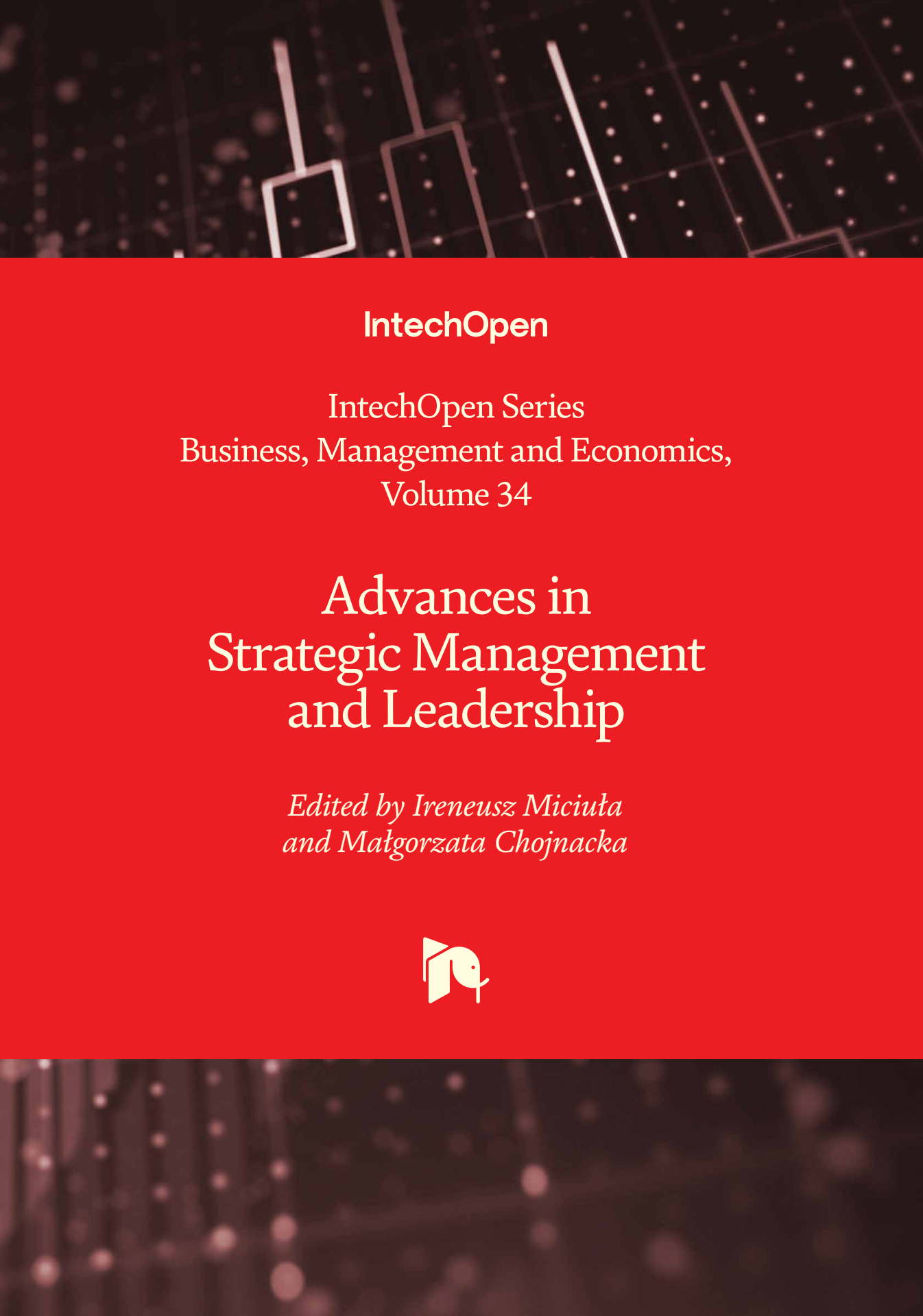




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Advances in Strategic Management and Leadership

*Edited by Ireneusz Miciuła
and Małgorzata Chojnacka*



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Prof. Choudhry holds a BSc degree in Economics from the University of Iowa, as well as a Masters and Ph.D. in Applied Economics from Clemson University, USA. In January 2006, he became a Professor of Finance at the University of Southampton Business School. He was previously a Professor of Finance at the University of Bradford Management School. He has over 80 articles published in international finance and economics journals. His research interests and specialties include financial econometrics, financial economics, international economics and finance, housing markets, financial markets, among others.

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Preface

The book *Advances in Strategic Management and Leadership* is the result of current research by many authors from various academic centres. The main goal of the chapters is to provide knowledge, recommendations, and practical solutions to new challenges within the processes of international strategic management and contemporary leadership.

This book is about knowing all the processes involved in modern management regarding economic units and all aspects of effective leadership. These processes are fundamental to the success of any economic activity. Therefore, the considerations contained in the book show the role, importance and benefits of appropriate leadership and effective management. Strategic management and leadership in the modern world are of indisputable importance and influence all processes and operational activities. Therefore, many current topics related to the discussed subject are extremely important and require continuous discovery and establishment of functioning principles, along with practical solutions for effective action. Current topics have been discussed and divided into two sections in this area. The first section of the book concerns strategic management, and the second section discusses solutions related to modern leadership to a greater extent. Although, of course, the mutual connection between these issues is deep and multidimensional, for the purpose of discussing detailed solutions, we separate them from each other as separate branches of science. Both of these fields are crucial for achieving long-term success of the organization, and their mutual influence shapes the direction, pace and manner of achieving strategic goals. Undoubtedly, it is leaders who most often participate in making key strategic decisions that affect the market position and development of the organization. And their leadership style affects how decisions are made and communicated. The book *Advances in Strategic Management and Leadership* aims to present knowledge, current considerations, and practical solutions in the field of broadly understood management science, as well as new forms of leadership and effective management.

We want to thank everyone who contributed to the creation of this publication, especially the authors, for their inspiring scientific considerations. As the editors of this monograph, I hope that many of the issues presented will motivate the reader to become interested in the subject, which will translate into new solutions to the research problems raised.

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Section 1

Strategic Management

Chapter 1

Introductory Chapter: Contemporary Leadership and Strategic Management of the Economy

Ireneusz Miciuła

1. Contemporary leadership

“Strategic management” and “leadership” are two key elements of effective organizational functioning—they often overlap but play different roles. Strategic management is a long-term planning and decision-making process that is designed to provide an organization with a competitive advantage and achieve its goals. It consists of several stages:

1. Analysis of the environment and the company.
2. Formulation of the strategy, including defining the mission, vision, and strategic goals.
3. Strategy implementation, for optimal allocation of resources for the purpose and appropriate establishment of structures and processes that will support the achievement of the set goals.
4. Monitoring and control, for evaluation of effects and introduction of corrections.

Leadership is timeless and has no single accepted definition. It is the ability to influence individuals or groups to achieve specific effects [1]. In management, it should be understood as the ability to influence employee behaviors to achieve specific goals [2]. Leadership is the ability to influence, inspire, and lead people to achieve common goals. A good leader:

- has a vision that they can communicate,
- motivates the team,
- builds trust and relationships,
- makes difficult decisions,
- develops the people around them.

Strategy sets the direction, and leadership mobilizes people to act in that direction. Leaders are very often the creators and ambassadors of strategy [3]. Therefore, without the right leadership, even the best strategy may not be implemented.

Contemporary leadership is characterized by several features that distinguish it from traditional, hierarchical models of command. Currently, the role of a leader is not only management but, above all, inspiring, supporting, and building relationships [4]. Here are the key features of modern leadership:

1. Empathy and emotional intelligence—leaders understand their own and others' emotions and are able to listen and support. They build an atmosphere of trust and psychological safety.
2. Authenticity and consistency—a modern leader does not pretend—they act in accordance with values and are honest and transparent. They are not afraid to show their human side.
3. Focus on people's development (coaching style)—instead of giving orders, they ask questions, support employee development, and encourage independent thinking.
4. Ability to work in change and uncertainty—in a dynamic world, a leader must be able to operate in an unpredictable environment, so they must be flexible and resistant to stress.
5. Ability to build an organizational culture—a leader shapes the organizational climate, so they promote values such as openness, cooperation, diversity, and innovation.
6. Communication and storytelling can convey a vision in an inspiring way, so they engage emotions and create narratives that captivate people.
7. Orientation on purpose and values—acts not only for profit but also based on a broader social, ethical, and ecological context.

A contemporary leader is not a commander but a guide and partner who can inspire and support the development of others and operate effectively in a changing world. This results from changes in the modern economy and in the management of economic entities that operate in a global world based on information in the digital reality.

2. Strategic management of the economy

Strategic management in the economy refers to actions taken by enterprises, public institutions, and even entire countries in order to effectively function and develop in a changing economic environment. It is a process of long-term planning of actions that are to ensure competitiveness, efficiency, and sustainable development in economic conditions full of uncertainty and change [5]. Global markets are subject to frequent fluctuations as a result of functioning in the era of information technology. Although often it is the change of human decisions of people managing states and international

institutions that causes chaos in national economies, the technology itself only promotes the speed of information transfer, on which the knowledge-based economy depends.

Strategic management is based on understanding that an organization operates in a complex environment in which many factors affect its actions [6]. Hence, there are so many research topics and problems to explain in the search for more effective solutions. Strategic management is also an information and decision-making process that is supported by such functions of the enterprise as planning, organization, motivation, and control [7]. It is to support solving problems related to its development and survival, taking into account the influence of the environment ([8], p. 224).

The importance of strategic management for the economy is indisputable, because within the framework of these decisions, fundamental decisions are made regarding the future operational activities of all departments in a single enterprise or in the entire country and international institutions. It is within the framework of these actions that economic entities are able to survive crises and develop in the long term on global markets [9]. At the same time, it influences the innovation and competitiveness of entire economies through the optimization and sustainable use of resources, which in turn will contribute to macroeconomic stability [10].

Strategic management of the economy is the foundation in the era of globalization and technological progress, in particular, IT systems that are the basis for organizing world markets. At the same time, micro-level management also requires the ability to search, analyze, and use the necessary information to support decision-making processes. The essence of obtaining global information necessary in conducting any economic activity is attributed to strategic management and appropriate leadership [11]. Therefore, the issues of leadership and management at the strategic level play a key role in society and the economy based on ubiquitous information and the knowledge resulting from it.

Strategic management addresses a number of key topics and issues that are essential for the long-term success of an organization, regardless of the size of the economic entity, that is, whether it is a company, a public institution, or the entire economy. The most important research areas of strategic management include analysis of managed resources, the external environment, creation and implementation of action strategies, as well as sustainable development in the concept of social responsibility, and all crisis management. Therefore, strategic management in a broad sense is the art of predicting the future, making decisions, and building a lasting advantage in a dynamic world.

Effective strategic management focuses on flexibility and readiness to invest in new tools and solutions that improve operational efficiency and product quality. This applies in particular to the use of new tools made available in the era of the digital economy in key areas of the enterprise. By automating many activities, companies can focus on what is most important, such as business development, but with the responsibility associated with sustainable development.

3. Sustainable management in the digital age

Sustainable management refers to practices that balance economic success with environmental responsibility and social well-being [12]. In the digital age, this concept is enhanced by rapid technological change, data-driven decision-making, and new business models. The digital age is the delivery of traditional services digitally,

through devices such as computers, tablets, and smartphones [13]. The digital age has the potential to make management accessible to underserved populations in areas that lacked physical infrastructure for these services [14]. We are currently witnessing the digital transformation, which additionally increases the need for sustainable management education of entire societies [15]. In the digital age, companies and organizations face new challenges and opportunities [16]. Technologies such as artificial intelligence, the Internet of Things (IoT), and data analysis can support sustainable development goals, but they also pose new threats.

The book “Strategic Management and Leadership” covers broadly understood knowledge regarding the development of global markets. However, for the proper organization and optimal functioning of global markets, it is necessary to solve and improve a number of problems at the interface of many technical and social sciences. An interdisciplinary approach allows for innovative solutions based on modern knowledge. This is due to the undeniable impact of information technologies and the interdisciplinary nature of the organization and business entities on socioeconomic development. The selection of topics presented in this book reflects the increasing importance of market processes, the necessary education regarding the world of finance, and the future global socioeconomic problems resulting from changes in the organization of financial flows in international markets. As part of the scientific research for this book, special attention will be paid to contemporary changes in strategic management and leadership. Sustainable management in the digital age is not just a trend but a necessity. The future belongs to organizations that can use technology responsibly and ethically.

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Synergy between Project Management and Entrepreneurship

Salim Morched and Anis Jarboui

Abstract

The document explores the intricate relationship between project management and entrepreneurship, emphasizing the significance of project management methodologies in guiding entrepreneurial ventures. It highlights the nine knowledge areas defined by the Project Management Institute (PMI) and their relevance to entrepreneurs, such as scope management, cost management, and risk management. The text argues that understanding these areas can enhance the effectiveness of entrepreneurs in planning and executing their projects. Additionally, it discusses the dual perspectives of entrepreneurship—internal and external—and how these perspectives shape the entrepreneurial process. By analyzing these elements, the document aims to provide insights into optimizing entrepreneurial practices through structured project management approaches, particularly in the Tunisian context.

Keywords: project management, entrepreneurial projects, time management, quality management, project planning, Business Model Canvas (BMC), methodology

1. Introduction

It is evident that the concept of a project is one of the themes in entrepreneurship that remains largely overlooked in research on this phenomenon [1]. Historically, studies on entrepreneurship have primarily been framed around two perspectives [2–5]: the “internalist” perspective, which pertains to the trait paradigm (“Who is the entrepreneur?”), and the “externalist” perspective, which relates to the paradigm of entrepreneurial facts (“What decisions does the entrepreneur make?”). However, several authors have approached entrepreneurship from a dialectical and processual standpoint [2, 3, 5–8]. This perspective gives rise to a new and relatively unexplored avenue of research: the entrepreneurial project.

In this chapter, we will examine the significance of the connections between project management (PM) and the entrepreneurial project, aiming to clarify the nature of entrepreneurial action. To achieve this, we have structured the chapter into three sections. The first section highlights the relevance of the project concept within the entrepreneurial domain. In this context, we argue that a project serves as “an artifact” that bridges the entrepreneur and their representation of the environment [1].

The second section discusses the contributions and challenges associated with PM as a tool for steering and finalizing entrepreneurial projects. Our analysis emphasizes that the concept of a project is closely tied to the paradigm of entrepreneurial processes. This necessitates a closer examination of often-overlooked concepts in entrepreneurial discourse, such as the design, implementation, and valorization of projects, which are crucial to the engineering of entrepreneurial practices [5]. Indeed, managing an entrepreneurial project encompasses activities ranging from the design phase (developing a strategic vision) to the realization phase (achieving project success).

In the third and final section, we present a PM approach that entrepreneurs should adopt to effectively finalize their entrepreneurial projects.

2. The importance of the project in entrepreneurial dynamics

2.1 Project paradigm

According to Alimisis et al. [9], entrepreneurship is inherently linked to the concept of a project; however, this concept has seldom been the focus of research within the field of entrepreneurship. In essence, a project is viewed as “a figure of anticipation, which can certainly facilitate the scripting of the future while also guiding the rationalizations of action” [10].

The project paradigm lies at the core of various entrepreneurial paradigms, including those of organizational emergence, innovation, business opportunity, value-creation, traits, entrepreneurial facts, and entrepreneurial processes.

It is important to highlight that the concept of a project is prominently featured in the literature concerning entrepreneurial vision. Lehnén et al. [5] define this vision as “a target to reach, the destination we aspire to, or the ability to foresee far into the future.” This temporal positioning has enabled some authors to distinguish between the notions of vision and representation, with the latter referring more to a current state. Clearly, within the literature focused on the concept of vision, a dichotomy emerges between the future and the present. Consequently, we can assert that in projects, “it is not [...] the past, but the future that determines the present” [11].

Lecoivre-Soudain and Deshayes [12] posits that vision is “oriented toward ends (which may evolve) established within a continuous dialectic of ends and means, with these ends and means being contextualized within the (evolving) environments in which they will be applied.” This dialog between ends and means is indeed central to the paradigm of the entrepreneurial project. In his work “Anthropology of the Project,” Santos and Bentos [13] defines a project as the intersection of four universes:

- *Architectural universe*: Represents the connection between the design and execution of the project.
- *Political universe*: Explains the “societal vision of the project.”
- *Philosophical universe*: Reflects the intentionality that gives rise to the project.
- *Pragmatic universe*: Involves the practical implementation of the project.

It is evident that the project paradigm challenges the paradigm of entrepreneurial processes [14], prompting us to explore the relationships and implications between

these two paradigms. This exploration necessitates a rethinking of entrepreneurship, transitioning from “problematization” to “project projection.” However, two key issues arise: the capacity for design and the finalization of the project. Ultimately, it is this design capacity that shapes what we refer to as the entrepreneurial project.

2.2 Framework for analyzing the entrepreneurial project

Classic approaches to entrepreneurship have faced several criticisms, particularly for failing to provide a clear understanding of the factors that contribute to the success or failure of entrepreneurial projects [2, 3, 5, 6, 15, 16]. As a result, research in this field has largely been organized around two paradigms: traits (who is the entrepreneur?) and entrepreneurial facts (what actions are taken?).

In response to these criticisms, some researchers have adopted a more proactive stance aimed at clarifying the complexities of the entrepreneurial process and understanding how entrepreneurial projects are executed. This has led to the emergence of a new stream of research focused on the “how” of entrepreneurship, specifically addressing questions such as:

- How does the entrepreneur conceptualize and design their project?
- How can we account for the success or failure of an entrepreneurial project?

From this perspective, another pertinent question arises: what methodologies can assist entrepreneurs in finalizing their projects? This approach emphasizes the practical realization of the project rather than its cognitive design. It seeks to foster in-depth reflections on the project to facilitate improvements in the entrepreneurial process [17].

Notably, the work of Barbot et al. [16] aligns with this perspective. They define the entrepreneurial project as “an artifact that enables better design and translation of the project.” Furthermore, they propose a methodology based on five key questions:

1. What is the project?
2. What is the purpose of the project?
3. What does the project accomplish?
4. In what environment does the project operate?
5. What is the historical context of the project?

In this context, Asquin et al. [1] illustrate the entrepreneurial project as the intersection of these five questions (see **Figure 1**).

Barbot et al. [16] emphasize that a project is not an entity in itself but rather a means of representation and communication to various stakeholders. Their proposed methodology aims to assist project leaders in articulating their vision [2] and effectively engaging with third parties.

This perspective underpins the application of project management (PM) to entrepreneurship. While our focus does not center on the entrepreneur’s vision, we concentrate on examining the mental representations that entrepreneurs have regarding

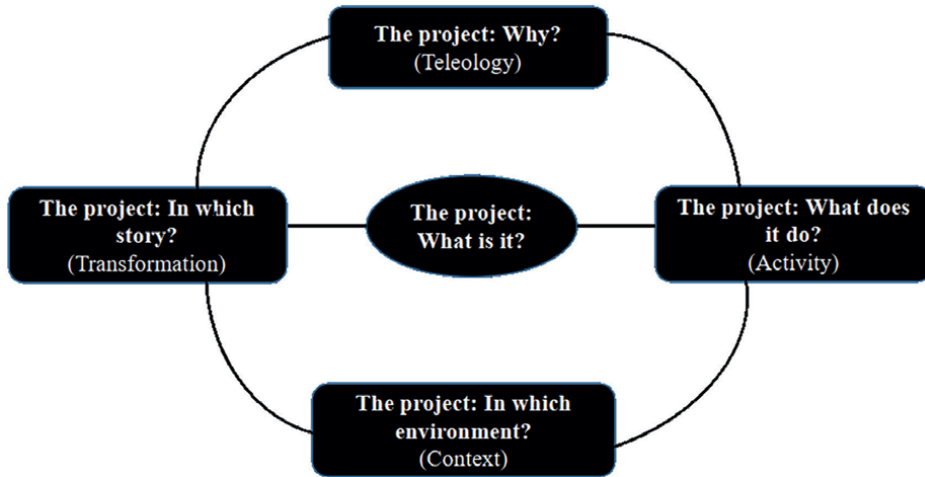


Figure 1.
Representation of the entrepreneurial project as a system [1].

PM methodologies as they seek to finalize their entrepreneurial projects. As we will elaborate later, PM was developed to provide a structured approach that aids leaders in bringing their projects to fruition. Our analysis is thus situated in the implementation phase rather than the design phase of the project.

3. Project management: The key to finalizing and succeeding in entrepreneurial projects

Project management, or “PM,” encompasses two fundamental concepts: the project itself and the management of that project. According to Condor and Hachard [17], the origins of project management can be traced back to the ancient Egyptians, particularly in the construction of the pyramids. Over time, PM evolved around significant public and private construction endeavors. Today, sectors such as the military, aerospace, and various industries continue to adopt PM methodologies to enhance execution timelines, control costs, and ensure quality [18].

The primary goal of PM is to translate the project leader’s vision into actionable outcomes. PM is viewed as a tool for executing a project rather than merely designing it [5, 16]. Additionally, PM seeks to coordinate and organize collective efforts from both technical and human resource perspectives. For instance, establishing a local business, such as a grocery store in a residential area, is generally less complex than launching a large retail outlet. Consequently, the intricacies of the process and the associated risks necessitate the involvement of multiple stakeholders and experts, extending beyond the capabilities of a single individual.

The overarching aim of PM is to demystify the process of managing local business projects through effective task planning, risk management, cost control, human resource allocation, and quality assurance. However, the application of cumbersome and intricate PM methodologies to small projects can present challenges. This raises the question of whether an entrepreneur truly needs to engage in detailed task planning to ensure that their project is completed within a specified timeframe and budget. This inquiry prompts us to clarify the boundaries of the PM methodology.

3.1 Project management methodologies: Accelerating entrepreneurial success

Project management is defined by the Project Management Institute (PMI) as “the art of directing and coordinating human and material resources throughout the life of a project, using modern management techniques to achieve predefined objectives in terms of scope, cost, time, quality and stakeholder satisfaction.”

According to AFNOR, “project management encompasses all methods, evaluation, planning and organizational tools enabling project objectives to be achieved while respecting performance, deadline and cost constraints.” For Kerzner ([19], p.4), “project management consists of planning, organizing, directing and controlling the resources of a company to achieve specific short-term objectives.”

Project Management Institute (PMI) emphasizes the need for adaptability and risk management within entrepreneurial projects. PMI's project management framework (PMBOK) is highly applicable, especially in areas like scope management, resource allocation, and risk management. The role of project managers in entrepreneurial projects includes setting clear goals, ensuring alignment among team members, and managing the dynamic nature of risks and resources that characterize startups. PMI also highlights how strong leadership and strategic planning aid entrepreneurs in steering projects through phases from ideation to market maturity [20].

Entrepreneurial project management models now incorporate corporate entrepreneurship concepts, emphasizing flexibility and innovation. These models encourage breaking from traditional hierarchies to allow creative problem-solving within team structures. Integrating entrepreneurial thinking within project management can lead to improved innovation, making it easier to adapt to new markets and rapidly changing customer needs. Techniques like iterative planning and real-time adaptability are crucial to meeting entrepreneurial goals [21].

Innovation and knowledge management in entrepreneurial project management stress the importance of continuous learning and adaptability. By fostering a collaborative environment, project teams are more likely to share knowledge, thus promoting project resilience and adaptability. Knowledge management systems support entrepreneurial ventures by enabling better decision-making and maintaining a competitive edge. Studies show that successful entrepreneurial projects focus on integrating knowledge across various domains, which enhances team effectiveness and ensures sustainability [22, 23].

Risk management in entrepreneurship is particularly crucial, as new ventures face unique uncertainties. Risk management processes should proactively anticipate challenges, enabling project managers to apply mitigation strategies. Techniques such as sensitivity analysis, probability analysis, and scenario planning can help entrepreneurs assess potential risks and establish effective response plans. This allows them to respond swiftly to both expected and unexpected changes in the business environment, helping maintain project momentum even under uncertainty [23, 24].

The Montreal Club defines project management as a "set of methods and techniques designed for the design, analysis, and management of temporary, highly irreversible, and non-repetitive activities carried out under time constraints, utilizing scarce and limited resources."

The PMI methodology proposes 47 processes distributed across different knowledge areas, organized into five phases:

- Initiation

- Planning
- Execution
- Monitoring and control
- Closure

These 47 processes can be represented in a matrix format across the knowledge areas for each project phase. Like any process, they are associated with inputs and outputs that link together throughout the project.

The foundations of project management rest on nine knowledge areas, namely:

- Integration
- Scope
- Time
- Cost
- Quality
- Human resources
- Communication
- Risk
- Procurement

Project management requires a well-structured approach to reduce the uncertainty surrounding the project. In this sense, the business creation project is considered a project in its own right, allowing the application of project management techniques for entrepreneurial projects. These techniques cover the various stages of a project's life, from planning to completion. Consequently, it is legitimate to question whether project management methodologies are suitable for business creation.

Thus, entrepreneurial projects can be analyzed using two project management approaches proposed by the PMI: the nine aspects of Project Management and the project lifecycle. Today, PMI is recognized as the leading reference for disseminating best practices in project management. Despite criticism and controversies, PMI approaches remain a solid reference for analyzing entrepreneurial project management.

In the following discussion, we will focus on the methodology of the nine aspects of project management to examine entrepreneurial projects within the Tunisian context.

3.2 Entrepreneurship through the lens of PMI's nine areas

It is evident that entrepreneurship and project management are two closely interconnected fields. Indeed, there are numerous connections between the nine aspects of project management and entrepreneurship. These aspects provide a comprehensive

view of the skills a project manager must master to successfully execute a project. By comparing this approach to the practices of entrepreneurs and business founders, we can assess whether their methods align with a project management framework.

Furthermore, it is worth exploring which aspects of project management are not utilized, the significance of their absence, and whether, ultimately, the project management methodology is suitable for guiding and optimizing the entrepreneur's approach.

Table 1 establishes a connection between the nine aspects of project management and entrepreneurship, drawing inspiration from the work of Condor and Hachard [17].

It follows from **Table 1** that PM is a methodology composed of nine areas of knowledge, namely:

Integration management: Helps identify, define, combine, unify, and coordinate the different project management processes and activities.

Project scope management: Ensures that all work required by the project, and only the work required, is performed to successfully complete the project. Project scope management is primarily concerned with defining and controlling what is included and what is excluded from the project.

Project time management: Manage the timely completion of the project.

Project cost management: Project cost management includes the processes of estimating, budgeting, and controlling costs with the goal of completing the project within the approved budget.

Quality management: Project quality management includes the processes and activities of the performing company that determine the quality policy, objectives, and responsibilities for quality so that the project meets the needs for which it was undertaken.

Human resource management: Project human resource management includes the processes of organizing, managing, and leading the project team. The project team consists of individuals with assigned roles and responsibilities to complete the project.

Project communications management: Project communications management includes the processes required to ensure the timely and appropriate creation, collection, dissemination, storage, retrieval, and final processing of project information.

Project risk management: It is the planning of risk management, their identification, their analysis, the planning of risk responses, and their monitoring and control within the framework of the project.

Project procurement management: The processes of purchasing or acquiring the products, services, or results needed and external to the project team. The contract management and change control processes required to develop and manage contracts or purchase orders. The management of any contracts issued by an external organization (the buyer) that acquires the project from the performing company (the seller), as well as the management of the contractual obligations assigned to the project team by the contract.

In light of these considerations, we can ask ourselves *whether project management methodologies are suitable for business creation?* In other words, we seek to understand whether the practices of Tunisian entrepreneurs or business creators are part of a PM approach. Similarly, *we wonder which aspects of PM are not used* by Tunisian entrepreneurs. Therefore, we can outline our initial research model in **Figure 2**.

The theoretical model that we propose above, and around which the following developments are structured, contains three essential components, in this case, the nine stages of “project management” which constitute an approach to piloting the “conduct of the entrepreneurial project” which will lead to the finalization of the project and therefore its success.

	Meaning for the business creator
Management of the span	For a creator, scope corresponds to the size of the project and its strategic vision. This dimension is naturally linked to the creator's financing capacities. Managing scope will consist of clearly defining the project according to its financial capacities or knowing how to find additional financing if the scope is difficult to limit.
Cost management	In project management, cost management consists of monitoring the evolution of costs during the project and comparing it to the forecast curve. The S-curve is used in particular to analyze whether cost differences are due to an increase in the price of raw materials or to missed deadlines. In the same way, the creator is supposed to establish forecast financial statements, to monitor his expenses until the actual creation but also during the first years of existence.
Management of time limit	Deadline management consists of comparing the progress of the project to the established schedule. This is undoubtedly an element that is difficult to control in terms of business creation since the pressure exerted on the project manager by the sponsor does not apply in this specific case. The problems of paying unemployment benefits, for example, can nevertheless represent pressure for the creator, who must then respect certain deadlines to file the statutes of his company.
Management of the quality	Quality is naturally linked to the expectations of the client, in short, the sponsor. But, as in the previous case, the pressure is less than in the case of traditional project management: it is the creator himself who sets his own requirements in terms of creation, except when the creation of a company is directly the result of the request of one or more clients (for example, an entrepreneur who creates another company in a related field because several of his clients have encouraged him to do so).
Management of human resources	This is an important point in the management of collective projects. It can apply to business creations by a collective of individuals but not really to a single creator, at least until the actual creation. Subsequently, it is obvious that management will prove to be a key factor of success for the entrepreneur.
Management of communications	Internal or external communications: the project manager must be able to provide regular updates on the progress of the project. The same is true for the individual creator who must communicate with potential clients and at the same time communicate with his financiers.
Risk management	We touch on issues of social protection of the creator and risk insurance (unpaid bills, natural risks, etc.). This dimension also includes issues of hygiene, safety, and other regulations.
Supply management	Just as a project manager must ensure the supply of raw materials and the management of deadlines and associated costs, the business creator must choose the right suppliers and ensure that the costs planned in the business plan are not exceeded.
Management of integration	In project management, it is the ability to manage the eight other components at the same time and to mobilize a certain methodology/rigor in the way of leading the project (planning tasks, defining the project plan, identifying constraints, resolving problems, etc.).

Table 1.

The nine knowledge areas of project management according to PMI [17].

The diagram highlights three key interdependent elements in the entrepreneurship process: young entrepreneurs, project management tools, and the conduct of the entrepreneurial project itself.

3.2.1 Entrepreneurial project management: What is it?

The *management of the entrepreneurial project* represents the set of actions, decisions, and strategies implemented by a young entrepreneur to successfully carry out

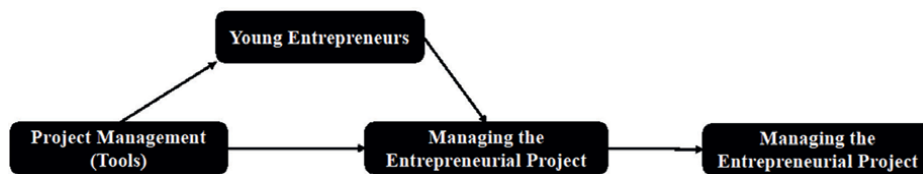


Figure 2.
Initial research model.

his project, from its conception to its realization. It is the common thread that allows an idea to be transformed into a concrete reality.

In other words, it is the art of:

- *Plan*: Define goals, steps, resources needed, and deadlines.
- *Organize*: Structure the project, assign tasks, and coordinate teams.
- *Lead*: Motivate teams, make decisions, and solve problems.
- *Control*: Monitor the progress of the project and adjust the plan if necessary.

3.2.2 The role of project management in entrepreneurship

The management of the entrepreneurial project plays a crucial role in the success of a project. It allows:

- *Controlling risks*: Anticipating difficulties and implementing measures to mitigate them.
- *Optimize resources*: Make the best use of financial, human, and material resources.
- *Meet deadlines*: Deliver the project within the given time frame.
- *Achieving objectives*: Carrying out a project that meets market needs and generates value.

3.2.3 The link with other elements of the diagram

- *Young entrepreneurs*: They are the main actors of the project. They implement the defined strategies and make the necessary decisions.
- *Project management (tools)*: These are the tools and methods (such as Gantt charts and Agile method) that allow you to plan, organize, and monitor the project. They facilitate the management of the entrepreneurial project.

3.2.4 The challenges of managing an entrepreneurial project

Leading an entrepreneurial project is a complex exercise that presents many challenges:

- *Uncertainty*: The entrepreneurial context is often uncertain and changing.
- *Limited resources*: Young entrepreneurs often have limited financial and human resources.
- *Pressure*: The pressure to succeed can be significant.
- *Decision making*: Decisions must be made quickly and often under conditions of uncertainty.

Managing an entrepreneurial project is an essential skill for any young entrepreneur. It allows you to transform an idea into reality and increase the chances of success. By mastering project management tools and methods, young entrepreneurs can better manage their projects and achieve their goals.

3.3 The Business Model Canvas: A strategic tool for entrepreneurial project management

The Business Model Canvas (BMC) is a strategic tool that helps entrepreneurs and managers visualize, design, and implement business models. When applied to project management within the context of entrepreneurial projects, it becomes a valuable asset for both planning and execution. In the realm of project management, the BMC can guide entrepreneurs in aligning project goals with broader business strategies, ensuring that the project delivers real value to the venture.

Here's how the Business Model Canvas relates to project management in entrepreneurial contexts (**Table 2**).

1. Customer segments (CS)

In project management: Understanding the target audience of the project is critical. Projects must meet the needs of key customer segments, whether it is internal stakeholders, end-users, or external clients.

Application: Clear identification of project stakeholders ensures that deliverables are aligned with the needs of customers, allowing for focused objectives and outcomes.

2. Value propositions (VP)

In project management: Every project must deliver value. The project's outcomes should contribute to creating value for the target customer.

Application: Defining the value proposition ensures the project stays aligned with the company's mission and meets customer expectations. It also guides decision-making and prioritization during the project lifecycle.

3. Channels (CH)

In project management: How the project results will be delivered is vital. Effective communication channels are necessary both during the project and in delivering final outcomes to customers.

Business Model Canvas				
Key partners	Key activities	Value propositions	Customer relationships	Customer segments
Who are our key partners? Who are our key suppliers? Which Key Resources are we acquiring from partners? Which key activities do partners perform? Motivations for partnerships: Optimization and economy, Reduction of risk and uncertainty, Acquisition of particular resources and activities	What key activities do our value propositions require? Our distribution channels? Customer relationships? Revenue streams? Categories: Production, problem solving, platform/network Key resources What key resources do our value propositions require? Our distribution channels? Customer relationships revenue streams? Types of resources: Physical, Intellectual (brand patents, copyrights, data), Human, Financial	What value do we deliver to the customer? Which one of our customer's problems are we helping to solve? What bundles of products and services are we offering to each customer segment? Which customer needs are we satisfying? Characteristics: Newness, performance, customization, "Getting the Job Done", design, brand/status, price, cost reduction, risk reduction, accessibility, convenience/usability	What type of relationship does each of our customer segments expect us to establish and maintain with them? Which ones have we established? How are they integrated with the rest of our business model? How costly are they? Channels Through which channels do our customer segments want to be reached? How are we reaching them now? How are our channels integrated? Which ones work best? Which ones are most cost-efficient? How are we integrating them with customer routines?	For whom are we creating value? Who are our most important customers? Is our customer base a mass market, niche market, segmented, diversified, multi-sided platform
Cost structure		Revenue streams		
What are the most important costs inherent in our business model? Which key resources are most expensive? Which key activities are most expensive? IS YOUR Business more: Cost-driven (leanest cost structure, low price value proposition, maximum automation, extensive outsourcing), Value-driven (focused on value creation, premium value proposition). SAMPLE Characteristics: Fixed costs (salaries, rents, utilities), variable costs, economies of scale, economies of scope		For what value are our customers really willing to pay? For what do they currently pay? How are they currently paying? How would they prefer to pay? How much does each Revenue Stream contribute to overall revenues? TYPES: Asset sale, usage fee, subscription fees, lending/renting/leasing, licensing, brokerage fees, advertising Fixed pricing: List price, product feature dependent, customer segment dependent, volume dependent Dynamic pricing: Negotiation (bargaining), yield management, real-time-market		

Table 2.
The Relationship Between the Business Model Canvas and project management in entrepreneurship.

Application: Defining the right channels for communication and distribution helps ensure smooth project execution and efficient delivery of project outcomes.

4. Customer relationships (CR)

In project management: Projects often require building strong relationships with customers and stakeholders to ensure long-term success.

Application: Project managers need to nurture stakeholder relationships to get buy-in, feedback, and support throughout the project lifecycle. A solid relationship guarantees better alignment and satisfaction.

5. Revenue streams (RS)

In project management: Projects must be justified in terms of their contribution to revenue generation or cost savings.

Application: The project should focus on either improving the financial health of the company or directly contributing to revenue generation through new products, services, or cost-efficiency.

6. Key resources (KR)

In project management: Projects depend on various resources such as personnel, technology, capital, and time.

Application: Proper resource allocation is crucial for project success. The BMC helps identify and allocate the necessary resources to ensure that the project is feasible and can be completed within constraints.

7. Key activities (KA)

In project management: These are the core actions that need to be performed to successfully complete the project.

Application: Identifying key activities helps in breaking down the project into manageable tasks, ensuring that milestones are met and that the project progresses as planned.

8. Key partnerships (KP)

In project management: Strategic partnerships can be essential for acquiring resources, sharing risks, or gaining access to knowledge or markets.

Application: Identifying key partners in a project helps to enhance collaboration and ensures that external resources or expertise are available when needed.

9. Cost structure (CS)

In project management: A clear understanding of the project's cost structure is necessary for budgeting and financial planning.

Application: Budgeting based on project needs and constraints ensures efficient use of resources and helps avoid overruns or wastage, thus keeping the project financially viable.

4. Discussion

The results of this analysis demonstrate that project management (PM) is a structured and effective approach based on nine knowledge areas that can significantly benefit entrepreneurial projects. These areas include integration management,

scope management, time management, cost management, quality management, human resource management, communications management, risk management, and procurement management. Each aspect is critical to ensuring project success, as it provides an organizational framework and reduces unforeseen issues through rigorous planning of key project phases [25].

Integrating these areas into entrepreneurial practices offers numerous benefits. For instance, scope management ensures that the project remains focused on its main objectives, thereby preventing resource dispersion and “scope creep” a situation where unplanned elements are added, negatively influencing both timelines and budgets [26]. Rigorous scope and cost management are essential for entrepreneurs who often face financial and human resource constraints, as several studies on project management in SMEs have noted [27].

Risk management is another crucial yet often underestimated area by entrepreneurs, particularly in Tunisia. Recent research indicates that entrepreneurs typically give less importance to risk identification and management, focusing instead on immediate goal achievement. However, proactive risk management is essential to project longevity, allowing for anticipation and mitigation of potential setbacks [28]. The lack of experience in risk management may stem from limited resources and unfamiliarity with project management tools, underscoring the importance of training entrepreneurs in this area [29].

To enhance entrepreneurial practices, the Business Model Canvas (BMC) is also a strategic tool that complements project management by providing a visual framework for aligning project goals with the broader business strategy. The BMC helps entrepreneurs identify key customer segments, value propositions, and communication channels critical to project success. Research shows that the combined use of the BMC and project management ensures that each entrepreneurial project measurably contributes to creating value for the business while supporting financial and strategic goals [30].

The implications of this study suggest that integrating project management methodologies into entrepreneurial practices represents an important pathway for improvement, especially in uncertain economic environments where resources are often limited. Future research could focus on adapting and simplifying these methodologies for SMEs and startups, as well as developing project management training tools specifically for entrepreneurs [31].

5. Conclusion

The document concludes that the integration of project management methodologies into entrepreneurial practices is essential for enhancing the effectiveness and success of entrepreneurial ventures. It emphasizes the importance of understanding the nine knowledge areas of project management as defined by the Project Management Institute (PMI), which can provide entrepreneurs with a structured approach to planning, executing, and finalizing their projects.

By examining the relationship between project management and entrepreneurship, the document highlights the need for entrepreneurs to adopt a proactive stance in managing their projects, focusing not only on the conception of their ideas but also on the practical execution and management of those projects. This dual focus can lead to better decision-making, improved resource allocation, and ultimately, greater project success.

Furthermore, the document suggests that there is a gap in the application of certain project management practices among Tunisian entrepreneurs, indicating an opportunity for further research and development in this area. By addressing these gaps and leveraging project management tools and methodologies, entrepreneurs can enhance their ability to navigate the complexities of the entrepreneurial landscape, leading to more sustainable and successful business outcomes.

By integrating the Business Model Canvas into project management, entrepreneurs can systematically address the various aspects of a business and align them with the goals and objectives of a project. This approach fosters a deeper understanding of how each project contributes to the larger business model, ensuring that the project not only succeeds in its own right but also enhances the company's overall strategy and value-creation efforts.

In summary, the document advocates for a deeper exploration of the interplay between project management and entrepreneurship, encouraging entrepreneurs to embrace structured methodologies to optimize their project outcomes and drive innovation in their respective fields.

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Managing the Workforce in the Era of Digital Transformation and Remote Work

Simangele Mkhize and Elizabeth Lourens

Abstract

Digital transformation and remote work have radically transformed workforce management, presenting global organisational challenges and opportunities. With the continual progress of technology, organisations are implementing adaptable work environments empowered by artificial intelligence and digital tools. This alteration has allowed organisations to use an international talent base, encouraging new ideas, enhancing access to specialised expertise, and improving workforce diversity. Consequently, it is necessary to rethink conventional management frameworks and methods for collaborative teamwork, job performance analysis, and employee engagement. Digital workspaces demand efficient global communication, changes in corporate culture, a shift toward a distributed workforce, and the implementation of new productivity solutions. Managers are now accountable for managing independence and responsibility to ensure that remote employees remain connected while retaining increased efficiency and motivation. Furthermore, the technological revolution has permitted businesses to improve decision-making and focus on more impactful tasks. These progressions introduce employee well-being, data privacy, and cybersecurity challenges because remote work redefines the parameters relating to employees' personal and professional lives. Moreover, businesses need to deal with challenges relating to digital literacy to guarantee that employees have the required skills to manage the progressively technology-oriented environment. While organisations manoeuvre through this evolving environment, priority should be placed on innovation, diversity, and flexibility for the global workforce. The effective incorporation of digital transformation and remote work relies on the capacity to adjust to continuously evolving social and technical dynamics to align organisations for long-term success in the globalised economy.

Keywords: global workforce, digitalisation, HR technology, sustainable organisation, remote work

1. Introduction

The sudden growth in continuous digital transformation and accelerated adoption of remote work led to a significant shift in the landscape of global workforce

management. Once initiated, the technological progression in digital partnerships, AI, and cloud computing allowed organisations to alter standard procedures for employment and the management of employment. For many organisations, once deemed an interim measure, remote work has evolved into a regular feature, allowing organisations to expand their flexibility and minimise overhead costs.

Such a transition also brings about challenges. Modern approaches to administering employees with diverse skills, cultures, and time zones are needed for the decentralised nature of remote work. Organisations must constantly develop approaches to organisational communication, monitoring or performance, and employee engagement as they adopt digital transformation. Incorporating modern technologies requires reconceptualising how the execution of work takes place. It also requires a technologically proficient and agile workforce to adjust to continuous change.

Global workforce management handles complex concerns, including employee well-being and cybersecurity. At the same time, organisations must prioritise organisational culture, innovation, and productivity. This chapter lays the foundation for investigating how digital transformation and remote work transform workforce management methods. The chapter focuses on unexplored prospects for development while introducing important challenges that require considerate remedies. Global workforce management's prospects lie in the organisation's ability to equalise user-focused and technological innovation methods.

2. Obstacles and prospects for HR in transitioning to the digital environment

The evolution of human resources (HR) toward a virtual environment is a complex process that comprises both challenges and prospects. HR functions must advance as organisations embrace digital technologies to remain effective and competitive. The barriers and opportunities for HR in this technological advancement include organisational and cultural barriers, technological and environmental factors, and human and technical challenges.

HR cultures that are regulation-focused and resistant also hinder technological evolution. Frequently, HR professionals are uncertain about the value of big data, and misapprehensions concerning its use can delay growth [1]. In addition, various managers in organisations are untrained in technological integration and are concerned it will negatively affect employment, which can decelerate the implementation of digital HR practices [2].

The fast evolution of change and uncertainty about technology brings challenges to HR departments. The issues of ethical use, fairness in algorithms, and data privacy concerning the use of digital tools in HR functions must be addressed by organisations [3]. Furthermore, environmental factors have emphasised the importance of digital HRM processes [4]. When adopting digital tools, the HR personnel encounters considerable technical and human challenges. These comprise poor data quality, traditional information systems, and obsolete HR processes that can hamper the successful use of big data integration (BDI) and human resources analytics (HRA) [1]. Furthermore, there is a shortage of expertise in business understanding and analytics among HR professionals, which limits professionals' capacities to use data to resolve challenges [3].

3. HR technology and technological revolution

Digital transformation is evolving human resources management (HRM) by incorporating progressive technologies into HR functions. This intense evolution, or more correctly, revolution, is reforming how human capital is managed by organisations that are reconsidering HR roles and productivity.

Technology has impacted many HR functions, including efficiency and automation, talent and recruitment, performance management, and employee engagement. Incorporating the Internet and automation systems has transformed the functions of HR systems, including training, performance appraisals, and payroll. Computerisation has simplified such processes, making them more cost-effective and efficient [3]. Cloud computing and artificial intelligence (AI) also improve such efficiencies by affording adaptable and scalable solutions [5].

HR technology, such as machine learning and AI, enhances recruitment by improving onboarding and candidate screening. HR departments rationalise the use of automation in the hiring process. Technology-driven recruitment tools can quickly evaluate candidates, run interviews, and scan resumes for particular roles [6]. Such systems assist HR departments in making data-driven decisions, thus enhancing recruitment efficiency and minimising bias. Platforms driven by technology can improve the experience of candidates by offering appropriate communication, including responses and insights in the recruitment process. More qualified and diverse candidates and more efficient and quicker results result from incorporating technology in HR [7]. Such technologies take into account organisational health and employee performance, promoting effective talent management [8, 9].

Digital platforms have enhanced performance management and employee engagement by providing data-driven and personalised perceptions. How organisations approach performance management has been transformed by technology. More real-time feedback and dynamic procedures via digital tools are substituting traditional annual performance reviews. Persistent performance management platforms driven by analytics and AI enable leaders to offer instant feedback and monitor employees' progress on key performance indicators (KPIs) [10]. Such systems enable productive and frequent conversations among employees and managers, leading to well-timed and precise mediation. Data analytics also allows HR to modify development programmes, determine individualised employee objectives, and recognise performance development trends, thus advancing performance and productivity [11]. Using technology has enhanced employee engagement, offering immediate recognition and feedback opportunities. Tools for employee engagement assist organisations assess and enhance employee satisfaction, motivation, and commitment. Such platforms permit employees to provide opinions transparently that can be used to promote supportive work environments, develop individualised development plans, and handle difficulties [12].

Incorporating AI creates challenges that require consideration. These include reluctance to change, ethical and privacy concerns, and skill gaps. In organisations, employees may resist incorporating AI because they fear losing their jobs and are uneasy with AI-driven decisions [1, 3]. That can harm trust and team dynamics when using AI systems. Psychological and cultural barriers may also hamper employees. These barriers include anxiety and fear about AI substituting human roles, which can prevent integration and acceptance of AI [3]. Guaranteeing transparent communication about the benefits and role of AI is essential for minimising resistance and promoting a coordinated environment [13].

There are also ethical concerns about adopting AI in HR, namely, security and privacy. Ensuring bias and fairness are addressed is imperative when AI is adopted [2]. Discrimination and transparency are additional ethical concerns in HRM when using AI [14].

Skill gaps are another concern when adopting AI in HRM. AI requires enhanced expertise, such as adaptability and proficiency; many employees may not possess the expertise [2, 15]. To reskill and upskill their employees, organisations must commit to training programmes that aim at digital literacy, problem-solving, and critical thinking to minimise the knowledge gap [5]. Recognising and handling impending skill gaps, ongoing learning initiatives, and strategic workforce planning are critical for ensuring sustainability in the workforce [13].

HR specialists are becoming more tactical as technological advances dominate administrative tasks. These tasks emphasise organisational growth and workforce planning. Such modifications require HR specialists to develop new skills and adjust to the digital landscape, which is quickly progressing [9]. However, human elements are still crucial in HR regardless of technological progress. Instead of superseding HR practices and roles, innovations must support the capabilities of humans [12].

4. Creating and sustaining organisational culture in the digital environment

Developing and maintaining organisational culture during digitalisation is a multifaceted challenge that includes modifying traditional cultural elements and incorporating digital technologies to accommodate recent digital paradigms. This section focuses on the main features of digital organisational culture, how performance is influenced, and approaches to maintaining a digital environment.

A digital organisational culture is important if digital technologies are to be effectively implemented and support positive organisational performance. The culture functions as a requirement for employing digital tools appropriately and is a prerequisite for using digital tools effectively, encouraging advancement within an organisation's valued activities [16, 17]. A robust digital culture encourages teamwork, versatility, and innovation, which are crucial to guiding the opportunities and challenges present in the age of digitalisation [18].

Changing work environments to hybrid and remote brings about challenges sustaining organisational culture. A hands-on engagement that promotes cultural stability and socialisation in digital spaces is typically restricted [19]. Organisational cultures should be modified to provide hybrid and digital work and maintain value creation in present-day corporate settings [20].

Command strategy integration of technology innovations with stakeholder anticipations and organisational goals is needed to maintain a tech-driven organisational culture. Such strategies include adopting a culture emphasising innovation, collaboration, and digital skills [18, 21]. Essential strategies involve constantly observing digital performance metrics, incorporating them in organisational policies and digital practices, and maintaining management's dedication to digital transformation [22]. Furthermore, tech-driven leadership is fundamental for improving organisational performance using employees' digital skills and culture [23].

Technological transformation was enhanced by occurrences such as the COVID-19 pandemic and has drawn attention to the significance of a technology-oriented

culture in promoting modernisation. Businesses needed to modify their strategies to remote collaboration, highlighting the requirement for an atmosphere encouraging technological innovation and modernisation in an adaptive work environment [24]. A comprehensive digital culture improves organisational performance, innovation, and efficiency, thus differentiating the digital business landscape [18].

Developing and maintaining the digital environment and organisational culture includes incorporating traditional components with digital technologies. This incorporation includes attending to the complications involved in remote work and applying organisational methods that promote performance and innovation. A robust digital culture is important for businesses to flourish in the fast-advancing digital environment.

5. Recruitment, onboarding, and development in the global talent pool

In the interconnected global landscape, coordinating the worldwide talent pool by organisations is a complicated and multifaceted hurdle. Such hurdles include onboarding, recruiting, and creating and maintaining the organisation through different cultural and geographical environments.

5.1 Recruitment strategies

Organisations are gradually shifting their focus to advanced recruitment strategies to invite the best candidates. A successful hiring process includes performing comprehensive interviews, obtaining applicants, and constructing convincing job postings to guarantee long-term success and a cultural fit via personalised onboarding plans [25]. Furthermore, the incorporation of AI in recruitment processes has demonstrated enhanced onboarding experiences, modernised sourcing of candidates, and improved decision-making. It also manages issues of diversity and bias [26]. Providing innovative methods for performing work can enhance talent and emphasise how crucial flexible work arrangements are [27].

5.2 Onboarding practices

Effective onboarding is important for improving organisational fit and minimising turnover intentions. An important component in onboarding success is granting support to new employees, while job satisfaction plays a connecting role between turnover intentions and onboarding success [28]. The onboarding process must be individualised and adaptable and enable shared learning prospects about the organisation for new employees, which is critical in expanded remote work [29].

5.3 Development and retention

Advancement of international talent includes strategic management methods, including the use of talent pools and mentoring. Mentoring is a crucial instrument for developing talent, even though its function is ambiguous in recruitment and selection [30]. If deliberately directed, candidate pools can offer an effective in-house talent pool and guarantee a successful talent management process [31]. Foreign nationals who are independent are crucial providers in the global

workforce. To be successfully employed, talent management approaches must be customised [32].

Global talent management (GTM) encounters numerous difficulties, including handling talent from different cultural backgrounds and coordinating the approaches of global organisations. Additional scientific data and a comprehensive understanding of mentoring methods and the administration of talent pools require development [31, 33]. Further studies must focus on creating a human-driven AI recruitment system and examine the function of mentoring in pre-employment [26, 30]. Furthermore, the anticipation of new employees in an organisation must be aligned, specifically regarding remote work arrangements and flexibility [29].

6. Diversity and inclusion in a digital environment

In the digital environment, diversity and inclusion are important for guaranteeing fair access and involvement in a digital society. Dealing with the technology gap and encouraging inclusive methods are important in promoting economic success and social fairness as technological innovations evolve and become an important part of daily activities.

Inclusion in the digital world is an important aspect of an inclusive society that wishes to close the digital gap and divide that abandons some individuals, communities, and countries who are deprived of using technological innovations. Studies emphasise the continuing disparities in using and accessing digital technologies, aggravated by income levels, education, and age [34, 35]. The COVID-19 crisis highlighted such differences, emphasising the pressing need to deal with these digital gaps [35].

Technology is crucial for encouraging diversity and inclusion by connecting individuals and encouraging effective teams. Guaranteeing the availability of digital technology through different cultural, social, and economic settings can notably improve attempts at diversity and inclusion [36]. The constructive influence of technology in such settings highlights the requirements for inclusive initiatives for digital access [36].

Obstacles in technology access comprise the requirement for customised approaches that acknowledge the differences in demographics such as educational background, profession, and age. Such considerations significantly impact the success of the approaches for diversity in digital settings [37]. Furthermore, incorporating the values of diversity and inclusion within web design can convert virtual environments to team-oriented settings that foster and regard diversity [38].

In organisations driven by digitalisation, training and education are important for promoting diversity and inclusion in the workplace. Such programs assist the workforce in acknowledging and supporting diversity, resulting in a multifaced talent pool, improved probability and innovation, and improved organisational reputations [39]. Reinforcing education and training can reinforce positive understanding and behaviours among employees, which is important for obtaining significant levels of diversity and inclusion [39].

Encouraging diversity and inclusion in the technology space involves a comprehensive method that addresses the inequalities in digital access, uses comprehensive technology techniques, and includes education and training in the organisational environment. Key players can be effective in an inclusive and just society by focusing on these domains.

7. Privacy of data and security in global workforce management

Due to growing dependence on regulations, data privacy and security are important aspects of global workforce management. The expansion of organisations into a global setting implies complications with safeguarding information sensitive to breaches and guaranteeing compliance with regulations for data privacy.

There are some challenges in data privacy and security, including the big data paradigm and data governance fundamentals. Emerging obstacles to privacy and security are apparent with the increase in big data collection and use, and modern tools, technologies, and policies are required to safeguard vulnerable information. A holistic strategy is needed for privacy and security because of the difficulties associated with big data. This strategy should incorporate policy development, governance, and technology to handle such challenges successfully [40].

To guarantee data privacy, efficient data governance is important. Data privacy is important when applying policies, while data security refers to data access. Before meeting data security concerns, attending to privacy issues is imperative because they are connected. To employ and sustain such practices, sound IT leadership, although labour-intensive, is essential [41].

To improve data privacy and security, approaches that include cyber security measures and ethics-based leadership are crucial. Data protection measures comprising encryption methods, firewalls, and intrusion detection techniques are imperative to ensure that management information systems are data protected. Encryption techniques for data privacy assurance have favourable outcomes and a reasonable impact. Nonetheless, the interconnection between data privacy and detection systems is multifaceted and requires in-depth exploration [42].

Ethical leadership is important in administering data privacy and security. Ethical leaders are responsible for ensuring that ethical and technical considerations are incorporated into the decision-making process. Such tactics assist in guaranteeing adherence to rules, encouraging a protected environment, and developing a norm that highlights data privacy. Methods such as these afford a competitive advantage by improving trust for business partners and customers [43].

Continuing research and development for data privacy and security in response to emerging difficulties in the big data age comprises investigating the foundational systems driving the complex security landscape and integrating technology and security in management information systems [40, 42]. Organisations must also persistently modify security practices and data privacy to continue being cooperative while the regulations grow increasingly rigorous, which requires ethical considerations and preventative measures in governance and strategies for data management [43]. In global workforce management, privacy and data security require a comprehensive strategy incorporating strong governance outlines, ethical leadership, and technological solutions. Tackling such difficulties is important to maintain trust and protect sensitive information in the digital world.

8. Approaches for efficient management of remote workforce

Promoting a supportive organisational culture, adjusting HR methods, and employing technology are aspects of proficiently managing remote employees. The main methods for coordinating remote employees include technology use, HR and

leadership practices, organisational communication and culture, employee engagement and well-being, and project management.

Employing digital tools, including performance monitoring systems, secure cloud solutions, and virtual collaboration platforms, is fundamental to sustaining productivity and communication in remote teams [44–46]. Ongoing technological knowledge and expanding into innovative technologies additionally improve the effectiveness of management [45]. Furthermore, HR practices that are creative and leadership that are impactful are crucial in sustaining engagement and encouraging employees. Such comprises development prospects, continuous training, and flexible work policies in remote environments [47, 48].

Creating a unified remote work environment by promoting a philosophy of collaboration and trust and coordinated communication strategies is crucial and can be realised through offering social support services and promoting knowledge sharing [45, 49, 50]. Equally, guaranteeing work-life balance and attending to mental health concerns is important. Institutions must focus on frequent virtual meetings, flexibility, and organised routines to sustain employee retention and satisfaction [46, 47]. Agile frameworks can be used efficiently in remote environments for project management. Such methods assist in improving business communication and handling geographically distributed teams [51].

Managing a remote workforce requires a versatile strategy incorporating technology, an uplifting organisational culture, and flexible HR practices. Through prioritising such demands, it becomes effortless to uphold a competitive edge and improve employee satisfaction and productivity in the work environment.

9. The future of work: Predictions and trends for the workforce globally

The future of work includes radical shifts in how work is carried out, who executes it, and the environment. Such a transition is influenced by changing consumer expectations, globalisation, demographic shifts, and technological advancements. Such changes were enhanced by the COVID-19 pandemic, which encouraged the re-examination of models for traditional work and the introduction of new techniques.

Incorporating AI, robotics, and machine learning is foreseen to herald the automation of knowledge-based jobs and tasks. Such a transition is set to result in a hybrid workforce in which intelligent machines and humans work together [52–54]. The full digital transformation is a significant movement, and some employees regularly use AI. Such a shift is anticipated to persist, altering skills and job roles [52].

The global outbreak of COVID-19 dramatically grew virtual work together with numerous organisations implementing adaptable work arrangements. Such change resulted in remotely distributed workforces and assisted in developing online collaboration tools and workplace technology solutions [53, 55]. The gig economy is likewise increasing, accompanied by rising opportunities for project-based freelance work. Such a wave is propelled by the versatility it provides for employers and employees. Its expansion is anticipated to persist compared to traditional employment [52, 56].

Of increasing significance is developing a labour market that is comprehensive to guarantee there is no discrimination and there are equal opportunities. Organisations are gradually concentrating on diversity and inclusion in the context of workforce strategies to their advantage [55, 57].

When new technologies and automation restructure occupations, a need arises for upskilling and reskilling employees. In order to equip workers for the challenges in the

future, investment by organisations to develop new competencies is made [54, 56]. Computational thinking, cross-cultural competency, and virtual collaboration are significant skills that will be required in the future. In addition, attention to well-being and mental health is necessary [55, 56].

10. Challenges and future directions

The transition to remote work overlaps the distinction between home and work, which affects mental health. In sustaining employee satisfaction and productivity, organisations acknowledge the necessity of handling such obstacles [52, 55]. In addition, there is a requirement for strategies that assist knowledge development, access to education, social safety programmes, and employment protection that is flexible. Such initiatives are crucial for integrating a changing workforce landscape [57].

Overall, attention to diversity and inclusion, adaptable work arrangements, and rapid technological advancements define the future of work. By attending to the obstacles the new work models bring and committing to developing the workforce, organisations can adjust to the technological revolution. The ongoing change creates prospects for a more efficient workforce in the context of global economic requirements.

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Conflict of interest

The authors declare no conflict of interest.

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Next Management: The Unending Human-Centered Organization Transformation in Navigating the VUCA Landscape

Kirti Peniwati

Abstract

The volatility, uncertainty, complexity, and ambiguity (VUCA) environment is reshaping the paradigms of organizations and business operations in transformative ways. Organizations are in a continuous learning mode striving for agility, adaptability, innovation, anticipation, and customer-centric strategies while fostering collaboration, resilience, and evolving leadership styles. This transition is driving organizations toward a human-centered approach that focuses on adding value to customers. Peter F. Drucker, recognized as the father of modern management, provides relevant insights that resonate within today's rapidly changing VUCA landscape. The Global Peter Drucker Forum serves as a platform for exploring Drucker's management philosophy, emphasizing the necessity of implementing his ideas to navigate contemporary challenges effectively. This chapter advocates for the adoption of 'Next Management,' a new era characterized by a growth mindset and an organic approach to strategic management that emphasizes strengths and emerging planning. Leadership in this context involves managing in environments without command authority, ensuring integrity and ethical practices, with CEOs acting as vital links between their organizations and the external landscape. By fostering a culture of continuous learning augmented by scientific management theories, organizations can leverage appreciative inquiry and the analytic hierarchy process (AHP) to align tacit perceptions holistically. The forward-backward planning process of AHP is particularly valuable, as it integrates the influence of various stakeholders and facilitates scenario planning to explore future possibilities. This chapter aims to illuminate these evolving concepts and their implications for management practices in a VUCA world.

Keywords: analytic hierarchy process, appreciative inquiry, continuous learning organization, forward-backward planning, human-centered organization, mindsets, next management, paradigm shift, Peter Drucker forum, positive revolution, SOAR planning, transformative leadership, VUCA environment

1. Introduction

The volatility, uncertainty, complexity, and ambiguity (VUCA) environment is fundamentally altering the paradigm of organizations and business operations in several critical ways. Essentially, organizations embark on a journey toward becoming human-centered, aiming to add value to customers. It is reshaping various aspects of organizations by striving for agility and adaptability, emphasizing innovation and engagement, focusing on customer-centric strategies, establishing collaboration and networks, developing resilience, and transforming leadership styles. They embrace a continuous learning mindset [1].

Peter F. Drucker, often referred to as the father of modern management, offered insights into management that remain highly relevant, particularly in the context of today's rapidly changing VUCA landscape [2]. The Global Peter Drucker Forum, the world's leading management conference, seeks to explore Drucker's management philosophy and its application to contemporary challenges. Over the years, the Forum has emphasized the importance of implementing Drucker's ideas, reminding participants to move forward with established concepts. The 2018 Forum highlighted that several large companies have successfully adopted Drucker's insights in sophisticated ways, enabling them to navigate their VUCA environments effectively. Some of these organizations have been on their transformation journeys for several decades and continue to strive for excellence.

This chapter emphasizes the need to embrace 'Next Management', a new era of management within the VUCA environment, aligning with ideas discussed at the Global Peter Drucker Forums. The call for a positive revolution characterized by a growth mindset underscores the ongoing journey toward practicing Next Management. It advocates for a shift in strategic management that is more organic, emphasizing strengths and opportunities and promotes anticipative planning. Leadership is about learning to manage in situation where they do not have command authority. CEO need to play the role as the link between his organization and its environment. The Next Management strives for a continuous learning orientation that is augmented by scientific management theories. Appreciative inquiry and the analytic hierarchy process (AHP) have been shown to provide holistic approach where eliciting and aligning tacit perception in the most effective and efficient ways are at the core of the process. AHP's forward-backward process is a unique approach for planning that incorporate the influence of other actors. The resulting model could be used to explore future possibilities as scenario planning.

1.1 VUCA environment and its challenges

The VUCA environment has prompted a fundamental shift in management paradigms and will continue to alter our foundational assumptions about best practices and principles within this field. VUCA stands for four distinct characteristics that contribute to the uncertainty and complexity of the modern world [3]:

- **Volatility:** Refers to rapid and unpredictable changes, such as sudden market shifts or technological breakthroughs.
- **Uncertainty:** Describes the difficulty in predicting future events, even when relevant information is available.

- **Complexity:** Represents the multitude of interrelated factors that complicate the identification of causes and effects.
- **Ambiguity:** Indicates unclear or contradictory information that permits various interpretations.

The VUCA landscape challenges the discipline of strategic management and leadership significantly. These challenges disrupt traditional strategic planning processes, necessitating a comprehensive reevaluation of how organizations craft and implement strategies in the face of constant change.

Rapid environmental changes lead to unpredictability, demand agility, and adaptability in executing organizational plans. The elements of uncertainty and complexity affect the analysis and decision-making processes, often resulting in hesitation or paralysis when confronted with problem-solving and strategic planning. This dynamic environment requires sophisticated collective decision-making—both internal and external—integrating objective data and subjective insights from diverse stakeholders and experts.

Moreover, the ambiguity surrounding information interpretation and the implications of various scenarios complicates strategic decision-making. Organizations must adopt ‘what if’ thinking, exploring multiple future possibilities. Addressing these challenges compels a reevaluation and redefinition of the roles of formal leaders and organizational structures [4–6].

1.2 Global Peter Drucker forum: The next management

Peter F. Drucker (1909–2005), widely regarded as the father of modern management, was an influential thinker and author whose contributions profoundly shaped management theory and practice throughout the twentieth century. His insights into business, society, and economics remain relevant, particularly within the context of today’s rapidly evolving VUCA environment.

In his 1999 book, Drucker addressed the fundamental challenges organizations face as they entered the new millennium, emphasizing several key ideas [2]:

- **Knowledge work and knowledge workers:** Knowledge is the most valuable resource in the twenty-first century.
- **Decentralization and empowerment:** Organizations must promote agility and responsiveness.
- **Focus on results:** Emphasis on measurable outcomes is crucial.
- **Innovation as a core capability:** Innovation should be deeply embedded within the organization.
- **Customer-centric approach:** Prioritizing customer needs is essential for success.
- **Managing in a global economy:** Organizations should ‘think globally, act locally.’
- **Ethics and responsibility:** There is a need to balance business objectives with social responsibility.

The Global Peter Drucker Forum was established with the mission to explore Drucker's management philosophy and its applications to contemporary challenges by bringing together thought leaders, scholars, and practitioners. The Forum aims to inspire a new generation of leaders to create a better world by providing a platform for sharing innovative management practices and theories, aligning with Drucker's legacy as the 'father of modern management.' It plays a significant role in advancing the concept of human-centered organizations, fostering discussions on contemporary management challenges and solutions in a VUCA world.

Some key contributions of the Forum include:

- 2012 forum: Highlighted that a revolution in management and capitalism is underway [7]. Firms navigating the transition to the new management ecosystem must master five fundamental shifts: the management mindset, the role of managers, the coordination of work, the value practiced, and the methods of communication [8].
- 2015 forum: Revealed that mindset is more important than technology. A group of companies formed a Learning Consortium for the Creative, focusing on transforming the world of work. The Consortium's key finding was that 'changes in mindset are more important than changes in hardware or software.' When traditional mindsets accompany technological deployment, organizations struggle to be agile enough to capitalize on it. To succeed, management must leverage the full talents and capabilities of those doing the work [9].
- 2017 forum: Discussed establishing a new balance between short-term and long-term focus to support investment and entrepreneurial innovation in large organizations. Corporate leaders need to embrace Drucker's insight that the only valid purpose of a firm is to create a customer. The dialog emphasized the necessity of implementing this principle rather than merely discussing it [10].
- 2018 forum: Indicated that a major transformation in management is already underway. The outcomes of this Forum were significantly different from those of previous years, when participants were still grappling with understanding what management transformation might entail [11].
- 2023 forum: Proposed future discussions centered on reframing management for the twenty-first century, termed 'the Next Management' [12].
- 2024 forum: Focused on identifying Next Management practices, with a general consensus that success today requires new practices based on agile, creative, and people-centered leadership [13].

This evolution reflects the timeless relevance of Drucker's principles as organizations navigate the complexities of the modern business landscape.

2. The 'next management' initiative challenges

In 2008, Gary Hamel's Management Lab launched the 'Moonshots for Management' initiative, bringing together 35 distinguished management experts and

executives to ‘re-imagine management for the 21st century,’ in alignment with the vision of the Global Peter Drucker Forum. Despite their progress, Denning’s conclusion is clear: ‘Now in 2024, 16 years later, management is still broken.’ To enhance the effectiveness of the Drucker Forum’s ‘Next Management’ initiative, Denning reviewed the key insights from the Moonshots initiative [14].

2.1 Insight #1: Recognize the gravity of the challenge

The challenges articulated by the Moonshots group remain relevant today: ‘How do you create organizations that are as adaptable and resilient as they are focused and efficient in an age of rapid change? ...How do you inspire employees to bring their gifts of initiative, imagination, and passion to work every day in a creative economy where entrepreneurial genius is key to success?’ The ongoing struggles of many large firms, compounded by new challenges such as artificial intelligence, highlight the urgency of addressing these issues.

2.2 Insight #2: Get the right definition of management

The Moonshots initiative defined management as a system of ‘structures, processes, and techniques used to compound human effort,’ a framework that has historically driven economic progress. Denning asserts that these systems and processes must be motivated by the right human mindsets, goals, values, and culture. Without this foundational alignment, they cannot foster the initiative, imagination, and passion that the initiative aspires to achieve.

2.3 Insight #3: Seek the right kind of solutions

The inappropriate definition of management has led to misguided solutions. Of the proposed 25 Moonshots, 18 centered on adjustments to systems, processes, tools, and techniques. These elements alone cannot ignite employees’ initiative, imagination, and passion. True inspiration can only be cultivated by prioritizing human values, mindsets, and culture, which energize creativity and innovation.

2.4 Insight #4: Use an appropriate change model

The Moonshots group began by compiling a list of 25 challenges, inspired in part by the 14 grand engineering challenges proposed by the U.S. National Academy of Engineering. Unlike engineering puzzles that tend to have singular solutions, organizations are complex adaptive systems that robustly resist change. Consequently, solving a problem in one part of an organization—such as budgeting—often encounters counteractions in other areas. Thus, management challenges must be approached holistically.

2.5 Insight #5: Learn from conversations with outliers

In May 2008, the Moonshots group conducted an insightful interview with Google CEO Eric Schmidt, who explained that Google had moved beyond traditional management practices. This shift enabled creativity and innovation in a dynamic, engaging, and productive workplace. While Google succeeded, its insights were notably absent from the final Moonshots report. One lesson for the Drucker Forum’s ‘Next

Management' initiative is to leverage experiences from 'outlier' firms that challenge conventional wisdom.

2.6 Insight #6: Examine the financial facts

The Moonshots initiative emerged during the worst financial crisis in 80 years, during which several prominent firms collapsed or required bailouts. Remarkably, the initiative's report did not address financial considerations. A closer examination of financial data could have revealed the rise of companies like Amazon, Apple, and Google.

2.7 Insight #7: Recognize customer centrality

While the Moonshots initiative acknowledged the impact of the Internet, it did not fully grasp one of its most profound consequences: the centrality of the customer in management. Recognizing this new customer-centric focus was crucial for the fastest-growing firms in the coming years.

2.8 Insight #8: Spot emerging new management paradigms

As early as 2008, the rapid growth of companies like Google, Apple, and Amazon signaled the emergence of a new paradigm. Google exemplified a fundamentally different approach to management, emphasizing value creation for others through customer focus, staff empowerment, and horizontal networks rather than rigid hierarchies. By 2024, this paradigm has become increasingly apparent, with 20% of the fastest-growing firms now valued at half of the total S&P 500 market capitalization.

2.9 Insight #9: Fix the philosophical foundation of management

Today's social reality reveals that few individuals wish to operate within controlled systems. The Drucker Forum's Next Management Initiative could benefit from an unambiguous declaration: future management must prioritize human mindsets, goals, values, and aspirations over systems. This direction is not only ethically sound but also leads to more profitable, engaging, joyful, inspiring, and beautiful outcomes—one that resonates with younger generations aspiring to create a world they want to inhabit.

3. Next management: New paradigms for management and leadership

The Global Peter Drucker Forums revealed that Next Management is new paradigms under development, requiring a totally different mindsets in shifting its concepts and practices.

3.1 Joining positive revolution

De Bono is regarded as the leading author in the field of creative thinking, innovation, and teaching of thinking as a skill. He maintains that thinking plays so central role in human happiness and development both from moment to moment or for a longer time. He believed that we have done very little about thinking but have been

content with a fluency of argument and ability to attack and defend position. This sort of thinking unfortunately lacks the creative, constructive and design energies that we really need to develop the practice of the Next Management. Our emphasis on negativity seriously impedes such progress. However, there is still value of negativity in changing values, in improving ideas, and in forming the conscience of a society. But the constructive and creative energies have to be there to get steady progress that is the basis of positive revolution. Positive revolution is about generating constructive energy. Positive revolution is a revolution of people and perception. Positive revolution is a revolution of actions and doing [15].

The history of the positive revolution traces back to the emergence of positive psychology in the late twentieth century, pioneered by Martin Seligman in the late 1990s. Seligman emphasized a shift in psychology's focus from solely addressing mental illness to exploring the positive aspects of human experience. Its principles encouraged a focus on strengths, positivity, and well-being in everyday life and work settings [16].

As the concepts of positive psychology merged with organizational development, they evolved into the human-centered organization movement. This movement stresses the importance of placing people at the core of organizational practices, emphasizing empathy, engagement, and empowerment as essential for organizational success. Happiness and wellbeing in social progress is important at the global level.

Human-centered design and management approaches further formalized this movement, integrating insights from positive psychology to create environments that foster collaboration, innovation, and well-being.

A positive revolution may be contrasted with a negative one [15]:

- Instead of attack there is construction.
- Instead of criticism there is design.
- Instead of change through violence there is change through perception.
- Instead of the power of guns there is the power of information.
- Instead of the hard edges of 'rock logic' there is the now of 'water logic'.
- Instead of ideology to provide the direction there is humor to allow changes in direction.
- Instead of a centrally organized system there is a self-organizing system.

There are five basic principles of the positive revolution:

- Effectiveness: setting out to do something and doing it.
- Constructive: the direction and the way to go.
- Respect: the way one behaves toward all other human beings.
- Self-improvement: the right and duty to make oneself better.
- Contribution: what you can contribute.

3.2 Organization as a strategy implementation system

In the context of an organic human-centered organization that behaves as an organic entity, strategy refers to a dynamic framework that prioritizes adaptability, collaboration, and responsiveness to change, rather than relying on rigid, top-down directives. Such an organization views its strategy as a living, evolving process that is influenced by the contributions and needs of its members, customers, and other stakeholders.

Characteristics of Strategy in an Organic Human-Centered Organization [17].

- **Flexibility and adaptability:** Strategies are not set in stone; they evolve as circumstances change. Organizations embrace a flexible approach that allows for quick adjustments in response to external and internal shifts.
- **Collaboration and empowerment:** Strategy development involves input from various levels of the organization, encouraging collaboration and leveraging the diverse insights of team members. Employees are empowered to contribute their expertise to strategic discussions.
- **Focus on relationships:** Relationships with employees, customers, and stakeholders are emphasized. Strategies are informed by a deep understanding of the human experience, enhancing engagement and satisfaction.
- **Learning orientation:** A commitment to continuous learning and improvement is central to strategic thinking. Organizations encourage experimentation and view failures as opportunities for growth.

Strategy implementation within an organic human-centered organization means putting these flexible and collaborative strategies into action in a way that aligns with the organization's values and goals. The key aspects of strategy implementation in this context are: engagement across all levels, iterative processes, supportive culture, and alignment with values.

To successfully implement strategy, leaders must [18]:

- communicate the urgency of adapting to the changing environment. This can motivate employees to engage with the strategy and take ownership of its execution.
- build a guiding coalition of diverse leaders who can champion the strategy and empower action to move strategy forward.
- lead with vision and values that aligns with the core values of the organization.

3.3 Strategic planning: Focusing on strengths and opportunities

Organizations in their journey toward the Next Management join the positive revolution by focusing on strengths and opportunities. They use SOAR approach, a strategic planning framework that emphasizes a strengths-based, future-oriented perspective, with a focus on four key components: strengths, opportunities, aspirations, and results. Unlike traditional SWOT analysis, which often highlights

weaknesses and threats, SOAR encourages organizations to leverage their strengths and explore opportunities to envision a positive future [19].

Components of SOAR:

1. Strengths: Identifying and building upon the existing strengths of the organization, including resources, capabilities, and competencies.
2. Opportunities: Examining external factors and trends that can be harnessed for growth, innovation, and expanding the organization's impact.
3. Aspirations: Defining a compelling vision of the future that reflects the values and goals of the organization. This component emphasizes what the organization aspires to achieve.
4. Results: Setting measurable outcomes to evaluate progress toward achieving the aspirations, ensuring accountability and focus on performance.

3.4 Scenario planning

Baker maintains that there are three keys to the future for any organization that wants to participate fully in the twenty-first century: anticipation, innovation, and excellence [20]. Drucker emphasizes the need for organizations to be adaptable and proactive when navigating turbulent times. He discusses several key themes [21]. Scenario planning is a way to be prepared for anticipated changes in the environment [22]. It provides tools and frameworks that help organizations navigate the inherent uncertainties and dynamics of modern business landscapes, and the process benefits organizations in the following ways:

- Anticipating various future possibilities
- Fostering a culture of agility and adaptability.
- Fostering organization alignment and promoting commitment.

3.5 Leadership: Post-capitalist executive

Peter Drucker characterizes leadership in the Next Management, living in a post-capitalist society, need to be in a learning mode themselves [23].

- 'You have to learn to manage in situations where you do not have command authority, when you are neither controlled or controlling. That is the fundamental change.' However, 'Management books still talk mainly about managing subordinates. Similarly, business still refers to managing subsidiaries'
- Today business grow through alliances, new type of growth, upsetting the traditional manager who believes they must own or control success and market.

Lafley welcomed the job of CEO, a job he had never done before, when he became Procter & Gamble CEO in June 2009 in the midst of crises. He had been closely following the development of Peter Drucker's thinking on CEOs role. Responding to the

question 'What is the work of the CEO' in 2004, he still believed that we did not really understand the role and unique work of the CEO. However, he argued that people wrongly view CEOs as coaches and problem solver as needed and that CEOs indeed have work that is his own [23].

In 2004 Drucker said: "The CEO is the link between the *Inside* that is the organization and the *Outside* of society, economy, technology, and market. *Inside* there are only costs. Results are only on the *Outside*." Langley's experience validated Drucker's observation and came up with his interpretation that there are four fundamental tasks, quoted as follows:

- Defining and interpreting the meaningful outside.
- Answering, time and time again, the two-part question: What business are we in and what business are we *not* in?
- Balancing sufficient yield in the present with necessary investment in the future.
- Shaping the values of standards of the organization.

3.6 Building ethical culture with integrity

Practicing 'Next Management' also means building an ethical organization culture with integrity. It involves fostering an environment where ethical behavior is valued and promoted, ensuring that integrity is at the core of organizational practices. An ethical culture encourages employees to act consistently with the organization's values, norms, and ethical standards, promoting trust among stakeholders and enhancing overall organizational performance [24, 25].

Hamilton Mann promotes artificial integrity, a journey that promises a human-centered perspective on artificial intelligence (AI) role in modern society. He emphasized that the challenge of artificial intelligence is in ensuring systems that exhibit integrity-led capabilities over the pursuit of more general or super intelligence [26].

Mann envision a world where artificial intelligence can deliver integrity-led outcomes seamlessly, adapting to diverse cultural context, value models, and situational nuances, countering subconscious biases, all while operating in an advanced human-centered manner. This is the promise of artificial integrity. The challenge is in ensuring systems that exhibit integrity-led capabilities over the pursuit of mere general or super intelligence. Artificial integrity is essential for anyone involved in AI development, from executives, business leaders, and managers to entrepreneurs, tech enthusiasts, and policymakers. It is also perfect for laypeople interested in how AI intersects with society. Dive into this compelling and thought-provoking read to ensure you are prepared for the challenges and opportunities that lie ahead in a human-centered AI-driven future [26].

4. Scientific theories augmenting the next management journey

There are two breakthrough scientific theories that could advance the continuous learning journey toward the Next Management. Appreciative Inquiry and Analytic Hierarchy Process.

4.1 Appreciative inquiry

Appreciative inquiry was developed by renowned scholar David Cooperrider [27]. It is a breakthrough theory for organization learning and development, grounded in various theoretical foundations that emphasize a strengths-based, positive approach to organizational change and development. The key theoretical foundations include:

- Social constructionism: Knowledge and meanings are constructed through social interactions. Organizations can co-create realities by engaging in positive dialog and shared storytelling, allowing members to collaboratively envision their desired future.
- Positive psychology: Focus on what works well within an organization, fostering a positive outlook that encourages growth and development.
- Systems theory: Organizations are interconnected systems, aiming to understand and leverage these relationships to promote holistic development.
- Constructivist learning theory: Principles that stress the importance of active participation in the learning process. Participants engage in collective inquiry, building knowledge and insights from their experiences and perspectives.

Appreciative inquiry simply means conversation about what matters. Its implementation involves guided conversation on the change direction represented by well thought affirmative topic. Conversation promotes a collective understanding on what works, imagining possibilities, thinking, and agreeing on actions. The central premise of appreciative inquiry is to inquire into and amplify the positive core of an organization, uncovering its unique strengths, values, and success stories. By engaging stakeholders in a collaborative and affirmative dialog, appreciative inquiry aims to inspire change, cultivate creativity, and co-create a shared vision of a desired future represented by well thought affirmative topic. It is an approach used for SOAR planning [28].

4.2 The analytic hierarchy process: From complex tacit sense of order to tangible structured relative priorities

The analytic hierarchy process (AHP) is a priority measurement theory developed by Saaty that aims to create a model that accurately reflects the complex, tacit knowledge held by its users. AHP facilitates decision-making by breaking down a problem into a hierarchy or network of sub-problems, allowing for a clearer evaluation of each element's importance relative to others. Its fundamental 1–9 scale enables AHP to produce numerical values representing relative priorities on a ratio scale. This advancement addresses the challenges of achieving rational social choice, a concept previously deemed elusive as demonstrated by Kenneth Arrow, who was awarded the Nobel Prize in 1972 for his work in this area. Before the introduction of AHP, the pursuit of a decision theory utilizing a ratio scale was considered largely unattainable.

AHP systematically analyzes complex decisions and encourages discussions among participants, striving for consensus through the synthesis of shared knowledge and judgments. The theory imposes no inherent limitations on its application, allowing

users to determine the level of complexity in their models. To achieve accurate results, it is essential for users to ensure that four foundational axioms of AHP are met throughout the process. Given that tacit knowledge is inherently personal, aligning participants' perceptions and judgments in a group context can be challenging. Fortunately, AHP is robust enough to accommodate this, enabling groups to pursue satisfactory outcomes without requiring complete alignment or homogeneity among members [29, 30].

When utilized by an individual, the modeling process aids in clarifying thoughts, serving as a tool to organize their thinking and potentially highlighting any flaws in their overall perceptions. In a team setting, the creation of an AHP model promotes collaboration and organizational learning. The core process of organization learning is systems thinking, the means for shifting mental models, promoting team learning, improving personal mastery, and building shared vision [31]. Collective decision-making through AHP yields more objective outcomes efficiently by circumventing the communication issues and groupthink dilemmas typical of conventional decision-making processes. Groupthink is a psychological phenomenon in which consensus is reached without critical reasoning or evaluation of alternatives, often driven by a shared desire for harmony and conformity within the group [32]. De Bono, renowned for his contributions to creative thinking and problem-solving, asserts that while language has facilitated human progress, it also poses a significant barrier because it inadequately captures perception [33]. AHP effectively elicits perceptions and judgments that serve as foundational elements of the decision model. However, when the elicitation of judgments reveals incoherence, it is essential for the group to engage in discussions to align their thinking. Using storytelling and guided conversations during appreciative inquiry sessions can enhance the resonance of AHP models among team members, offering a more engaging alternative to traditional brainstorming methods.

AHP's validity rests on the following four axioms applicable to both individual and collective decision-making process [29]:

- **Reciprocity:** This axiom ensures that judgments comparing small elements to larger counterparts follow the same logic as those for larger element to small elements. Reciprocity applies to group judgments as well, necessitating the use of geometric averages for aggregating group judgments.
- **Homogeneity:** This axiom requires to pairwise compare elements within one order of magnitude difference, to ensure validity. Ensuring homogeneity in a group process helps aligning disparate judgments.
- **Hierarchic and systems dependence:** This axiom requires a thoughtful structuring for accurate representation of a problem. An AHP model articulates a priority problem as a hierarchy, showcasing clusters of elements dominated by those directly above them, assuming no dependence between clusters. An ANP model builds on AHP, addressing dependencies within and across elements. While hierarchical modeling simplifies complex problems, network structures are recommended for intricate issues.
- **Expectation:** This axiom suggests that decision-makers intuitive beliefs about alternatives should be adequately represented in the hierarchy by including all relevant elements.

5. Scenario planning with the analytic hierarchy process

Scenario planning with AHP is a unique approach involving forward–backward planning process. The models involve identifying a set of distinct scenarios, representing the composite scenario of the industry. The elements of the set of distinct scenarios are structured in the bottom level of the forward planning model. Their relative priorities are the effect of the collective actions of different industry players. It is the ‘do nothing’ future. The backward planning model has the same set of distinct scenarios located on top of the hierarchy with different relative priorities, representing the wanted future. The bottom level would be strategies that need to be done. The backward planning model represents the strategic plan. Scenario planning with AHP would then be carried out by constructing different future planning models, which may simply need different prioritizing judgments, followed by reviewing the strategies in another backward planning process.

The steps of scenario planning with AHP are as follows [34, 35]:

- Identify the set of distinct elements forming a composite scenario of the industry.
- Identify other actors/players whose actions affecting the future of the industry
- Construct the an AHP forward planning structure, elicit and synthesize judgments to generate the ‘do nothing’ relative priorities of the composite scenario.
- Study the ‘do nothing’ relative priorities of the composite scenario and decide the ones representing the composite scenario to strive for.
- Decide strategic actions to change the future and construct a backward planning model with strategies in the bottom of the hierarchy. Elicit and synthesize judgments to obtain the relative priorities of the strategic action.
- Explore different future scenarios and the strategic actions needed by constructing another sets of forward-backward planning models.

6. Conclusion

In conclusion, navigating the complexities of the VUCA environment demands a fundamental shift in management approaches, moving beyond traditional models toward a more organic, human-centered perspective. This necessitates a ‘Next Management’ paradigm that prioritizes agility, adaptability, innovation, and continuous learning. The Global Peter Drucker Forum’s ongoing discussions, building upon Drucker’s enduring insights, emphasize the crucial role of mindset transformation and the implementation of customer-centric, ethically sound practices. The challenges highlighted by Hamel’s Moonshots initiative as reviewed by Denning underscore the need for a holistic approach to management that prioritizes human values and aspirations above rigid systems. By embracing a positive revolution, organizations can leverage strengths-based strategic planning frameworks like SOAR and anticipative tools like scenario planning, powered by AHP’s forward-backward approach, to effectively navigate uncertainty. The role of leadership is redefined,

requiring CEOs to act as vital links between the organization and its dynamic environment. The advancement of scientific theories, appreciative inquiry and the analytic hierarchy process, enables elicitation and alignment of perceptions, fostering more effective and efficient decision-making and ultimately creating more human-centered, resilient, and successful organizations. This Next Management approach is not just a pragmatic response to the challenges of the VUCA world; it also represents a path toward creating more ethical, engaging, and fulfilling work environments.

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Empirical Studies and Methodological Innovations in Strategic Management Research in “Advances in Strategic Management and Leadership”

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Abstract

The landscape of strategic management research is undergoing a profound transformation, driven by technological innovations and advanced methodological techniques. This study explores the revolutionary approaches reshaping empirical research in strategic management, focusing on novel data sources and cutting-edge analytical methods. The research reveals how these innovations are expanding the boundaries of strategic analysis by examining unconventional data collection technologies such as satellite-based remote sensing, earth observation satellites, nuclear monitoring systems, and artificial intelligence applications. The study critically evaluates emerging methodological frameworks, including causal inference techniques and multilevel longitudinal modelling, which offer more nuanced and comprehensive insights into strategic phenomena. Advanced computational methods, particularly machine learning and AI-driven analytics, are demonstrated to enhance researchers' ability to process complex, unstructured data and uncover previously imperceptible patterns in strategic decision-making. Key technological innovations highlighted include satellite imagery for tracking operational activities, AI-powered pattern recognition, and sophisticated quantitative methods that address traditional research limitations. The research underscores the potential of integrating diverse data sources and computational techniques to generate more robust, real-time strategic intelligence. By bridging technological advancement with methodological rigour, this study provides a comprehensive roadmap for future strategic management research, emphasising the critical role of innovative approaches in understanding contemporary organisational dynamics.

Keywords: strategic management, methodological innovation, satellite remote sensing, artificial intelligence, causal inference, multilevel modelling, big data

1. Introduction

The field of strategic management research has undergone significant transformation in recent years, driven by technological advances and methodological innovations. This chapter examines key developments in empirical approaches and methodological techniques that are reshaping our understanding of strategic phenomena. This transformation has been driven by technological improvements, increased data sources, and the continuous innovation advanced analytical techniques [1].

The strategic management domain is constantly evolving, striving to keep up with the complexity of today's enterprise environment [2, 3]. It focuses on the intricate dynamics that are key to an organisation's growth and sustainability. It is crucial to examine the relevance of various organisations and their industry effectiveness based on the practical impacts of research, teaching, and the decisions that managers make [4]. It emphasises the requirement for empirical investigations than can analyse these intricate influences and provide real-world insights.

Empirical research plays a vital role in strategic management, providing evidence-based insights that guide decision-making and strategic planning. Yet, traditional research methods often fall short when it comes to capturing the subtleties of complex strategic issues [2]. Recently, there has been a growing recognition of the limitations of these conventional approaches, leading to requests for advanced methodologies that enhance research rigour and objectivity.

Regularisation and cross-validation powered by ML algorithms provides objectives and solutions to these challenges. Regularisation helps identify true confounding variables, while cross-validation assesses predictive performance [5]. These advancements improve data analysis and boost the predictive accuracy of strategic models.

The emergence of Big Data and machine learning technology is creating new prospects for the exploration of innovations and strategic phenomena. In strategic management research cycle, big data can be effectively utilised at every stage—whether it is formulation, implementation, or ongoing learning [5]. These innovations enhance the understanding of strategic processes, empowering researchers to produce more reliable insights in real-time or faster pace.

The objective of this study is to indicate how advanced technologies, like satellite-based remote sensing, earth observation satellites, nuclear detection and monitoring systems, AI and ML applications, and advanced quantitative methods, have changed the ways and results of empirical research. This research aims to explore methodological innovations, focusing on their application in strategic management research. It will address key questions on how to integrate diverse data sources and methodologies, substantially contributing to a more nuanced understanding of strategic management practices.

2. Unconventional data sources

2.1 Satellite-based remote sensing

The emergence of novel data sources has expanded the empirical toolkit available to strategy scholars. Satellite imagery data has enabled researchers to track physical assets and operational activities at unprecedented scales [6]. For instance, recent studies have used satellite data to scaleup and measure operations in various industries, including manufacturing plant productivity [7] and assess supply chain

resilience during crises [8]. The proliferation of advanced sensing technologies has dramatically expanded the scope and scale of data collection capabilities through satellite-based remote sensing.

Satellite-based remote sensing refers to the use of satellites to collect data about the earth's surface and atmosphere without physical contact [9]. It has a broader scope, encompassing various applications that focus on collecting data using various sensors, while there is some overlap in applications. Numerous fields, such as agriculture, forestry, and disaster management, utilise this system extensively.

The deployment of satellites and ongoing advancements in extraction methods [10] have rendered satellite remote sensing a viable method of tracking concentrations of various environmental pollutants across specific spectral ranges. The primary source for satellite remote sensing data is the "USGS Earth Explorer," which provides access to a wide variety of satellite and aerial imagery, allowing users to search based on specific criteria and access sequential satellite imagery across different time periods [11]; other notable sources include NASA Worldview, Sentinel Copernicus Browser, and Google Earth Engine for data visualisation and analysis [12–14]. USGS is observed as one of the best platforms for accessing free remote sensing data with a large selection of satellite images and search options based on consumer experience.

Cong et al. [9] conduct the assessment of mission-capable satellites using the one-vote veto voting method. In this approach, if one neural network predicts that the satellite cannot perform the remote sensing mission, that prediction is deemed conclusive, regardless of the predictions from other neural networks that suggest the satellite is capable of fulfilling the mission. The primary focus of the satellite-based remote sensing is the collection of data using various sensors and instruments onboard the satellite [15]. Numerous fields utilise this application, such as land cover classification, crop monitoring, weather forecasting, disaster management, and ecological/environmental monitoring. The satellite-based remote sensing carries various sensors, such as multispectral sensors, hyperspectral sensors, radar sensors, lidar sensors, and thermal sensors.

Empirically, NASA Worldview is an interactive platform to access near real-time satellite imagery from various satellites, including historical data [16]. Sentinel Copernicus Browser provides access to free, high-resolution satellite imagery from the Sentinel-2 program, offering wide global coverage [12, 14]. Google Earth Engine, a cloud-based platform for analysing and visualising satellite imagery, enables users to detect changes and map trends over time [17, 18].

2.2 Earth observation satellites (EOS)

Earth Observation Satellites (EOS) are a type of satellite specifically designed to observe and study the earth's surface, atmosphere, and oceans [19]. The primary focus is on monitoring the earth's physical and biological systems, including climate, weather, oceans, land, and natural resources. This technology is commonly used in various applications, including climate change monitoring, weather forecasting, oceanography, land mapping, and natural resource management data collection [20]. Examples of this technology are Landsat (USA), Sentinel-2 (ESA), MODIS (USA), GOES (USA), and Suomi NPP (USA).

Consequently, Earth Observation Satellites are specifically designed for monitoring the Earth's systems [21]. It focuses on monitoring the earth's physical and biological systems. Earth observation satellites are primarily used for climate change monitoring, weather forecasting, and oceanography and employ various sensors to

collect data across different spectral bands [22]. The Landsat program, operational since 1972, has provided continuous earth observation data, enabling long-term environmental monitoring and change detection [23]. This technology is commonly used in agricultural yield prediction and monitoring, urban development tracking, natural disaster response and damage assessment, climate change impact assessment, forest coverage, and deforestation monitoring.

2.3 Nuclear monitoring technologies

According to the IAEA Report [24], the nuclear industry is adopting artificial intelligence (AI), specifically machine learning (ML) and deep learning techniques, to enhance operational systems and improve its general operational infrastructural framework with the help of advanced computing capabilities and data analysis tools. ML approaches have been particularly valuable in extracting insights from unstructured data sources. Natural language processing techniques have been applied to analyse corporate communications, earnings call transcripts, and social media data to better understand strategic decision-making processes [25].

As the IAEA Member States continue to develop advanced reactor technology, an increasing number of private companies and start-ups are developing new reactor models, attracting both public and private investment [26]. These companies introduce disruptive business models and innovative methodologies, including digital twins, advanced manufacturing techniques, and AI and ML applications, which have the potential to transform the design, licencing, and operation of nuclear systems [27]. AI can improve the integration of computational analyses and experimental data obtained from small-scale experiments or sensors in real-time operations. According to Popescu et al. [28], optimised integration enables computational scientists to create highly accurate physics models and helps experimental scientists reduce the cost and quantity of validation experiments for novel systems. This enables system operators to observe states that are not directly measurable through instrumentation. AI methodologies and tools facilitate physics-based predictive analysis applicable to design, manufacturing, and construction optimisation, as well as operational effectiveness, enhanced reactor design iterations, model-based fault detection, and advanced control systems. Yaacoub et al. [29] attest that artificial intelligence can enhance the nuclear industry by improving reliability, safety, and overall efficiency.

The integration of advanced technologies with established security measures holds the promise of creating a new standard of resilience against a range of threats, both traditional and non-traditional. In recent years, advancements in technology have driven a significant change in surveillance and monitoring capabilities. Artificial Intelligence (AI) and remote sensing technologies have made it possible to analyse large volumes of data in real time, allowing for quick identification of unauthorised access or suspicious activities [30, 31]. Cybersecurity serves as a crucial foundation for nuclear security in today's digital landscape, consistently confronting challenges posed by cyber adversaries aiming to exploit weaknesses in vital systems [32].

Nuclear detection and monitoring systems employ various radiation detector technologies, like scintillation detectors, semiconductor detectors, ionisation chambers, and neutron detectors, to identify possible areas of threat and nonthreat [23, 33]. However, nuclear detection application systems in research and monitoring serve multiple purposes, including environmental radiation monitoring, nuclear safeguards verification, medical physics research, geological surveys, and archaeological dating.

2.4 Artificial intelligence applications

The integration of artificial intelligence (AI) methodologies has revolutionised research. AI-enhanced marketing, competitive intelligence using AI-powered analytics tools, and AI-powered customer analytics to better understand their target market are just a few of the many AI applications that are currently accessible to micro and small businesses [34]. Subramanya et al. [35] state that Machine Learning Operations, a DevOps extension, can help micro and small businesses with the model generation process. Machine learning (ML) is also much more affordable for micro and small businesses. However, every decision micro and small businesses make is important since they often have limited resources, and incorporating data analytics into their plans can be difficult [36].

In business organisations, technological and cultural shifts in data collection are giving rise to new dimensions that have not yet reached their full global potential. Therefore, to thrive in the current market, market research firms with an African foundation must diligently grasp this opportunity. If not, they would have to contend with fierce competition and go out of business. Developing innovative and creative data gathering methods that use data and insights to enhance strategy, efficiency, and results requires critical thinking and creative action [37]. Primary data gathering techniques for accurate and high-quality data will therefore unavoidably change. Social media's popularity and attention have led to an increase in the volume of real-time, detailed data from sources like metadata. AI and contemporary information technology (IT) enable thorough and real-time analysis of this data. AI enables researchers to access these new data sources, accurately assess the dataset, and offer the relevant insight [38].

AI should be integrated into business processes for any organisation, both profit-oriented and non-profit-oriented, as it promotes operational efficiency and reduces administrative and production overhead [39]. It is evident in the current era of data gathering that traditional survey-based approaches and conventional procedures alone are insufficient to achieve quality data collection, analysis, and insight generation [39].

The data revolution, the digital transformation, and the rise of "big data" all are impacting how data is gathered to promote economic security, governance, productivity, competitive advantage, smart decision-making, privacy protection, etc. [40]. The massive rise in processing data has made analytical performance capabilities necessary to enhance decision-making for strategic management research [41]. The primary themes propelling the next availability of analytical power and data harvesting [42].

One of the most important ways to improve businesses is through the automation of repetitive tasks using artificial intelligence (AI) to assess data related to consumers' needs, preferences, and levels of satisfaction [41] among others. In the industrial sector, AI-powered robots might do jobs like welding, painting and assembling, customer service, boosting output and cutting expenses [43].

In general, businesses and brands are using artificial intelligence (AI) progressively to optimise their business operations and remain competitive in the global marketplace. Organisations are gradually implementing various technologies, including predictive modelling for competitive dynamics using deep learning architectures, pattern recognition in large-scale strategic behaviour datasets, and automated content analysis of strategic data management.

Neo et al. [44] demonstrated that transformer models can identify emergent strategic patterns in vast amounts of unstructured business data, while Martinez and Lee [45] developed AI-driven techniques for analysing strategic business positioning. Businesses should leverage AI tools for business solutions to enhance efficiency by integrating smart system solutions like smart technologies and smart data, while adopting data confidentiality in the design and execution of their research projects [46].

2.5 Advanced quantitative methods

2.5.1 Causal inference in strategy research

The integration of causal inference into strategic management research represents a significant advancement in understanding the dynamics of strategy. This approach not only enriches the theoretical frameworks employed in strategic analysis but also facilitates a deeper comprehension of the causative factors influencing managerial decisions [47]. The evolution of strategy research has historically grappled with the challenge of establishing clear causal links, a task that has gained renewed focus with the advent of advanced causal inference techniques [48].

The computer science and artificial intelligence literature has introduced powerful tools for causal inference using observational data [49]. These tools are based on graphic models of causation, which provide a robust framework for analysing complex causal relationships within strategic management [50]. The computing discipline and machine intelligence scholarship offers robust methods for causality deduction utilising empirical information grounded in visual representations of causation. This method employs graphs as mathematical objects, consisting of nodes and edges that denote variables and their causal connections, respectively [51, 52].

The strategic management field has long been characterised by a tension between deterministic approaches and those that allow for managerial agency [53]. As Spender and Kraaijenbrink [48] articulate, strategising implies making agentic choices in some middle ground between unanalysable free will and agency-denying determinism. This highlights the need for frameworks that accommodate managerial discretion while acknowledging the constraints imposed by external factors. Frameworks, rather than theories, offer a better tool for analysing this middle ground, providing a space for agency practice without denying the influence of constraints [48]. The field has witnessed significant advancement in causal inference techniques. Regression discontinuity designs, instrumental variables approaches, and difference-in-differences methods have become increasingly sophisticated in addressing endogeneity concerns to increase the strategy validity and reliability of findings in research [54, 55].

Latest improvements to recommender systems (RS) include causal inference, which makes it easier to understand how causes and effects are connected [56]. This is a more advanced method than previous methods. Causal inference facilitates the modelling of scenarios such as confounding effects and counterfactual evaluations, hence improving the precision and pertinence of suggestions. Causal inference frameworks acknowledge the constraints of correlation-based models, emphasising the fundamental reasons that influence user interactions [56].

Causal inference involves discovering and measuring cause-and-effect correlations derived from the dataset [57]. In contrast to conventional statistical analysis, which typically emphasises relationships, causal inference seeks to elucidate the direct

impact of one or more variables on others. This entails utilising instruments such as counterfactual reasoning and statistical methodologies to ascertain causation. In strategic management research, causal inference addresses an essential “what if”: Brand XYZ in a particular region or location was unavailable over a period of time based on the insight generated from data collected during a primary research study. What would the impact of this insight be on sales, revenue, and customer experience?

2.5.2 Multilevel and longitudinal modelling

Contemporary strategy research has embraced complex modelling approaches to capture nested and temporal phenomena [58]. Hierarchical linear modelling has enabled researchers to simultaneously examine firm, industry, and country-level effects on strategy formation [59]. Multilevel modelling represents a significant advancement in handling nested data structures and addressing the limitations of traditional regression approaches [60–62]. The key strength lies in its ability to simultaneously estimate effects at different hierarchical levels while accounting for the non-independence of observations. Yet, there are methodological considerations to be considered, i.e., model specification challenges; the complexity of model specification remains a significant concern, and researchers often struggle with decisions about random versus fixed effects [63]. To this end, there is the debate about the optimal approach to centring variables at different levels. In the behavioural, social, and medical sciences, longitudinal modelling has become a fundamental methodology that allows researchers to examine patterns of change and stability over time [64, 65]. This analysis examines current methodological approaches, highlights key challenges, and identifies emerging trends in the field. Mixed effects models (also known as multilevel or hierarchical linear models) remain the dominant approach for analysing longitudinal data. They have the ability to handle unbalanced designs with missing data, time-varying covariates, both fixed and random effects, and complex variance-covariance structures [66–68]. These models rely on assumptions about the distribution of random effects and error terms. Recent methodological work has focused on developing robust estimators when these assumptions are violated.

However, researchers have acknowledged the multilevel modelling technique’s statistical and practical limitations. Intensity-like estimation methods can be hard to compute; convergence problems often happen with complex random effects structures, and it gets harder to compare models as they get more complicated. And some violation assumptions are also noted on normality assumptions for random effects, which are often violated in principle; heteroscedasticity at different levels can bias standard errors, while missing data handling remains challenging, particularly with non-random missing variables [63].

3. Methods

The research design for this study is anchored in an analytical exploration of methodological innovations, focusing on a comparative analysis of empirical studies that employ novel methods. This approach allows for the assessment of how these innovations influence the robustness and comprehensiveness of research intelligence and outcomes. The study aims to shed light on the methodological advancements reshaping strategic management research. A thorough review of scholarly articles,

case studies, and empirical research was used to gather data through secondary sources. Key findings from relevant sources in the field of strategic management were then put together. This approach ensures a comprehensive understanding of current trends and patterns in methodological applications. For instance, the integration of machine learning techniques with social media data has been highlighted as a significant advancement [69]. A machine learning (LLM) approach to measuring CEO narcissism using Twitter data outperforms a dictionary-based approach [70]. This new approach shows how unstructured data from digital technologies can be used to learn about the traits and behaviours of business executives, which are important for understanding how organisations implement their operations [71]. In analysing the collected data, thematic analysis was utilised to identify trends and patterns in methodological applications. This analysis was cross-referenced against existing literatures to validate findings, ensuring the reliability and accuracy of the study's conclusions.

3.1 Novel data sources in strategic management research

The subject of empirical foundation has evolved from basic cross-sectional analyses to complex longitudinal investigations that integrate various levels of analysis [72]. Initial research studies predominantly relied heavily on case studies and fundamental statistical concepts, while contemporary approaches leverage advanced computational methods and diverse data sources [73, 74].

Recently, the research domain have witnessed a shift from traditional positivist approaches toward more nuanced methodological frameworks [75]. Mixed-method research designs have gained prominence *by* combining both quantitative rigour with qualitative insights [75]. This integration has enabled researchers to address complex strategic phenomena more comprehensively. Businesses and researchers increasingly leverage digital platforms and social media to collect strategic management data [76, 77] to make decisive business decisions. These sources provide real-time competitive intelligence, consumer sentiment analysis, strategic movement tracking, and network relationship mapping.

The advent of big data has revolutionised strategic management research. According to Gill et al. [78], researchers now employ sophisticated algorithms to analyse vast datasets, uncovering patterns and relationships previously undetectable [77] through machine learning techniques for qualitative pattern recognition in strategic decision-making, quantitative predictive modelling of competitive dynamics, and text analysis of corporate communications.

4. Results

This research's findings are grounded in empirical evidence that delineates the elements facilitating the utilisation and acceptance of the e-learning system, while also corroborating previous researchers' insights and analyses regarding the issues confronting the existing e-learning system.

Unconventional data sources continue to evolve, providing increasingly sophisticated tools for research, monitoring, and analysis. The integration of these technologies with advanced processing methods presents new opportunities for scientific discovery and application. Particularly, it emphasises satellite-based remote sensing and nuclear detection systems. These technologies have revolutionised our ability to

collect data in previously inaccessible contexts, enabling new approaches to environmental monitoring, security applications, and scientific research.

This chapter sets the stage for a comprehensive exploration of novel data sources, including satellite-based remote sensing, Earth Observation Satellites (EOS), Nuclear Monitoring Technologies, AI applications, and advanced quantitative techniques (causal inference and multilevel and longitudinal modelling) approaches. Outlining the academic context, highlighting research significance, and establishing the scope of the study, this research provides a foundation for the subsequent analysis. The integration of advanced causal tools promises to enhance the strategic management discipline, offering innovative ways to understand and influence strategic outcomes.

The methodologies articulated in this chapter underscore the significance of leveraging novel data sources, advanced quantitative methods, and innovative qualitative approaches in strategic management research. By integrating these methods, researchers can generate more robust and comprehensive insights into complex strategic phenomena, ultimately contributing to a deeper understanding and more effective strategic decision-making.

While multilevel and longitudinal modelling has significantly advanced, substantial challenges remain. Future developments should focus on practical tools that balance statistical rigour with their real-world applicability. The integration of traditional statistical approaches with modern computational methods offers promising directions for addressing current limitations.

5. Ethical considerations

This chapter delineates the methodologies employed in the exploration of empirical research and methodological innovations within the domain of strategic management. The research design, data collection strategies, analytical approaches, and ethical considerations are carefully articulated to guide the comprehensive examination of complex strategic phenomena.

Adhering to strict ethical standards is a cornerstone of this research. Ensuring the integrity and accuracy of data interpretation is paramount, and measures are in place to maintain the credibility of sources and neutrality in data analysis. The ethical framework guiding this research ensures that all findings and conclusions are derived from unbiased data and interpretations, reinforcing the study's validity and reliability.

Therefore, ethical considerations play a crucial role in this research, ensuring strict adherence to proper citation and acknowledgement of original authors [79]. Maintaining objectivity and neutrality is crucial to uphold the integrity of the study. This ethical framework ensures that the research respects the intellectual property of others and contributes to the academic discourse in a responsible manner.

6. Future directions and implications

The convergence of novel data sources, advanced quantitative methods, and innovative approaches presents exciting opportunities for strategic management research. Several promising methodological developments are shaping the future of strategic management research [80]. Thus, future studies might benefit from:

- Artificial intelligence applications by integrating traditional statistical approaches with machine learning techniques
- Quantum computing potential
- Web scraping techniques
- Tools for model diagnostics and sensitivity analysis
- Improved software implementations for complex models

7. Conclusion

This research examines the significant transformation in strategic management research methodology, emphasising the integration of novel data sources and advanced analytical techniques. The study explores four primary technological innovations that are reshaping the field. The paper discusses how nuclear monitoring technologies have evolved through the integration of AI and machine learning, employing various radiation detector technologies for threat detection while emphasising cybersecurity integration and real-time data analysis.

Satellite-based remote sensing has emerged as a powerful tool for tracking physical assets and operational activities at unprecedented scales. Through platforms like USGS Earth Explorer, NASA Worldview, and Google Earth Engine, researchers can now conduct comprehensive analyses spanning land cover classification, crop monitoring, and disaster management.

Earth Observation Satellites (EOS) represent another crucial advancement, specifically designed for monitoring Earth's physical and biological systems. Systems like Landsat, Sentinel-2, and MODIS have proven instrumental in climate change monitoring, weather forecasting, and oceanographic studies.

Consequently, artificial intelligence applications have revolutionised research methodologies through enhanced marketing and analytics capabilities, enabling automated content analysis and pattern recognition while improving operational efficiency and reducing administrative overhead. In terms of quantitative methods, the research highlights two significant approaches. Causal inference employs graphical models of causation and addresses endogeneity concerns through regression discontinuity designs and instrumental variables, enabling deeper understanding of direct impact variables. Multilevel and longitudinal modelling captures nested and temporal phenomena, though it faces challenges in model specification and variable centering.

Looking forward, the research identifies several promising directions, including the integration of Bayesian approaches, development of cross-classification methods, machine learning integration, and quantum computing potential. Throughout the study, ethical considerations remain paramount, with emphasis placed on maintaining objectivity and proper citation practices.

The paper concludes that these methodological innovations and novel data sources enable more robust and comprehensive insights into strategic phenomena, ultimately enhancing strategic decision-making capabilities. This research makes a valuable contribution to the field by providing a comprehensive overview of how technological advancements are reshaping strategic management research, while acknowledging both the challenges and opportunities these developments present.

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Section 2

Contemporary Leadership

From Sustainability Strategic Decision to Its Implementation: CEO Responsibilities, Constraints, and Solutions

Anne-Flore Maman Larraufie and Marc Poulain

Abstract

In an era where sustainability has emerged as both a necessity and a competitive advantage, the role of the Chief Executive Officer (CEO) is pivotal in integrating sustainability into corporate strategy. However, the transition from strategic decision-making to practical implementation is fraught with challenges. This chapter examines the multifaceted responsibilities of CEOs in promoting sustainability, the constraints they face, and actionable solutions to bridge the gap between vision and execution. Through a synthesis of existing literature and insights from empirical studies—including a field survey and interviews conducted with CEOs—this chapter provides a comprehensive roadmap for CEOs to effectively embed sustainability within their organizations, contributing to academic discourse and practical applications.

Keywords: sustainability, CEO responsibilities, corporate strategy, implementation, constraints, solutions, sustainability integration

1. Introduction

Sustainability has evolved into a critical priority for corporations globally, reflecting an urgent need to address environmental, social, and economic challenges. It is no longer merely a peripheral concern but a central component of strategic decision-making. The growing awareness among stakeholders—from governments and investors to employees and consumers—has intensified the call for organizations to adopt sustainability-oriented practices. As highlighted by Porter and Kramer [1], embedding sustainability into business operations is not only a mechanism for mitigating risks but also a powerful driver of innovation and competitive advantage.

At the forefront of this transformation are Chief Executive Officers (CEOs), who bear the dual responsibility of steering their organizations toward sustainability goals while balancing immediate operational priorities. The role of CEOs has expanded to encompass not only economic stewardship but also environmental and social

leadership. This duality is deeply challenging, as CEOs must reconcile pressures from multiple stakeholders while ensuring profitability and long-term viability.

The theoretical foundations of sustainability, including concepts like the triple bottom line [2] and stakeholder theory [3], provide a robust framework for understanding the implications of corporate responsibility. These theories emphasize that organizations thrive when they create value across economic, environmental, and social dimensions, aligning their interests with those of broader society. CEOs must translate these theoretical principles into actionable strategies, navigating the complexities of implementation within diverse and dynamic organizational contexts.

However, the journey from strategic intent to operational reality is fraught with challenges. CEOs encounter significant barriers, including resource constraints, regulatory hurdles, and cultural resistance within their organizations. This chapter aims to illuminate these challenges while providing actionable insights for overcoming them. By leveraging empirical data collected from a field survey and interviews with 20 CEOs across various industries, the analysis presents a nuanced understanding of the CEO's role in driving sustainability.

The introduction sets the stage for an in depth exploration of the CEO's responsibilities, the barriers they face, and the innovative solutions they employ. Drawing from the findings of this study and the broader literature, this chapter contributes to the discourse on sustainability leadership by offering practical strategies for CEOs to embed sustainability into their organizational DNA. Ultimately, it underscores the transformative potential of sustainability as a strategic priority, not only for corporations but for society at large.

2. Methodology

This study employed a mixed-methods approach to explore the perceptions, responsibilities, and constraints faced by CEOs in implementing sustainability. Combining qualitative and quantitative methodologies allowed for a comprehensive analysis of both the broad patterns and nuanced insights that characterize leadership in sustainability.

2.1 Research design

The research design incorporated two primary components: a structured survey distributed to CEOs across various industries and semi-structured interviews conducted with a representative subset of these participants. The dual-method approach facilitated triangulation of findings, enhancing the reliability and validity of the results.

2.2 Sample and participant selection

The sample consisted of 20 CEOs drawn from diverse sectors, including luxury, insurance, technology, and retail. Participants were selected through purposive sampling to ensure representation across different organizational sizes, geographic regions, and market focuses. The demographic profile of the respondents included 16 male and 4 female CEOs, with ages ranging from 35 to 60 years and professional experience spanning 8–30 years. This diversity ensured that the study captured a broad spectrum of perspectives and experiences. Appendix A summarizes sample data.

2.3 Data collection and analysis methods

- **Survey:** A structured questionnaire was developed to gather quantitative data on key themes, including organizational sustainability priorities, perceived barriers, and leadership strategies. The survey comprised 15 questions, with a mix of open-ended and closed-ended formats to balance depth and statistical analyzability.
- **Interview:** Semi-structured interviews were conducted with 10 CEOs, providing qualitative insights into their lived experiences and decision-making processes. These interviews lasted between 30 and 60 minutes and were conducted *via* video conferencing. The interview protocol included open-ended questions designed to probe participants' strategies, challenges, and reflections on sustainability leadership.
- **Quantitative data from the survey** was analyzed using descriptive statistics to identify trends and patterns. Responses were categorized based on variables such as industry, organizational size, and geographic region. For example, 70% of respondents indicated that regulatory compliance was a significant driver of their sustainability initiatives, while 50% highlighted consumer demand as a key motivator.
- **Qualitative data from the interviews** were analyzed thematically using NVivo software. Key themes were identified through iterative coding, and verbatim quotes were extracted to illustrate participants' perspectives. For instance, terms like "innovation," "resistance," and "accountability" frequently emerged, reflecting the multidimensional challenges faced by CEOs.

2.4 Ethical considerations

The study adhered to ethical research standards, including informed consent, confidentiality, and voluntary participation. Participants were provided with detailed information about the study's objectives and methods and were assured that their identities would remain anonymous.

2.5 Limitations

While the study provides valuable insights, several limitations should be acknowledged. First, the sample size, though diverse, is relatively small, limiting the generalizability of findings. Second, reliance on self-reported data introduces the possibility of response bias. Future research could address these limitations by incorporating larger samples and longitudinal designs to capture evolving trends in sustainability leadership.

By employing this rigorous methodological framework, the study offers a robust foundation for understanding the complex dynamics of CEO leadership in sustainability.

3. The CEO's role in sustainability

CEOs play a pivotal role in embedding sustainability within their organizations. Their responsibilities transcend the development of strategic objectives, extending

into operational integration and cultural leadership. This section explores these key dimensions through insights from empirical studies and interviews.

3.1 Strategic vision and global alignment

At the heart of a CEO's role lies the ability to craft a strategic vision that integrates Environmental, Social, and Governance (ESG) priorities into the organization's broader goals. This vision not only aligns the company with global frameworks such as the United Nations Sustainable Development Goals (SDGs) [4] but also fosters innovation and stakeholder trust. One CEO interviewed emphasized, *"The SDGs are not just a checklist; they are a north star guiding our investments and partnerships."*

Another CEO in the luxury sector highlighted the competitive advantage gained through alignment with these frameworks: *"Our commitment to SDGs has positioned us as a leader in responsible luxury, attracting customers who value both exclusivity and ethical practices."*

This vision is operationalized through stakeholder engagement, ensuring that the often-competing interests of shareholders, employees, customers, and regulators are balanced. CEOs must navigate these dynamics while remaining adaptable to market trends and societal expectations.

3.2 Operational integration: From strategy to execution

Operationalizing a sustainability strategy requires robust systems and metrics to track progress and ensure accountability. CEOs increasingly leverage cutting-edge technologies such as artificial intelligence, blockchain, and data analytics to enhance transparency and decision-making.

A technology sector CEO explained, *"Real-time data analytics allow us to adapt quickly and measure our impact precisely. It's the backbone of our sustainability strategy."* Similarly, a CEO in the manufacturing industry noted, *"Blockchain has revolutionized our supply chain management, ensuring traceability and minimizing waste."*

Key Performance Indicators (KPIs) tailored to sustainability goals play a critical role. For example, some organizations track reductions in carbon emissions or improvements in supply chain efficiency as part of their ESG reporting. The implementation of these tools often requires significant investment in training and infrastructure, a challenge that CEOs must address proactively.

3.3 Leadership and cultural transformation

Beyond operational oversight, CEOs must act as cultural ambassadors for sustainability within their organizations. This involves fostering a corporate ethos that prioritizes long-term value creation over short-term gains.

An insurance executive shared: *"We launched a sustainability education campaign across all departments, emphasizing that this isn't a trend but a core value."* Similarly, a retail CEO described symbolic leadership initiatives: *"When our CEO committed to using only recycled materials for product packaging, it inspired confidence across the company."*

Internal resistance often poses challenges to cultural shifts. CEOs must employ effective change management strategies, such as involving employees in sustainability initiatives and recognizing their contributions. As one interviewee noted, *"Inclusion is the key to cultural transformation. When employees see their ideas being implemented, it creates a ripple effect of commitment."*

3.4 CEOs as innovators and collaborators

Innovation and collaboration are crucial for advancing sustainability goals. CEOs play a dual role as innovators within their industries and collaborators across sectors. Partnerships with NGOs, government agencies, and industry peers amplify their impact. One CEO described a successful collaboration: *“By partnering with a global NGO, we not only reduced our environmental footprint but also cut costs by 20% through innovative packaging solutions.”*

Another recurring theme was the importance of incentivizing leadership. Several organizations have tied executive bonuses to ESG performance, fostering a culture of accountability. *“We introduced sustainability metrics into our performance reviews,”* shared one CEO, *“and the results have been transformative.”*

4. Constraints in implementing sustainability

While the benefits of sustainability are well-documented, the path to its implementation is fraught with significant challenges. CEOs must navigate complex landscapes of resource limitations, regulatory complexities, organizational resistance, and market uncertainties. These constraints often threaten to derail even the most ambitious sustainability agendas. Drawing from the insights of CEOs and empirical data, this section explores these obstacles in depth.

4.1 Resource limitations: Financial and human capital

One of the most prominent barriers identified by CEOs is the significant financial and human capital required for sustainability initiatives. A retail sector CEO remarked, *“Building a sustainable supply chain isn’t a one-time expense; it’s an ongoing investment that evolves as supplier expectations and global standards change.”*

Financial constraints are further compounded by the long-term nature of sustainability benefits. While programs may yield cost savings or market advantages over time, initial investments in new technologies, employee training, and infrastructure upgrades can strain company budgets. Bansal and DesJardine [5] argue that reframing these expenditures as strategic investments rather than operational costs is essential for overcoming financial resistance.

Human capital limitations also present challenges. Organizations often lack the in-house expertise needed to design and implement effective sustainability programs. This leads to a reliance on external consultants or training programs, which can further escalate costs.

4.2 Regulatory complexities: A moving target

The dynamic nature of sustainability regulations across different jurisdictions creates a complex compliance environment for multinational corporations. CEOs must contend with overlapping and sometimes contradictory regulations, particularly in industries with global supply chains. As one technology sector leader shared, *“Every region we operate in has its own set of rules, from emissions caps to labor practices. It’s like trying to solve a jigsaw puzzle with missing pieces.”*

The Paris Agreement [6] exemplifies the global push for carbon reduction, but its lack of enforcement mechanisms and uniform standards leaves much room for

interpretation. This regulatory ambiguity often forces companies to adopt overly cautious or inconsistent approaches, stalling progress.

4.3 Market uncertainties and consumer expectations

Fluctuating consumer demand for sustainable products introduces another layer of complexity. While surveys suggest growing consumer interest in sustainability, actual purchasing behavior often lags behind these intentions. A CEO in the food and beverage industry noted, *“Consumers say they want sustainable options, but they aren’t always willing to pay a premium. This creates a disconnect between our investments and our returns.”*

Additionally, market disruptions such as the COVID-19 pandemic have exposed vulnerabilities in global supply chains, further complicating efforts to achieve sustainability goals. Deloitte [7] highlighted the increased costs of raw materials and logistical challenges as significant hurdles during this period.

4.4 Organizational resistance: The human factor

Resistance to change within organizations remains a critical obstacle. Employees and middle managers often perceive sustainability initiatives as additional burdens that do not align with their immediate objectives. A CEO from the energy sector explained, *“When we introduced our sustainability program, we faced skepticism from employees who felt it would disrupt existing workflows without delivering clear benefits.”*

Change management strategies, such as clear communication of sustainability’s business value and employee involvement in program design, can mitigate these challenges. Kotter [8] emphasizes the need for leaders to create a sense of urgency around sustainability to overcome inertia.

4.4.1 Root causes of resistance

1. *Cultural inertia*: Organizational cultures deeply rooted in traditional practices often struggle to adopt the forward-thinking approaches required for sustainability. Employees may fear change, viewing it as a threat to established norms.
2. *Misalignment of priorities*: Sustainability objectives often compete with short-term financial or operational goals, leading to resistance among teams focused on immediate deliverables.
3. *Lack of awareness and training*: Employees may lack a clear understanding of sustainability’s importance and how it aligns with broader organizational objectives. This knowledge gap exacerbates resistance.
4. *Unclear benefits*: Without visible or quantifiable benefits, employees may view sustainability efforts as vague or unnecessary, reducing their willingness to engage.

4.4.2 Mitigating organizational resistance

Effective change management strategies are essential to overcoming resistance and fostering a culture of sustainability. Drawing from John Kotter’s eight-step change model, the following approaches are particularly relevant:

1. *Creating a sense of urgency*: Leaders must communicate the pressing need for sustainability, emphasizing the risks of inaction. Highlighting tangible examples—such as customer expectations, regulatory pressures, or competitive advantages—can motivate employees to see sustainability as a priority.
2. *Involving employees in program design*: Engaging employees in designing sustainability initiatives ensures that their perspectives are considered, fostering a sense of ownership and reducing resistance.
3. *Clear communication of value*: Demonstrating the business value of sustainability is critical. For example, linking sustainability efforts to cost savings, market differentiation, or employee well-being can help align initiatives with individual and organizational goals.
4. *Empowering change agents*: Identifying and training key influencers within the organization can help drive adoption. These individuals can champion sustainability, demonstrating its relevance and benefits to their peers.
5. *Providing training and resources*: Addressing the knowledge gap through targeted training programs equips employees with the skills and understanding needed to implement sustainability effectively.

4.4.3 Leadership's role in overcoming resistance

The CEO's role as a change leader is paramount in addressing resistance. Symbolic actions, such as personal commitments to sustainability, can inspire confidence and set a positive example. Additionally, fostering transparency and regularly sharing progress can reinforce the importance of sustainability initiatives.

By addressing resistance through thoughtful strategies and inclusive leadership, organizations can transform sustainability from a perceived burden into a shared value, paving the way for long-term success.

4.5 Data deficiencies: Navigating in the dark

Accurate and comprehensive data are crucial for setting goals, measuring progress, and ensuring accountability in sustainability efforts. Yet, many organizations lack the systems and expertise required to collect and analyze this data effectively. A luxury sector CEO summarized, “*Without reliable data, we are making decisions in the dark, and that's a risk no CEO wants to take.*”

This challenge is particularly acute in industries with complex global supply chains. While direct suppliers often provide some level of transparency, second- and third-tier suppliers frequently operate beyond the visibility of the primary organization. This opacity makes it difficult to assess and address environmental or social risks within the supply chain. For example, a CEO from the manufacturing sector emphasized that “Understanding the environmental footprint of secondary suppliers remains one of the biggest challenges to achieving our sustainability goals.”

Even in cases where organizations have the intent and infrastructure to gather data, they face fragmented systems that lack integration across departments or regions. Many legacy systems are not designed to handle the real-time demands of sustainability tracking, creating delays in data consolidation and analysis. Moreover,

the absence of in-house expertise compounds the problem. As one CEO observed, “We rely heavily on consultants for analyzing sustainability metrics, but this comes with a steep learning curve and significant costs.”

The deployment of advanced technologies such as blockchain and artificial intelligence offers a potential solution to many of these data challenges. Blockchain can provide an immutable ledger of transactions, making it easier to track and trace supply chain activities. Meanwhile, AI can analyze complex datasets to identify inefficiencies or predict future risks. A technology sector CEO explained, “AI has been transformative for us, enabling predictive analytics that inform our sustainability strategies in real time.” However, the adoption of these tools is not universal. Their high costs and technical requirements often place them out of reach for smaller organizations or those operating in resource-constrained environments.

To address these issues, organizations must adopt a phased approach to building their data capabilities. Investing incrementally in technologies that offer immediate value can pave the way for broader adoption over time. For instance, starting with basic data collection systems allows companies to identify gaps and prioritize investments in advanced tools such as AI or blockchain. Similarly, fostering collaborative data-sharing networks within industries can reduce individual costs while improving sector-wide transparency.

Leadership plays a pivotal role in overcoming data deficiencies. CEOs must not only advocate for the importance of robust data systems but also allocate resources to develop in-house expertise. Transparent communication about the strategic value of sustainability data can help build organizational buy-in, ensuring that data collection and analysis become integral parts of the company’s operations. As a luxury industry CEO remarked, “Data is not just a tool for accountability; it’s our compass for innovation and progress.”

By addressing these challenges head-on, organizations can transform data deficiencies into an opportunity for growth and leadership in sustainability. Proactively closing the data gap will not only enable better decision-making but also reinforce the organization’s commitment to transparency and long-term value creation.

4.6 Sector-specific barriers

Certain industries face unique constraints in implementing sustainability. For example, the luxury sector must balance sustainability with the perception of exclusivity and quality. A CEO in this field shared, *“Our customers expect nothing but the best, both in terms of product quality and ethical practices. Meeting these dual expectations without compromising on either is a tightrope act.”*

Conversely, the technology industry grapples with e-waste management and the sourcing of rare earth materials. Apple’s [9] commitment to achieving a closed-loop supply chain illustrates how companies in this sector are addressing these challenges, but such initiatives require significant innovation and investment.

5. Conclusion: Bridging vision and practice in sustainability leadership

This chapter has explored the multifaceted role of CEOs in embedding sustainability into corporate strategy, the constraints they face, and the innovative solutions they implement. By integrating insights from empirical studies, theoretical frameworks, and interviews with industry leaders, the analysis underscores the pivotal role of CEOs in driving sustainability.

At the strategic level, CEOs are tasked with crafting long-term visions that align with global frameworks such as the SDGs while addressing the unique demands of their industries. This vision must be operationalized through robust tools, technologies, and KPIs to ensure accountability and measurable progress. However, the road to implementation is fraught with challenges, including financial constraints, regulatory complexities, and internal resistance.

The chapter highlights how CEOs navigate these barriers by leveraging their leadership to foster cultural transformation and by investing in innovative technologies. For instance, blockchain and AI have been instrumental in enhancing supply chain transparency and improving resource efficiency. Additionally, the role of collaboration—whether through public-private partnerships or stakeholder engagement—emerged as a recurring theme in achieving sustainability goals.

Empirical findings revealed that while CEOs face considerable obstacles, their ability to act as visionaries and change agents is crucial for embedding sustainability into the DNA of their organizations. As one CEO aptly stated, “*Sustainability is no longer an option—it is the foundation for long-term success.*”

The title of this chapter—“From Sustainability Strategic Decision to its Implementation: Which Responsibilities, Constraints, and Solutions for the CEO?”—frames the discussion around three core areas:

Responsibilities: CEOs are responsible for setting the strategic direction, integrating ESG priorities, and ensuring that sustainability is a core value across all organizational levels. They must act as champions of ethical practices, innovators in their industries, and collaborators in global efforts to address pressing challenges.

Constraints: The barriers to sustainability implementation are both internal and external. Internally, resistance to change, resource limitations, and data deficiencies often hinder progress. Externally, regulatory ambiguity and market uncertainties create additional complexities.

Solutions: Successful CEOs overcome these constraints by fostering a culture of accountability, leveraging advanced technologies, and aligning sustainability goals with business incentives. Their ability to build coalitions and invest in long-term strategies ensures that sustainability is not only implemented but sustained.

While this chapter provides a comprehensive roadmap for CEOs navigating the sustainability journey, several areas warrant further exploration:

Integration of emerging technologies: The role of technologies such as AI, IoT, and blockchain in sustainability is still evolving. Future research should focus on how these innovations can be scaled to benefit smaller organizations and less resource-rich industries.

Cross-sector collaboration: Public-private partnerships and industry alliances have proven effective, but there is a need for more inclusive models that involve civil society and local communities. CEOs should lead efforts to democratize sustainability solutions.

Longitudinal impact assessment: Organizations must move beyond immediate results to assess the long-term impacts of their sustainability strategies. Developing standardized metrics and frameworks will be crucial in this endeavor.

Leadership development: CEOs cannot drive sustainability alone. Investing in the next generation of leaders who are well-versed in ESG principles will ensure continuity and innovation in sustainability efforts.

As stewards of organizational vision and strategy, CEOs hold the key to bridging the gap between sustainability as a strategic decision and its tangible implementation. Their ability to navigate constraints, foster collaboration, and drive innovation is central to this mission. While the challenges are significant, so too are the opportunities. By embedding sustainability into the fabric of their organizations, CEOs not only

secure their company’s future but also contribute to a global movement toward a more equitable and sustainable world.

As one CEO concluded, “*True leadership in sustainability is not about avoiding risks but about creating opportunities—for people, the planet, and profit.*”

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Appendix

See **Table A1**.

ID	Gender	Age range	Professional experience (years)	Company scope	Industry	Role
1	Male	35–60 years	8	National	Luxury	CEO
2	Male	35–60 years	10	National	Insurance	CEO
3	Male	35–60 years	12	National	Technology	CEO
4	Male	35–60 years	15	National	Retail	CEO
5	Male	35–60 years	18	National	Health	CEO
6	Male	35–60 years	20	National	Coaching	CEO
7	Male	35–60 years	22	National	Urban mobility	CEO
8	Male	35–60 years	25	National	Audiovisual production	CEO
9	Male	35–60 years	28	National	Sports	CEO
10	Male	35–60 years	30	National	Music	CEO
11	Male	35–60 years	8	International	Luxury	CEO
12	Male	35–60 years	10	International	Insurance	CEO
13	Male	35–60 years	12	International	Technology	CEO
14	Male	35–60 years	15	International	Retail	CEO
15	Male	35–60 years	18	International	Health	CEO
16	Male	35–60 years	20	International	Coaching	CEO
17	Female	35–60 years	22	International	Urban mobility	Board Director
18	Female	35–60 years	25	International	Audiovisual production	Business Unit Head
19	Female	35–60 years	28	International	Sports	Board Director
20	Female	35–60 years	30	International	Music	Business Unit Head

Table A1.
Sample data.

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Big-Five Personality Traits of Manufacturing Managers Engaged in Mass Customization

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Abstract

In literature, mass customization is achieved through job shop (supported by MRP-2), flexible manufacturing system (FMS) and modularization. Job of organization leaders (in mass customized firms) is to integrate the demands of the marketing department (high product variety, short lead times and excellent delivery performance) and the manufacturing department (seeking longer production runs and more accurate demand forecasts). We argue that leaders of mass customization firms need to be high on extraversion (to keep everyone on the same page: not supported), low on agreeableness (so that the organization does not make a blunder: supported but not statistically significant), high on openness to experience (to try out newer things and innovate: not supported), high on conscientiousness (more systematic to reduce chaos: supported), low on neuroticism (greater emotional stability under stressful conditions: supported), high on perception and low on judgmental (MBTI type personality) so that one takes a good look at different alternatives available (supported). We argue also that leaders of MC firms are thinkers (supported) and need to be more intuitive (Jungian personality type) to handle higher complexity and dynamism (not supported). We discussed reasons why some hypotheses were not supported.

Keywords: personality, Myers-Briggs Type Indicator, BiG-Five factor of personality, mass customization, production and marketing

1. Introduction

Manufacturing is one of the most important economic activities because it involves value addition, which has positive multiplier effects on other areas of the economy. Additionally significant is the fact that it possesses a high employment elasticity of output, which is an element that is indispensable to the process of generating employment opportunities. Therefore, it is not surprising that India's government would emphasize manufacturing, given that the country has the fifth largest manufacturing base in the world [1, 2].

1.1 Organization strategy

Miles et al. [3] typology comprising defenders and prospectors has been used. *Prospector* organizations are more amenable to change and adapt relatively quickly to the dynamic external environment. *Defender* organizations have a bias for stability and focus primarily on cost optimization and streamlining of business processes. The human relations model is more applicable in prospector companies than defender companies. Prospector organizations have a marketing orientation with a focus on new product development. Human relations has emphasized making the worker feel important and valued by the manager. Prospectors give equal emphasis on all types of information: hard or soft [4–6]. Miles et al. [3] argued that prospector firms offered very high product variety and defender firms resorted to mass production while trying to keep costs down to rock bottom.

1.2 Mass customization

Increasing the variety of a company's product portfolio at a low cost and with more speed, flexibility, and responsiveness can be accomplished through a process known as mass customization. This process is used by businesses to employ technology and managerial techniques. The MC strategy makes it possible to achieve the efficiencies of mass production by distributing the demand for a product across a limited number of levels or options while also making it possible to achieve a high level of customization through the use of modular product design. According to research conducted by Kotha [7], an optimal combination of mass customization and mass production strategies would perform better than either individually in an environment characterized by a dynamic market subject to rapid change.

Mass customization is one approach to tailoring a product or offering to the specific requirements of an individual customer without unduly driving up the price of the good or service. A business can meet the specific requirements of individual clients in a manner that does not compromise quality standards or result in an increase in the selling price of the product. Many businesses have successfully incorporated mass customization strategies into their production and operational procedures. Companies such as Lutron Electronics [8], Motorola Pager ([7]; Krueger and Hergeth), Levi Strauss Jeans, National Bicycle Industrial Company, and Dell Computer are some well-known examples of businesses that implemented mass customization in its early stages after its introduction [9]. If we look back at the research, we can see that Levitt [10], in the seminal article titled "Marketing Myopia," also argued that even "growth" sectors of the industry are also vulnerable to decay if there is an over-reliance on simply mass production and unit economics to remain competitive in the market. This can be seen if we look back in the literature.

The high product variety is supported by material requirement planning (MRP-1 and MRP-2), which is implemented over a job shop [11] and decision problems are lot sizing, scheduling, lead time of introduction, and capacity planning (how much in-house and how much outsourced). Another approach to mass customization is to deploy flexible manufacturing systems (FMS) over automated computer numerically controlled (CNC) machines and setup time is nearly zero with the use of advanced jigs and fixture technology. Decision problems are aggregate planning, machine grouping (to facilitate cellular manufacturing and reduce attendant chaos), machine loading, and scheduling (between machines and scheduling of jobs over a "railway" link that connects different machines). Both environments are fairly complex, with

more white-collar jobs in FMS. If the lot size is small in MRP, then it leads to excessive setups (and loss of productive time, and costs go up), whereas FMS is already very expensive due to very high overheads [12].

Leaders and manufacturing managers or MC firm leader, have a complex and dynamic job as they deal with absenteeism, militant labor, revision in marketing forecasts, machine breakdown, rejects, rework, low-fidelity data (this is mitigated to a great extent by the use of in-house radio frequency identification (RFID) in MRP- and FMS-based systems), suppliers, and TQM/Quality issues. These effects are more pronounced in prospectors (as they deal with higher environmental uncertainty that percolates into the organization).

1.3 Personality

Here we primarily deal with the BiG-five factors of personality and Jungian personality types and perceptive-judgmental personality types of Myers-Briggs Type Indicator (MBTI) categorization.

2. Conceptual framework

Studies have shown a positive relationship between the extraverted trait of a person's personality and their sociability and propensity to talk to strangers. According to McCrae and John [13], extroverted people have a wide range of sociable traits. The Oxford English Dictionary defines gregarious as someone who enjoys the company of others. According to Hogan [14], being sociable is a part of being extraverted. Straightforwardness is a personality trait that facilitates engaging in conversation. Thus, the present study concludes that frankness is associated favorably with extroversion. Extraversion is necessary so that one communicates complexities to one and all and sees that all persons are mostly on the same page.

A low level of agreeableness tends to avoid blunders being committed, and extensive damage to the organization is avoided. High openness to experience is necessary so that innovations can be tried for the betterment of MC organizations. Careful planning is a must in highly complex MC firms. MC leaders need to be emotionally strong in the wake of high complexity, uncertainty, and dynamism.

The Myers-Briggs Type Indicator [15] is a complex instrument for assessing one's character. In general, perceptive people are more thorough in their research before making any choice. At the most extreme, they can become paralyzed by indecision. On the other hand, people with a judgment bias tend to form opinions quickly and rely on scant information. The Myers-Briggs Type Indicator includes this section (MBTI). Mass customization leadership should be both transformative (providing individualized attention to employees) and reflective (they frequently evaluate themselves). It is hypothesized that leaders in the mass customization movement will need to be relatively neurotically stable.

Mass customization company decision-makers are argued to be more perceptive than average because of the complexity and variety of the information they process daily.

The following hypotheses are proposed in light of MC firms and the personality of their leaders in the framework of, the BiG Five factor theory and the perceptive/judgmental personality type of the MBTI. Hypothesis H₁: Mass customization (MC) firm leaders have a high level of extraversion. Hypothesis H₂: Mass customization (MC)

firm leaders have a low level of agreeableness. Hypothesis H₃: Mass customization (MC) firm leaders have a high level of openness to experience. Hypothesis H₄: Mass customization (MC) firm leaders have a high level of conscientiousness. Hypothesis H₅: Mass customization (MC) firm leaders have a low level of neuroticism. Hypothesis H₆: Mass customization (MC) firm leaders are mostly perceptive due to increased information processing load (rather than judgmental).

The NT-type leaders are special in the sense that while they rely on intuition (an ability to understand or know something without giving a systematic thought to it), they use an objective, cause-and-effect model while arriving at a decision. NT-type managers have a tendency to ignore instances that are contrary to their belief system. Intuitive managers adopt an open-ended approach toward solving any problem given to them. As per Miles et al. [3], prospector-type organizations focus on exploring new market opportunities so that they can launch new products. In order to achieve this objective, prospector-type firms emphasize both market and product innovation, for which thinker-type leaders are expected to be most suitable.

According to Myers et al. [15], NF-type leaders put a high salience on exploring possibilities. NF types are also eager to explore greenfield projects or perform new activities not done in the past. NF leaders prefer decentralized organizational structures. Miles et al. [3] have also argued that decentralization is the preferred form for prospectors too. NF-type people value marketing [15]. Gallen [16] has argued that the downside risk in NF leader-based organizations and also in prospector organizations is that they do not tend to have a sharp focus on profitability. Gallen [16] has also pointed out NF-type managers and leaders have a sharp focus on promoting external effectiveness which has been in the literature to be an important attribute of mass customization. Hence, we propose the following hypothesis: Hypothesis H₇: Mass customization (MC) firm leaders are primarily thinkers.

As per Singh & Sharma [17], perceptive persons tend to collect more information for every decision they make. They are prone to decision paralysis in an extreme case. Judgmental persons collect limited data and are known to make quick decisions. This is part of Myers Briggs Type Indicator. Leaders for mass customization are transformative (they give tailor-made attention to their subordinates) and reflective (they frequently evaluate themselves). Prospector-type organizations are oriented toward gathering as much information as possible to enable them to exercise a high degree of perception of the associated factors that impact the market. With this reasoning, the following hypothesis can be framed:

Sensing-feeling (SF) type leaders are unique in the sense that although they gather factual information but they analyze it on a subjective basis based on their own predilections. SF-type people are swayed by the opinions of people, as per Haley and Pini [18]. As per the study done by Haley and Pini [18], the proportion of SF people in the general population of managers and leaders is relatively less as compared to NF, NT, and ST types. In the extant literature, type leaders have been found to exist in the teaching and nursing domains. Hence, we propose the following hypothesis:

Juxtaposing Miles et al. [3] typology with different cognitive styles of leaders, an empirical conclusion that has been arrived at past studies is that ST leaders are more amenable to managing defender organizations, as such organizations usually possess functional structure with centralized control. As per Miles et al. [3], defenders usually have subject experts in finance or production occupying prominent places in the organization who have a major role in decision-making. ST leaders generally prefer

a stable external environment for their business. Gallen [16] is also of the view that efficiency gains are the main driving force behind ST leaders' thinking and also for defender-type organizations.

As per Singh and Sharma [17], in intuitive thinking (NT), people rely on intuition for purposes of perception and on thinking for purposes of judgment. They use intuition too, but depend on thinking while making judgments. Leader needs to be a thinker, but he also needs to be of feeling type (which is indicative of creativity and imagination); and therefore we say that the leader needs to be ambidextrous.

Hence, we propose the following hypothesis: Hypothesis H₈: Mass customization (MC) firm leaders are primarily intuitive.

The *aim* of this study is to test these eight theoretical propositions/hypotheses that seek to identify the association between mass customization (MC) firm leaders and their cognitive styles.

3. Data analysis

We prepared a 17-item scale to identify MC firms and it appears in the appendix. We contacted 380 companies and identified 131 MC firms that had an average score of higher than 3.17/5 for 129 firms; and one firm had an average score of 2.65/5 (they had a higher score than 3 on 9/17 items); and one firm had a score of 2.94/5 (they had a higher score than 3 on 13/17 items).

Table 1 gives Croanback alpha's of scale on BiG-Five factor of personality. It is satisfactory. The scale on Jungian personality type (adapted from [19]) is such that it is not possible to perform reliability tests on it and similar is the case for the scale on perceptive and judgmental (scales appear in appendix in **Table A7, A8, A9, and A10**).

The source data is the 131 respondents whose responses are used in **Table 1**. The Cronbach's alpha for this 29-item personality scale is very high at 0.779, indicating high internal consistency.

Table 2 is the contingency table for the BiG-Five factor of personality; **Table 3** is the contingency table for the "perceptive-judgmental" type of personality; and **Table 4** is the contingency table for the Jungian personality types.

Table 5 gives the results of Chi-square tests performed on hypotheses H1-H6, and **Table 6** gives the results of Chi-square tests performed on hypotheses H7 and H8.

The Chi-square test for independence was performed on the primary data collected from 131 respondents to empirically test the hypotheses H1 to H6 in the study relating the five-factor model of personality with mass customization and hypotheses H7 and H8 for Jungian personality of MC firm leaders on a sample

SN	Constructs	Total items	Alpha values (α)
1	Extraversion (Ext)	7	0.879
2	Agreeableness (Ag)	5	0.604
3	Conscientiousness (Con)	2	0.720
4	Neuroticism (Neu)	4	0.741
5	Openness to experience (Op)	11	0.793

Table 1.
 Cronbach's alpha values of constructs relating to BiG Five factor theory.

Extrovert	Introvert	Total
63	68	131
Low agreeableness	High agreeableness	Total
73	58	131
Low openness to experience	High openness to experience	Total
94	37	131
Low conscientious	High conscientious	Total
37	94	131
Low neuroticism	High neuroticism	Total
77	54	131

Table 2.
Contingency tables for BiG-five factor of personality.

Perceptive	Judgmental	Total
77	54	131

Table 3.
Contingency tables for perceptive-judgmental type of personality.

Thinking	Feeling	Total
100	22	122
Sensing	Intuition	Total
73	49	122

Table 4.
Contingency tables for Jungian type of personality (S/N and T/F).

size of 122. When testing the hypothesis that two variables in a population are related to one another, the Chi-square test for independence is a useful tool. The information, which is referred to as observed frequencies, merely demonstrates how many people from the sample are contained within each cell of the matrix. For the purposes of this test, the “null hypothesis” states that there is no relationship between the two variables or that the variables can be considered independent of one another.

The hypothesis states that there is a significant association between mass customization (MC) leaders of prospector-type firms and a high level of extraversion was supported by a Pearson Chi-square value of 0.191 and a significance (p-value) of 0.662. These findings provide evidence NOT in favor of the hypothesis. According to HBR paper, marketing managers are “extroverts” and manufacturing managers are “introverts” by training, and that the marketing function is outwardly oriented and the production function is inwardly oriented (Shapiro [22]; and see also <https://www.ringcentral.com/gb/en/blog/business-orientation-product-orientation-and-market-orientation-whats-the-difference/>). Job demands

	Hypotheses	Pearson Chi-square value	df	Sig. (p-value)	Results
H ₁	Mass customization (MC) firm leaders have a high level of extraversion.	0.191	1	0.662	Not supported (it is nearly 50–50)
H ₂	Mass customization (MC) firm leaders have a low level of agreeableness	0.893	1	0.344	Partially supported (There is an association but not statistically significant)
H ₃	Mass customization (MC) firm leaders have a high level of open to experience	24.8	1	0.000	Not supported (are L on openness to experience)
H ₄	Mass customization (MC) firm leaders have a high level of conscientiousness.	24.8	1	0.000	Supported
H ₅	Mass customization (MC) firm leaders have a low level of neuroticism.	4.038	1	0.044	Supported
H ₆	Mass customization (MC) firm leaders are mostly perceptive due to increased information processing load (rather than judgmental).	4.06	1	0.044	Supported

Table 5.
Summary of the results of hypothesis testing H1-H6.

	Hypotheses	Pearson Chi-square value	Df	Sig. (p-value)	Results
H ₇	Mass customization (MC) leaders are thinkers	50.00	1	0.000	Supported
H ₈	Mass customization (MC) leaders are more intuitive than sensing	4.72	1	0.024	Not supported (it is in favor of “S”)

Table 6.
Summary of the results of hypothesis testing H7-H8.

have forced a good number of manufacturing managers to be extroverts, but an equally a good number are “introverts” as manufacturing managers are “introverts” by training. So MC leaders with marketing (or definitely sales orientation or having operational experience; marketing strategy orientation could make them introverts) backgrounds will be extroverts and MC leaders with manufacturing backgrounds will be introverts (definitely manufacturing managers involved in operations will be extroverts, and manufacturing managers involved in STAFF positions [PPC] are introverts by training [as job demands]). Definitely, more research is required on this.

This research has found evidence to support the hypothesis that there is an association (though not statistically significant) between mass customization (MC) leaders of prospector-type firms and a low level of agreeableness. The Pearson Chi-square value was 0.893, and the significance (p-value) was 0.344; 73/131 were low

on agreeableness and 58/131 were high on agreeableness. There are more MC leaders who are low on agreeableness, but the number is not significant. High on agreeableness reduces “friction” and “day-to-day” altercations and leads to smooth conduct of operations.

It is reasonable to hypothesize that the empirical finding is due to the fact that agreeable leaders have a tendency toward avoiding conflict, and as a result, they are not necessarily in the best position to make difficult business decisions, which may be the need of the hour. This is because agreeable leaders tend to avoid conflict, and as a result, they tend to avoid conflict. However, leaders who exhibit the agreeableness personality trait are humble and modest and exude warmth. This could lead to “Group-Think” and could breed disaster (a famous example is the Cuban-Missile crisis). Hence, managers need to be “low” on agreeableness and raise objections whenever necessary, especially in strategic decisions.

Thus, low agreeableness in strategic decisions is to be encouraged, whereas high agreeableness in day-to-day operations is desirable.

The study’s findings did NOT support the hypothesis of a significant association between mass customization firm (MC) leaders and a high level of openness to experience. The Pearson Chi-square value for the hypothesis was 24.8 (in favor of L on open to experience: probably here in MC firms uncertainty is high and leaders do not want to try out radically new things but may like to muddle through by making “incremental” changes in decisions and try things that have worked in the past) and the significance (p-value) was 0.000.

This research found evidence to support their hypothesis that there is a significant association between mass customization (MC) firms and their leaders having a high level of conscientiousness. The Pearson Chi-square value was 24.8, and the significance (p-value) was 0.000.

In a similar vein, although leaders who exhibit the conscientiousness personality trait carry out their actions with diligence and carry out their actions with careful planning, they may at times avoid taking the unbeaten tracks, which may otherwise prove to be beneficial for the firm. In this way, conscientious leaders are similar to those who act diligently and carefully plan their actions. In this respect, conscientious leaders are comparable to leaders who carry out their responsibilities diligently and carry out their actions after careful planning.

The data supports the hypothesis that there is a significant association between mass customization (MC) firm leaders and a low level of neuroticism. Chi-square value is 4.038, and the significance (p-value) is 0.044. in the wake of high uncertainty, one needs managers who have nerves of “steel” in the wake of high complexity.

Nevertheless, the empirical finding concerning neuroticism supports our hypothesis. It has been discovered that people who have the neurotic personality trait are emotionally unstable, and as a result, they have a lower emotional intelligence quotient. These people may be leaders or managers. Because of the way that they are wired, they find it very easy to become agitated and worry excessively about small things. This characteristic of a leader or manager is not suitable for steering a company in the world we live in now because things are changing speedily (high dynamism).

Personality has a genetic predisposition, and also social information processing (environmental factors) affect personality. Environmental “nervousness” (or MRP Nervousness, as they call it) affects the personalities of manufacturing managers and

tends to make them “neurotic,” but genetic predisposition has to be in favor of “low” neuroticism.

Because of the increased amount of information that needs to be processed, the leaders of prospector-type companies that participate in mass customization (MC) are more likely to be perceptive than judgmental, according to the hypothesis. A Pearson Chi-square value of 4.06 and a significance (p-value) of 0.044. Out of 131 managers, 77 were perceptive and 54 were judgmental. Thus, this hypothesis is supported.

Leaders of mass customization firms are thinkers (Chi-square value is 50; significance level 0.000). this hypothesis is supported.

In prospector-type firms, we need “intuitive” manufacturing managers, but they are in short supply. (see: <https://www.google.com/search?q=is+intuitive+personality+fewer&oq=is+intuitive+personality+fewer&aqs=chrome..69i57j33i160.22846j0j15&sourceid=chrome&ie=UTF-8>).

4. Conclusion

Out of eight hypotheses these following were fully supported and statistically significant: MC firm leaders are highly systematic, are low on neuroticism, are high on perception, and are predominantly thinkers. They are low on agreeableness (partially supported: not statistically significant); issue that was raised was that in strategic matters, low agreeableness is desirable to avoid making strategic mistakes, but in operational matters one can be high on agreeableness for better organizational climate and reduction of conflict in not so important matters. MC firm leaders could be extroverts if they have a marketing backgrounds and introverts if they have a production backgrounds. MC firms leaders are not open to experience as uncertainty is high (although this was not measured) and would like to follow the “incremental” strategy-making process and like to “muddle through” through the process of “disjointed incrementalism.” MC firm leaders need to be more “intuitive” but in societies, not many “intuitive” personalities are available. These are topics of future research.

Appendix: Scales used in the study

Item	Statement	Response
MCS1	Level of customer responsiveness.	1 2 3 4 5
MCS2	Level of cost efficiency.	1 2 3 4 5
MCS3	Level of high-volume production:	1 2 3 4 5
MCS4	Degree of supply chain relationships of the firm.	1 2 3 4 5
MCS5	Involvement of customers in design and manufacturing process.	1 2 3 4 5
MCS6	Units (or modules) designed independently.	1 2 3 4 5
MCS7	Following of modular design philosophy.	1 2 3 4 5
MCS8	Partitioning of information into visible design rules and hidden design parameters by Product Designers.	1 2 3 4 5
MCS9	Involvement of customer with the product manufactured by the firm.	1 2 3 4 5

Item	Statement	Response
MCS10	Importance of feedback, inputs from customers which is then used in product, services realization process.	1 2 3 4 5
MCS11	Use of IT or web-interface for taking inputs from customers regarding product attributes.	1 2 3 4 5
MCS12	Use of IT by the firm in providing transparent communications between a firm and its trading partners.	1 2 3 4 5
MCS13	What is the ability of the firm to add product variety without sacrificing production volume, customization responsiveness, and customization cost-effectiveness?	1 2 3 4 5
MCS14	Does the firm have the ability to produce differentiated products with cost effectiveness?	1 2 3 4 5
MCS15	Does the firm have the ability to produce differentiated products with volume effectiveness?	1 2 3 4 5
MCS16	Does the firm have the ability to produce differentiated products with responsiveness?	1 2 3 4 5
MCS17	To what extent are identifying individual customer requirements important in Product Design?	1 2 3 4 5

Table A7.

Scale to identify companies undertaking mass customization. Mass customization provides tremendous variety and individual customization, at prices comparable to standard goods and services [20]. The following scale is used to identify companies that undertake mass customization. Please rate the following statements at 5 points Likert scale where: (1: Not Important, 2: Slightly important, 3: Neutral, 4: Important and 5: Critically Important).

Items	Statements	Responses
Straight_forward	Leaders of firms following mass mustomization strategy are straightforward in their dealings with team members.	1 2 3 4 5
Modest	Leaders of firms following mass customization strategy are modest and unassuming in their nature.	1 2 3 4 5
Trust	Leaders of firms following mass customization strategy trust their team members.	1 2 3 4 5
Co-operative	Leaders of firms following mass customization strategy are inclined to cooperate but known to avoid conflict.	1 2 3 4 5
Demanding	Leaders of firms following mass customization strategy are demanding in nature.	1 2 3 4 5
Cold	Leaders of firms following mass customization strategy are cold and disconnected with their team members.	1 2 3 4 5
Ideas	Leaders of firms following mass customization strategy are full of new ideas.	1 2 3 4 5
Old_Ideas	Leaders of firms following mass customization strategy tend to go with old ideas and are averse to new ways of working.	1 2 3 4 5
Activity	Leaders of firms following mass customization strategy take interest in wide range of activities.	1 2 3 4 5
Conventional	Leaders of firms following mass customization strategy adopt a conventional approach to work.	1 2 3 4 5
Artistic	Leaders of firms following mass customization strategy are artistic in the nature.	1 2 3 4 5

Items	Statements	Responses
Personal_Touch	Leaders of firms following mass customization strategy like to interact closely with their team members on a personal level.	1 2 3 4 5
Warmth	Leaders of firms following mass customization strategy are warm and friendly in their nature.	1 2 3 4 5
Adventurous	Leaders of firms following mass customization strategy are adventurous in their nature.	1 2 3 4 5
Enthusiastic	Leaders of firms following mass customization strategy are enthusiastic toward their work.	1 2 3 4 5
Emotional_Adjustment	Leaders of mass customization firms have a poor emotional adjustment	1 2 3 4 5
Holistic_Info	Leaders of firms following mass customization firms seek holistic information while taking decisions.	1 2 3 4 5
Planful	Leaders of mass customization firms describe possibilities and then take decisions.	1 2 3 4 5
General_data	While taking decisions, leaders of mass mustomization firms use data that are more general.	1 2 3 4 5
Logic	While taking decisions, leaders of mass customization firms use logical reasoning.	1 2 3 4 5
Values	While taking decisions, leaders of mass customization firms rely on understanding values.	1 2 3 4 5
Subjective	Leaders of mass customization firms are subjective while taking decisions.	1 2 3 4 5
Multi_Variables	Leaders of mass customization firms deal with phenomena that involves large number of variables in play simultaneously.	1 2 3 4 5
Parts	Leaders of mass customization firms deal with phenomena that involves more moving parts.	1 2 3 4 5
Uncertainty	Leaders of mass customization firms deal less with uncertain phenomena in the conduct of their business.	1 2 3 4 5
Dynamism	Leaders of mass customization firms are at ease while dealing with the rapid changes happening in their business.	1 2 3 4 5
Stable	Leaders of mass customization firms operate in a stable business environment.	1 2 3 4 5
Diversity	The decision-makers of firms following mass customization are attuned to dealing with greater diversity among people working in the organization.	1 2 3 4 5
Relationship_oriented	Decision-makers of firms following mass customization focus on relationships among individuals and try to derive useful knowledge from these relationships.	1 2 3 4 5

Table A8.

Exploring personality types of leaders of firms following mass customization using BiG Five factor theory. Big Five factor theory is used to analyze personality dimensions of individuals. Here are a number of characteristics that may or may not apply to leaders of mass customization firms. Please rate the following statements at five points Likert scale where: (1: Strongly Disagree; 2: Disagree; 3: Neutral (Neither agree nor disagree); 4: Agree; 5: Strongly Agree).

Statements		Response
1.	Do you generally	A. Get things settled fast? B. Seek more information?
2.	Are you	A. Strongly attached to your ideas? B. Flexible?
3.	Do you	A. Feel comfortable in stable situation? B. Entirely adapt to change?
4.	While making decisions are you	A. Determined to make quick decisions? B. In no hurry and seek additional information.
5.	Most of the time	A. Are you quite serious about the issues? B. Do you derive pleasure in creating humor out of the situation.
6.	When doing large number of well defined jobs	A. You do them efficiently? B. You do not enjoy them at all?
7.	Are you at your best	A. When it is easy to organize the problem and run the related activities? B. When faced with unstructured ill defined situations.
8.	Are you	A. Skeptical about people? B. Friendly with people?
9.	Are you	A. Decisive about issues? B. Too absorbed with issues?
10.	Do you	A. Get things settled fast? B. Enjoy why and how are things?
<i>Please indicate the response that usually describes your concerns and behaviors. For each question, indicate by encircling which of the two alternative statements is more characteristic of you.</i>		

Table A9.
Judgment and perception indicator scale [Ref: Sharma and Sharma [21]].

Statements		Response
1.	Your day to day affairs are guided by	A. Practically B. Principles
2.	You are influenced by	A. Rules B. Feelings
3.	Are you moved more by arguments	A. Logical B. Emotional Appeals
4.	It is very bad to be	A. Idealistic (Impractical) B. Sticking to a boring Routine
5.	You like a person more who has	A. Folk Wisdom (Good Common Sense) B. Creative ideas

Statements			Response
6.	You evaluate others more by	A. Results	A or B
		B. Circumstances	
7.	You are more oriented to	A. Brooding over past	A or B
		B. Looking forward to the future	
8.	More often you make decisions by	A. Specifies of the the situation	A or B
		B. Sentiments	
9.	More often you are influenced by	A. Realities of life	A or B
		B. Dreams	
10	Are you more	A. Loyal	A or B
		B. Systematic (Logical)	
11.	Do you believe more in	A. Making decisions (Action-oriented)	A or B
		B. Producing new things (Creation-oriented)	
12.	What influences you more	A. Thoughts (Brain)	A or B
		B. Feelings (Heart)	
13.	As a part of your personality what is more prestigious to you	A. Being down to earth	A or B
		B. Creating new ideas	
14.	What is more appropriate of you?	A. Your consistency in decision-making	A or B
		B. Your concern for people	
15.	Are you more attracted by	A. Fundamentals	A or B
		B. Results	
16.	It is more appropriate to	A. Be impartial	A or B
		B. Go by feelings	
17.	You enjoy more the company of people who are	A. Practical	A or B
		B. Creative	
18.	Are you	A. Hard taskmaster	A or B
		B. Accommodative	
19.	What image do your friends have about you?	A. A practical man	A or B
		B. A creative person	
20.	You will like to be make known as a person who goes by	A. Logic	A or B
		B. Sentiments	
Instructions: If you feel that A is most appropriate for your behavior then give five points to A and 0 points to B. If you feel that A is mostly your behavior then give four points to A and 1 point to B. If you feel that A and B are somewhat equally describing your behavior with more slant toward A then give three points to A and two points to B. Similarly, you can go reverse way also. If B is mostly your behavior then give four points to B and one point to A. And if B is most appropriate for your behavior then give five points to B and 0 points to A. Ensure in all cases that sum of points given to A and B is 5.			

Table A10.
 To decipher Jungian personality type: S/N and T/F: [Adapted from Hellriegel et al. [19]].

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Strategic Initiatives for Manufacturing Digital Readiness: Evidence from a Socio-Managerial Lens

Clarissa F. Rocha

Abstract

This article explores the emergence of preparing manufacturers to operationalize digital innovation practices from a social perspective. It discusses the driving forces, strategies, challenges and broader implications of Digital Transformation (DT) from a social lens. In-depth interviews of large British and Brazilian manufactures were conducted, and later, the content analysis technique was used. A theoretical-empirical framework for social readiness factors for Digital Transformation (DT) was proposed. The findings highlight the critical role of social efforts in manufacturing to digitalize in an era of relentless technological advancement. Digital leadership, sponsors, organizational mindset, culture, and people training are identified as crucial drivers of innovation and competitiveness in the cases. The results give the practitioners, policy makers, and researchers a guideline for further research and applicability of manufacturing DT under a more micro-organizational lens. The article stands out since it examines DT in depth while considering its implications and contributions to organizational practice for the literature, bringing future perspectives.

Keywords: digital innovation, social readiness, digital mindset, Brazilian reality, British reality

1. Introduction

Studies on Digital Transformation (DT) have grown considerably in recent years, while the main trend in organizations is digitalization of its processes, products, services, and the way companies operate their businesses [1]. The ways in which organizations and respective stakeholders' interactions take place are changing, through multiple channels, interconnectivity, and interdependence [2]. This phenomenon was magnified in the last two years by the global health crisis provoked by COVID-19 virus outbreak and consequently, being digital became mandatory for many organizations [3]. Moreover, driven by advanced data analysis, DT has been changing labor scenarios, society values and human relationships [4].

The social aspects are relevant, since DT has been changing labor scenarios, society values and human relationships [4]. DT provides a unique type of human-computer interaction, and employees play a vital role in managing and adopting digital technologies [5]. Social factors of DT can be understood as antecedents or preparatory factors for this journey of change, and a social-managerial perspective could help to better understand how such aspects are linked to DT [6].

Most academic DT research still focuses on deepening its technical domain, lacking further studies on socio-managerial perspective. DT challenges and readiness do not only refer to the technological domain but also include strategic, social, managerial, and macro-environmental aspects of organizations [7]. Thus, there is a gap when it comes to understanding the complexity of the change management process in terms of digital enablement of senior executives and other employees as well [8].

A number of researchers have extended DT concept, linking it to knowledge management [9, 10], open innovation [7, 9, 11–13], absorptive capability [14–16], competitiveness, business models, and strategic management [17–20], supply chain management [21, 22], digital servitization [23, 24], and education and training [25, 26]. Despite the prolific scientific production, just a few of these studies establish an in-depth discussion, as well as empirical data, regarding the readiness of society for the digital economy. There is also no common understanding of what are the social antecedent factors that could facilitate the digital journey of companies.

Moreover, digital readiness allows firms to evaluate their preparation to implement digital practices. Several digital maturity models are in use; however, academic studies that empirically discuss how to prepare for digitalization are still lacking, especially ones that address the specific difficulties of developing countries, like Brazil, at micro-organizational levels [27, 28]. This paper addresses this gap in literature. Recommendations on DT management, specifically data management, offered by the academic community and specialized consultancies aimed at developed nations that are digital leaders [29]. Successful DT practices from companies in developing economies are few and not consolidated into universal approaches [30]. There is a gap between digital assessment models developed for industrialized countries and those with nascent digitalization that lack clear goals and support from governmental and private entities.

Since emerging economies have been historically more focused on commodities, local companies are frequently behind on technology adoption when compared to developed countries [31]. Few studies on digital initiatives have been conducted in Brazil, even though industrial applications have significantly increased [32]. Consequently, there is a knowledge gap regarding the impacts and contributions of digital technologies in this context [7, 31, 32].

There is also no common understanding of what are the social antecedent factors that could facilitate the digital journey of companies, whether they are in developed or emerging economies. Therefore, the purpose of this paper is to investigate the readiness factors to engage digital innovation practices from a social perspective of large manufactures. A multiple case study of Brazilian and British manufactures was applied to better understand how they operationalize digital innovation projects through a micro-organizational lens. Based on the previous literature review, we can state this is one of the first empirical articles to identify the social facilitating factors for DT based on the insights drawn from the cases.

2. Theoretical background

DT is not only marked by the adoption of digital technologies such as: Internet of Things (IoT), Artificial Intelligence (AI), Big Data, to influence business and society improvement [33, 34], but also represents the development of social-managerial capabilities considered a paramount for a smarter enterprise pursuing.

2.1 Digital transformation in manufacturing companies

Digital technologies are transforming business strategies, firm capabilities, products and services and interfirm relationships in business networks [35]. The integration of digital technologies with business activities, impacts not only the business strategies of enterprises but also the nature of industries, sources of value creation and capturing [1, 35, 36]. DT is the creation and consequent changing of market offers, processes and even business models resulting from the use of digital technologies [1]. Digital solutions drive smart data collection and analysis and, consequently, facilitate more assertive decision-making and firm competitiveness.

It is necessary to make a distinction on the delimitation and impacts of DT and Industry 4.0 (i4.0) concepts. DT includes the i4.0 and focuses on the end-to-end digitalization of all physical assets and integration into digital ecosystems with value chain partners [7, 37]. Industry 4.0 refers to the digital connection used particularly in manufacturing processes [38]. The main reason why DT differs from i4.0 and from digitization concepts is that DT implies a radical change in an existing organization, rather than differences in its *modus operandi* alone. DT is an emerging paradigm that allows firms to push their competencies by bringing together the physical and digital world in a holistic environment [39].

There is no consensus about which technologies constitute the scope of DT. Just to name a few, IoT, 3D printing, Cloud Computing, AI, Augmented and Virtual Reality (AR & VR), Big Data & Advanced Analytics, among others, are technologies associated with digitalization [40–42]. A commonality among all these technologies is internet use. The connectivity to the net enables real-time and remote monitoring, data extraction, and systems, objects, and people access [43]. These technologies enable firms to exponentially expand the scope and scale of their businesses. In-short, digital solutions are changing the ways in which new business opportunities are explored [1].

This transition to digital demands not only leverages digital technologies adoption and deployment, but also promotes a new way of thinking, a digital mindset, and capabilities building [41, 44]. Effective DT implies organizations expand their focus beyond solely considering technology in isolation and to include the underlying organizational capabilities [45]. Adopting a capability approach as opposed to a process-based approach can result in greater value generation for an organization. This highlights the need for a social digital readiness based on a capability approach [46].

2.2 Digital transformation social driver

Smart organizations also affect professional qualifications and work relationships and create new markets and business models. The need to innovate digitally also instigates and strengthens intra- and inter-collaborations [7]. Managers need to transform their routines, capabilities, and organizational structures to cope with the digital era challenges [47].

Deploying digital technology resources and assets *per se* may not create business value, cannot enhance firm performance, and cannot provide a competitive advantage by themselves [48, 49]. However, these technologies can act as enablers of higher-order organizational capabilities or interact with other business resources to increase firm performance [50]. New capabilities are offered by digital solutions in highly dynamic environments, such as the facilitation of experimentation, improvisation, and fast failure strategies.

The use of digital technologies is a prerequisite for DT but is not sufficient for success. Successful efforts require re-optimization to allow the effective use of digital technologies and the creation and capture of value in new ways [51]. This may require new forms of organizing and new work practices to build the capacity for sensing and seizing opportunities [52, 53]. If manufacturing firms do not comprehensively take control of their digitalization efforts in terms of developing and transforming their strategies and practices, they will risk losing profit-generating opportunities and being outcompeted by others [51].

Leading manufacturers complement and integrate IT resources with non-IT resources to create new organizational capabilities or enhance existing ones to better deal with environmental changes and management challenges [54–56]. DT is also about developing a digital strategy, managerial skills, management techniques, digital leadership, supporting organizational structure and, building a collaborative culture that fosters and motivates the adoption of digital solutions to enable enhanced business competitiveness [7, 57, 58]. Business leaders need to focus on developing new practices, capabilities, and strategies that will allow the creation and capture of value from digitalization [7, 51, 55, 59].

In complex networks of digital or physical entities, there is a strong need for integration between information systems and people, inside and outside the firm, to encourage digitalization [7]. Obtaining information in such situations is a difficult task, requiring high level of relational capability. Collaboration is a company dynamic relational capability as it is a potential source to create, modify and expand knowledge, innovation, and technological resources to cope with an uncertain and highly competitive context [45]. Müller et al. [57, 58] complement that digital firms should display strong and proactive leadership and develop a digital mindset.

To seize the full potential of digital technologies, companies need to ensure mutual understanding and collaboration between the ‘technical side’ and the ‘business side’. This may require redefining managers’ roles and might need to create new roles [48]. These changes may cause organizational disruption, such as in large companies in which several functional areas are competing with one another. In such companies, switching from rivalry to intra-collaboration may be difficult since it involves important changes in mindsets. That is why implementing digital technologies is more than a technical project and is related to a business transformation initiative requiring a suitable and clear strategy, top management support, and active and careful change management [7, 48].

DT is a learning process that requires integrating technology, business, and learning strategies in an entrepreneurial-oriented organization [60]. Moreover, digitalization of operations and processes, when aligned with the firm’s core strategies, capabilities, and procedures, can offer superior competitiveness in the digital era [56]. Companies can leverage digital resources to increase their competitiveness in the digital age [61].

Manufacturers transitioning into digitalization have been developing their employees to handle less routines, complex, and digitized daily tasks, including a

significant expansion of remote work, via continuous knowledge and skills development [56, 62]. Low-income and low-qualification individuals are those who face a greater risk of having their posts computerized [63, 64]. However, the use of digital technologies creates more jobs than it eliminates them, mostly in the areas of mechatronics, IT support and industrial engineering [56].

A first step to overcome social challenges (e.g., change resistance) could be to initiate training programs to teach employees how to effectively analyze data [65] to jointly research, develop and apply digital solutions that aim to extract value from business data [66]. Top managers need to develop appropriate digital strategies that can in turn shape their resources management strategies. The digital resources involve the tasks of leaders and top managers, orchestrating, sponsoring, prioritizing, and committing to digital project investments [49, 50]. Having a clear digital strategy facilitates budget approvals for digital projects [7]. To facilitate their DT journey, firms should also be clear about what they want to achieve, have flexible internal processes, and be open to continuous learning [51].

It is necessary to conduct and manage an organizational change and a gradual adaptation in terms of company culture to seize the full benefits stemming from digital technologies and to increase agility [67]. For Barlette and Baillette [48], the role of top managers to succeed in this endeavor is crucial. DT need the support of business leaders and top managers who foster a culture of consistent, coherent, and comprehensive presence of values and norms that promote digital solutions use by everyone in the company [68]. Digitalization makes additional demands on business leaders to act entrepreneurially, and to think strategically in a more uncertain market environment [19].

2.3 British and Brazilian digital transformation status

The applications of digital practices in Brazil faces some harsh challenges, from investment in technological infrastructure and equipment to processes and resources adaptation. According to a digitalization mapping report [69], the knowledge about digital technologies and their application to manufactures is still no widespread. The adoption of digital solutions is still not a reality for great part of Brazilian companies, being them, in general, concentrated in larger companies [31, 32]. The implementation of digital technologies is also a challenge due to a lack of clear definition regarding the benefits to justify their adoption [31, 70, 71].

It is well-known that the adoption of advanced technologies can be more challenging for emerging countries [72]. Since emerging economies have been more focused on the extraction and commercialization of commodities, companies in these countries are frequently behind on technology adoption, when compared to developed nations [32]. Other factors such as ICT infrastructure, culture, education and economic stage and political instability also interfere in the value perception and level of investments in advanced technologies [73]. Few studies have been conducted in Brazil on digital initiatives, while most of them come from consulting research and present only descriptive, and technical information of this scenario [70].

Differently from Brazil, several investments on digital innovation were made in the United Kingdom being them based on ideas, people, infrastructure, and business environment [74]. There are also other actions made by the British government to promote innovation practices, such as the “Innovate UK”, which is an innovation consortium created as part of the UK Research and Innovation, a non-departmental

#	Proposition	Literature support
P1	Intra- and inter-organizational collaboration is relevant for social preparation toward manufacturing DT	[7, 28, 32, 57–59, 76]
P2	Training for the development of digital skills and competences is a paramount for social preparation toward the digital journey	[51, 55, 56, 65, 66]
P3	The digital strategy needs to be deliberate and structured by top managers and clearly communicated for all employees to be encouraged to prioritize the execution of digital practices	[7, 28, 49, 50, 59]
P4	Digital sponsors and leaders engage people, and it is more effective in breaking natural resistance	[8, 28, 46, 48, 51, 68, 77]
P5	A Digital Mindset construction is critical to the effectiveness of the manufacturing trajectory toward TD	[7, 28, 67, 68]
P6	National government has fundamental role to trigger effective DT in manufacturers	[31, 32, 70, 73, 74]

Table 1.
Theoretical propositions.

public body funded by a grant-in-aid from the UK government, to promote the productivity and economic growth by supporting businesses to develop and realize the potential of new ideas [74].

Even with low adoption rate of digital techs and the uncertainty around the benefits of their use, there are several investments being made in digital technologies R&D and applications with a perspective of increasement over the next years [74, 75].

Based on theoretical background, six propositions were listed in **Table 1**, regarding how social factors affect digital transformation in manufactures.

3. Research design

This research adopts an exploratory qualitative approach since its theme has a lack of scientific knowledge and is little explored. A multiple case study [78, 79] was applied to nine large manufacturers. The case study is a coherent research strategy for this study, as it is a current and a real-life context with no clear definition regarding the boundaries between the phenomenon and the context, requiring an in-depth study of a few cases.

The case studies selection was based on the companies' sector and size, being selected factories from the automotive, electro-electronic and telecommunication sectors from Brazil and the United Kingdom. The selection of large companies for the present study was also based on the findings that: large companies are more prone to invest in process and product innovation, and relationships between large companies and advanced implementation of digital technologies can be more easily observed [31, 32].

Regarding the Brazilian cases, initially conducted, the sectors selection was based on the greater maturity on digital technology awareness, application and adoption [69]. As for the British cases, the size and sectors were selected mainly based on the case studies already conducted in Brazil, aiming to better compare

the differences and similarities on social readiness factors for DT. These sectors were also selected for the United Kingdom due to their economic relevance, since the manufacturing sectors accounts for 10% of the total economy, as well as their maturity on technology adoption [74]. The final selection included five Brazilian, and four British large manufactures from the automotive, electro-electronic and telecommunications sectors. Due to prior information from the experts, the cases were on the way to their digitalization.

The data collection instruments, once validated by academics and practitioners' DT experts, included interviews (Table 2) and questionnaires with closed questions that complements the interview script, and non-participating observations to understand the technological structure of the factory *in loco*. Before the interviews were applied, the script was validated by DT academics specialists, and experts-practitioners in factory DT with over 10 years of experience. For each case, participants were chosen from both the tactical and strategic levels who work directly with digital innovation projects and R&D activities.

Brazilian collection took place from Oct/2018 to Mar/2019, the same period of visits for non-participating observations. The British took place from Aug/2019 to Mar/2020. Content analysis by codification [80, 81], with the support of the software ATLAS.ti 8.4 was applied to the cases supporting the search for convergences, assisting in data triangulation, comparative analysis, providing elements to cross-check the information. Content analysis followed the three phases proposed by Bardin [80] (Pre-analysis; Coding and categorization of the written texts; and Treatment of results, inferences, and interpretations), and followed the coding cycles by Saldaña [81]. After this analysis, the process was reviewed by other researchers involved in the project to verify and discuss possible differences on the analyses.

Case	Sector	Product	Headquarters	Employees (Worldwide)	# Interviews
Alpha BR	Automotive	Cars	France/Japan	+450,000	6
Beta BR	Automotive	Driveline and drivetrain components and systems	USA	25,000	7
Gama BR	Industrial	Diesel injection systems	Germany	400,000	7
Delta BR	Automotive	Trucks	Sweden	100,000	5
Omega BR	Industrial	Electric and electronics equipment	Japan	50,000	5
Sigma UK	Automotive	Luxury cars	The United Kingdom	+4000	4
Theta UK	Industrial	Precision fastening and assembly solutions	The United States	+50,000	5
Kappa UK	Industrial	Aircraft engines	The United Kingdom	50,000	5
Iota UK	Automotive	Cars	Japan	140,000	4

Table 2.
Case studies profile.

4. Case analysis

DT maturity varies between companies. It was possible to find evidence that the surveyed manufactures have adopted digital solutions whether tangible such as sensors and 3D printers; or intangible, such as cloud computing and artificial intelligence. As the Sankey Diagram (**Figure 1**) presents, the main solutions and some companies prefer focus on few solutions in a wider range of applications whether other companies prefer to invest in many solutions at the same time. For instance, artificial intelligence (AI) was exhaustively mentioned by Kappa UK, company that is recognized for pioneering DT in the United Kingdom. In Brazil, use and development projects in AI were found only in Gama BR.

4.1 DT social aspects

Despite the great potential of digitalization envisioned by the investigated manufactures, they have already realized the impact of DT on workforce dynamics, organizational mindset change, and new job profiles emergence, especially in operational levels. The proper implementation and use of these technologies should not result in massive layoffs, but rather to facilitate and add value to the work. For all analyzed cases, the changes arising from the using of digital technologies should occur incrementally to make people, at any hierarchical level, to be aware of digitalization necessity and urgency. The changes arising from the using of digital technologies should

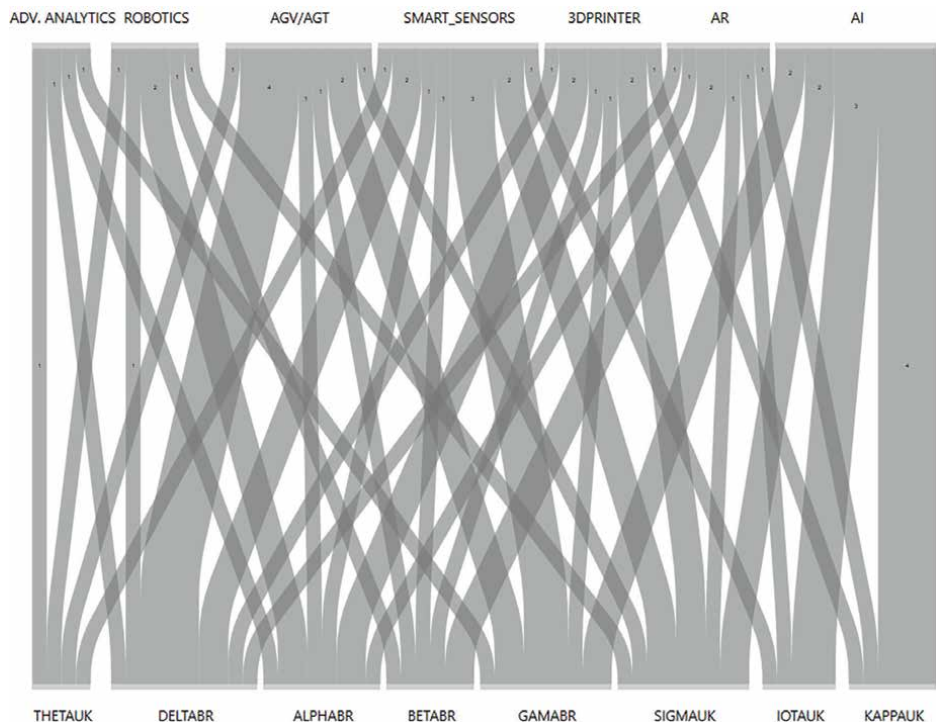


Figure 1. Sankey diagram of digital solutions vs. manufactures. Legend: ADV.ANALYTICS = Advanced Analytics; AGV/AGT = Automated Guided Vehicles/Automated Guided Transport; VR = Virtual Reality; AR = Augmented Reality; AI = Artificial Intelligence.

occur, initially, incrementally to enable people, at any hierarchical level, to be aware of digitalization necessity and urgency.

It was possible to list 11 social impacts mentioned by all interviewees: (i) changing in the workforce dynamics and new job profiles; (ii) change in the worker profile – multifunctional and with greater relational capability; (iii) repetitive work optimization; (iv) know-how development, emergence of new learning; (v) new ways of training people; (vi) increase in employee satisfaction, given the gains in quality and safety in the new way of working; (vii) need to insert everyone in a new digital context; (viii) shift in employees mindset; (ix) development of (intra-) entrepreneurial capacity; (x) need to engage and educate employees and external stakeholders about digitalization; (xi) increase in work productivity. It is crystal clear that almost all impacts are linked to digital mindset building, which involves resource reconfiguration and competences development.

Moreover, it can be inferred from the cases of the importance of building a digital workforce ecosystem, that can be defined as a structure that consists of interdependent actors, comprising internal and external players, with high relational capability working to pursue both individual and collective goals. This workforce may assist digital leaders and sponsors better manage changes driven by technological forces. Managing this workforce in a way that is aligned with the business and digital strategic goals seems to be a new critical business need.

A well-structured communication and training plans are essential to develop innovation awareness and digital mindset. Without people management and training, there is no transformation. Therefore, leaders should engage and empower people so they can contribute and be part of DT.

Focusing on employee's engagement and qualification investigated companies (Brazilian and The United Kingdom) invest in Digital Labs (experimental digital projects), Hackathons, DT committees and management platforms, skip level meetings, fairs, and multi-level training. As an example, Kappa UK has its own Digital Academy to educate and train its work force.

However, for all initiatives to be successful and manage to raise funds, digital transformation must be part of the organizational strategy. In 2015, Gama BR realized Industry 4.0 would be a trend and started to work on it. The preparation to the future was then prioritized and a project called "Strategy 4.0" was put in place.

4.2 DT social challenges

British and Brazilian surveyed manufactures face similar social barriers. The limitations consist mainly in lack of knowledge and competence to understand and apply digital solutions; resistance to change and, make people aware of the DT benefits to their quality of life. The resistance to change is evidenced in different hierarchical levels and occurs mainly to long time working associates, who tend to be suspicious of the emergence of new tasks of a more analytical nature and new responsibilities that demand new skills.

Make associates aware of digital technologies is also considered a challenge because technologies implementation must make sense to all involved otherwise it may lead to the discrediting of DT. Delta BR emphasize the fear of individuals, in particular operators who feel menaced by digital technologies and the potential of being replaced by automation. This social challenge is also present in Sigma UK and Iota UK. The lack of confidence leads to resistance to accept DT.

Omega BR, producer of electronic components, point that some social challenges induce the search of external capabilities, such as partnerships and recruitment of experienced people to accelerate the development and implementation of digital solutions. The lack of internal capability and understanding of what Industry 4.0 is, stimulates open innovation outside-in initiatives, that is, Omega BR collaborate with other organizations with skills and knowledge which are missing internally.

Alpha BR mentioned the lack of competences of Brazilian startups and High Education Institutions. Indeed, there's a common agreement among the interviewees that Brazilian market still have low technological literacy. Other significant challenge raised by Delta BR is the Brazilian economic context, marked by recession, high Brazil Cost, imports complex bureaucracy and difficulties to obtain support and tax breaks from the government to R&D&I projects. Some interviewees from Brazilian cases also point the internet coverage in Brazil is still faulty in some regions or machines are not prepared to connectivity. Therefore, some manufactures have not gone even in Industry 3.0 yet.

The difficulties in the application of new technologies to change production processes are even greater in luxury cars manufactures, like Sigma UK. The century-old tradition of making cars is certainly a strength of the brand, but at the same time, it can be a hindrance to digital change. Kappa UK also faces high resistance from employees and the vast majority have been with the company for more than 30 years. In British cases, there are also challenges beyond manufactures borders and control. There is still low acceptance and misunderstanding from regulatory agencies and the unions regarding digital technologies impacts. Additionally, after Brexit in 2020, British manufactures have been going through instability and digital technologies are the focus for companies remain competitive.

5. Discussion

The cases highlighted that digital economy background fosters new managerial human capabilities (e.g., leadership skills, relational or social capabilities, managerial cognition) to realize DT [34, 82]. Specifically, human capital is highlighted as one of the most critical drivers of DT [23, 83]. In all cases, in the digital context, it is better to collaborate with partners by developing networks with external parties than to compete alone. The digital environment is collaborative: as an evolving communication platform, it has given rise to new patterns of social interaction that have led to the birth of a true digital culture. The findings of the cases are in line with the empirical study by Heubeck [82]: social capital allows managers to benefit from the capital of socially connected actors—such as collaborations between managers—and enhances learning through the recombination of different types of information, knowledge, and skills.

The findings from the cases highlight that high levels of social capital not only benefit information exchange but also instill greater reciprocity and collaboration among actors, leading to greater support for (digital) change. This finding complements the empirical studies by Rocha et al. [7] and [28]. Therefore, due to the holistic nature of DT that requires support from all actors and departments within a firm [84], collaborations, whether between departments or with actors external to the firm, are beneficial for managers by motivating key actors to support DT. This finding is in line with the research of Guo et al. [85].

Existing literature has examined the influence of DT on external partners with a focus on customer relationships. However, it tends to neglect the crucial importance of the digital proficiency of the workforce. For Zlatanovi et al. [86], this omission fails to consider how employees' digital skills can impact a company's performance and the successful utilization of technological investments. According to the cases in this study, matching employees' digital skills with organizational goals is important to fully utilize digital technologies. Such alignment is crucial to creating an environment conducive to DT [87]. Based on theoretical background and cases content analysis, it is possible to propose a framework to DT readiness through a social lenses as it is presented in **Figure 2**.

Regarding capability building (**Figure 2**), digital literacy (DL) is a crucial skill that prepares individuals to navigate the digital age and lead organizational change to improve performance. This finding was also found in the empirical study by Ben and Alzubi [88]. Furthermore, in the Dynamic Capabilities theoretical approach [53], DL is recognized as an essential catalyst for DT and enables organizations to connect digital technologies as strategic assets, thus ensuring a sustainable competitive advantage [88]. Kozanoglu and Abedin [89] emphasized the need to assess DL at both the individual and organizational levels to consider the surrounding factors that influence the use of digital solutions. Understanding such a concept is essential to comprehend the role of employees in the digital journey.

Regarding the importance of digital sponsors or leaders (**Figure 2**), the cases reinforced the relevance of digital leadership development programs focused on instilling digital innovation practices in cross-functional teams and training new behaviors and mindsets. Such programs or events encourage multisession learning to develop employees' knowledge. These findings are in line with research by Tinmaz et al. [90] which concluded that digitally literate managers are better equipped to embrace the values of innovation, collaboration, and learning within their companies, increasing digital readiness and enabling the organization to proactively respond to digital disruption.

The presence of digital sponsors and the involvement of engaged leaders are crucial to building a digital mindset. This finding aligns with research by Bojesson and Fundin [91] which emphasizes the critical role of digital leadership and sponsors

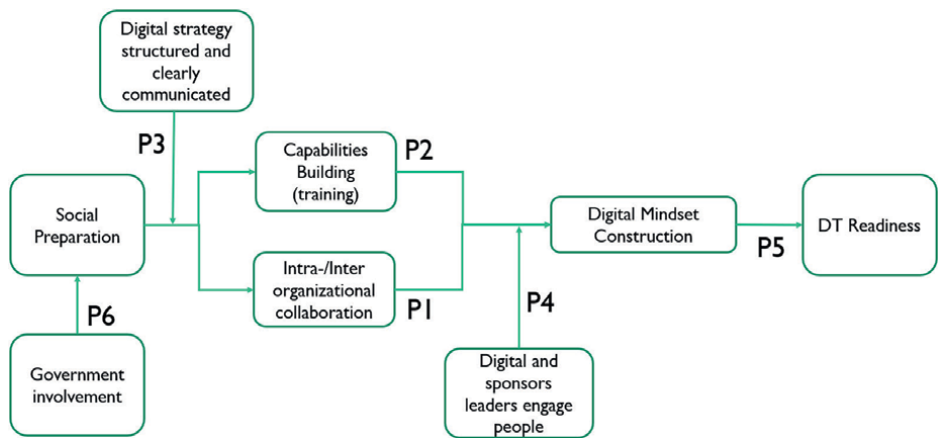


Figure 2.
Micro-organizational aspects for DT readiness.

in facilitating organizational change. The present study highlights the role of management leadership in fostering successful digital projects. The findings emphasize the importance of leadership in cultivating an innovative culture and direction to improve innovative practices and methods, instigating organizational (digital) innovation [82].

The results point out several internal practices, all of which make a DT more likely to succeed. These characteristics fall into some categories: (i) leadership and communication; (ii) capability building for the workforce of the future; (iii) empowering people to work in new ways; (iv) clear digital strategy for all; (v) external networking or partnerships building; (vi) cross-functional team's work. These categories suggest where and how manufactures can start to improve their chances of successfully making digital changes to their business.

Regarding P1, for all cases, in digital context, it is better to collaborate with partners by developing relationship networks with external parties than to compete alone. The web environment is collaborative: as an evolving communication platform, gave rise to new patterns of social interaction that led to the birth of a true digital culture. As for P2, the cases highlighted that to increase effectiveness on digital journey, companies need to reimagine their workplace. The implications of digitalization for the workforce are significant, and companies need to invest in training and competency management for different skills and capabilities. Whether or not the organization has already started its DT, it is important for manufactures to think critically on the ways in which digital solutions can affect their business, in the short and long term, and the capabilities they need to stay current. Developing digital skills throughout the organization—a fundamental action for traditional transformations—is one of the most important factors for success in a digital change effort. Also, practices offer leadership development programs focused on cross-functional teams; identifies skills required to deliver smart business products and processes; offers multisession learning programs or events to develop employees' knowledge; and train on new behaviors and mindsets.

Regarding P3, all cases highlighted the importance of establish clear digital targets, such as: clear communication of timeline for implementing digital projects; goals for new digital solutions; how digitalization will change the business strategy.

Capabilities building as well as collaborative webs occur following strategic paths. Moreover, there is a need to focus on efforts to raise awareness and convince employees on the benefits of DT. Therefore, the presence of digital sponsors and the involvement of engaging leaders is crucial for the construction of a digital mindset (P4). To cultivate a pro digital environment, committed leadership is needed, with the ability to (re)learn, adapt, and challenge their own successful conceptual mindsets [41, 92]. A clear communication is critical during a digital journey. More specifically, one key to success is communicating a change story, which assists employees understand where the company is headed, why it is changing, and why digital changes are important. Another key is digital leaders instigating a sense of urgency for making the transformation's changes within their teams.

As for P5, for manufactures to achieve a digital mindset, it is also necessary to adopt a collaborative, open mindset that goes beyond company boundaries, involving exchanges of information and knowledge with a diversity of partners [7]. Therefore, companies that remain confined in functional silos will not be able to achieve the integration between functional processes, people and systems that is one of the basis to realizing the benefits of DT. One key behavioral change to (digital) transformation success is establishing practices related to working in new

ways, such as continuous learning, open work environments, empowering workers ensuring that people play parts in reinforcing change; and giving employees a say on where digitalization could and should be adopted in the business factory. Therefore, even with the need for a strategic plan, the digital journey needs to be participatory from the beginning.

Lastly, concerning P6, as for the governmental aspects, there is still a lack of strategies for the Brazilian industry development, which is essential for the competitiveness of the industry, being these initiatives limited by timid direct and indirect government incentives [32]. The government has an important role in DT leverage. Both countries Brazil and UK mention about barriers and limits imposed by the State. This support should not be restricted to technologies development but also the development of professionals for the future.

In view of the findings of this research and comparing them with findings from recent empirical literature, this article presents the results of the theoretical propositions (**Table 1**) and summarizes the main findings of the cases investigated that support and characterize each proposition. Additionally, as a motivation for future research, each of these propositions should be better investigated qualitatively or quantitatively in other organizational contexts to support (or not) the findings of this research (**Table 3**).

#	Results	Highlights from the case studies
P1	Supported in case studies	A. General aspects: 1. The companies have been motivating their workforce to engage with external partners for jointly digital innovation; 2. Workforce ecosystem can help firms to prepare digitally; 3. On digital workforce, companies seek to make their human resources more transactional and more inter- and intra-collaborative; 4. Companies have motivated their workforce to engage with external partners; 5. Digital Labs helping the factories to engage with partnerships and to manage inter-collaborations with right partners; 6. It is relevant to participate in innovation hubs or use Digital Labs seen as physical spaces for inter-collaboration that foster co-innovation practices, opening doors for R&D of digital solutions together.
P2	Supported in case studies	A. General: 1. Training for the development of digital skills positively influences the construction of a pro-digital innovation mindset; 2. With digital technologies quickly becoming a commodity, the journey to organizational digitalization depends on the intensity of qualification of people and their work profile, who need to improve not only technological capabilities (hard skills), but also more subjective competences (soft skills); 3. One of the first critical step on digital readiness is to develop clear digital workforce strategy to determine the digital skills and capabilities the firm currently has and will need to meet their future goals; B. Country Specifics: BR cases have been investing in receiving other companies to present and discuss their 'best practices' or host technology conferences or hackathons.
P3	Supported in case studies	A. General: 1. Establishing and communicating a structured and planned digital strategy for everyone is crucial; 2. DT will only happen if managers build and prioritize a digital strategy that needs to be aligned with the business strategy; 3. No "one size fits all": the digital journey needs to be customized; 4. The strategy for DT and for i4.0 is top-down in British cases. The digital project approval for obtaining a budget is centralized at the respective headquarters; 5. A transparent "digital roadmap" supports the implementation of digital solutions in a more structured and quick way; B. Country Specifics: Brazil: Although the planning of a digital strategy is relevant, the digital trajectory is also characterized by "learning by doing"; UK: 1. DT's strategy involves business innovation based on advanced data analysis, involving the servitization of information based on a greater connection with customers; 2. Having a more fluid, flexible, organic strategy, and being open to adjustments is preferable; it is linked with the use of an agile mindset.

#	Results	Highlights from the case studies
P4	Supported in case studies	A. General: 1. Leaders should engage and empower people so they can contribute and be part of DT; 2. The effectiveness of the DT journey to enterprise digitization depends on how digital leaders and sponsors drive and communicate digital change; B. Country Specifics: UK: Digital success is more likely when leaders and top managers who are engaged in DT encourage employees to experiment with new ideas—e.g. through rapid prototyping and allowing employees to learn from their failures.
P5	Supported in case studies	A. General: 1. People perceived as the real digital change protagonists; 2. New methods (e.g.: Scrum, Agile) and attitudes (e.g.: Critical Thinking) when managing digital innovation projects; 3. Investments and dedication in experimental technological projects; 4. Acceptance of mistakes and risks in digital projects because they are new and generate uncertainty; 5. Open and flexible mind to engage in intra and inter collaborations; 6. When making an internal diagnosis, companies recognize they need to innovate digitally to be competitive and this innovation is facilitated by the involvement with external actors; B. Country Specifics: UK: DT require cultural changes such as calculated risk and failures taking, increased collaborations, and customer centricity (offer digital servitization).
P6	Supported in case studies	A. General: 1. Lack of strategies for the Brazilian industry development, which is essential for the competitiveness of the industry, being these initiatives limited by timid direct and indirect government incentives; 2. Lack of integration between Brazilian government entities to put into action the agenda for DT, and the strategic plan for making digital projects feasible in manufacturing; 3. Unlike Brazil, UK government created strong instruments that integrate with each other to serve as catalysts for innovation. 4. Brazil is lagging behind regarding public efforts, with government actions still timid, dispersed and without alignment; 5. UK has a government that is more committed and willing to invest much more to boost digital factory innovation; 6. In UK cases, for greater competitiveness via digital innovation, the government, industrial sector, academia and R&D centers work together; 7. British government chose to support collaboration between actors as a way to accelerate DT in companies; 8. UK government guides manufacturers to place digitalization at the center of the current industrial strategy; 9. Fragmented efforts and little coordination for the effective dissemination of digital technologies represents the poor dedication of the Brazilian government; 10. In the United Kingdom, digital technologies are the key to strengthening the economy, and particularly the industry creating opportunities for new, more interesting and well-paid jobs; 11. UK government is dedicated to creating an ecosystem, on a national scale in the future, for DT, by strengthening approximations between universities with their R&D centers, and the British productive sector; 12. The government's role is to be a financing and integrating agent, facilitating connections between British companies, aligning the interests of different actors around a common language and objective.

Table 3.
Research propositions validation.

6. Final considerations

The study investigated readiness factors from a social perspective of large manufacturers to operationalize digital innovation practices. The cases highlighted that DT is linked to the demands of a new reality and the need for radical changes in the way organizations function and are structured. DT is a global concern and is accelerating around the world. Before organizations adopt digital solutions, they need to prepare themselves to receive the technological change that evidently brings strong social impacts.

6.1 Managerial contributions

The mapped social factors can give the manufacturers, practitioners, policy makers, and future researchers a guideline for further research and applicability in

manufacturing DT, whether in industrialized or developing countries. Social findings for DT journey were highlighted by the cases, such as (1) clearly communicating the digital strategy and focusing the efforts on people to develop a digital mindset and (2) technology is not destiny. It is human actions that will determine the way to work; (3) motivate the workforce to engage with intra- and also inter-collaborations to create a sense of urgency for digital change, and to accelerate knowledge in digital technologies R&D suitable for the company's reality; (4) innovate quickly, gradually, and humbly, which motivates the need for collaborations. It could be also inferred from findings that, manufactures need to learn from the future, and not be afraid to learn by doing. Rather than focusing on the past for insights, organizations need to increasingly look forward. This research, in a broader sense, stimulate forward-looking debate regarding how researchers and practitioners should proceed given the research findings.

Although DT is a buzzword, few organizations understand the concept, its social preparatory factors, social advantages, and challenges in detail. It is necessary to invest time and money in strategic and socio-managerial preparation. This transformation is human, and users of technologies are protagonists of this change. It is needed to open to external actors, to fortify cross-functional teams, promote suitable partnerships, instigate the development of capabilities, encourage experiments and new ideas and create a culture that is more tolerant of mistakes. Such aspects can be facilitated by using digital leaders and sponsors that can also help accelerate investments in digital projects. This paper also discussed the potential effects of digital technologies on the workforce and employment. The DT effects on employment can be positive, depending on many other factors discussed in the study.

Firms should strive to develop digital readiness and ensure that their systems, equipment and people are ready for the challenges that digitalization present. This highlights the importance of cultivating a digitally conducive environment within firms to capitalize on the expertise of digitally literate managers.

The research highlights the importance of investing in DL, or more broadly, in digital skills development. Leaders or top managers need to prioritize initiatives that aim to improve the digital skills not only of executives and managers, but also of other employees at all levels of the organization. Continuously renewing skills by complementing them with digital ones and fostering a mindset of constant learning and change requires the provision of educational practices such as mentoring options and seminars.

By fostering a culture of collaboration, empowerment and innovation, companies can harness the collective intelligence and creativity of their workforce to navigate the complexities of digitalization and explore emerging opportunities. Furthermore, policymakers and industry associations can play a critical role in supporting digital initiatives by providing funding and resources to facilitate inter-collaborative knowledge sharing and dissemination of best practices among companies. By fostering an enabling environment for a digital innovation ecosystem, such policymakers or industry associations can contribute to the growth and competitiveness of the digital economy at a regional or national level.

6.2 Main limitations and suggestions for future research

All the research findings need to respect the realities of nine manufactures of specific industrial segments, and therefore can be no generalizations of the findings. It is also a limitation not to have collected perceptions from the operational level

employees of the cases, and not to have interviewed the external actors that collaborate in digital innovation projects in each case. The COVID-19 health crisis came with radical socio-economic impacts. To maintain social distancing, the pandemic has been pushing task automation as much as possible, forcing businesses to go online during lockdown. This article does not address the specific impacts of the pandemic on factories, as data were collected before the pandemic, but rather emphasizes the relevance and effects of the necessary adaptation of companies to digital.

This study discussions accentuate the diversity of research opportunities across different scientific areas. It underlines the need for further research that reaches beyond single disciplines and integrates insights from multiple thematic directions, such as innovation, leadership, dynamic capabilities, organizational ambidexterity, and corporate governance.

Based on the empirical findings (see **Figure 2**), its application in quantitative research (e.g., surveys) and experimental research is also suggested. Another suggestion would be to conduct a survey from a macroeconomic perspective to understand the differences between continental Europe, the United Kingdom, and South American countries regarding the “appetite” or predisposition of manufacturers in these regions to collaborate on digital technological innovation.

It would also be interesting to compare cases between Brazilian factories and manufacturers in other developed countries, such as Germany, Japan, the United States and even other developing countries such as China, which have structured digital industrial policies, thus comparing their digital innovation ecosystems, if any. In addition, it is recommended to investigate how the best practices of these developed countries can contribute to strengthening manufacturers in underdeveloped economies.

Other future qualitative research could explore aspects of intrapreneurial thinking as one of the preparatory social factors for the company to rethink its way of doing business in the digital age. Additionally, some aspects inherent to humans (e.g., perception, social intelligence, and creativity) are skills that machines do not (yet) master. Professions that work with high repetition in tasks and search for patterns are the most threatened by technologies. Thus, a balanced partnership between humans and robots will result in a cooperative environment and complementary skills. In this context, there is a need for future research to better understand the profile of the “professional 4.0”. What are the skills, or how is the blend between soft and hard skills, to train and prepare these professionals to meet the new reality faced by manufacturers? To this end, it would be interesting to explore whether and how higher education institutions, which are responsible for training competent people for the market, are renovating their schools to train such professionals.

Lastly, an interesting and necessary suggestion for further research would be, based on the results of this study and possibly other cases involving large-scale manufacturers in the same economic sectors analyzed, to propose a maturity model to assess the stage of each company on its path toward the digitalization of its business. Considering the vast dimension and difficulties in predicting the impact resulting from the adoption of digital technologies in a company, it is necessary to propose a model to measure the degree of preparation of manufacturers regarding the assertive implementation of digital solutions and their implications for their business.

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Innovating R&D Practices to Adapt Swiftly to Market Trends: Insights from the Food and Beverage Industry

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Abstract

Dynamics in the food and beverage (F&B) industry have become increasingly complex and abrupt because of consumer expectations regarding health issues, nutrition facts, functionality, sensory attributes, sustainability, and lifestyles. Companies are in a constant state of experimentation, under pressure from a post-pandemic business environment to accelerate product innovation. In this context, Research & Development (R&D) processes have changed over the past years to accelerate new product launches and display a high probability of success through a deep understanding of product design, formulation, raw materials, processing, packaging, storage, distribution, shelf life, and regulatory restrictions. This chapter tackles recent and innovative R&D practices in the F&B industry from a practical perspective and a graphic model based on innovation capabilities, innovation activities, and product innovation. The results illustrate the importance of considering the technical factors involved in formulation and production and market pull requirements to adapt swiftly to market trends and even fads that consumers demand.

Keywords: R&D practices, market trends, innovation activities and capabilities, F&B industry, Tree of R&D

1. Introduction

The food and beverage (F&B) industry faces significant challenges due to rapidly evolving consumer expectations and market dynamics. Today's consumers not only are looking for products that satisfy their sensory and nutritional needs but also demand attributes such as functionality, sustainability, and compliance with health and wellness standards [1]. The complexity and speed of these changes require companies in the F&B sector to quickly adapt their research and development (R&D) practices to remain competitive.

In this context, innovation becomes a crucial factor for the success of companies in the food industry. Innovating involves not only the creation of new products but also

the improvement of processes, the adoption of new technologies, and the integration of sustainable practices [2]. Companies are pressured to accelerate their innovation processes to respond to a post-pandemic environment that demands speed and effectiveness in launching new products [3]. The COVID-19 pandemic has had a profound impact on the industry, accelerating certain changes in R&D practices; companies were forced to reconsider their product development strategies, adopting more agile and flexible approaches to deal with supply chain disruptions and market volatility [4]. Thus, the ability to swiftly adapt to market trends and fads can determine the success or failure of a product in today's competitive landscape. The pandemic has highlighted the importance of resilience and agility in R&D processes. Companies that managed to pivot quickly to the production of essential products and meet new market demands emerged stronger. This included the development of products with health benefits, such as functional foods that enhance immunity, and products with a long shelf life that responded to consumers' storage needs during lockdowns [5].

The dynamics of the F&B industry are also marked by a paradox: the need to continually innovate to grab the consumer's attention and, at the same time, ensure the profitability and viability of the products launched into the market. The effective management of R&D processes must balance these objectives, considering technical, market, and regulatory factors [6]. Companies must be able to identify specific market niches and adapt their innovation strategies to maximize profitability without compromising product quality and safety [7]. Moreover, the competitive food industry demands effective integration of innovation capabilities. The standout companies are those that can merge their technical expertise with a thorough understanding of market trends; this involves not only developing and producing new products but also focusing on their packaging, distribution, and marketing [8]. In addition, the adoption of green technologies and sustainable practices has become significantly important, reflecting a change in consumer preferences towards more environmentally friendly and healthier products.

This chapter is relevant to a wide audience. It can be very useful for R&D practitioners and professionals seeking to improve their practices and strategies in the food and beverage industry. Also, it is valuable for managers and executives who want to better understand how innovation can boost their companies' competitiveness and profitability. Even curious consumers who want to know how the products they consume on a daily basis are developed will find this chapter a rich source of information and perspectives on innovation in this industry. The chapter is structured as follows: First, an analysis of the context and current trends in the food and beverage industry is presented, providing economic data and examples of the most notable consumer trends. Next, traditional and emerging R&D practices in the industry are explored, highlighting innovation models such as Stage-Gate and the concept of open innovation. Subsequently, innovation capabilities, innovative activities, and the innovations themselves are discussed in detail, focusing on how companies can manage these processes effectively. Lastly, it introduces a proposed model, "The Tree of R&D," which offers a conceptual compass to guide future research and practice in innovation management.

2. The food and beverage business: context and trends

2.1 The importance and impact of the F&B industry

The F&B industry is one of the most dynamic and critical industries worldwide and constitutes a significant part of the global economy. In 2022, the global food

market generated a total revenue of approximately US\$8.67 trillion, and it is estimated that by 2024, this revenue will reach US\$9.12 trillion [9]. This growth reflects a compound annual growth rate (CAGR) of 6.47% between 2024 and 2029, driven by the growing demand for high-quality and innovative food products [9]. It is estimated that by 2029, global food production will reach 3087 million kilograms [9] as a response to the needs of a growing global population and evolving consumer preferences for healthier and more sustainable foods.

The F&B industry's economic impact is measured not just in terms of revenue and production but also in terms of employment and economic development. According to the United Nations Food and Agriculture Organization (FAO), the food industry directly and indirectly employs at least half a billion people worldwide, from agricultural production to distribution and retail [10]. In many countries, this industry is a key pillar of the economy, making significant contributions to the gross domestic product (GDP) and rural development. Furthermore, the F&B industry is a major driver of innovation. Companies in this sector constantly invest in R&D to create products that align with new market trends and meet consumer demands for more nutritious, safe, and sustainable foods [5]. In 2022, the global industry is estimated to have invested approximately \$2.476 trillion in R&D activities, marking a 5.45% increase from the \$2.348 trillion invested in 2021. A significant part of this increase, 81.6% or \$104 billion, is attributed to annual increases in R&D investment in the top ten countries, from the United States to Brazil. These investments not only enhance the competitiveness of companies but also contribute to economic growth and job creation [11].

The F&B industry comprises various key players and relevant stakeholders. This includes raw material producers, technology providers, food manufacturers, distributors, and retailers, all constantly seeking new ways to create or derive value through innovation (see **Figure 1**). The industry's value chain is intricate and requires effective management to ensure the quality and safety of food products. Unlike other traditional sectors, the F&B industry demonstrates a more apparent influence of supplier bargaining power and monopolies in certain areas, which can significantly impact market dynamics [2].

While considered traditional, the food and beverage industry is being reshaped by emerging trends in food consumption. Companies that quickly adapt to these changes and offer innovative products have a significant competitive advantage [1]. Understanding the business context and market trends is a determinant for companies aiming to maintain success in this industry. In the following section, we will delve into the business context and trends of the F&B industry, analyzing the forces driving these changes and exploring how companies can strategically adapt to capitalize on emerging opportunities.

2.2 Key trends in the F&B industry

The F&B industry is dynamic worldwide, with companies constantly striving to meet the population's nutritional demands and habits. Today's consumers seek organic food, vegetarian and vegan alternatives with high nutritional value, and new flavor experiences. Moreover, newer generations are more discerning and seek innovative features in products and packaging, functional ingredients that promote health, a commitment from companies to environmental responsibility, and fair treatment to the primary suppliers. It is important to note that food consumption and



Figure 1.
Food and beverage industry value chain focused on innovation. Source: The authors.

market dynamics are evolving towards a consequential transition to more sustainable food production and processing technologies, aligning with the pressures to shift towards a greener food economy.

In response to this environment, companies in F&B develop their competitive strategy based on their philosophy and the conditions and demands of the market in which they operate. Some firms specialize their products to remain global leaders in their categories, while others seek diversification and operate in separate business units to stay agile in decision-making. More and more companies are aligning themselves with global and local market trends to propose a product innovation strategy. This involves deploying innovative activities to design, develop, prepare, conserve, and market their new proposals [12].

The trends in food and beverage consumption observed internationally are varied; some respond to healthy lifestyles that accompany routines such as constant exercise, eating at specific times, getting 8 hours of sleep, and avoiding tobacco and alcohol consumption; others join initiatives and activists such as animal and environmental care and well-being. The following **Table 1** describes some of these trends, as well as their drivers and benefits, and some examples in this regard:

Irrespective of the trend, the appearance, aroma, taste, and consumption experience of food and beverages are essential for product success on the shelf and gaining consumer loyalty. Companies' ability to remain relevant in such a demanding market relies heavily on innovation. Innovation in the food and beverage industry is not just about creating new products but also about continually improving processes, adopting new technologies, and integrating sustainable practices [13, 14]. In the next section, we will explore how this industry innovates. We will highlight the innovation models and R&D best practices that allow companies to adapt and thrive in such a competitive and ever-changing environment.

Lifestyles		
Consumption trend	Driver/profit	Examples
Adoption of vegetarian and vegan diets	Solidarity towards an awareness of social and environmental improvement	Salads prepared from fresh vegetables and drinks made with plant-based ingredients (cereals, legumes, and seeds)
Preference for natural, fresh, organic, and minimally processed products	Foods with high nutritional value that promote mental and emotional health	Increasing consumption of teas and infusions
Reduction in the consumption of beef and its replacement with chicken and fish	Reduction in the content of saturated fats and promoting the consumption of proteins with high nutritional value	Replacement of dishes typically made with beef with the meat of another species like chicken, fish, and others
Health maintenance		
Consumption trend	Driver/profit	Examples
Food and drinks that contain soluble and insoluble fiber in their formulation	The first improves the functioning of the large intestine, while the second is a prebiotic that promotes microbiota and boosts the immune system	Cereals made from whole grains and fermented drinks that promote a beneficial microbiota for the consumer
Probiotics	Improved quality of life	Whipped yogurt and fermented foods with lactic acid bacteria help intestinal transit
Food and drinks that naturally contain beneficial compounds for metabolic maintenance and act as nutraceuticals	Reduction of oxidative stress	Natural antioxidants such as anthocyanins, catechins, and resveratrol. Omega 3 and 6 fatty acids found in salmon and flaxseed
Food and drinks low in some nutrients whose excessive consumption is unhealthy	Reduction in the intake of saturated fats, trans fats, cholesterol, and foods and beverages with high sugar and sodium content	Vegetable oils like canola, safflower, avocado, and flaxseed with high amounts of polyunsaturated fatty acids (PUFA)
Food without additives of synthetic origin	Elimination or reduction of synthetic molecules such as antioxidants, sulfites, colorings, preservatives, sweeteners, and flavors	100% natural cooking oils with natural antioxidants. Replacing artificial colors and flavors with natural ones
Drinks reduced in their alcohol level	Moderation without sacrificing the pleasure of tasting alcohol	Increase in the consumption of drinks whose alcohol content is less than 5% (Hard Seltzers)
Fortified foods	Addition of vitamins (A, B complex, C, D, E, and K) and minerals (calcium, phosphorus, iron, magnesium, potassium, and zinc)	Infant formula milk, milk modifiers, cereals from whole grains, and fortified drinks, juices, and nectars.
<i>Source: The authors.</i>		

Table 1.
Current consumption trends in the F&B industry.

3. Innovation and R&D in the F&B industry

3.1 The background for innovation in the F&B sector

Innovation is widely recognized as an economic force that transforms the well-being of societies. It is well-known that innovation determines the foundations for new businesses, employment creation, and increased productivity [8]. Since the 1930s, there have been different ways of classifying innovations according to Schumpeter's theories. Schumpeter identified five types of innovations [15]: The introduction of a new product or a qualitative change in an existing product, a new manufacturing process, the opening of a new market, the development of new sources of raw materials, and changes in industrial organization. Currently, the fourth edition of the OSLO Manual [16] distinguishes two main types of innovations: product innovations and business process innovations. Product innovations can be goods or services; business process innovations can occur in the production of goods or services, distribution and logistics, marketing and sales, information and communications systems, administration and management, and the development processes of products or businesses.

From the point of view of their field of action or the field in which they are implemented, innovations can be made in terms of the product, in the process, in marketing, or in the organization [17]. From an operational point of view, the Innovation Radar shows twelve dimensions in which business innovation can be manifested and the relationship between them: product and service offering, platform, solutions, customers, customer experiences, the capture of value, processes, organization, supply chain, presence, networking, and brand [18]. Given the array of possibilities in terms of innovation, each firm can implement one or more depending on their interests.

In any case, the innovative efforts of organizations respond to the need to improve their competitive position and therefore must be aligned with their business strategy. In this sense, it is convenient to recognize that innovation is a systemic phenomenon in which all business dimensions must be considered for success [7]. Because of the remarkable dynamism of the food and beverage manufacturing industry, along international supply chains—from the production of raw materials to points of sale—emerging business model strategies can be identified based on innovations in the value proposition, innovations in value creation processes, and innovations in processes for value delivery [19].

However, in the F&B sector, innovation in product development occupies an important place among the possibilities of innovation. Product-focused innovation is an attractive path for some companies in the manufacturing sector and has become an essential part of their competitive strategy [12]. For these companies, adequate management of the R&D processes is crucial, from the productive conception of the idea to the positioning of the product in the market. Developing products quickly and that achieve consumer satisfaction is imperative in the sector. The following section explains the models used to conduct R&D in the F&B industry.

3.2 Innovation and R&D management models in the F&B industry

Innovation in the F&B industry has evolved significantly. Innovation models are necessary for understanding how new ideas are effectively developed and brought

Wave of innovation	Main authors	Main focus	Decade of popularity
Closed Innovation	Thomas Edison, Joseph Schumpeter	Innovation based on internal R&D, secrecy, and total control	1900s–1950s
Stage Innovation	Robert G. Cooper	Product development through sequential stages	1960s–1980s
Networked Innovation	Henry Chesbrough	Open Innovation, external and internal collaboration	1990s–present
Systemic Innovation	Eric von Hippel, Michael E. Porter	Innovation based on systems and value chains, co-creation with customers and suppliers	2000s–present

Source: The authors.

Table 2.
Evolution of the different waves of innovation management models.

to market. These models offer structured frameworks that help companies manage risk, optimize resources, and improve productivity. Although innovation models may vary depending on the context, such as country, culture, industry, and time, it has been observed that specific approaches are widely accepted by both the scientific community and industry professionals. The main waves of innovation models are presented below (see **Table 2**) along with their most prominent authors, the focus of each model, and the decades in which they were most popular:

A brief description of the models is presented as follows:

- *Closed innovation*: In the first decades of the twentieth century, innovation was characterized as a closed process, where companies completely controlled their R&D efforts. Thomas Edison and Joseph Schumpeter were among the pioneers in this wave, emphasizing the importance of invention and secrecy in business success [20].
- *Innovation by stages*: As global competition increased, the need arose to structure innovation processes. Robert G. Cooper introduced the Stage-Gate model, which structures new product development into a series of sequential stages, from conception to launch [21]. This model allows companies to manage risk and resources more efficiently.
- *Network innovation*: With the advent of globalization and information technologies, open innovation gained popularity. Henry Chesbrough popularized this concept, arguing that companies can and should use internal and external ideas to advance their technologies [22]. This approach encourages collaboration between organizations and co-creation with customers and other stakeholders.
- *Systemic innovation*: Today, innovation is seen as a systemic phenomenon. Eric von Hippel and Michael E. Porter have highlighted the importance of value chains and co-creation. Systemic innovation involves multiple actors and considers sustainability and environmental impact [23].

In the next section, we will delve into the Stage-Gate Model, which is widely used in R&D in the F&B sector.

3.3 Stage-gate: A model that endures

Innovation in the F&B industry has evolved significantly. Although different ways to innovate in this industry have been tested, such as open innovation, collaborative innovation models, and co-creation, the Stage-Gate model remains the most popular and widely adopted. This model provides a clear and methodological structure vital for managing the complexity of product development in the F&B industry. The popularity of the Stage-Gate model is due to several reasons.

First, the Stage-Gate model allows for a systematic and rigorous evaluation of each stage of product development, which minimizes risks and ensures that only the products with the most significant potential for success reach the market [24]. This structured approach is essential in the F&B industry, where product quality and safety are critical. Second, the model offers greater transparency and control over product development, facilitating resource management and informed decision-making [24]. The “gates” methodology allows companies to review and evaluate progress at critical points, helping to identify and resolve problems before they become major obstacles. In addition, studies have shown that companies that implement the Stage-Gate model tend to perform better in terms of speed to market and success of new products [13]. This efficiency is crucial in a highly competitive environment like the F&B industry, where consumer demands and market trends change rapidly.

The Stage-Gate model comprises several stages, each followed by a “gate” where the results are evaluated before moving on to the next phase (see **Figure 2**). The main stages include:

1. *Scoping*: Generation of ideas and opportunities
2. *Business case*: Preliminary evaluation and project planning
3. *Product design*: Detailed design, testing, and prototypes
4. *Testing/validation*: Market evaluation and pilot tests
5. *Product launch*: Marketing and mass production

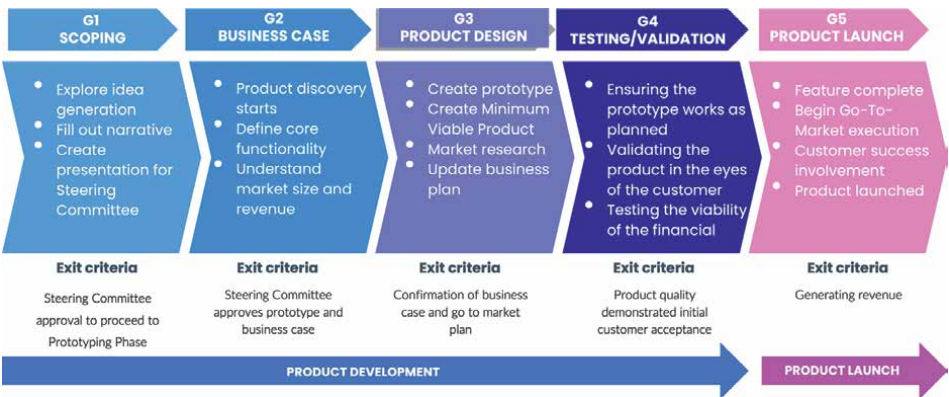


Figure 2.
Stage-gate model. Source: Adapted from Cooper [24].

This sequential approach allows companies to minimize risks and optimize resources, ensuring that only products with a high potential for success reach the market [25]. Although open innovation and other collaborative models have brought significant benefits, the Stage-Gate model remains the predominant trend in food and beverage industry R&D due to its clear and well-defined structure, its ability to manage complexity, and its proven effectiveness in the commercialization of new products.

4. Present R&D practices in the F&B industry

The R&D function in the F&B industry faces the enormous challenge of modifying, enhancing, and developing food. The universe of products in the food industry is immense and will continue to grow based on the diversification needs set by consumers. A detailed classification of different foods could be an unlimited task given their wide variety and possible criteria for their categorization. As an example, we display the following classification of the different foods and beverages present in the product portfolio of some global companies:

Food:

- *Vegetable oils and fats*: canola, safflower, corn, olive, soybean oil
- *Dressings and sauces*: ketchup, mustard, blue cheese, ranch, Caesar
- *Cereals*: extruded, granola, flakes
- *Condiments*: spices, aromatic herbs, seasonings, chili peppers
- *Confectionery*: chocolates, sweets, chewing gum
- *Egg and egg products*: chicken egg, quail egg, egg whites, dehydrated egg
- *Pasta and soups*: broths, consommé, Italian pasta
- *Fish and seafood*: tuna, sea bass, salmon, sardine, shrimp, prawn
- *Desserts*: jelly, custard, pudding
- *Meat products*: ham, pate, pepperoni, sausages
- *Foods derived from fruits and preserves*: jellies and jams
- *Bakery and baked goods*: cookies, bread, pancakes, cake, cereal bars
- *Dairy products*: cream, butter, mousse, cheese, yogurt
- *Seeds and nuts*: almond, hazelnut, pecans, cashews, walnuts, peanut, macadamia
- *Snacks*: chips, extruded, baked, fried, popcorn

Nonalcoholic beverages:

- *Juices or with fruit pulp*: juices, nectars, cocktails
- Sparkling and still waters, flavored and natural
- Energizing and isotonic beverages
- *Dairy*: milk, kefir, yogurt
- Coffee, infusions, and teas
- Soft drinks

Given the wide variety and complexity of the business offerings in the food and beverage industry, the main purpose of R&D management is to oversee the processes for effectively and efficiently developing food alternatives that offer advantages to consumers and improve companies' profitability and viability. The outcomes from the R&D processes have diverse implications across all business areas. Thus, the management of the R&D process in the food industry covers a wide field of action: the development and processing of new raw materials to obtain innovative products, the development of methods and technologies to save resources, the development of effective technologies to increase safety—notably in infant foods, the development of technologies for functional foods with an adequate composition to improve the effectiveness of pathology treatments, and the development of scientific knowledge applied through complex technologies for the processing of raw materials to reduce the environmental impact [3]. It is worth highlighting two drivers that are present regardless of the position of the food-producing companies in the value chain: consumer demand and product quality. Particularly for processing companies, new technologies and environmental factors also contribute to the innovation of their business models [2].

The objectives of R&D processes in the food industry for developing new products can be categorized into the following: creation of new products, creation of new recipes, quality improvement, enhancement of nutritional characteristics, and sustainability [6]. Nevertheless, the R&D function in companies is based on essential assumptions such as the impact on the target market, access to food and beverage science and technology, return on investment and profitability, compliance with current regulations, and safety guarantee. In this sense, the areas and departments involved must address questions about a new product launch, such as compliance with current regulations and safety guarantees. In this sense, the functional areas and departments involved must respond to questions about a new product launch:

- Is it compatible with the company's philosophy and organizational structure?
- Is it congruent with the current product portfolio?
- What is the expected market share?
- What is the minimum acceptable profitability of the new product?
- What is the financial risk involved?

- Is there scientific and technological knowledge for development?
- Is the technology for design, development, processing, preservation, and distribution accessible and at hand?
- What controls are required to guarantee the quality and safety of the product?
- What are the main direct and indirect competitors?

Each firm has its processes and methodologies to achieve its R&D objectives. However, it is important to underscore the need to identify the critical path to meet the goals established by senior management on time. It is equally important to integrate a work team with the different areas involved: R&D, Sensory Evaluation, Quality Assurance and Control, Packaging Engineering, Compliance, Finance, Marketing, Sales, Logistics, and Legal. More recently, companies have integrated innovation departments that oversee or are strongly involved in the development of high-impact projects in organizations [12]. One of the biggest challenges is for this interdisciplinary team to work in a coordinated manner. The success of the new product launch heavily relies on the team's ability to work together. Each member's role is significant and their contributions are impactful. It is also common for companies to hire specialist consultants for the development of these new products to integrate innovative capabilities into their processes.

The process to follow for the design and development of a new food or drink involves, at least, the following steps:

1. *Ingredient selection and proportioning*: It is critical to select ingredients that exhibit synergy and avoid any potential antagonistic effects.
2. *Formula definition and prototyping*: This step requires the experimental validation of the prototype through comprehensive physical, chemical, microbiological, and sensory analyses.
3. *Process scaling*: Transitioning the formulation from the laboratory to manufacturing, initially at a pilot plant and subsequently on the production lines.
4. *Sensory evaluation*: This entails the participation of a panel of rigorously trained judges who are tasked with determining the level of acceptance of sensory attributes such as appearance, color, brightness, aroma, flavor, acidity, salinity, pungency, residual flavor, texture, and creaminess, among others.
5. *Packaging selection*: Simultaneously conducted with other steps, this stage aims to identify the most suitable packaging according to the nature and composition of the product, with the goal of providing an optimal barrier for protection while preserving its characteristics, nutritional value, and quality.
6. *Production process establishment*: This pivotal step encompasses the determination of variables and conditions in the process that ensure compliance with the technical specifications and prevailing regulations in each case.
7. *Storage and shelf-life tests*: Essential to ascertain the stability of properties and attributes of the new product throughout its shelf life, requiring storage tests on the finished product.

Even though a perfectly structured process has been established to design a new food or drink, it is always important to continue observing what is happening in the market since consumer demands vary daily. It could be that the original concept for which this development was initiated has to be modified for various reasons, such as changes in the regulatory status of some ingredients and food additives—in 2022, the European Commission banned titanium dioxide as a coloring and clouding agent in foods and beverages [26]—or the negative perception that exists about some ingredient, as is happening today with palm kernel oil due to its high content of saturated fatty acids (81.5%), directly related to cardiovascular diseases and a high content of low-density cholesterol [27].

The R&D team should always have contingency plans to address unforeseen events that may impact the launch of the new product. Also, the R&D department, in collaboration with the commercial and marketing teams, should closely monitor the product's commercial performance; this will enable informed decisions regarding potential reformulations, size adjustments, esthetic modifications to the packaging, or even the potential withdrawal of the product if necessary.

5. A schematic way of understanding food and beverage R&D: the R&D tree

Food and beverage R&D management in the complex post-pandemic business environment faces pressures and challenges to meet the needs of consumers and stakeholders. Therefore, it is convenient to understand the R&D function from a holistic point of view. So, for the systemic management of R&D in F&B companies, it is possible to differentiate three components of the innovation system: innovation capabilities, innovative activities, and innovations. Besides, the elements of the system environment can be divided into sources of knowledge, the competitive environment, the regulatory and normative framework, sources of financing, available operating technologies, and consumption trends [7].

The **Figure 3** illustrates the R&D function schematically and playfully, like a tree. In this analogy, customer expectations along the food chain, regulatory restrictions, trends, and fads are fertile ground for companies to exploit market opportunities. The R&D function is rooted in the innovative capabilities of food science and technology, which allow it to bear the fruits of research and development. There is only a leafy tree with solid roots. The trunk is the realization of the innovative activities of the organizations. Each action carried out in favor of product development—specifically the development and transfer of technologies and alliances with suppliers—will give way to forming branches that bear fruit in the appropriate season.

Finally, the desired innovations or fruits will stem from a trunk nourished by a better understanding of market requirements and regulatory compliance. A powerful sap will give large, healthy, and attractive fruits. The diversity of foliage is variable as it can refer to the product's functionality, to promoting a healthy lifestyle, to a specific consumption trend, or to the delight of the consumer to whom said product is directed and its positioning in the market. Finally, the Tree of R&D in an adequate ecosystem with sufficient water and fertilizer—sources of knowledge, sources of financing, and access to cutting edge technologies—will be able to offer benefits in the form of food and shelter for the population.

Over the next few years, the tree is expected to continue growing and developing, sprouting new branches and with other branches continuing to grow. Consumer

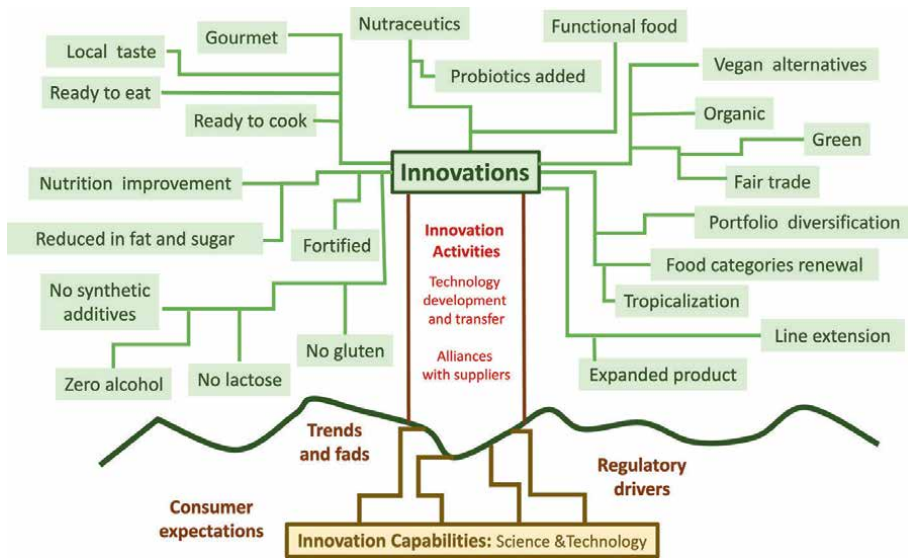


Figure 3.
The R&D tree in the F&B industry. Source: The authors.

needs, regulations, trends, and fads will influence the tree's growth. Companies will work to ensure the tree is strong enough to support the desired healthy fruits for the world's population.

6. Conclusions

The economic and social impact of the F&B industry is significant. It stimulates production and generates income, and it is a major source of employment and economic development. Moreover, this industry is related to the well-being of the global population. Nowadays, the challenging business environment puts pressure on firms to maintain competitiveness. The aim is to deploy innovation strategies focused on consumer security, needs, and expectations.

The performance of R&D in the F&B industry is a significant issue, so it is indispensable for firms to establish solid bases for this function to deliver results and constantly add value to consumers and stakeholders. These bases can depart from theoretical models of innovation and R&D, and thus, it is crucial to emphasize their relevance. For instance, Stage-Gate, Open Innovation, and Systemic Innovation models provide clear and proven methodological structures that help companies manage the complexity of product development processes. Moreover, these models enable a systematic and rigorous evaluation at each stage of product development, thereby minimizing risks and ensuring that only products with the most significant potential for success reach the market.

Aligned with the idea of the usefulness of innovation and R&D models, we proposed a conceptual tool in this chapter that simplifies the complexity of the R&D function in F&B companies. The "R&D Tree" is a playful model that proposes a simple way of understanding the complexity of the R&D function in F&B companies. Managing resources to obtain the most nutritious and delicious fruits requires the use of suitable fertilizers and the gardener's patience; in other words, successful

brand-new products result from a long process of building and exploiting innovation capabilities based on science and technology, appropriate market research, and the effective development of innovation activities. We believe better sector knowledge, regulatory restrictions, and better-applied engineering will yield correct product launches.

Moreover, the branches of the “R&D Tree” deserve much attention since they are the concrete result of the organization’s processes and the consumer’s offer. As in nature, the tree will yield unforeseen branches and sprouts, but we can maintain them in good health. In the coming years, the “R&D Tree” is expected to continue growing and developing, sprouting new branches and influencing the growth of others. In addition, consumer needs, regulations, trends, and fads will influence this growth. Therefore, companies must ensure the tree is strong enough to bear the healthy fruits that the global population demands.

We have previously emphasized that companies that adopt innovative approaches to their R&D practices are better positioned to respond to market demands and outperform their competitors. Aligned with this idea, this chapter has explored the importance of innovation and R&D in this industry, highlighting how these elements are fundamental to remaining competitive and relevant in such a dynamic environment. Adopting green technologies, improving process efficiency, and implementing sustainable practices will be vital to meeting future challenges and seizing emerging opportunities. Collaboration between businesses, consumers, and regulators will be essential to promoting sustainable and balanced development in the industry and ensuring its relevance and continued success. We hope that the ideas presented in this chapter support both practitioners’ and researchers’ overview of the importance of the critical elements in the innovation and R&D process in the F&D industry.

Finally, since we acknowledge that this chapter could be seen as an introductory work for several of the topics presented, we suggest some avenues for future research. For instance, future research could focus on the proposed “R&D Tree,” developing specific case studies in companies recognized for their innovation or those facing substantial challenges. They could also focus on elements of the tree’s roots to establish more suitable innovation capabilities or on the tree trunk, such as innovation activities like technology development and transfer or supplier alliances, linking them to current consumer trends and how companies develop new products, even innovating in other aspects of its value chain. As mentioned, innovation and R&D in the F&B industry are inherently linked to several social and technological megatrends. Therefore, we believe there are numerous opportunities to further explore the captivating subject of R&D in the F&B industry.

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The modern world is changing faster than ever before. Globalization, dynamic technological development, geopolitical instability, changing social expectations and growing ecological awareness are just some of the challenges organizations face in the 21st century. In such an environment, success is no longer the result of a well-planned strategy or efficient operational management. Today, two closely related elements play a key role: strategic management and leadership. This book aims to show how effective leadership interacts with strategic management, creating the foundations for the sustainable development of an organization. We look at how leaders shape the vision of the future, engage teams and transform ideas into specific strategic actions. We also analyze how strategic management supports leadership in achieving goals by analyzing the environment, allocating resources and designing competitive advantages. The book combines a theoretical approach with business practice, presenting contemporary models, tools and examples from the lives of companies and institutions. It is addressed to everyone who wants to better understand the mechanisms behind organizational success in a rapidly changing world.

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