
Evaluation of the impact of innovation and innovation management on competitive advantage in the context of strategic management: A Focus on Algeria's Innovation Landscape

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Abstract:

This study investigates the critical interplay between innovation management, and competitive advantage within the framework of strategic management. By focusing on Algeria's unique innovation landscape, we aim to gain insights into the country's strengths and weaknesses in fostering innovation-driven economic growth. Adopting a mixed-method approach, we conducted a thorough literature review to establish the theoretical foundation, and empirical data from the Global Innovation Index was collected to assess Algeria's performance in innovation dimensions and indicators. Our findings underscore the significance of human capital and research as Algeria's strengths, while market sophistication emerged as a key area for improvement. This research contributes to a deeper understanding of the factors influencing competitive advantage through innovation.

Keywords: Strategic Management; Innovation; Innovation Management; Competitive Advantage; Algeria's innovation ecosystem.

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1. Introduction:

In today's fiercely competitive business environment, innovation plays a pivotal role in shaping organizational success and fostering economic development. Understanding the relationship between innovation, strategic management, and competitive advantage is crucial for businesses seeking sustainable growth. This study aims to explore the impact of innovation and innovation management on gaining a competitive edge, specifically focusing on the context of strategic management. Moreover, the research delves into the unique innovation landscape of Algeria, shedding light on its strengths, weaknesses, and potential for growth.

1.1. Materials and Methods:

To achieve our research objectives, we adopted a mixed-method approach. First, we conducted an extensive review of existing literature on innovation, strategic management, and competitive advantage. This provided a comprehensive understanding of the theoretical framework and current practices in the field. Subsequently, we collected empirical data from various sources, including the Global Innovation Index (GII), to assess Algeria's performance in innovation dimensions and indicators. The GII data allowed us to identify the country's innovation strengths, such as human capital and research, and weaknesses, notably in market sophistication.

by combining theoretical insights and empirical evidence, this study seeks to offer valuable insights into the relationship between innovation, strategic management, and competitive advantage, as well as practical implications for policymakers and practitioners in Algeria and beyond. Furthermore, we acknowledge the limitations of our study and provide recommendations for future research to enrich the understanding of innovation dynamics in different contexts.

2. STRATEGIC MANAGEMENT CONCEPT:

Management, as a universal term, deals with understanding human beings, whose actions and behaviors can be difficult to predict. It examines individuals' interactions with others and their attitudes and behaviors under different circumstances (Can, 2001:31). Management is the process of efficiently and effectively bringing together human and other resources to achieve organizational goals and objectives (Rachman et al., 1993:124). If Management is to be defined as a process, it involves the organization's ability to use its resources, organize, implement, and control through people in a way that produces efficient and effective results and establishes its purposes and objectives. (Mirze, 2018, p. 23)

The meaning of Management has been subject to study in different fields of science. Economists consider Management as a production factor along with natural resources, human capital, and financial capital. Sociologists describe Management as authority and class systems, while in legal sciences and other disciplines, it

is referred to as the activities aimed at achieving objectives through the efforts of others. Therefore, Management can be defined as the whole process of implementing and decision-making, making the goals set, and achieving them by utilizing human factors, financial resources, machinery and equipment, raw materials, auxiliary materials, and time in a harmonious, efficient, and effective manner.(Eren, 2011, p. 04)

The concept of Strategy involves long-term idea formation, perceiving the environment, and accordingly formulating objectives (Çevik, 2001, p. 139). Strategy is a long-term plan that includes the factors leading to a conclusion (Ülgen & Mirze, 2018:34). According to Chandler's definition (1962), Strategy is "the determination of the basic long-term goals and objectives of an enterprise and the adoption of courses of action and the allocation of resources necessary for carrying out these goals." Strategy deals with expressing and developing the organization's business model, the picture of the business aiming to achieve competitive advantage and make money (Armstrong, 1992:28).

From the perspective of Management and Business, Strategy expresses the direction an organization aims to move in. It provides options to implement the actions determined to achieve the goal (Daft, 2008:48). Strategic Management is a Management technique that reveals what an organization does, its purpose of existence, and the objectives it aims to achieve in the future (Bryson, 1988). Strategic Management examines the process through which Businesses determine the goals they want to achieve in the future and how they will reach these goals (Barry, 1986:10). Strategic Management, regarded as the best process (Boxall & Purcell, 2003:31), involves understanding the Strategic position of a Business, making Strategic choices for the future, and converting Strategy into action (Johnson et al., 2005:4).

The ability of an organization to determine its Strategy, create and implement the Strategic process is the fundamental source for its presence in today's rapidly changing formations. The absence of Strategy in businesses leads them to face a life-threatening situation. The primary goal organizations aim to achieve is to sustain their existence in the long term by gaining a competitive advantage. The achievement of competitive advantage and its sustainability for firms are only possible with a distinctive strategy that sets them apart from other firms (Hurst, 2000: 50). Therefore, Strategic Management can be defined as the set of managerial decisions and practices that influence an organization's long-term performance (Hunger & Wheelen, 2007: 5).

Strategic Management of Innovation can enhance the level of Management quality. In the context of Strategic Management, the level of quality possessed by Management plays a crucial role as an assessment and control mechanism. Innovation is helpful in creating organizational conditions, situations, processes, and defining Innovations we encounter to progress. It is known that firms gain insights by examining and analyzing other successful firms when it comes to developing previously non-existent products. Nowadays, many organizations are striving to create Innovation in products, services, processes, and Management by aligning

their customers, quality groups, and employees with this Innovation formation. This is because the tools that make Innovation Management superior are the supportive means of quality Management (Bossink, 2002: 195).

The Strategic Management of Innovation has become a central topic in the field of Strategic Management (Hermann, 2005: 115). The developments in the literature related to Innovation in the last two decades and various observations made by senior researchers consistently demonstrate that the current literature on the Strategic Management of Innovation is marked by many inconsistencies, competing theoretical predictions, persistent knowledge gaps, and many unresolved issues concerning the Strategic Management of Innovation (Drazin & Schoonhoven, 1996: 1067).

In the Strategic Management perspective, the concept of Innovation is emphasized as a significant competitive advantage for the future of all organizations worldwide. Moreover, it is pointed out that Strategy alone does not create Innovation, and the implemented Strategy processes do not necessarily generate welfare.

Because businesses not only formulate Strategy but also focus on the managerial relationship between Strategy and Innovation to create sustainable differentiation (Hamel, 1997). When the concept of Innovation is used alone, it can describe the process, but when used as Innovation Management, it emphasizes the need to control and manage Innovation (Drucker, 2003: 120).

3. Innovation

Most organizations feel the need for making changes in their structures, Strategies, Management processes, and administrative tasks. In the past, organizations focused on minor changes, as the environment they operated in was considered relatively stable, and they addressed significant issues or exploited newly emerging opportunities. However, this situation has almost reversed in the last decade. Organizations worldwide have been facing radical developments in Management, structure, and Strategic processes to adapt to competitive demands (Raymond et al., 1995:130).

Schumpeter (1934), one of the earliest proponents of the term Innovation, considered it a guiding principle for past and future studies related to Innovation. He pointed out that Innovations would eliminate existing conditions over time, referring to this process as "creative destruction" (Schumpeter, 1934).

The concept of change signifies differentiation, and Innovation, as an advanced form of change, along with innovativeness and renewal, is a new idea applied to initiate or advance and improve a product, process, or service (Kanter, 1988:170). For example, Twitter is considered an Innovation in the dissemination of information (Robbins & Judge, 2017:603). On the other hand, W.L. Gore is one of the most prominent examples of an Innovative Organization. As a company with an annual revenue of 1.4 billion dollars, it has gained a high reputation as the creator of Gore-Tex fabric (Anfuso, 1999:49).

Innovation refers to the process of bringing in something new and problem-solving. It involves generating new ideas, processes, products, or services and their acceptance and application. While acceptance and application are central to this definition, they also encompass the capacity for change and adaptation (Kanter, 1983:5). The introduction of a previously non-existent product into the market or the initial economic use of a new or improved process encompassing technical, design, production, Management, and economic activities is referred to as Innovation (Bessant & Tidd, 2007:8). Table 1 presents definitions of Innovation by leading scholars based on the information in the literature.

Table N°1:Definitions of Innovation

WRITER	DEFINITIONS OF INNOVATION
Oslo Manuel (2005)	The application of a new or significantly differentiated product, service, or process in business practices, non-business organizations, or the organizational context.
Rogers (1995)	The domain of implementing a previously uncreated idea.
Rosenfeld and Servo (1990)	The abstract and general design of an object, feeling, or thought in the mind, leading to the emergence of an invention or a new situation.
Drucker (1985)	Refers to the change that entrepreneurs use as a condition that needs to be evaluated for various businesses and services.
Afuah (2003)	The utilization of new information from technology and the market to bring forth the new products and services that customers demand.
Trott (2002)	A thought process that involves generating ideas for entirely unused products, designing technology, managing production and marketing activities, and reaching a specific outcome.
Goldhar (1980)	The sequence of organizational and individual behaviors, spanning from the emergence of an idea to commercialization.
Rickards (1985)	The implementation of completely unused thoughts.
Kanter (1983)	The advancement and application of new ideas for problem-solving.
Ulijn and Weggeman (2001)	Creating things that have not been previously created and effectively applying them in the market.
Myers and Marquis (1969)	Not just an activity but a thought process resulting from its sub-stages and interactions among them.
Caldwell and Q'Reilly (1995)	The outcome of two formations: the ability to create (creativity) and implementation.
Elçi (2006)	The transformed state of taught things (knowledge) into economic and social benefits.

Source: done by the researcher.

The following text discusses different types of Innovations, namely radical, incremental, and structural Innovations. While radical and incremental Innovations are often the focus of examination, there exists a third type of Innovation that combines the characteristics of both, known as structural Innovation. Radical Innovation refers to the creation of something new (product, service, process, or management) that does not yet exist and is developed through research and improvement for beneficial purposes. Such Innovations cause significant

differences and changes in human behavior and life and are adopted by small businesses to facilitate their entry into the market, offering them a competitive advantage against other market players (Noori, 1990). On the other hand, incremental Innovation involves gradual differentiation and improvement efforts in the existing state (product, service, process, or management) (Henderson & Clark, 1990:12).

Radical Innovations have a significant impact on firms' long-term growth and competitive gains (Utterback, 1994:79). Achieving a competitive advantage through radical Innovations and maintaining this superiority is accomplished through incremental Innovations (Leifer, 2000:131). On the other hand, structural Innovations occur through interaction between the changes in one part of the existing product, service, process, or Management and the other parts that form the system. However, this change does not lead to a major differentiation in the main system. As a result, structural Innovations strengthen the connections between the components (Henderson & Clark, 1990).

Organizational Innovation Management is one of the primary concerns for academia, politics, and business environments (Lopez-Nicolas & Merono-Cerdan, 2011). Innovation is considered a fundamental driver of competition in the present day (Volberda et al., 2013). It serves as a crucial tool for the survival and development of organizations. Therefore, Innovation needs to be managed and understood before being implemented. The effectiveness of Innovation Management is essential because it depends on how well organizations manage their diverse capabilities to benefit from Innovation (Dodgson et al., 2014:506).

Drucker (2003) defines Innovation Management as "the act of mobilizing an organization's activities, in conjunction with its complex and uncertain environment, to bring about the adaptation of different changes and diversity in such a way that innovation is achieved within a specific process under the control and evaluation of Management." In this context, the success of Innovation is related to the available resources (human, equipment, technology, knowledge, etc.) and the organization's ability to manage these resources (Berghman et al., 2013:46). Innovation Management involves integrating Innovation into an established organization and thus represents a specific form of organizational change. Broadly speaking, Innovation Management can be defined as the Management activities in an organization where change deviates from the past in a novel or unprecedented way, with regards to its form, quality, or state over time (Hargrave & Van de Ven, 2006:871).

By assessing valuable and rare opportunities in the environment, managers can gain a competitive advantage through an innovative perspective (Ansoff, 1971). Including innovations in the content of organizational objectives in the long term is seen as a necessary assistant. Additionally, Innovation concerning unpredictable events has been recognized as a strategic parameter and emphasized that Innovation must be incorporated into the central theme of business strategies (Budak, 1998:21).

4 .INNOVATION FOR COMPETITION IN THE CONTEXT OF STRATEGIC MANAGEMENT

In the intensely competitive environment of our era, one of the significant tools through which firms can create differentiation in their Strategic Management approach is Innovation. Innovations, which lead to improvements in product, service, process, and Management areas, are seen as means to enhance efficiency and profitability for businesses.

In the past, valuable assets and large capacities held by companies used to be one of the crucial tools for gaining a competitive advantage for organizations. However, globalization, technological advancements, and the rapid exchange of knowledge have made knowledge, technological elements, and experiences that can foster Innovation in product, service, process, and Management become important issues (Kay, 1993:101).

Porter (1985) introduced the concept of competitive advantage, which refers to achieving a position that enables gaining benefits by either cost leadership or differentiation compared to competitors, providing superior value to customers, and possessing valuable and rare resources and capabilities that are difficult to imitate or obtain. It should be understood from this that the goal is not only to create a competitive advantage but also to sustain it in the medium and long term (Tidd et al., 2005).

According to Tidd et al. (2005), the ways to create a competitive advantage include :

- Generating Innovation in products, services, and processes.
- Creating differences that competitors would find challenging to implement.
- Ensuring legal protections.
- Simplifying the development of competitive advantage factors for Innovation.
- Properly evaluating time.
- Durability (robustness).
- Redesigning existing rules and processes and transferring a particular application to other domains.

Porter states that competitive advantages are achieved not by nations but by firms. Therefore, it is crucial for organizations to adopt and implement strategies that will lead to competitive gain (Porter, 1985:3-7). Drucker suggests that countries seeking competitive advantage rely on knowledge (Drucker, 1995). This refers to the strategic nature of knowledge and its potential to confer a competitive edge (Aadne et al., 1996:14).

Innovation, due to its capacity to form a fundamental competence, enables the implementation of various strategies in organizations and facilitates gaining a competitive edge. Considering that every business should possess a fundamental competence today, it is implied that this competence should be Innovation.

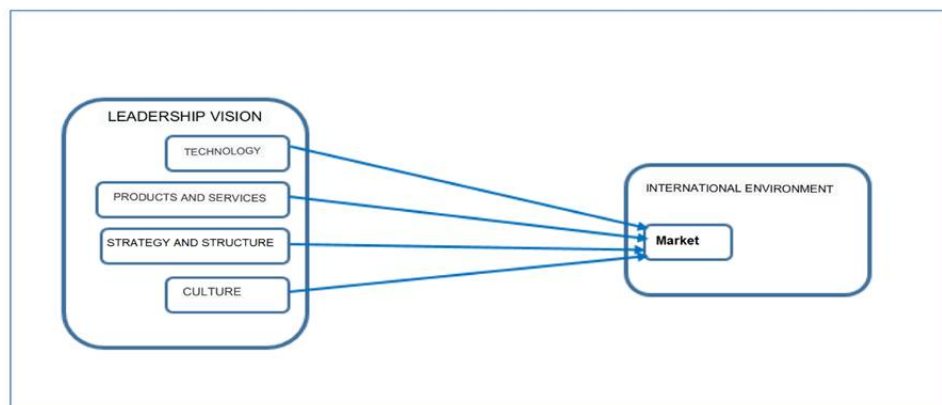
The process of Innovation, as a learning process, allows for a high degree of trial and error and provides employees with practical learning opportunities. This situation allows for holistic learning within organizations (Higgins, 1996).

In strategic management, Innovation is defined as disrupting the existing process and gaining benefits by considering new processes and ideas to achieve a competitive advantage in the market (Markides, 2000:179). The key element is the redefinition of what the business is by pointing to different aspects of processes that will lead organizations in significant transformations. To identify their purpose of existence, foster growth, and attain a competitive edge, organizations need a well-crafted strategic plan. To sustain success within Strategic Management, the Innovation Strategy must be aligned with the organization's corporate strategies. This alignment will lead to a competitive advantage over rivals (Dobni, 2010:48-49).

Upon reviewing the literature, it is indicated that Innovation capacity of businesses consists of Innovation Strategy (structure and strategy), innovation culture (cultural changes), organizational structure, relationships with customers and resource providers (product and service changes), and technology capability (technological changes) (Terziovski, 2010). These functions illustrate how businesses change, how managers manage the Innovation process, and the Strategic role of Innovation, emphasizing the need to be open to Innovation.

The four types of competition that will provide strategic competitive advantage are illustrated in Figure 2 (Daft, 2008:372).

Fig N° 1: Four Elements of Competition to Provide Strategic Competitive Advantage



Source: Daft, 2008:372.

Technology capability encompasses all situations related to having and using technologies that enable businesses to compete (Rush et al., 2007:226). Due to technological advantages, established firms' positions can be disrupted, and market actors can change (Han et al., 1998:36). Therefore, companies aiming to continue their existence in these sectors need to be strong in gathering competitive intelligence and exploiting opportunities (Li & Calantone, 1998:16-17).

Organizations employ a versatile approach that integrates suitable structures and management stages for creating technology and implementing Innovation (O'Reilly & Tushman, 2004:78). In this approach, businesses can be formed organically and mechanically to explore new ideas (March, 1991:76). The purpose of formation varies depending on whether it is to explore new ideas or to implement those ideas. Research shows that

companies adopting a versatile approach differentiate themselves from competitors in terms of implementation and service and achieve greater success (Lubatkin et al., 2006:657). Canon and Honda, prominent Japanese companies, have been found to achieve success through a versatile approach (O'Reilly & Tushman, 2004:78).

To implement a versatile approach, businesses use various techniques. Gardetto's, a snack product company in the food sector, encourages its employees to engage in brainstorming and generate new ideas by creating variable structures (McDonough & Leifer, 1983:732), directing them to Eureka! Ranch (Datz, 1999:44). Adobe Systems and Yahoo! have established creative departments to foster new idea generation through idea incubation centers (Eng, 2000:174-175). Lockheed Martin, to encourage its employees to develop new ideas and processes, implements a two-year sabbatical policy (Hise, 1997:33). Additionally, managers emphasize corporate entrepreneurship to establish structures that support Innovation. Top-level managers at BP, a renowned petroleum company, sign agreements with all business unit heads (Jennings & Lumpkin, 1989). Collaborative teams are formed to create numerous innovations through creative teamwork groups, and famous technology companies like IBM organize meetings with general participation (Hempel, 2006:70).

Studies in the literature indicate a high level of uncertainty in product and service Innovation (Stevens & Burley, 1997:22). This uncertainty is exemplified by RCA Company's \$500 million loss, Time Company's \$47 million loss, Pfizer Company's \$70 million investment (Hensley, 2002), and American companies introducing around 5000 products to supermarkets annually with a failure rate of approximately 70-80% in terms of new products. Despite this misleading measure of success for new products, a survey conducted by the Product Development and Management Association (PDMA) revealed that 14% of new products achieved economic success based on data analysis (Cope, 2007).

The scope of boundaries suggests that business units engaged in new products and services have strong connections and access to information in the external environment. Kimberly-Clark and Huggies Pull-Ups have achieved high success through external connections (Leonard & Rayport, 1997:107). On the other hand, companies that fail to establish sufficient connections with market forces and customer needs (such as New Coke, Kellogg's Breakfast Mates, and Susan B. Anthony Dollar) face failure (Kahn, 2001:317-318). In today's context, companies gain competitive advantage and superior success through Open Innovation. Open Innovation implies the exploration of products and services that are yet to be created and extending beyond the industry's sector boundaries to generate economic value for the enterprise.

Agreements with customers and suppliers are considered significant factors that influence the strategic timing of new product launches (Jusko, 2007). In the Strategic Management of the Innovation process, customer and supplier relationships play a crucial role (Moorman, 1995). Treating customers and suppliers as partners will enable the company to gain high efficiency from resources that are not sufficiently available internally (Appiah-

Adu& Singh, 1998:388-389). Agreements with suppliers can bring together firm resources with the suppliers' resources, thereby achieving a competitive advantage (Spender, 2007:179).

An environment that enables businesses to share their queries is provided through websites like Cambrian House and Kluster (Tedeschi, 2008). Companies such as Procter & Gamble, W.L. Gore, and Boeing become open to new ideas through customer feedback (Schilling & Hill, 1998). The pathway to gaining a competitive advantage has now become strategic for top-level managers in the present day, emphasizing the importance of being swift and agile for businesses (Miranda & Thiel, 2007). This is due to the rapid differentiation of products and services, which necessitates strategic moves in the global market (Pearce, 2002: 193-194).

Superior competitive advantage can be achieved compared to competitors through strategic moves. Zara, a clothing company, introduces new products to its stores twice a week. Russell Stover rapidly places its products on store shelves to meet customer demand (Rohwedder & Johnson, 2008). Additionally, companies like Levi's and Haagen Dazs create new product ideas by engaging with customers in different geographical areas (McDonough et al., 2001).

Miller (1987), defining the organizational structure, emphasized the continuous correlation of job roles and managerial functions to establish, organize, and control business activities and resource allocation (Miller, 1987: 8). The natural organizational structure supports the ability to respond quickly to customer needs and facilitates efforts in team development within the organization (Saleh & Wang, 1993: 17-18). To gain a competitive advantage, businesses need to innovate in their strategies, structures, and management processes. The innovations implemented by the organization's top-level managers differ from technological, product, or service innovations and are part of their responsibility (Porter & Parker, 1992: 52-53). The implementation of innovations within the scope of strategy and structure is carried out by top management. Top-level executives may be involved with employees in this process, but the responsibility for managing innovation belongs to top-level managers. Hewlett-Packard's CEO was aware of this responsibility when assuming the top-level position (Tam, 2006).

Organizations that embrace a flexible innovation culture, adapt to change, and have a high capacity for risk and uncertainty, will gain a competitive advantage. An innovation culture is a form of culture in which innovation and change are continuously applied and developed throughout all norms of the organization.

Culture encompasses the norms, values, beliefs, and other factors applied in organizations, and an innovative organizational culture necessitates change in all factors (Demir-Uslu, 2012). To sustain successful innovation practices, organizations need to establish a culture that encourages innovation from the outset. However, fostering a culture of innovation can be challenging because new ideas and practices often contradict people's core values and conventional thinking. Organizations with an innovative culture must align their

innovation strategies with their organizational structures from a managerial perspective. Innovation refers to the process of creating new ideas that provide societal and technological benefits. In today's increasingly competitive environment, innovation is crucial for sustainable growth and economic benefits, requiring proactive planning for the future. Innovation can encompass topics such as gaining new market share, developing new products, reshaping organizations, and revising production methods. Supporting employees' ideas and comparing them through strategic R&D methods also contributes to innovation (Timmerman, 2009). Additionally, it is essential to strengthen the R&D structure within the organization and provide economic support (Panne et al., 2003:5).

Managers attempt to integrate innovation into organizational cultures through various approaches, using the concept of organizational development. Values such as human development, justice, transparency, and others that enable employees to perform their tasks within the organization's constraints are emphasized (Burke, 2000). IKEA implemented a new technique called large-group intervention to shape how the organization operates. All departments of IKEA collaborate to establish the new system (Weisbord & Janoff, 2005:70-82).

Today, the majority of superior innovative organizations attribute their success to being led by top-level leaders who value and support innovation. Leaders who embrace innovation management strategically think about and implement innovation through their actions (Loewe & Dominiquini, 2006). Their persuasive abilities are developed in the context of innovation investment. Philip A. Newbold, the President of Memorial Hospital in Indiana, played an encouraging role in investing in innovation in the healthcare sector (Lublin, 2008).

Especially the leadership style known as transformational leadership exhibits a structure conducive to innovation (Bass, 1995). Additionally, leaders involve their employees in the innovation commitment process through three stages: preparation, acceptance, and actual commitment (Conner, 1992).

Leaders are advised to develop personal capabilities and management processes to sustain businesses' competitive gains. In the fast-changing environment of the 21st century, leaders need to develop the necessary personal traits, skills, and methods to help sustain businesses' competitive advantages (Drucker, 1995). Leaders should implement innovation management by :

- Instilling a sense of urgency for innovation (Kotter & Schlesinger, 1979)
- Establishing a group to guide innovation management (Rogers & Shoemaker, 1971)
- Formulating innovation-oriented strategies (Daft & Becker, 1978)
- Generating ideas that meet requirements (Daft & Becker, 1978)
- Developing plans for innovation (Dahl, 2008)
- Creating innovation teams and supporting idea superiority (Hrebiniak, 2006).

Innovation is considered a fundamental driving force for progress and prosperity. Significant efforts are being made to develop new technological knowledge, process technologies, and products. However, evidence

from both SMEs (Small and Medium-sized Enterprises) and large companies indicates that successful innovation is not solely a result of technological advancements; it is also significantly dependent on strategic innovation management. Strategic innovation management entails changing a company's organizational structure, practices, and processes in novel ways for the benefit of the firm or industry, leveraging innovation, efficiency, and competitive advantage from the firm's technological knowledge base. Recent research demonstrates that management innovation accounts for a considerable portion of the variance in firms' innovation performance. Emphasizing the promotion of strategic management innovation and strengthening technological innovation is crucial for enhancing firms' competitiveness (Henk et al., 2013).

5. Algeria's Innovation Landscape: Strengths and Opportunities from GII 2022

The Global Innovation Index (GII) is a vital tool developed by the World Intellectual Property Organization (WIPO) to assess and rank economies based on their innovation capabilities and outcomes. It plays a crucial role in gauging innovation performance and serves as a valuable reference for fostering economic development through innovation. This section explores Algeria's performance in the GII 2022, shedding light on its strengths and weaknesses in various dimensions of innovation, including human capital, research, infrastructure, credit, and market sophistication. By analyzing the GII rankings, policymakers and stakeholders can gain insights into Algeria's innovation landscape, identify areas for improvement, and develop strategies to enhance the country's competitiveness in the global innovation arena.

Fig N° 2: The Global Innovation Index



In Figure 1, The Global Innovation Index (GII) is published by the World Intellectual Property Organization (WIPO), a specialized agency of the United Nations.

The Global Innovation Index (GII) is a significant instrument that aims to assess and rank approximately 130 economies based on their innovation capabilities and outcomes, recognizing the crucial role of innovation in

fostering economic development. The GII has become a prominent reference for gauging innovation performance and serves as a valuable tool for economies incorporating it into their innovation agendas.

This comprehensive index measures innovation across various dimensions, including institutions, human capital and research, infrastructure, credit, investment, linkages, knowledge creation, absorption, and diffusion, as well as creative outputs. To provide a comprehensive assessment, the GII is structured into two sub-indices, namely the Innovation Input Sub-Index and the Innovation Output Sub-Index, with each sub-index comprising seven pillars, further divided into three sub-pillars.

Regarding Algeria's performance, the GII 2022 emphasizes the need to interpret the rankings in the context of data availability and changes to the GII model framework, as these factors can influence year-on-year comparisons. Based on statistical analysis, the confidence interval for Algeria's ranking in the GII 2022 is estimated to be between ranks 109 and 117.

Table 2, Table 3, and Table 4 in the GII 2022 report showcase Algeria's performance in various innovation indicators. Notably, Algeria demonstrates strengths in the Human capital and research pillar, indicating significant investment in education, research, and development. However, the country's weakest performance is observed in the Market sophistication pillar, suggesting opportunities for improvement in areas related to business sophistication, knowledge absorption, and technology adoption.

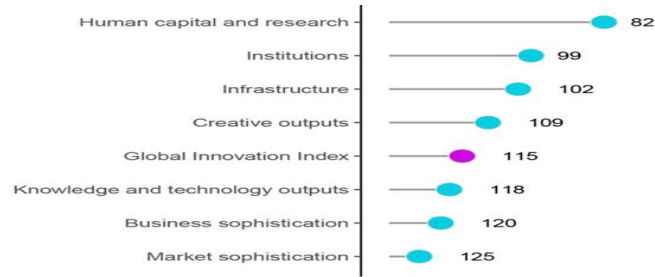
In summary, the Global Innovation Index provides valuable insights into Algeria's innovation landscape, enabling policymakers and stakeholders to identify strengths, weaknesses, and areas for potential growth. It highlights the significance of innovation in driving economic progress and encourages economies to adopt strategies that foster innovation-driven competitiveness and sustainable development.

Table N°2: Rankings for Algeria (2020–2022)

GIYYR	GI	Innovation inputs	Innovation outputs
2020	121	111	126
2021	120	109	128
2022	115	110	118

In the context of innovation performance, Algeria exhibits a relatively stronger performance in innovation inputs compared to innovation outputs in the year 2022. Specifically, in terms of innovation inputs, Algeria holds the 110th position, representing a decrease from its ranking in the previous year (2021), but an improvement from the position in 2020. On the other hand, concerning innovation outputs, Algeria ranks 118th, indicating a higher position compared to both the rankings observed in 2021 and 2020. These rankings reflect the country's efforts in investing resources and inputs into the innovation process, which has resulted in improved outputs and outcomes, showcasing a positive trajectory in its innovation capabilities over the observed period. However, there is still room for further enhancement in both input and output dimensions to bolster Algeria's overall innovation performance on the global stage.

Table N°3: The seven GII pillar ranks for Algeria



In the context of Algeria's innovation landscape, the nation exhibits commendable strengths in the domains of human capital and research, while concurrently facing challenges in the area of market sophistication. This observation underscores the significance of human resource development and research activities within Algeria's innovation ecosystem. The thriving human capital and research sectors serve as foundational pillars for fostering innovation-driven progress and economic growth. On the other hand, the relatively weaker performance in market sophistication necessitates strategic attention and efforts to enhance the country's market-related capabilities, including market knowledge, marketing and sales practices, and overall business development strategies. Addressing these areas of opportunity could lead to improved market competitiveness and greater capacity to capitalize on innovation-driven opportunities for sustainable advancement in Algeria's economic landscape.

The table 4 below gives an overview of the indicator strengths and weaknesses of Algeria in the GII 2022.

Table N°4: strengths and weaknesses of Algeria in the GII 2022

Strengths		Weaknesses	
Indicator name	Rank	Indicator name	Rank
Expenditure on education, % GDP	19	Regulatory quality	128
Tertiary enrolment, % gross	61	PISA scales in reading, maths and science	76
Graduates in science and engineering, %	20	Global corporate R&D investors, top 3, mn USD	38
Researchers, FTE/mn pop.	56	QS university ranking, top 3	72
Gross expenditure on R&D, % GDP	58	E-participation	130
Gross capital formation, % GDP	5	Market capitalization, % GDP	81
Domestic market scale, bn PPP\$	42	Venture capital recipients, deals/bn PPP\$ GDP	103
State of cluster development and depth	66	Software spending, % GDP	122
High-tech imports, % total trade	55	High-tech exports, % total trade	130
Industrial designs by origin/bn PPP\$ GDP	42	Global brand value, top 5,000, % GDP	77

The Global Innovation Index (GII) 2022 provides valuable insights into the strengths and weaknesses of Algeria in various indicators related to innovation, education, research, and market sophistication.

6. Results and discussion

Let's take a detailed look at the strengths and weaknesses of Algeria based on the indicators mentioned in the table:

❖ **Strengths:**

- **Expenditure on education, % GDP (GII Rank 19):** This indicator measures the percentage of the country's GDP allocated to education. Algeria has a relatively strong performance in this area, investing a significant portion of its GDP in education, which lays the foundation for human capital development and future innovation.
- **Tertiary enrolment, % gross (GII Rank 61):** This indicator reflects the percentage of students enrolled in tertiary education (universities, colleges, etc.) relative to the total population of the corresponding age group. Algeria's ranking at 61 suggests that a considerable portion of its population is pursuing higher education, contributing to a skilled workforce.
- **Graduates in science and engineering, % (GII Rank 20):** This indicator showcases the percentage of graduates in science and engineering fields. A high rank at 20 indicates that Algeria is producing a significant number of graduates with expertise in science and engineering, which is crucial for innovation and technological advancement.
- **Researchers, FTE/mn pop. (GII Rank 56):** This indicator represents the number of researchers per million population. A rank of 56 suggests that Algeria has a reasonably good presence of researchers, contributing to research and development activities in the country.
- **Gross expenditure on R&D, % GDP (GII Rank 58):** This indicator measures the percentage of a country's GDP invested in research and development. With a rank of 58, Algeria shows commitment to R&D investments, which is essential for driving innovation and technological progress.
- **Gross capital formation, % GDP (GII Rank 5):** This indicator assesses the percentage of GDP allocated to gross capital formation, which includes investments in physical assets like infrastructure and equipment. Algeria's high rank at 5 indicates strong investment in physical infrastructure, fostering a conducive environment for innovation and economic growth.
- **Domestic market scale, bn PPP\$ (GII Rank 42):** This indicator measures the size of the domestic market in terms of purchasing power parity (PPP) dollars. With a rank of 42, Algeria boasts a substantial domestic market, providing opportunities for businesses and startups to thrive.
- **State of cluster development and depth (GII Rank 66):** This indicator evaluates the development and depth of industry clusters within the country. A rank of 66 suggests that Algeria has some degree of industry clustering, which can promote collaboration and specialization.
- **High-tech imports, % total trade (GII Rank 55):** This indicator reflects the percentage of high-tech imports compared to the total volume of trade. Algeria's rank of 55 indicates a considerable involvement in importing high-tech goods, contributing to technology diffusion and adoption.

- **Industrial designs by origin/bn PPP\$ GDP (GII Rank 43):** This indicator assesses the number of industrial designs originating in the country relative to PPP GDP. A rank of 43 indicates a significant contribution to industrial design, which can boost product innovation and competitiveness.

❖ **Weaknesses:**

- **Regulatory quality (GII Rank 128):** This indicator assesses the quality and effectiveness of regulations in the country. A low rank at 128 suggests that Algeria faces challenges in terms of regulatory efficiency and effectiveness, which can hinder innovation and business growth.

- **PISA scales in reading, maths, and science (GII Rank 76):** This indicator reflects the performance of students in the Program for International Student Assessment (PISA) tests in reading, mathematics, and science. A rank of 76 suggests room for improvement in educational outcomes and the quality of education.

- **Global corporate R&D investors, top 3, mn USD (GII Rank 38):** This indicator measures the amount of research and development investments made by the top three global corporate players in Algeria. A rank of 38 indicates that the country could attract more significant R&D investments from global corporations.

- **QS university ranking, top 3 (GII Rank 72):** This indicator evaluates the ranking of the top three universities in the country according to the QS World University Rankings. A rank of 72 suggests that there is potential for further improvement in the quality and reputation of Algerian universities on the global stage.

- **E-participation (GII Rank 130):** This indicator assesses the level of e-participation in the country, reflecting the use of digital platforms for citizen engagement. A low rank at 130 suggests limited digital participation and engagement opportunities.

- **Market capitalization, % GDP (GII Rank 81):** This indicator measures the market capitalization as a percentage of GDP. A rank of 81 indicates that the country's financial markets may be relatively underdeveloped compared to other economies.

- **Venture capital recipients, deals/bn PPP\$ GDP (GII Rank 103):** This indicator evaluates the number of venture capital deals relative to PPP GDP. A rank of 103 suggests that the country's startup ecosystem may need further support and investment.

- **Software spending, % GDP (GII Rank 122):** This indicator measures the percentage of GDP spent on software development and acquisition. A rank of 122 indicates that there is potential for increased software adoption and development in Algeria.

- **High-tech exports, % total trade (GII Rank 130):** This indicator reflects the percentage of high-tech exports in relation to the total volume of trade. A rank of 130 suggests that Algeria may have limited participation in exporting high-tech products.

- **Global brand value, top 5,000, % GDP (GII Rank 77):** This indicator measures the global brand value of the top 5,000 companies relative to GDP. A rank of 77 indicates that the country's companies may have room for improvement in terms of global branding and recognition.

Algeria exhibits strengths in areas like education, research, human capital, and market scale, which provide a solid foundation for innovation and economic growth. However, there are areas of concern, such as regulatory quality, educational outcomes, and limited global corporate R&D investments, which require attention to further enhance the country's innovation ecosystem and competitiveness on the global stage.

7. Conclusion:

In conclusion, this study sheds light on the crucial role of innovation and innovation management in achieving competitive advantage within the context of strategic management, with a particular focus on Algeria's innovation landscape. The findings highlight Algeria's strengths in human capital and research, emphasizing the importance of continued investment in education and research to foster a skilled and innovative workforce. However, the country's weaknesses in market sophistication call for strategic attention and efforts to enhance business development and technology adoption.

Implications for policy and practice: The research underscores the significance of aligning national policies with innovation-driven economic development. Policymakers should prioritize investments in education, research, and infrastructure to bolster the innovation ecosystem. Emphasizing market-related policies and fostering a supportive environment for startups and SMEs can enhance market sophistication and drive economic growth through innovation.

Overall, this research contributes to the understanding of innovation dynamics and competitive advantage, offering valuable implications for policymakers and practitioners to propel Algeria towards a more innovative and competitive future. By addressing the identified limitations and embracing strategic recommendations, Algeria can harness its innovation potential and drive sustainable economic development.

Concluding remarks :

Despite the valuable insights obtained from the Global Innovation Index, the study acknowledges certain limitations, including data availability and the dynamic nature of innovation. To overcome these limitations, future research should employ additional data sources and longitudinal studies to track the evolution of Algeria's innovation landscape over time. Moreover, conducting case studies and engaging stakeholders directly can provide deeper insights into the challenges and opportunities in innovation management.

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