Chapter 2

Comparative Analysis of Innovative Thinking and Artificial Intelligence For Systematic Creativity

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Abstract

In today's competitive environment, businesses struggle to achieve sustainable competitive advantage with traditional approaches that focus solely on reducing costs and increasing operational efficiency. In this context, this study examines innovation from a blue ocean strategy perspective. Innovation is considered a tool that enables businesses to grow through a blue ocean strategy, rather than a red ocean strategy. The study emphasizes the decisive role of innovation in enabling businesses to produce high value-added outputs. Within this framework, a case study is conducted on acquiring innovation skills, applying innovation theory to this purpose. The study demonstrates how innovation skills can be developed through theoretical applications. To better understand the abstract concepts of innovation, a case study using the sand-bicycle metaphor, developed within the framework of the SCAMPER approach, a thinking technique, is employed. Through this metaphor, it is shown that value originates not from physical inputs but from the transformation process achieved through knowledge, technology, and skills. In conclusion, the study suggests that businesses should build their competitive strategies not only on increasing efficiency in existing markets but also on innovation-focused approaches aimed at creating new value areas. In this respect, the study offers a conceptual and theoretical contribution to the innovation literature.

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1. Introduction

Artificial Intelligence (AI) has been very beneficial for getting info and knowledge as steps of science and technology production. In these movements, AI gathers data, and analyzing data with contacts and communication of data sources. It is not at the level of creative thinking yet. This study provides a comparative analysis between AI and a human for creativity and innovation as specific case though both lenses to evaluate their efficiency, depth of insight, and practical applicability. Because the sustainability of life within the socio-economic balance of the globalized world is under serious threat between AI and creative thinking. With globalization and digitalization, the world has become visible and accessible as if it were a village; consequently, value judgments that prioritize the social nature of human beings in competition have gradually been disappearing (Akbas et al., 2016). That's why today, under the prevailing "the strong wins" mentality, rights violations have increased within the framework of the red ocean strategy. Due to this ruthless competition, innovation has become an important subject of public policy in its theoretical, practical, experimental development, and social experimentation stages, and it is particularly regarded as the key to competitiveness (Gokce, 2015).

Innovation is a concept capable of opening every door and, by replacing the red ocean strategy with the blue ocean strategy, enabling access to resources sufficient for everyone. When the key to competition shifts from imitation, provocation, and aggressive confrontation toward genuine stages of innovation, a sustainable world for humanity will become possible (Kim & Mauborgne, 2015).

As is well known, individuals with weak character and insatiable desires often resort to deception and cunning. When the fundamental purposes of human activity to earn a living, ensuring the sustainability of life, and being beneficial (sustainability) are considered (profit, service to society, and sustainability), balance can be achieved if sustainability becomes the ultimate horizon. In other words, when differences are perceived as rich, a world in which culture, cultural diversity, knowledge, science, technology, innovation, development, and sustainability coexist will enable all living beings to live together in balance.

The mindset that frequently uses values to protect personal interests and transforms them into rent-seeking behavior gradually gives way to an approach that listens, speaks, reads, writes, imagines, discovers, and designs-produces. This state of mind forms the very foundation of the blue ocean strategy, which stands in contrast to the bloody competition inherent in the red ocean strategy. Innovative thinking has been very important for future of innovation.

Instead of focusing solely on earning a living and sustaining life, individuals direct their attention toward the broader objective of sustainability being beneficial. Through thoughts nourished by reason, they move toward knowledge-based development. Rather than undermining others in competition, they produce commercially viable outputs such as original designs, formulas, and products through new and innovative ideas (Stiglitz et al., 2009).

Such an understanding respects beliefs and nations and preserves the environmental balance in which plants and animals sustain their lives by organizing cultural activities enriched by the contributions of different cultures. In this way, goodwill and cultural diversity contribute to the construction of a world in which love, peace, and justice prevail for everyone and everything. Otherwise, unchecked ambition where individuals consume only what they themselves produce initially manifests itself in inconsistency and broken promises and ultimately leads to a situation in which one reaps what one sows.

They are pioneering leaders who stand out in communities and society with their humanity and good morals, wishing to benefit humanity; free in thought, original in ideas, and who will bring forth what is good for everything (Northouse, 2021). They are those who embark on a journey of knowledge, seeking to progress through stages that can be summarized as Faith, Islam, Sincerity, Mind, Thinking, Logic, Intelligence, Judgment, Knowledge, Wisdom, and Insight = Perfect Human. They aim to build and revive a blue ocean instead of competition, advancing with new ideas and innovations at every stage. They are not those who use national and spiritual values for personal gain, but those who love their country most with these sensitivities and work hard as a demonstration of this love. Rather than undermining those they perceive as competitors by putting forward various arguments against them while striving to secure the best for themselves, humanity should focus on sowing seeds and producing for the benefit of all living beings. The study proposes that numerous real-life events be examined in a similar manner to create "original designs based on readings of nature and history." It is predicted that by analyzing stories, tales, events, cases, etc., and applying innovation theories to foster innovation skills, the study will, over time, accelerate the creation and revitalization of blue-oceans through innovative entrepreneurship, replacing the red-ocean competitive approach with a blue-ocean strategy.

Today, the widespread accessibility of information and the necessity of coexistence among different cultures are causing individuals to face rapid and multifaceted changes in technological, social, cultural, and economic fields. In this world dominated by constant change and where the learning

process continues uninterrupted, individuals need to possess 21st-century skills to succeed (Bani-Hamad & Abdullah, 2019). These skills are defined as competencies necessary for problem-solving, critically approaching social issues, and achieving success in both professional and social life (Atalay & Boyacı, 2019).

High-tech industrial development zones are defined as special areas that bring together innovative resources to support the development of high-technology sectors, based on policy support and environmental advantages. Globally, high-tech zones have become a preferred development model for many countries and regions in terms of establishing innovation centers, nurturing innovative businesses, building innovation ecosystems, improving innovation performance, and guiding innovation-oriented economic development (Ulutas, 2020).

Learning and innovation skills refer to the mental processes necessary for individuals to adapt to and thrive in the modern work environment (OECD, 2019). While in the past, the storage and retrieval of information for future use was important, the proliferation of tools and technologies that directly guide individuals to readily available information has made learning and innovation skills even more critical (Kirschner and De Bruyckere, 2017). Integrating these skills into education systems is considered essential for effective development in the 21st century. In this context, stakeholders in education are making intensive efforts to ensure that students acquire learning and innovation skills through educational institutions.

Large-scale businesses and innovative and entrepreneurial businesses can operate in the same sector or in different sectors. The relationship between these two actors is too complex to be explained solely within the framework of "capital supply" and "capital demand." In the innovation and development process, the interaction between large businesses and entrepreneurial businesses does not exhibit a zero-sum structure; on the contrary, it is based on mutual value creation (Rossi et al., 2022).

Moore argued that businesses must continuously meet customer needs not only through competitive and collaborative dynamics, but also through innovation. In line with this approach, businesses have moved beyond being isolated industry actors and become part of a broader industrial ecosystem. Through analyses of companies such as Apple, IBM, Ford, and Walmart, Moore demonstrated that core businesses develop unique business ecosystems by creating service, technology, value networks, and generate economic value through these structures (Moore, 1999).

A strong symbiotic relationship exists between large corporations and startups. Examining this interactive symbiosis model between these actors and analyzing its evolution over time offers significant practical contributions and enriches the existing theory of innovation ecosystems (Durusoy, 2024).

Today, organizations are striving to maintain their presence in the global market due to challenges created by factors such as globalization, intense competition, and technological advancements. In this process, organizations are moving away from approaches focused solely on increasing efficiency and differentiating their products or services, and are turning to inimitable resources, especially human capital. Employees are considered the most important resource and asset for every organization; it is stated that organizations that manage their human capital effectively and efficiently are more likely to achieve their goals and ensure sustainable performance (Nafei, 2015).

Organizations today face problems related to talent limitations rather than capital shortages (Kehinde, 2012). Literature indicates that talented employees constitute only 3–5% of the total workforce in an organization (Berger & Berger, 2004). However, talent is considered a fundamental success factor in improving and sustaining organizational performance. The concept of talent encompasses an individual's skills, experience, knowledge, intelligence, and qualifications, as well as their capacity for learning and development (Nafei, 2015).

These regional collaboration networks are organized by public institutions, businesses, universities, research centers, and financial institutions; and share common characteristics such as internal cooperation, embeddedness, openness, stability, and dependence on the environment (McPhilips, 2020). Such regional knowledge networks play a decisive role in the formation of regional economic competitiveness, development potential, and regional advantages by enabling the efficient allocation of heterogeneous knowledge sources and the production of new knowledge.

Today's businesses must make strategic decisions with a more rational and long-term perspective due to increasing competitive pressure, limited resources, and rapidly changing consumer demands. In this context, increased efficiency is considered not only an operational performance indicator but also a strategic competitive tool. However, strategies based on direct competition with rivals in existing markets make it difficult for businesses to achieve sustainable competitive advantage in the long term. At this point, the blue ocean strategy gains importance as an innovative approach that redefines the boundaries of competition. For the blue ocean strategy gains, creative

thinking is necessary and AI have to be developed by innovative thing where some techniques necessary such as SCAMPER, and TRIZ.

2. SCAMPER technique for Creative Ideas

The SCAMPER technique representing Substitute, Combine, Adapt, Modify, Magnify, Minimize, Put to other use, Eliminate, Reverse, and Rearrange is a creative thinking strategy designed to move designers beyond conventional logic and stimulate a wide spectrum of innovative ideas (Boonpracha, 2023). Developed by the American psychologist Robert F. Eberle, SCAMPER functions as an intuitive and user-friendly instructional approach for creativity, widely applied in product development and project enhancement processes (Tharwa & Farid, 2019).

This method offers practical tools that support idea generation, helping individuals overcome the psychological challenge often associated with confronting a "blank page" and enabling a transition toward creative thinking. Through a series of guiding prompts, SCAMPER encourages multidimensional and expansive thinking, thereby strengthening both the range and depth of cognitive engagement. Owing to its clear structure and comprehensive framework, the technique can be easily learned and effectively applied in diverse contexts.

3. AI Driven Innovation Ecosystems

Artificial Intelligence (AI) has become one of the most influential technological developments of the contemporary era, significantly transforming industries and altering competitive dynamics. However, the complexity and high costs associated with the development and implementation of AI technologies, along with uncertainties regarding value generation, indicate that organizations are unlikely to fully exploit AI's capabilities on their own. Consequently, this situation has encouraged the emergence of innovative ecosystems in which various organizations collaborate by combining complementary capabilities, pooling resources, and fostering collective advancement. Furthermore, as a general-purpose technology, AI has the capacity to reshape and disrupt established innovation ecosystems, including fields such as robotics, pharmaceutical development, and bioengineering.

Moore was the first academic to define the conceptual content of the innovation ecosystem, arguing that the interdependence among different actors in the system reflects ecological characteristics. According to Moore, the group organizational ecology created by innovative businesses in accordance with specific rules and orientations constitutes the innovation ecosystem.

The introduction of this concept triggered widespread research in academic circles. Most researchers state that the innovation ecosystem consists of interconnected and interdependent network participants (main businesses, customers, suppliers, complementary innovators, and regulatory bodies), and that these participants also demonstrate absolute dependence on the system environment (Gomes et al., 2018).

The emergence of the innovation ecosystem concept is based on a deepening understanding of the innovation system and the continuous development of innovation practices. Innovation ecosystem theory is a theoretical system that incorporates the fundamental approaches of ecological theory and evolutionary economics theory, and represents the latest stage in the deepened development of innovation systems theory. This theory highlights the dynamic growth characteristics of the innovation system and emphasizes its self-organizing nature (Zeng et al., 2013).

Innovation ecosystems, like biological systems, have evolved from a structure composed of initially randomly selected elements to an ordered and structured community; however, they still retain their essence as an innovation system (Iansiti and Levien, 2004). Feng et al. state that the innovation ecosystem is structurally composed of innovation ecological communities, and these communities consist of populations with different sources of innovation. The innovation ecosystem is defined by features such as nestedness, multi-layeredness, and multiplicity, and is considered a typical complex network system that transcends physical boundaries (Feng and Yang, 2020).

4. Machine Learning Innovation Ecosystems

At present, innovation management organized by human actors remains central to firms and to their ability to renew themselves through exploratory activities. Nevertheless, Artificial Intelligence (AI) can provide forms of support that extend beyond human capabilities (Wamba et al., 2017). Both scholars and industry practitioners have suggested that AI is likely to exert a considerable influence on organizational innovation processes in the future (Bughin et al., 2018). This perspective is reinforced by the rapid progress in AI and machine learning technologies, which signals the potential for significant and far-reaching transformations (Varian, 2018). Despite these developments, the current understanding of the limitations of AI within innovation contexts remains relatively limited. Moreover, applying AI and machine learning to creativity and innovation differs substantially from more established domains in which AI has already replaced conventional managerial functions (Chui et al., 2018).

5. Technological Innovation Efficiency

Technology innovation efficiency is generally defined as the ratio of the outputs obtained in the technology innovation process to the inputs transferred to the process. This ratio is considered an important indicator in evaluating whether resources are allocated effectively and in assessing the innovation capacity of businesses. In the literature, Data Envelopment Analysis (DEA) and Stochastic Frontier Analysis (SFA) are among the most commonly used methods for measuring technology innovation efficiency (Gong et al., 2020).

6. Data Analytics for Talent Management

Data analytics for talent management plays a critical role in fostering a supportive and growth-oriented environment for employees, ensuring that appropriate resources and opportunities are directed toward the right individuals to achieve strategic objectives. The ability to effectively address future organizational challenges significantly influences the sustainability and success of various departments. Nonetheless, risk management efforts cannot succeed without competent personnel. This underscores the importance of talent management practices, which aim to align with the organization's overall strategy by attracting, motivating, developing, and retaining highly skilled and capable employees (Aina & Atan, 2020). Talent represents a pivotal factor in enhancing and sustaining organizational performance, encompassing not only skills, knowledge, and experience but also intelligence, personal competencies, and the capacity for continuous learning and development (Berger, 2004). Research investigating the influence of talent management on organizational outcomes operates on the premise that effective talent management contributes to improved performance by securing and retaining individuals with the requisite abilities (Armstrong & Taylor, 2014).

7. Big Data in Strategic Innovation

Big data refers to extremely large data sets generated and accumulated by organizations, which continue to expand rapidly over time. Due to their scale and complexity, these datasets are difficult to manage using conventional data-processing software. As a result, specialized big data technologies and tools have been developed to support organizations in collecting, processing, and analyzing large volumes of information. These tools enable firms to derive meaningful insights, address complex business challenges, enhance organizational agility and innovation, and support more effective decision-making processes (Alghamdi & Ahag, 2023). Essentially, the objective of big data is to extract intelligence from large datasets in order to identify

opportunities and convert them into competitive business advantages (McAfee et al., 2012).

However, the mere accumulation of large datasets without a clear objective may not provide long-term value (Müller, 2016). To produce meaningful outcomes, big data must be systematically organized and analyzed through appropriate analytical methods, tools, and techniques in order to uncover valuable insights and support effective data visualization (Mikalef et al., 2018). In this regard, big data analytics refers to the process of gathering, examining, and presenting insights derived from large datasets in ways that facilitate actionable knowledge, generate business value, and strengthen competitive advantage (Wamba et al., 2020). Successfully implementing this process requires adequate organizational resources, specialized skills, and well-developed capabilities to ensure effective execution.

8. Methodology

This methodology of the study contributes to innovation literature in several ways. First, it provides a **conceptual integration of productivity, talent management, innovation ecosystems, and Blue Ocean Strategy**, offering a holistic framework for understanding innovation processes.

Second, the study introduces the **sand–bicycle metaphor developed within the SCAMPER framework**, which serves as an analytical tool for explaining how value can emerge from the transformation of ordinary inputs through knowledge and creativity.

Third, the study contributes methodologically by demonstrating how **creative thinking techniques can be used as explanatory models in innovative research**.

Finally, the study highlights the strategic importance of **human capital and talent management** in innovation ecosystems and emphasizes that sustainable competitive advantage depends on knowledge-based transformation rather than physical resources alone.

10. Competition and Productivity in Businesses

In the context of businesses, productivity means minimizing costs, using resources effectively and rationally, and optimizing business processes. High levels of productivity not only provide businesses with an advantage in price competition but also strengthen other competitive elements such as quality, flexibility, and service level (Oren, 2016). While increased productivity has a profitability-enhancing effect in the short term, it plays a supportive role in the

innovation capacity and investment potential of businesses in the long term. In this context, productivity is of strategic importance in achieving sustainable competitive advantage. This requires the development of innovation skills and a blue ocean strategy.

The Blue Ocean Strategy was introduced to literature by Kim and Mauborgne (2005). The authors defined traditional competitive environments as "red oceans," arguing that intensified competition in these environments leads to decreased profitability. The Blue Ocean Strategy, however, aims to render competition irrelevant by creating new areas of demand and simultaneously reduce costs and increase customer value through value innovation. The Blue Ocean approach prevents businesses from focusing solely on existing competitors; it also encourages them to explore potential demand and redefine market boundaries. In this context, Blue Ocean strategies offer businesses the opportunity to gain a sustainable and long-term competitive advantage.

Productivity enhancement and the blue ocean strategy are considered two complementary strategic elements. Businesses with efficient processes can allocate more resources to innovation activities and thus increase their capacity to create a blue ocean. On the other hand, new business models developed within the framework of blue ocean strategies contribute to further increases in the productivity levels of businesses. This relationship is observed more clearly in sectors with intensive technological innovations; digital transformation processes provide businesses with both increased productivity and the opportunity to develop completely new value propositions (Yakar and Tasliyan, 2025).

The concept of value innovation forms the basis of the blue ocean strategy and explains the relationship between efficiency and innovation. Kim and Mauborgne (2015) showed that in successful blue ocean examples, businesses create new areas of benefit for the customer by eliminating unnecessary cost elements. This approach demonstrates that efficiency is not only a tool for cost reduction but also an element that supports strategic innovation.

In the literature focusing on technology and digital transformation, the role of increased productivity in creating a blue ocean is becoming more prominent. Brynjolfsson and McAfee (2014) state that digital technologies increase the productivity of businesses while simultaneously enabling the emergence of new business models. This reveals that when increased productivity is integrated with strategic innovation, it transforms into a competitive advantage.

In conclusion, the literature shows that productivity increases are necessary for competitive advantage but not sufficient on their own; sustainable value can

be created when supported by innovative approaches such as the blue ocean strategy. This study, building upon this literature, examines the complementary relationship between productivity and the blue ocean strategy within a holistic framework.

11. Productivity and Organizational Performance Through Talent

The concept of "talent" is considered the most valuable component of human capital and is treated as a strategic resource in modern management literature (Barkun et al., 2020). In literature, talent management is defined as the process of selecting, developing, motivating, and retaining employees, and it is frequently emphasized that these processes increase employee productivity and organizational performance. Various studies show that talent management practices have positive effects on employee performance and overall productivity. Integrating management into organizational strategies not only increases efficiency but also provides a sustainable competitive advantage.

The literature contains studies examining the relationship between talent management and productivity in various sectors (healthcare, manufacturing, services, etc.); however, most of these studies are Western-centric, and cultural differences have been addressed to a limited extent. While previous research has shown a significant relationship between talent management and organizational performance (Stahl et al., 2012), how talent management practices should be implemented to ensure sustainable organizational performance remains a controversial issue. Furthermore, a large portion of these studies have been conducted in the USA and Western Europe, where talent management is considered a mature practice. These countries have recognized the critical role of human capital in the development of organizations and nations; they possess an advanced and adaptable structure in terms of civilization, economy, and technological infrastructure, as well as the capacity to implement new techniques and practices.

Although many organizations in developing countries, particularly in the Middle East, have recently adopted talent management practices from developed countries, researchers recommend that organizations in these countries not simply copy these practices. Factors such as cultural differences, structural imbalances, religious and cultural conflicts, and underdeveloped financial markets can limit the effectiveness of the practice (Gandhok and Smith, 2014).

12. Analytical Model

The analytical model of this study is based on the premise that the perceived value of natural resources can be transformed through innovation-oriented thinking frameworks. In this context, the SCAMPER technique is adopted as an analytical tool to explore how a traditional raw material such as sand can be reconceptualized and utilized within modern industrial production systems. The model assumes that each component of the SCAMPER framework (Substitute, Combine, Adapt, Modify, Put to Another Use, Eliminate, and Reverse/Rearrange) represents a distinct mechanism for generating innovative perspectives on resource utilization.

Within this framework, sand is considered the primary input resource, while technological processes, knowledge-based capabilities, and human capital represent enabling factors that facilitate value transformation. The analytical model suggests that the interaction between these elements leads to the emergence of new industrial applications and higher value-added products. In particular, the transformation of sand into materials such as silicon and fiberglass illustrates how innovation processes can convert traditional raw materials into strategic technological inputs.

Accordingly, the analytical model conceptualizes value creation as a multi-stage process in which raw materials are reinterpreted through innovation mechanisms and integrated into advanced manufacturing systems. This perspective highlights that industrial value is not determined solely by the physical characteristics of resources but by the knowledge, creativity, and technological capabilities that enable their transformation.

13. Conceptual study: The Sand–Bicycle Metaphor and SCAMPER Analysis

To illustrate the development of innovation skills, this study introduces a metaphorical case based on the SCAMPER creative thinking technique.

To illustrate this point with a well-known anonymous story, let's talk about the story of the Mexican biker. The story describes a man repeatedly crossing a border with a sack filled with sand on his bicycle. Border officials repeatedly inspect the sack but fail to realize that the object being smuggled is the bicycle itself.

This example highlights a common cognitive bias: focusing excessively on complex details while overlooking the most obvious element.

Within the SCAMPER framework, the metaphor demonstrates several innovation principles:

A Mexican man was entering the U.S. on a bicycle, with a huge sack on the rear rack. The border officer became suspicious and said, "Open the sack." The Mexican opened it. Sand. The next day, the same Mexican showed up at the border whistling, again with a sack on the back of his bicycle. The officer grew suspicious again. "Open it." Again, sand. The following day, the same Mexican pedaled up to the border crossing, once more with a sack on the rack. This time, not just customs officers but narcotics officers had him open it. But it was useless out came sand yet again. They were going crazy. Five days, two weeks, a month is always the same scene. The Mexican casually arrives; they scan him with thermal cameras, run tests, let the dogs sniff around, track him with satellite images it's all in vain. The sack contains sand.

Years pass… One day, the border officer who had nearly lost his mind over this run into the Mexican at a bar. He says, "It's eating me up inside. What's done is done. At this point I can't do anything to you. For heaven's sake, tell me what you were smuggling in that sack?"

"Bicycles," he says!

When we asked Artificial Intelligence, it gave the following response:

Artificial Intelligence's Comment on the Story:

The clever twist in this joke comes from focusing attention on the content while overlooking the vehicle itself.

The item being traded here: the bicycle.

The Logic of the Situation:

While the officers were busy each time with the "sand" inside the sack, they failed to notice that the Mexican was bringing a new bicycle across the border every day. The police assumed so (Anonymus)

This story perfectly illustrates how the most obvious thing can become invisible when we focus too much on complicated details (OpenAI, 2026)

A Mexican man attempts to enter the United States by bicycle, carrying a large bag on the saddle. When the police open the bag, they find only sand inside. Similarly, on subsequent entries, the bag is again filled only with sand. Years later, even with advanced technology and trained dogs, border security officials examine the bag, but the result remains the same: only sand. Finally, the police ask the Mexican man, "What was in the bag?" and his answer is, "A bicycle." This story shows that what is truly valuable is not the bicycle itself, but the "innovative idea" carried in the bag. In other words, the Mexican man went to the US to gain innovation, and the bag symbolizes that innovation.

The sand in the Mexican's sandbag may not seem like a direct raw material in bicycle production, thanks to modern manufacturing technologies, it plays a critical role in the production process of almost every part of a bicycle. What creates value is not the visible raw material (sand), but its transformation with a different function and technology. Instead of sand being a seemingly worthless and ordinary raw material, it undergoes a perceptual and functional substitution as a fundamental input for high value-added innovation. Therefore, in the question "What is the real value?", knowledge, technology, and skills are substituted for the physical product. This directly corresponds to the "Substitute" heading in SCAMPER. The sandbag example, while not standalone, also includes the following SCAMPER steps at a secondary level.

Reframe/Reverse (Reverse/Rearrange: Related to "Reverse/Rearrange" in SCAMPER. While the police focus on the bag, the real value is hidden in the bike.)

This is a reversal of the question "Where is value to be found?" and a shift from concrete input to abstract ability.

Put to Another Use: Sand is normally a low-value raw material. In the presented example, it has been used for multiple high-tech purposes such as microchips, composite materials, glass fiber, electronic components, and surface technology. This clearly falls under the scope of Put to Another Use.

Combine: In the example: The raw material, sand, is integrated under a single metaphor by considering Technology, Talent management, and the Innovation ecosystem together. This supports the Combine dimension in SCAMPER.

Here's how sand transformed into bicycle parts:

Metal Part Casting (Molding): The bicycle frame (whether aluminum or steel), pedals, brake calipers, and gear systems are usually produced using the casting method.

Sand Molding: Molds are prepared from sand to shape the metal. Molten metal is poured into these sand cavities. In other words, without sand, it would be much more difficult to obtain those complex metal forms.

Fiberglass and Carbon Fiber Parts

The lightweight components found in high-end bicycles are based on silica (sand).

Rims and Frame : Fiberglass is obtained from sand melted at high temperatures. Some composite bicycle parts use these sand-derived fibers to increase durability.

Electronic Components (Gears and Indicators): If your bike is electric or has a wireless shifting system (such as SRAM eTap, Shimano Di2), you're dealing with the most technologically advanced version of sand riding.

Microchips: The silicon in the sand is the main component of processors and sensors. Bicycle computers and electronic gear control units operate using this technology derived from sand.

Surface Treatments (Sandblasting): After parts are manufactured, the paint needs to adhere well to the metal or achieve a matte finish.

Sandblasting: Before painting, the bicycle frame is cleaned and smoothed using high-pressure sandblasting.

In summary, the sand tracks on the bicycle can be presented in Table 1.

Table 1. The role of sand in bicycle manufacturing.

Industry / Part Group	**Functional Role of Sand**	**Process Type**	**Material Used**	**Industrial Purpose**
Tooling and Surface Preparation	Shaping and cleaning	Sandblasting process	Sandblasting molds/abrasive sand	Surface finishing and preparation
Automotive Components (Gears&Brakes)	Mold formation in casting	Metal casting	Silica sand	Production of metal components
Electronics Industry (Displays)	Semiconductor production	Circuit and chip manufacturing	Silicon	Production of electronic devices
Composite Materials	Fiber reinforcement production	Composite manufacturing	Fiberglass	Manufacturing durable composite parts

The table illustrates the functional roles assumed by sand and sand-derived materials across different industries. The analysis reveals that sand is not only utilized in traditional casting processes but also serves as a critical input in advanced manufacturing sectors such as electronics production and composite material technologies. In particular, silica sand is widely used in the metal casting industry for mold production, whereas silicon derivatives constitute the fundamental raw material for semiconductor manufacturing in the electronics sector. Similarly, the production of fiberglass enhances the

mechanical strength of composite materials, thereby playing a significant role in modern manufacturing technologies. Overall, these findings indicate that sand-based materials represent a versatile and strategically important resource across various industrial processes.

14. Framework

This research framework explains the role of sand-based raw materials in modern industrial production systems. The model assumes that different types of sand-derived materials, such as silica sand, silicon, and fiberglass, function as key input resources in various industrial processes. These raw materials undergo several processing mechanisms including sandblasting, metal casting, semiconductor fabrication, and composite manufacturing. Through these processes, sand-based materials contribute to multiple industrial application areas such as the automotive, electronics, and composite materials industries. Ultimately, these applications influence industrial outputs, including manufacturing efficiency, product durability, and technological performance. The framework therefore conceptualizes sand-based materials as strategic resources that enable diverse manufacturing technologies and industrial production systems.

This example metaphorically illustrates the strategic role of talent management and innovation on organizational performance. When managed correctly, talent provides businesses with productivity, innovation, and a sustainable competitive advantage.

The multifaceted relationship between talent management, innovation, and productivity is often discussed through abstract concepts, making it difficult to concretize at the application level. Therefore, to present this relationship in a more understandable and analytical way, a metaphorical example is used in this study, employing the SCAMPER approach, a creative thinking technique. The SCAMPER technique offers a systematic framework that allows for the rethinking of existing elements in different ways and serves as an explanatory tool in explaining how innovation emerges. In this context, the sand-bicycle metaphor presented below aims to demonstrate that even low-value-added inputs can be transformed into high-value-added outputs when talent and knowledge are managed correctly. Table 2 shows the SCAMPER analysis of the sand-bicycle metaphor.

Table 2. SCAMPER Analysis of the Sand-Bicycle Metaphor

SCAMPER Dimension	Conceptual Transformation	Innovation Mechanism	Industrial / Strategic Outcome
Substitute	Sand is reconsidered not as a low-value raw material but as a strategic technological input.	Cognitive reframing of resource value	Recognition of knowledge-driven value creation
Combine	Sand, technology, and talent management are integrated.	Innovation ecosystem approach	Synergy between natural resources and human capital
Adapt	Sand is adapted to different production technologies.	Process innovation	Integration of traditional resources into advanced manufacturing
Modify	Sand is transformed into silicon, glass fiber, and other advanced materials.	Material transformation and technological upgrading	High value-added industrial products
Put to Another Use	Sand is used in semiconductors, composite materials, and surface technologies.	Functional diversification	Expansion of industrial application areas
Eliminate	The assumption that raw materials alone generate value is rejected.	Paradigm shift in production logic	Emphasis on knowledge, technology, and skills
Reverse / Rearrange	The perspective shifts from raw material to value-creation capability.	Strategic perspective change	Focus on innovation and capability-based value

The sand-bike metaphor, within the scope of the SCAMPER technique, is **largely based on the "Substitute"** approach. In this metaphor, the traditional assumption that value originates from raw materials is replaced by the idea that knowledge, skill, and innovative transformation capacity are the primary sources of value. In this respect, the example aligns with the fundamental assumptions of value innovation and blue ocean strategies.

However, the metaphor also includes the steps of **"Put to Another Use"** and **"Reverse** ." Demonstrating the uses of sand in different sectors and advanced technologies reveals how the relationship between productivity and innovation can be strengthened through the strategic repositioning of inputs. Seeking value not in the physical object itself, but in how it is transformed, supports the systems perspective emphasized in the innovation ecosystem literature.

In this context, the sand-bike metaphor is not only an illustrative narrative element but also an example of innovation based on analytical and theoretical foundations, compatible with the SCAMPER technique.

15. Conclusion and discussion

This study examined the relationship between productivity, innovation, and strategic competitiveness within the framework of Blue Ocean Strategy and innovation ecosystems. The findings suggest that organizations should not rely solely on operational efficiency but should also invest in innovative capabilities and talent development. By using the SCAMPER technique and the sand–bicycle metaphor, the study demonstrates that innovation emerges from the transformation of resources through knowledge, technology, and creativity.

The relationship between productivity increases and strategic innovation within a holistic framework, considering the intense competition, rapid technological transformation, and limited resources faced by today's businesses. Literature findings indicate that while productivity is a significant factor supporting profitability in the short term, it is insufficient on its own to create a sustainable competitive advantage. Therefore, this study emphasizes the necessity of considering productivity-focused approaches in conjunction with blue ocean strategies and value innovation. In this research, innovation ecosystems were evaluated as dynamic structures that enable knowledge sharing and shared value creation among businesses, universities, research centers, and public institutions. Within these ecosystems, human capital and talent management stand out as one of the key determinants of innovation capacity. Consistent with findings in the literature, talent management practices were found to improve employee performance, support organizational learning, and thus contribute to both increased productivity and the creation of innovative outputs.

One of the study's original contributions is the concretization of the abstract relationships between talent, productivity, and innovation through the sand-bike metaphor developed within the framework of the SCAMPER technique. This metaphor demonstrates that value stems not from physical inputs, but from how these inputs are transformed through knowledge, technology, and skills. The prominence of the Substitute approach in the SCAMPER analysis reveals that the traditional understanding of value, centered on raw materials, is being replaced by value creation based on knowledge and skills. This finding also aligns with the fundamental assumptions of the blue ocean strategy.

However, the fact that the sand-bike metaphor also includes the "Put to Another Use" and "Reverse" dimensions shows that innovation is not limited to new product development; it can also arise through the repositioning of existing resources in different ways. This highlights the importance of actors in innovation ecosystems re-evaluating their limited resources from a strategic perspective.

The findings of this study not only offer significant managerial implications for businesses but also highlight the need for organizations to focus solely on operational efficiency. In this context, it addresses talent management at a strategic level, replacing traditional competitive strategies. It develops approaches integrated with innovative ecosystems. Productivity increase should not be considered an end, but rather a tool enabling strategic innovation. In conclusion, this study demonstrates that the relationship between productivity, talent management, and innovation is not linear, but rather a multi-dimensional and dynamic ecosystem-based one. Productivity-focused approaches, supported by a blue ocean strategy, not only provide businesses with a competitive advantage in existing markets but also create new value areas, paving the way for sustainable growth. Future research testing this conceptual framework empirically in different sectors and countries will make significant contributions to literature.

Future research may extend this conceptual framework by conducting empirical studies across different industries and countries to test the relationship between talent management, productivity, and innovation performance. Applied research, experimental development, and social experiments are succents for future research about innovative thinking and innovative culture where blue ocean strategy impacts productivity without destroying competitors. Business worlds must move very fast to contact, communicate, collaborate, cooperate, cluster, create together for community development. Otherwise, some competitors will be destroyed due to red ocean strategy since AI uses becoming widespread in business worlds. As understood from the bicycle metaphor, AI is not going to replace the human brain. Humans need to use AI for knowledge and continue with creative thinking for innovation where blue economy occur without destroying competitors as well as environment.

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