and the third involves distinct subcultures or microcultures—individual groups within organizations—often referred to as clans (Ouchi, 1979).

Planning Controls

Malmi and Brown (2008) point out that, first, planning defines the goals of an organization's functional areas, thereby directing effort and behavior. Second, it establishes the standards to be achieved in relation to those goals and clarifies the level of effort and behavior expected from organizational members. Furthermore, planning facilitates coordination by aligning the goals of different functional areas, helping to control the activities of groups and individuals to ensure consistency with the desired organizational outcomes (Malmi & Brown, 2008, p. 291).

Cybernetic Controls

Malmi and Brown (2008) note that cybernetic principles have long been associated with the concept of control. A cybernetic system functions as an information and decision-support system when managers themselves detect undesirable variances and modify the underlying behaviors or activities that generated those variances (for instance, in a production process) without the intervention of third parties. However, when behavior is linked to goals and responsibility for performance variations is established, the cybernetic information and decision-support system becomes an MCS. According to Malmi and Brown (2008), four basic cybernetic systems are identified in MCSs research and included in this typology: budgets, financial measures, nonfinancial measures, and hybrid systems that combine both financial and nonfinancial measures.

Reward and Compensation Controls

According to Bonner and Sprinkle (2002), reward and compensation systems aim to motivate and enhance the performance of individuals and groups within organizations, fostering alignment between their goals and those of the organization. The basic premise is that the presence of rewards and compensation leads to greater effort compared to situations in which explicit rewards are absent. Malmi and Brown (2008) note that, although reward systems can range from extrinsic to intrinsic (Flamholtz et al., 1985), research in management accounting has largely focused on extrinsic rewards (Ittner & Larcker, 2001).

Administrative Controls

Malmi and Brown (2008) state that administrative control systems influence employee behavior by organizing people, monitoring actions, defining accountability processes, and outlining task procedures. They identify three main types: organizational design and structure, internal governance structures, and procedures and policies. Organizational design serves as a key control mechanism by shaping relationships through structural choices. Governance structure encompasses the composition of the board and management teams, defining lines of authority, accountability, and both vertical and horizontal coordination mechanisms. Bureaucratic control relies on policies and procedures—such as standard operating procedures and rules—to specify required processes and behaviors.

2.2 Studies on MCSs as a package

Since the publication of Malmi and Brown (2008), numerous studies have drawn on the concept of the organizational control package. Gerdin (2020) notes that, since Otley (1980) introduced the notion of “organizational control package,” there has been an ongoing debate in the accounting and management control literature on how to conceptualize its components, functions, and interdependencies.

The study conducted by Grabner and Moers (2013) presents new challenges and opportunities for research on MCSs as packages, noting that there is ambiguity regarding what is meant by “control package” or “control system.” Grabner and Moers (2013) propose two perspectives on management control to guide studies in the field: management control as a package of controls and management control as a system of controls, based on the criterion of interdependence of management control practices.

The conceptual article by Merchant and Otley (2020) outlines the broader context from which the systems-versus-packages debate (Grabner & Moers, 2013) emerged and, drawing on several studies, offers suggestions for future research. They argue that much of the existing literature focuses on narrow aspects of management control systems, often isolating them from their broader organizational contexts and thereby diminishing their value.

Demartini and Otley (2020) draw on the concepts of Grabner and Moers (2013), namely, the management control system as a control package or as a control system. They explain that their study seeks to move beyond this dualism by adopting an approach that views the integration of mechanisms within a management control system as a continuum—ranging from a complete absence of integration to a fully integrated system.

Strauß and Zecher (2013) conducted a systematic review of the definitions of MCSs found in the academic literature, providing an overview of the various ways in which MCSs have been conceptualized. A special edition of the *Journal of Management Control* was dedicated to exploring the different concepts of management control systems. In the editorial, aptly titled “Management Control as a Package — The Need for International Research,” Malmi (2013) notes that the articles published in this issue are not expected to resolve all conceptual challenges but should help establish at least some common understanding of the terminology and concepts in studies of MCSs as a package.

The study by Bedford and Malmi (2015) empirically examines how accounting and other control mechanisms operate in combination as a package and analyzes their associations with contextual factors, resulting in a taxonomy of control configurations. The authors note that, although taxonomies describe rather than explain empirical phenomena, they play an important role in building valid theories.

Bedford et al. (2016) examine effective combinations of management controls across different strategic contexts, drawing on the approaches proposed by Grabner and Moers (2013)—that is, management control as a package and management control as a system. Their goal is to develop an understanding of which management control practices are interdependent and which operate independently within a package.

The study by Rehman et al. (2019) seeks to understand the influence of the MCSs as a package on organizational performance and how organizational capabilities help explain this relationship. Sandelin (2008) examines how management control practices operate as a package within a growing company, focusing on the interactions among cultural, personnel, action, and outcome controls. Berg and Madsen (2020) explore the evolution of a company’s management control package over time, aiming to gain deeper insight into the internal and external factors that shape it.

Einhorn et al. (2021) investigate senior managers of family businesses to explore how management accounting practices, the diagnostic and interactive use of performance measures, and cultural controls combine within an MCS. Arifin (2022), in a study of small and medium-sized enterprises, seeks to determine how the elements of the management control system package influence entrepreneurial competence and, in turn, affect business performance. Similarly, Rehman (2023), drawing on resource-based theory, examines the impact of the management control system package on business performance in small and medium-sized enterprises.

Frare et al. (2022) seek to understand the relationship between the elements of the management control system package of startup companies, entrepreneurial orientation, and company performance. Bresciani et al. (2020) focus on environmental management and aim to analyze the influence of the environmental management control system package and perceived environmental uncertainty on what they term green performance. Traxler et al. (2025) emphasize that companies must not only report their corporate sustainability performance but also demonstrate the alignment of their strategies with sustainability principles.

2.3 Systems theory and systemic view of the organization

One of the most significant theoretical contributions with applications in various fields of knowledge (Vale, 2012) is the General Systems Theory (GST), developed by the Austrian biologist Ludwig von Bertalanffy (1968). Mele et al. (2010) note that Von Bertalanffy promoted the idea of systems thinking across disciplines to identify general principles applicable to all systems. Von Bertalanffy (1968) introduced the concept of a system as a new scientific paradigm that contrasts with—or even challenges—the classical paradigm. He defined a system as a complex of interacting elements, referred to as subsystems.

Systems theory provides a theoretical framework for analyzing phenomena as wholes rather than as mere sums of independent parts. Its focus lies on the interactions and relationships among the components of an organization, fostering a dialogue between holism and reductionism (Mele et al., 2010). Silva et al. (2016) emphasize the importance of the systems concept for a proper understanding of organizations; however, Valerdi and Rouse (2010) argue that, for many managers, systems thinking is not an innate trait. They note that managerial focus is often narrow and limited, centered on highly specialized tasks.

Nightingale (2000) advocates a systemic approach to the firm, noting that although such a perspective is increasingly necessary in the contemporary environment, a clear and consensual definition remains lacking. Despite the relevance of systems theory and the widespread use of the term system within organizations, studies that apply a systemic view of the firm and its subsystems in business contexts are both scarce and inconsistent. Nightingale (2000) attributes this to the fact that firms are complex and highly integrated systems, composed of organizations, information, and support technologies, with multifaceted interdependencies and interrelationships that extend across their boundaries.

Purchase et al. (2011) argue that studying a company requires a systemic approach to management and the alignment of activities. In other words, understanding the functioning of a large and complex organization requires viewing the system as a cohesive whole rather than focusing on and optimizing isolated parts. Bio (1989) notes that one of the critical implications of the system concept in the business field is precisely the view of the company as an open system.

The works of Bio (1989), Guerreiro (1989), and Guerreiro et al. (2023) are among those that discuss and apply the concept of a systemic view of the company and its subsystems in academic and business contexts in Brazil. In a systemic approach, the company is decomposed into subsystems, whose analysis enables a comprehensive understanding of the organization's internal environment. Each subsystem represents a homogeneous component of the company and possesses a defining set of characteristics. From this perspective, the company system comprises six subsystems (Guerreiro, 1989): the institutional subsystem, the social subsystem, the organizational subsystem, the management subsystem, the information subsystem, and the operational subsystem.

These subsystems are organized and interact with one another to perform various functions. From this perspective, the business system unfolds into different organizational functions, such as production, sales, marketing, and finance. In each of these functions, elements from all subsystems can be identified. The view of business subsystems presented below is grounded in the work of Guerreiro (1989) and was later applied in Arantes (1994) and in Guerreiro et al. (2023).

2.4 MCSs as a control system

The study developed by Grabner and Moers (2013) presents new challenges and opportunities for research on MCSs as packages, highlighting the ambiguity surrounding the terms “control package” and “control system”. The authors propose two perspectives to guide studies in the field: management control as a package of controls and management control as a system of controls, distinguished by the degree of interdependence among management control practices. According to Grabner and Moers (2013), management control practices form a system when they are interdependent and when design choices explicitly consider these interdependencies. In contrast, management control as a package refers to the complete set of control practices in place that operate independently of one another. This implies that a control package may consist of multiple management control systems or of independent control practices that address unrelated control issues.

Grabner and Moers (2013) argue, based on their proposed definitions, that if the objective of a study is to examine the relationships among managerial control practices, viewing managerial control as a package is not an adequate starting point. To investigate interdependencies, it is necessary to adopt the perspective of managerial controls as a system (Grabner & Moers, 2013; Bedford et al., 2016). Gerdin (2020) notes that, under certain contextual conditions, managerial control from a systems perspective may also consist of complementary forms of control, and not only interdependent controls (De Jong et al., 2014; Kreutzer & Cardinal, 2015).

3 Methodological Aspects

As noted in the introduction, the motivation for this research stems from the suggestions of Malmi and Brown (2008) and Malmi (2013), who emphasize the need for more studies on MCSs from a package perspective. Once the parameters defining MCSs are established, a central question arises: what conceptually constitutes an MCS package—what is included, what is excluded, and why (Malmi & Brown, 2008, p. 288).

The fundamental premise of this research is that contributions from other fields of knowledge can offer important conceptual foundations to support the selection of the elements that constitute an MCS. This study adopts the conceptual lens of systems theory as applied to the business environment (Bio, 1989; Guerreiro, 1989; Guerreiro et al., 2013). This theoretical construct aligns with the perspective proposed by Grabner and Moers (2013), who conceptualize MCSs as a “control system”—that is, a configuration in which MCS elements operate interdependently or complementarily. As noted by Grabner & Moers (2013), this perspective contrasts with the view of management control as a “control package,” in which the elements operate independently, as proposed by Malmi and Brown (2008).

Considering the established motivation and assumptions, the research question guiding this study is: “How can the analytical controls of MCSs be characterized from a systems perspective?” The objective of this study is to discuss a theoretical framework, from a systems perspective, that contributes to the establishment of analytical controls for MCSs.

The research methodology employed involved two procedures. The first consisted of a literature review addressing the conceptual constructs used in the analysis. The second was a case study (Arantes, 1994), examining a structured MCS developed from a systemic view of the organization. The information collected and the insights derived from the model analysis were complemented and triangulated (Hopper & Hoque, 2006) through an interview with the model’s intellectual author. The interview followed a script, presented in the Appendix, and was conducted online via Zoom; it was recorded and lasted two hours. Subsequently, reflections, comparisons, and discussions were developed between Arantes’ (1994) proposal, the model proposed by Malmi and Brown (2008), and the other management systems studies presented in the literature review section.

4 The case study of the Business Management System

4.1 Antecedents

Nélio Arantes, the mastermind behind the model known as *Sistema de Gestão Empresarial* (Business Management System), is currently 81 years old and holds a degree in Business Administration from the Escola de Administração de Empresas de São Paulo da Fundação Getúlio Vargas (FGV-EAESP).

He was an employee of Banco do Brasil and, after graduating in 1969, joined the chemical company Rhodia in what was then known as data processing. He later worked at Deca, also in data processing, and subsequently at Philips do Brasil from 1973 to 1979. Arantes notes that, at the time, Philips was highly advanced in the systems area and had, within its organizational structure, a specific directorate dedicated to systems matters, known as Information Systems and Automation (ISA).

In 1979, Arantes began working as a systems and business management consultant at Directa Consultores, which later became SBS Consultores. According to Arantes, his interest in joining Directa Consultores stemmed from the opportunity to work with the firm’s partners, who had previously worked at Arthur Andersen. These professionals brought extensive knowledge and practical experience from management-system consulting projects. Drawing on his earlier experience at Philips, Arantes began to consolidate and apply systems-based thinking to consulting engagements.

Arantes notes that, in the second half of the 1980s, SBS Consultores brought together a distinguished group of consultants specializing in the modeling and implementation of management systems, many of whom were recognized for their published works: Nélío Arantes (Arantes, 1994), Armando Catelli (Catelli, 1999), Sergio Rodrigues Bio (Bio, 1989), and Reinaldo Guerreiro (Guerreiro, 1989). Much of the knowledge developed by these professionals emerged from the exchange of experiences accumulated during the execution of large-scale consulting projects in the field of management systems.

Catelli, Bio, and Guerreiro were professors in the PPGCC program at FEA-USP. Arantes did not pursue an academic career; however, he authored two notable books grounded his practical experiences: the first on business management systems (Arantes, 1994); and the second on valid companies (Arantes, 2012).

At that time, this group shared a highly homogeneous way of thinking on various subjects, particularly regarding the modeling of management information systems and business management systems. Arantes notes that his business management systems model was developed during his work at SBS Consultores. The model was conceived based on the systems knowledge he acquired through his professional experiences, especially at Philips, and on the expertise accumulated through his consulting work. Arantes explains that “SBS Consultores had a consulting approach in which the work needed to be very well theoretically grounded.” Consequently, consulting projects required extensive conceptual research and numerous meetings dedicated to discussions on conceptual modeling.

During the execution of the projects, it was very common for client employees to ask whether the consultants could recommend a book related to the work being carried out. According to Arantes, they often insisted: “You need to get me a book on this.” The projects relied on methodologies and concepts that were, in many ways, sophisticated. Arantes reflects: “At that time, in the business environment in general, the importance of management was not clearly understood.”

Considering the business environment of the time, Arantes explains that he was motivated to consolidate this body of knowledge in a book to provide clients with a reference for what was being carried out. “I understood that it was a professional duty to give back what I had learned from other people—to contribute in return for the contributions I had received.” He notes that it was necessary to highlight the set of instruments used by companies and, consequently, classify these instruments into subsystems. He recalls: “I reflected on where to place things within the system—that is, where to place the organizational chart, where to place the accounting, and so on. Thus, drawing on the accumulated knowledge of the systems view, I began to develop the model by organizing an inventory of everything companies did in practice, identifying and logically grouping these elements according to the characteristics of each subsystem.”

4.2 Presentation of the model

4.2.1 MCSs as a set of interdependent subsystems

The MCS model proposed by Arantes (1994) adopts, in a well-grounded manner, the perspective of MCSs as a system, consistent with the conceptual approach of Grabner and Moers (2013). Arantes (1994) uses the term “subsystems” to define the analytical elements of his MCS proposal, which he refers to as a management system. According to Arantes, this approach must align with the organization’s subsystem structure. He notes that the management system evolves and adjusts in accordance with the company’s subsystem models.

Arantes emphasizes in the interview that this management support system (MSS) model is applicable to what he calls *valid* companies (Arantes 2012), that is, companies that meet certain management assumptions; organizations that do not meet these assumptions operate under different management systems. He notes that the first two chapters of his book (Arantes, 1994) address the assumptions underlying valid companies. From Arantes' perspective (1994, p. 23), valid companies "are those that encompass the economic vision but are not restricted to it. They survive, grow, and endure because they adopt a broader rationale than profit maximization. They maintain an active and responsible interaction with the external environment in which they operate. Additionally, they hold internal commitments and responsibilities toward their entrepreneurs and employees."

Figure 1 depicts the MCS proposal developed by Arantes (1994, p. 88), in which the analytical elements are grouped into three subsystems: the institutional subsystem, which highlights the company's mission, purposes, and principles; the human and behavioral subsystem, which includes the elements of motivation, activation, and integration; and the technological subsystems, which encompass the managerial, operational, organizational, communication, and information subsystems.

Arantes' (1994) model distinguishes the institutional and human-behavioral subsystems from the other technical subsystems. Simons (1985) notes that culture and social controls have generally been examined because of their influence on managerial behaviors. This configuration is inspired by the sociotechnical approach (Eason, 2014), which integrates technical and human or social elements in system design. Gerdin (2020) also uses the concepts of social controls and technical controls to group management control system elements, primarily considering their control objectives. In contrast, Arantes' (1994) approach separates subsystems based on their intrinsic nature.

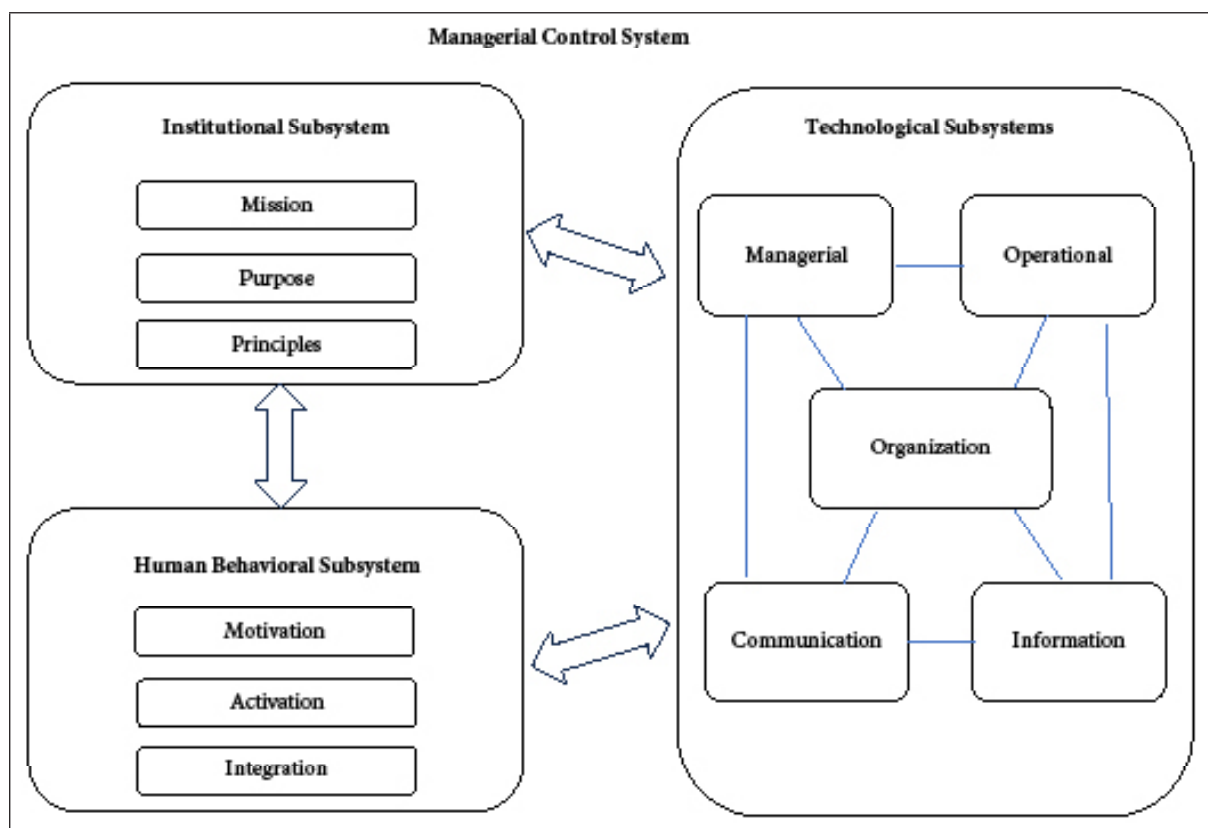


Figure 1. Management subsystems (Arantes, 1994)

Institutional Subsystem

The institutional subsystem relates to the organization's culture (Schein, 1990) and appears in various MCS frameworks, such as those in Simons (1985) and Malmi and Brown (2008). Arantes (1994) notes that the primary function of the institutional subsystem is to provide instruments that translate the motives, needs, beliefs, and values of entrepreneurs into definitions that clearly articulate the organization's *raison d'être*. These institutional instruments assist management in defining why the company exists (mission), what it intends to do (purpose), and what it believes in (principles).

Arantes (1994) uses the expression business philosophy to encompass these elements. Business philosophy is grounded in the motives, needs, beliefs, values, convictions, and expectations of entrepreneurs. Arantes (1994) notes that business philosophy is not a simple transposition of the entrepreneurs' personal objectives; rather, it is a synthesis that integrates these objectives into a broader vision capable of characterizing the company as an institution. Within the business philosophy, the entrepreneurs' objectives lose their individual character and are transformed into institutional definitions that are meaningful to everyone within the organization.

The institutional subsystem plays an inductive role in shaping the other subsystems of the organizational control system. Hofstede (1981) argues that it is unlikely that control systems can be imposed on organizations when they run completely counter to existing organizational culture. He highlights two key elements of organizational culture: values and rituals. Values represent broad preferences for certain states of affairs over others, tend to remain relatively stable over time, and shape how organizational actors perceive their own interests.

In the Japanese cultural context, Ushio and Kazusa (2013) observe the importance of values and norms discussed in the management and accounting environment. They note that *Keiei-rinen* (management credo) includes Simon's (1995) belief and boundary systems. Sawabe and Ushio (2009) note that the management credo is generally translated literally from Japanese to English as management philosophy and is used interchangeably with management principles in companies.

Human-Behavioral Subsystem

Companies do not achieve their objectives solely through their formal technological instruments. These normative subsystems do not ensure that the behavior of individuals or groups will align with planned formal definitions (Arantes, 1994).

Companies are human groups, and within their social systems, behavior does not always correspond to what norms prescribe. Individuals are not limited to their formal roles and authorities, nor do they always act in accordance with the norms, procedures, functions, and authority structures established in the other subsystems of the MCS. Their performance does not depend solely on technical-formal definitions. A manager is not guaranteed to be effective simply by virtue of their formal designation, appropriate decision-making power, or a clear description of their functions and expected results.

Shahnaei and Long (2015) highlight that people are one of the most important resources of an organization and, in their study, use the variables of recruitment, training, compensation systems, and performance evaluation. The human-behavioral subsystem comprises the set of instruments that assist management in mobilizing people and in aligning individual and collective behavior with the requirements of the business task. These instruments are directed toward motivating, activating, and integrating people (Arantes, 1994).

Motivational tools are designed to satisfy the needs or motives of individuals within the organization. Although these tools continue to include the remuneration employees receive for their work, the focus has also expanded to encompass contribution and opportunities—allowing individuals to meet needs that cannot be fulfilled by remuneration alone, such as self-actualization. Bandhu et al. (2024) highlight the importance of motivation, noting that it can be positive—encouraging individuals to adopt constructive actions and bring about positive change—or negative, prompting detrimental actions or unfavorable changes.

Activation tools are designed to support efforts that enable individuals within the organization to assume their roles effectively. Delegation of authority, participatory processes, and education or training programs aimed at fostering knowledge and understanding of roles and responsibilities are examples of instruments that facilitate activation efforts.

Integration tools are directed towards fostering collective effort, a fundamental requirement for achieving organizational results. These tools aim to promote employees' understanding of—and adherence to—the company's philosophy, objectives, and norms, and include mechanisms for integrating new employees, strengthening teamwork, and encouraging cooperation among individuals and organizational units. Examples of tools that support integration efforts include teamwork initiatives, meetings, seminars or conventions, and programs designed to introduce the company to both new and current employees (Inamori, 2013).

Management System

Institutional instruments—mission, purposes, and business principles—are, by their nature, insufficient to establish all the definitions required to guide the organization toward the desired results. Additional instruments are needed to assist management in formulating more specific definitions; this is the domain of decision-making (Arantes, 1994). The function of the management subsystem is to provide instruments that establish more detailed guidelines, enabling management to define the future, determine direction, and specify expected results (planning), to put the plans into action (direction), to evaluate outcomes and promote corrective actions (control) in an ongoing process. This process encompasses the strategic planning stage, the operational planning stage (including both the simulation and selection of alternatives and the detailing of chosen alternatives), as well as the execution and control stages (Guerreiro & Souza, 2015).

Planning, direction, and control instruments span all organizational levels and allow management to monitor both sectoral and overall results, in cycles that range from a single day to several years. Catelli (1999) states that what is not planned cannot be controlled, and Flamholtz et al. (1985) emphasize that planning is an ex-ante form of control. Management instruments induce managers to reflect before taking action; they require defining what must be done and why, guide operations, and enable results to be evaluated consciously and objectively.

Operational Subsystem

In its broadest sense, the concept of production within a business involves the creation of products and services of various kinds. Production is carried out through a set of operations, each responsible for performing a specific part of the business task, and these operations must function in an integrated and harmonious manner. This integrated execution of activities is ensured by the operational subsystem, whose purpose is to provide management with the necessary support to maintain the overall efficiency of the business (Arantes, 1994).

The operational subsystem defines which operations are necessary for the company to fulfill its purposes and how each of them should be executed to ensure the required performance standards in terms of speed, agility, quality, productive use of resources, adherence to deadlines, and appropriate costs. In this way, the operational subsystem supports management in carrying out the business task of ensuring efficiency in the execution of operations. Pereira and Romero (2017) analyze how the operational reality of companies has been profoundly transformed with the advent of Industry 4.0.

Organizational Subsystem

For a company to move towards its objectives, the business effort must be shared among the individuals who compose it. The essence of an organization lies in distributing the business task among its employees. An organization is, therefore, the subdivision of the business task. It involves allocating this task across organizational units, defining the roles and responsibilities of these units, establishing their levels of authority, and assigning competent individuals to perform the functions attributed to each unit. The organizational structure must reflect the mission, purposes, principles, and major objectives of the business (Arantes, 1994).

One issue that arises concerns the formalization of organizational structure. In this regard, the classic study by Hall et al. (1967) on organizational size, complexity, and formalization proposes a typology of formalization indicators. The first is the function indicator, which refers to the degree to which positions in the organization are concretely defined and whether written job descriptions exist. A second indicator concerns authority relations, involving the degree to which the authority structure is formalized—both in terms of clearly defining the hierarchy of authority and specifying this structure in written form.

Based on the seminal work of Hambrick and Mason (1984), the role of top management has been emphasized. They argue that, in the field of strategy, explanations—and even prescriptions—regarding organizational actions should take into account the organization's dominant coalition, particularly its top managers (Hiebl, 2014). In this regard, the study by Vaz and Espejo (2019) examines how trust between leaders and followers relates to Management Control Systems (MCSs) in achieving organizational objectives.

Communication Subsystem

Arantes (1994) notes that communication is fundamentally a process of human interaction aimed at achieving shared understanding among individuals—an essential condition for an organization to meet its objectives. Only through effective communication can the tasks distributed among the various individuals within the company be carried out correctly and directed toward common goals.

The communication subsystem facilitates human interactions (Arantes, 1994). Koschmann (2016) conceptualizes communication as the transmission of information, thoughts, or feelings in a manner that enables them to be received and understood by the recipient.

This subsystem enables employees to interact both internally and externally with various institutions. Hall et al. (1967) propose an indicator of communication-process formalization, which concerns the extent to which written communication is emphasized and the degree to which communication is required to follow established channels.

Ramos-Maças and Román-Portas (2022) empirically analyze the interrelationships among organizational communication, leadership, and employee commitment in the context of organizational change. They argue that communication is an essential element for achieving organizational objectives, as it can be used to motivate employees toward these goals.

Communication is a tool for expanding the field of knowledge, whether through educational programs or through direct contact among employees. In this sense, the communication subsystem supports and complements the other subsystems of the MCS.

Information Subsystem

Arantes (1994) notes that the information subsystem is the instrument available to managers for obtaining information organized in a manner that effectively supports knowledge. Bio (1989) explains that information subsystems can be classified as supporting operations and supporting management. This subsystem consists of the elements responsible for generating information to support the execution of operational activities and, especially, the decision-making process in the planning, direction, and control stages of the management subsystem (Guerreiro, 1989). A key point emphasized by Bio (1989) is the interdependence between the information subsystem and the other subsystems of MCSs.

The economic management model (Catelli, 1999) proposes a methodology for developing the conceptual model of the management information system. As discussed in Pereira et al. (2020), this conceptual model should be structured around four components: the identification and accumulation of results model, the decision model, the measurement model, and the information model. These components are reflected in the modules of the management information system that support each phase of the management process.

4.2.2 MCSs as a set of subsystems for managing functions

The company, understood as an open system, operates on the premise that certain inputs are transformed within the system and, once processed, generate specific outputs. In this sense, the organization draws on material, human, and technological resources, whose processing results in goods or services delivered to the market (Bio, 1989).

This dynamic unfolds through the execution of various business functions. As Arantes (1994) notes, each subsystem is present across the organization's general management functions—such as production management, financial management, marketing management, and human resources management, among others. This reflects the dynamic perspective of the subsystems: each function comprises specific business activities and tasks that contribute to the organization's overall business effort. Figure 2 illustrates this perspective (Arantes, 1994, p. 98).

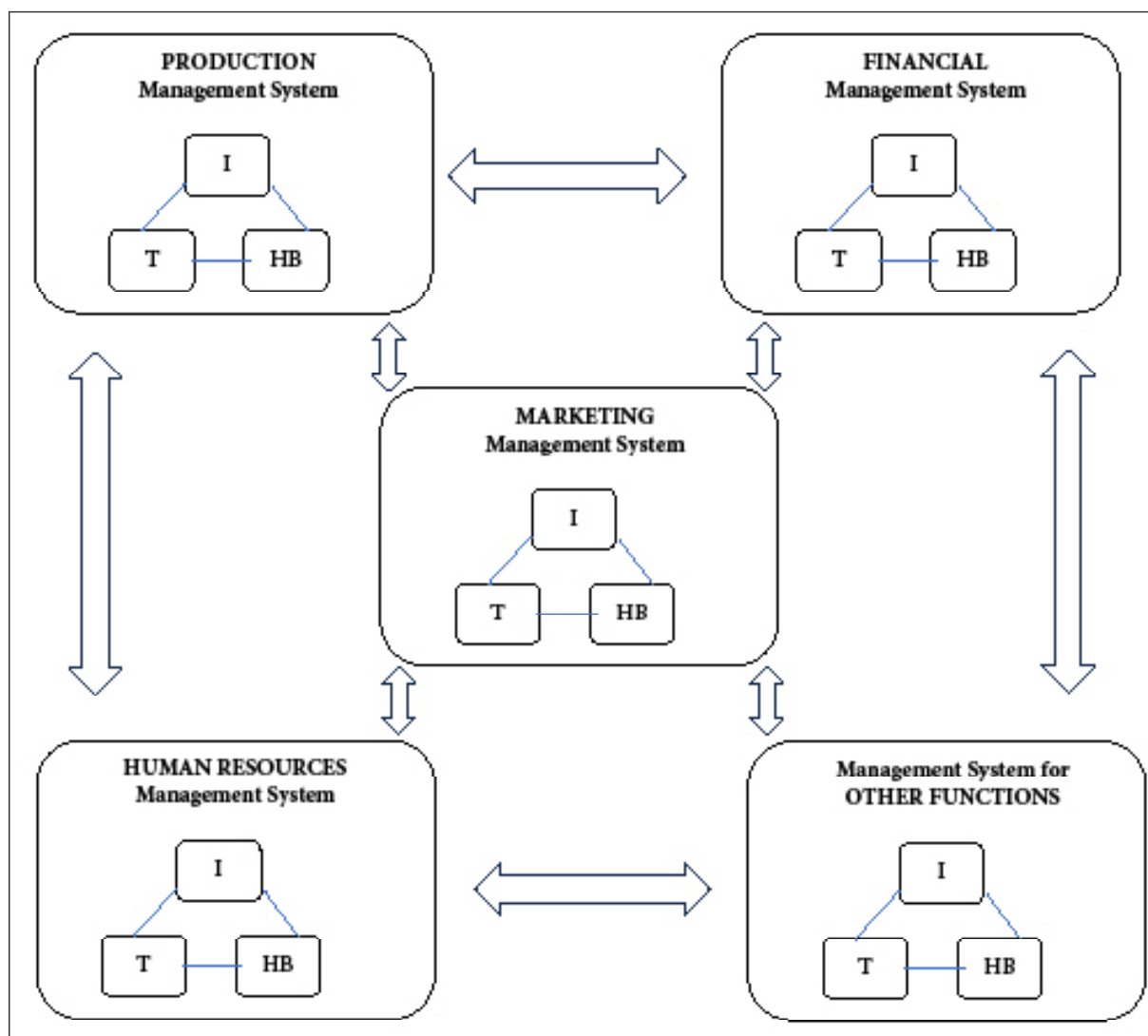


Figure 2. Function management system (Arantes, 1994)

As shown in Figure 2, each business function incorporates the institutional subsystem (I), the human-behavioral subsystem (HB), and the technological subsystem (T), whose instruments are specific to each function and derive from business-level definitions.

4.3 Discussion of the model

The management control system model proposed by Arantes (1994) offers innovative contributions. It characterizes analytical controls from a systemic perspective and, in this regard, is closely aligned with the view of subsystems within the organizational system (Guerreiro, 1989).

Each subsystem has its own defining essence or substance. The substance of the institutional subsystem is the organization's culture; for the human-behavioral subsystem, it is people's behavior; for the managerial subsystem, managerial decisions; for the operational subsystem, operations; for the organizational subsystem, the division of tasks; for the communication subsystem, human interactions; and for the information subsystem, operational and managerial information.

The model is presented from the perspective of MCSs as a system, consistent with the conceptual approach of Grabner and Moers (2013). In this view, the subsystems operate interdependently or complementarily. A second perspective of the proposed model concerns the management system of functions, which integrates elements of the various managerial controls in the field of action—that is, within the business functions developed through processes and activities. Specific aspects of each subsystem in the model are discussed below.

Arantes' model (1994), consistent with the sociotechnical approach (Eason, 2014), recognizes the importance of the institutional subsystem. As in Arantes' proposal (1994), institutional controls appear in several other models, such as Simons' (1985) framework—highlighted in the study by Martyn et al. (2016)—and in Malmi and Brown's (2008) model, where they are labeled cultural controls.

A key point in Arantes' (1994) model is the specific configuration of the human-behavioral subsystem. This control element does not appear explicitly in Malmi and Brown's (2008) model, where it is addressed more diffusely as part of administrative and reward controls. Malmi and Brown (2008) emphasize reward and remuneration controls. In Arantes' (1994) model, however, these controls represent only one component of the human-behavioral system. The configuration of this specific subsystem centers on motivating, activating, and integrating individuals within the organization (Arantes, 1994).

The MCSs package model by Malmi and Brown (2008) highlights planning controls in isolation. Arantes' (1994) model clarifies and broadens this view by introducing the management subsystem. This subsystem encompasses not only planning controls but also controls at all stages of the administrative process—planning, direction (execution), and control itself. In this regard, Arantes' (1994) proposal is fully aligned with the economic management model (Catelli, 1999).

Another distinctive feature of Arantes' (1994) model is the specific configuration of the operational subsystem, a control element that is not clearly delineated in Malmi and Brown's (2008) model. Arantes' (1994) proposal also explicitly defines the organizational subsystem, which corresponds to what Malmi and Brown (2008) refer to as administrative controls—essentially capturing the same types of controls in both models. Additionally, Arantes' (1994) model includes a clearly defined communication subsystem, a control element that is not explicitly characterized in Malmi and Brown's (2008) framework.

One of the control elements in Malmi and Brown's (2008) model is cybernetic controls, which include budgeting, financial measures, non-financial measures, and hybrid measures that combine both. Our understanding is that the term “cybernetic controls,” as used by the authors, does not adequately reflect the essence of this control element (Sony & Naik, 2020). The word cybernetics has its own established meaning—referring to a field of study concerned with automatic control systems, as well as regulation and communication in living beings and machines.

Arantes' model (1994) characterizes these control elements objectively within the information subsystem. The nature of all these elements is information—when related to planning events, it is generated and processed by the budgeting system; when related to events in the management (execution) stage, it is produced by operational systems and managed through accounting and cost systems. Information on budget variances, which forms the basis for performance evaluation, results from comparing planned events with actual outcomes. This information, along with other non-financial data and various measures and indicators, is produced and processed either within the budgeting system itself or within specific business intelligent (BI) systems.

5 Conclusion

This study was motivated by the suggestions of Malmi and Brown (2008), who proposed that studies on MCSs from a package perspective should be encouraged. It was guided by the conceptual lens of systems theory applied to the business environment (Bio, 1989; Guerreiro, 1989; Guerreiro et al., 2013). This approach aligns with the work of Grabner and Moers (2013), who characterize MCSs as a “control system” configured by control elements that operate interdependently or complementarily.

The question that guided the development of this study was: “How can the analytical controls of MCSs be characterized from a systems approach?” The objective was to discuss a theoretical framework that contributes to the process of establishing analytical controls for MCSs from a systems perspective. The research method involved two procedures: first, a literature review addressing the conceptual constructs used in the analysis; and second, a case study of an MCS model structured around the concept of subsystems (Arantes, 1994), which was presented and examined in light of the model proposed by Malmi and Brown (2008).

The comparisons, analyses, and reflections involving the two models yielded several findings. First, the study demonstrates the relevance and contribution of a systems approach for configuring the analytical controls of MCSs. Second, it presents and discusses a concrete and conceptually robust proposal for a control system structured from a systemic perspective and aligned with the approach proposed by Grabner and Moers (2013). Third, the study provides a critical evaluation of Malmi and Brown’s (2008) model, showing how the systems perspective offers more reliable guidance for specifying the analytical elements that should compose each control subsystem.

Although the study by Malmi and Brown (2008) should be regarded as a seminal contribution to the field of management control, the authors themselves acknowledge that their model remains open to improvements and conceptual refinements. Examining this model in relation to Arantes’ (1984) framework—developed based on systems concepts— reveals alternative perspectives that align with a systemic approach and may be useful for configuring MCSs in future studies. In summary, the main points are: the proposition of the human-behavioral subsystem; the proposition of a management subsystem that incorporates not only planning controls but also controls for all stages of the administrative process; the proposition of the operational subsystem; the proposition of the communication subsystem; and the suggestion to adjust the nomenclature of cybernetic controls to information subsystem.

This work has an innovative character, offering effective contributions to the academic environment by adding new knowledge to the study of MCSs. It also contributes to business practice by presenting conceptual and practical guidelines that support professionals involved in implementing MCSs within organizations.

This study opens avenues for further research on MCSs as a system—that is, as a set of interdependent subsystems. In this regard, several possibilities for future studies emerge: (i) analyses of real-world MCS cases in light of the model presented here; (ii) investigations into the logic of interdependence among the various MCS subsystems; (iii) studies focusing on the impact of specific MCS subsystems on business performance; and (iv) research examining the influence of the institutional subsystem on the configuration of the other MCS subsystems.

References

- Arantes, N. (1994). *Sistemas de gestão empresarial: conceitos permanentes na administração de empresas válidas*. São Paulo: Atlas.
- Arantes, N. (2012). *Empresas válidas: como elas alcançam resultados superiores ao servirem a sociedade*. São Paulo: Évora.
- Adler, R. W., Hiromoto, T. & Suzuki, H. (2020). Amoeba management and organizational ambidexterity. Similarities, differences, and implications for organizational fit and success. *International Journal of Productivity and Performance Management*, 69(2), 405-427. <https://doi.org/10.1108/IJPPM-07-2018-0254>
- Arifin, B., Mulyanah, M., & Martina, F. (2022). Management Control System Package And Entrepreneurial Competency Influence On Business Performance With The Moderating Role Of Business Strategy. *Review of Accounting and Taxation*, 1(02), 76-92. <https://doi.org/10.21070/rat.v1i02.992>
- Bandhu, D., Mohan, M. M., Nittala, N. A. P., Jadhav, P., Bhadauria, A., & Saxena, K. K. (2024). Theories of motivation: A comprehensive analysis of human behavior drivers. *Acta Psychologica*, 244, 104177. <https://doi.org/10.1016/j.actpsy.2024.104177>
- Bedford, D. S., & Malmi, T. (2015). Configurations of control: An exploratory analysis. *Management Accounting Research*, 27, 2-26. <https://doi.org/10.1016/j.mar.2015.04.002>
- Bedford, D. S., Malmi, T., & Sandelin, M. (2016). Management control effectiveness and strategy: An empirical analysis of packages and systems. *Accounting, Organizations and Society*, 51, 12-28. <https://doi.org/10.1016/j.aos.2016.04.002>
- Berg, T., & Madsen, D. Ø. (2020). The evolution of a management control package: a retrospective case study. *Journal of Applied Accounting Research*, 21(4), 763-781. <https://doi.org/10.1108/JAAR-10-2019-0148>
- Bio, S. R. (1989). *Sistemas de informação - Um Enfoque Gerencial*, São Paulo: Atlas, 2a. edição.
- Bonner, S.E., Sprinkle, G.B. (2002). The effects of monetary incentives on effort and task performance: theories, evidence, and a framework for research. *Accounting Organizations and Society*, 27 (4/5), 303-345. [https://doi.org/10.1016/S0361-3682\(01\)00052-6](https://doi.org/10.1016/S0361-3682(01)00052-6)
- Bresciani, S., Rehman, S. U., Alam, G. M., Ashfaq, K., & Usman, M. (2023). Environmental MCS package, perceived environmental uncertainty and green performance: in green dynamic capabilities and investment in environmental management perspectives. *Review of International Business and Strategy*, 33(1), 105-126. <https://doi.org/10.1108/RIBS-01-2022-0005>
- Catelli, A. (1999). *Controladoria: uma abordagem da gestão econômica - GECON*, São Paulo: Altas.
- De Jong, B. A., Bijlsma-Frankema, K. M., & Cardinal, L. B. (2014). Stronger than the sum of its parts? The performance implications of peer control combinations in teams. *Organization Science*, 25(6), 1703-1721. <https://psycnet.apa.org/doi/10.1287/orsc.2014.0926>
- Demartini, M. C., & Otley, D. (2020). Beyond the system vs. package dualism in Performance Management Systems design: A loose coupling approach. *Accounting, Organizations and Society*, 86, 101072. <https://doi.org/10.1016/j.aos.2020.101072>
- Eason, K. (2014). Afterword: The past, present and future of sociotechnical systems theory. *Applied ergonomics*, 45(2), 213-220. <https://doi.org/10.1016/j.apergo.2013.09.017>
- Einhorn, S., Heinicke, X., & Guenther, T. W. (2021). Management control packages in family businesses: A configurational approach. *Journal of Business Economics*, 91(4), 433-478. <https://doi.org/10.1007/s11573-020-01008-7>

- Ferreira, A., & Otley, D. (2009). The design and use of performance management systems: An extended framework for analysis. *Management accounting research*, 20(4), 263-282. <https://doi.org/10.1016/j.mar.2009.07.003>
- Flamholtz, E., Das, T., Tsui, A. (1985). Toward an integrative framework of organizational control. *Accounting Organizations and Society*, 10 (1), 35-50. [https://doi.org/10.1016/0361-3682\(85\)90030-3](https://doi.org/10.1016/0361-3682(85)90030-3)
- Frare, A. B., Cruz, A. P. C. D., Lavarda, C. E. F., & Akroyd, C. (2022). Packages of management control systems, entrepreneurial orientation and performance in Brazilian startups. *Journal of Accounting & Organizational Change*, 18(5), 643-665. <https://doi.org/10.1108/JAOC-04-2021-0052>
- Gerdin, J. (2020). Management control as a system: Integrating and extending theorizing on MC complementarity and institutional logics. *Management Accounting Research*, 49, 100716. <https://doi.org/10.1016/j.mar.2020.100716>
- Grabner, I., & Moers, F. (2013). Management control as a system or a package? Conceptual and empirical issues. *Accounting, organizations and society*, 38(6-7), 407-419. <https://doi.org/10.1016/j.aos.2013.09.002>
- Guerreiro, R. (1989). *Modelo conceitual de sistema de informação de gestão econômica: uma contribuição à teoria da comunicação da contabilidade*. Tese de Doutorado (Contabilidade), Universidade de São Paulo.
- Guerreiro, R., & Souza, R. P. (2015). Um estudo sobre percepções de importância de atividades do processo de gestão e barreiras à implantação do planejamento estratégico. *Revista Universo Contábil*, 11(1), 88-104. <https://doi.org/10.4270/ruc.2015105>
- Guerreiro, R., Amaral, J. V., Russo P. T., & Mucci, D. M. (2023). Industry 4.0: Features and potential impacts on the internal environment of companies. *Advances in Scientific and Applied Accounting*, 16(3), 105-117. <http://dx.doi.org/10.14392/asaa.2023160305>
- Hall, R. H., Johnson, N. J., & Haas, J. E. (1967). Organizational size, complexity, and formalization. *American Sociological Review*, 32(6), 903-912. <https://doi.org/10.2307/2092844>
- Hambrick, D. C., & Mason, P. A. (1984). Upper echelons: The organization as a reflection of its top managers. *The Academy of Management Review*, 9(2), 193-206. <https://doi.org/10.2307/258434>
- Hiebl, M. R. (2014). Upper echelons theory in management accounting and control research. *Journal of Management Control*, 24(3), 223-240. <https://doi.org/10.1007/s00187-013-0183-1>
- Hofstede, G. (1981). Management control of public and not-for-profit activities. *Accounting, Organizations and Society*, 6 (3), 193-211. [https://doi.org/10.1016/0361-3682\(81\)90019-8](https://doi.org/10.1016/0361-3682(81)90019-8)
- Hopper, T. & Hoque, Z. (2006). Triangulation approaches to accounting research. *Methodological Issues in Accounting Research: Theories and Methods*, 477-486.
- Hoque, Z. (2014). 20 years of studies on the balanced scorecard: trends, accomplishments, gaps and opportunities for future research. *The British Accounting Review*, 46(1), 33-59. <https://doi.org/10.1016/j.bar.2013.10.003>
- Inamori, K. (2013). *Amoeba management: the dynamic management system for rapid market response*. New York, CRC Press.
- Ittner, C. D., & Larcker, D. F. (2001). Assessing empirical research in managerial accounting: a value-based management perspective. *Journal of accounting and economics*, 32(1-3), 349-410. [https://doi.org/10.1016/S0165-4101\(01\)00026-X](https://doi.org/10.1016/S0165-4101(01)00026-X)
- Kaplan, R. S., & Norton, D. P. (1996). *The balanced scorecard: Translating strategy into action*. Boston: Harvard Business School Press.

- Koschmann, M. A. (2016). The communicative accomplishment of collaboration failure. *Journal of Communication*, 66(3), 409-432. <https://doi.org/10.1111/jcom.12233>
- Kreutzer, M., Walter, J., & Cardinal, L. B. (2015). Organizational control as antidote to politics in the pursuit of strategic initiatives. *Strategic Management Journal*, 36(9), 1317-1337. <https://doi.org/10.1002/smj.2306>
- Malmi, T. (2013). Management control as a package—The need for international research. *Journal of Management Control*, 23(4), 229-231. <https://doi.org/10.1007/s00187-013-0169-z>
- Malmi, T. & Brown, D. A. (2008). Management control systems as a package: opportunities, challenges and research directions. *Management Accounting Research*, 19, 287-300. <https://doi.org/10.1016/j.mar.2008.09.003>
- Martyn, P., Sweeney, B., & Curtis, E. (2016). Strategy and control: 25 years of empirical use of Simons' Levers of Control framework. *Journal of Accounting & Organizational Change*, 12(3), 281-324. <https://doi.org/10.1108/JAOC-03-2015-0027>
- Mele, Cristina; Pels, Jacqueline & Polese, Francesco (2010). A brief review of systems theories and their managerial applications. *Service Science*, 2(1-2), 126-135. <https://doi.org/10.1287/serv.2.1.126>
- Merchant, K. A. & Van der Stede, W. A. (2017), *Management control systems: performance measurement, evaluation and incentives*, 4a. ed., London: Pearson Education Limited.
- Merchant, K. A., & Otley, D. (2020). Beyond the systems versus package debate. *Accounting, organizations and society*, 86, 101185. <https://doi.org/10.1016/j.aos.2020.101185>
- Nightingale, D. J. (2000). Lean enterprises—a systems perspective. MIT Engineering Systems Division Internal Symposium, Cambridge, MA, 341–358.
- Otley, D.T., 1980. The contingency theory of management accounting: achievement and prognosis. *Accounting Organizations and Society*, 5, 413–428. [https://doi.org/10.1016/0361-3682\(80\)90040-9](https://doi.org/10.1016/0361-3682(80)90040-9)
- Ouchi, W. (1979). A conceptual framework for the design of organizational control mechanisms. *Management Science*, 25 (9), 833-848. <https://doi.org/10.1287/mnsc.25.9.833>
- Pereira, A. C. & Romero, F. (2017). A review of the meanings and the implications of the Industry 4.0 concept. *Procedia Manufacturing*, 13, 1206–1214. <http://doi.org/10.1016/j.promfg.2017.09.032>
- Pereira, C. A., Junior, E. B. C., & Guerreiro, R. (2020). A mensuração de eventos: uma contribuição do modelo de gestão econômica. *Revista Fipecafi de Contabilidade, Controladoria e Finanças (RFCC)*, 1(1), 45-77.
- Pfister, J. A., Peda, P., & Otley, D. (2023). A methodological framework for theoretical explanation in performance management and management control systems research. *Qualitative Research in Accounting & Management*, 20(2), 201-228. <https://doi.org/10.1108/QRAM-10-2021-0193>
- Purchase, V., Parry, G., Valerdi, R., Nightingale, D., & Mills, J. (2011). Enterprise transformation: Why are we interested, what is it, and what are the challenges?. *Journal of Enterprise Transformation*, 1(1), 14-33. <https://doi.org/10.1080/19488289.2010.549289>.
- Ramos-Maças, M. A., & Román-Portas, M. (2022). The effects of organizational communication, leadership, and employee commitment in organizational change in the hospitality sector. *Communication & Society*, 89-106. <https://doi.org/10.15581/003.35.2.89-106>
- Rehman, S. U., Mohamed, R., & Ayoup, H. (2019). The mediating role of organizational capabilities between organizational performance and its determinants. *Journal of Global Entrepreneurship Research*, 9(1), 1-23. <https://doi.org/10.1186/s40497-019-0155-5>
- Rehman, S. U., Elrehail, H., Nair, K., Bhatti, A., & Taamneh, A. M. (2023). MCS package and entrepreneurial competency influence on business performance: the moderating role of business strategy. *European Journal of Management and Business Economics*, 32(1), 1-23. <https://doi.org/10.1108/EJMBE-04-2020-0088>

- Sandelin, M. (2008). Operation of management control practices as a package—A case study on control system variety in a growth firm context. *Management accounting research*, 19(4), 324-343. <https://doi.org/10.1016/j.mar.2008.08.002>
- Sawabe, N., & Ushio, S. (2009). Studying the dialectics between and within management credo and management accounting. *The Kyoto Economic Review* 78(2), 127-156. <https://doi.org/10.11179/KER.78.127>
- Schein, E. H. (1990). *Organizational culture* (Vol. 45, No. 2, p. 109). American Psychological Association. <https://psycnet.apa.org/doi/10.1037/0003-066X.45.2.109>
- Shahnaei, S., & Long, C. S. (2015). The review of improving innovation performance through human resource practices in organization performance. *Asian Social Science*, 11(9), 52. <https://doi.org/10.5539/ass.v11n9p52>
- Silva, A. P. D., Santos, J. C. D., & Konrad, M. R. (2016). Teoria geral dos sistemas: diferencial organizacional que viabiliza o pleno entendimento da empresa. *Educação, Gestão e Sociedade*, 6(22), 1-12.
- Simons, R. (1995). *Levers of control: how managers use innovative control systems to drive strategic renewal*. Boston: Harvard Business Press.
- Sony, M., & Naik, S. (2020). Industry 4.0 integration with socio-technical systems theory: A systematic review and proposed theoretical model. *Technology in society*, 61, 101248. <https://doi.org/10.1016/j.techsoc.2020.101248>
- Strauß, E., & Zecher, C. (2013). Management control systems: a review. *Journal of Management Control*, 23(4), 233-268. <https://doi.org/10.1007/s00187-012-0158-7>
- Traxler, A. A., Schrack, D., Greiling, D., Feldbauer, J., & Lautner, M. (2025). The interplay of sustainability reporting and management control—an exploration of ways for dovetailing to develop reporting beyond accountability. *Journal of Applied Accounting Research*, 26(6), 160-182. <https://doi.org/10.1108/JAAR-08-2022-0222>
- Ushio, S. & Kazusa, Y. (2013). The development of accounting calculations as chronological network effects: growth rings of accounting calculations. *Journal of Accounting & Organizational Change*, 9(4), 380-407. <https://doi.org/10.1108/JAOC-05-2010-0009>
- Vale, C. C. (2012). Teoria geral do sistema: histórico e correlações com a geografia e com o estudo da paisagem. *Entre-Lugar*, 3(6), 85-108.
- Valerdi, R., Rouse, W. B. (2010). When systems thinking is not a natural act. In 5th IEEE Systems Conference, San Diego, CA, April 5–8, 2010.
- Vaz, P. V. C., & Espejo, M. M. D. S. B. (2019). Mensurando Confiança Intraorganizacional: um estudo sobre seu impacto no Sistema de Controle Gerencial. *Revista de Educação e Pesquisa em Contabilidade (REPeC)*, 13(2). <https://doi.org/10.17524/repec.v13i2.2151>
- Von Bertalanffy, L. (1968). *General system theory: Foundations, development, applications*. New York: George Braziller.

Appendix

Interview Script

1. Personal Information

Name

Age

Hobby

Family

2. Academic Background

Undergraduate degree

Graduate degree

3. Teaching Activities

Undergraduate program

Graduate program

4. Professional Activities

Type of professional activity

Organizations where you have worked

Main professional experiences

Main publications and professional outputs

5. Process of Building the Management System Model

What were the reasons for designing a management system?

How was knowledge about systems acquired?

What were the sources of inspiration?

Who were the key influencers?

How was the subsystem definition process conducted?

When was the modeling initiated and completed?

What empirical validations support the model?

In which companies has the system been implemented?

6. Book production

What motivated you to write the book?

In what year was the book project initiated?

What difficulties were encountered during the process?

What support or assistance did you receive?

7. Elements of the Management System Model

What is the role of the management within the model?

How does this role contribute to fulfilling the company's mission?

What is the rationale behind the subsystem approach used in the model?

How does the subsystem perspective integrate with the functional perspective?