INNOVATION TIMELINESS IN HYPER-COMPETITIVE AND TURBULENT ENVIRONMENTS: EMPIRICAL ASSESSMENT BASED ON INTERNATIONAL RANKINGS

Ionela-Beatrice IPSALAT [a*], Aurel BURCIU [b]

[a, b] *"Stefan cel Mare" University of Suceava, Suceava, Romania*

ABSTRACT
The current global context requires analyzing innovative companies in the three poles of the global triad. The study of Multinational Corporations (MNCs) thriving in turbulent and hyper-competitive environments provides insights and methods by which companies can also successfully apply open innovation. The analysis of innovative companies also exemplifies the ways in which they manage disruptive technologies, capitalize on core competencies, and at the same time highlights the ways in which they collaborate with diverse business ecosystems. The study of US vs Europe vs Asia MNCs is essential as it encompasses economic, strategic and methodological aspects of technology development. In particular, analyzing Romania in the context of innovation can provide insights needed to implement mechanisms to support the innovation ecosystem. This article contributes to the theoretical development of strategic management and provides a broad overview of the current global situation regarding innovation.

KEYWORDS: *business networks, disruptive technologies, MNCs, open innovation.*

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1. INTRODUCTION

The issues of this study arise from the uncertainty of the business environment, innovations, technologies and large companies change the trajectory of the market as a whole. As disruptive technologies continue to redefine industries, traditional boundaries between sectors are becoming increasingly blurred. The question arising from this is how and to what extent companies can integrate new technologies.

The aim of this article is to explore and highlight how and in what way innovations and technologies influence the market and the business environment, their role in the development of modern society. On the basis of specialized studies the article presents concrete examples of companies and innovations highlighting global challenges.

Essentially, the paper analyzes and highlights the interconnection between open innovation (OI), disruptive technologies, knowledge management and large companies from the three poles of power (USA, EU, Asia) in the current economic context. Specifically, in hyper-competitive and turbulent environments, those companies able to "navigate" in a constantly changing technological landscape remain in the market. Uncertainty becomes a catalyst for innovation, forcing organizations to invest in research and development (R&D), embrace new business models while global collaborations are needed.

* Corresponding author. E-mail address: *ipsalationelabeatrice@yahoo.com*

2. LITERATURE REVIEW

In the global market, there are companies that have become a model/standard in terms of creating innovation networks and open innovation (Procter&Gamble, Cisco Systems, General Electric and Intel). However, the market and business environment often proves the failure of new entrants that follow exactly the "steps taken" by pioneer companies. For example, in the software industry, change, technology and innovation happen extremely fast. Therefore, "players" in this industry have to adapt (Whelan et al., 2011) at the pace of change fHenry Chesbrough's vision of OI is reinterpreted and well analyzed (Vanhaverbeke et al., 2024), however, OI is a strategic and holistic approach to innovation that emphasizes collaboration, partnerships and the effective management of tacit and explicit knowledge in an increasingly interconnected and dynamic global economy. This can lead to slightly better financial performance (Chesbrough et al., 2014) for all partners involved by reducing innovation costs and generating additional revenues. Starting from the originator of this concept (Chesbrough, 2003), table 1 shows the parallel between closed and open innovation:

Table 1. Descriptive parallel between closed and open innovation

Closed innovation	Open innovation
20th century characteristic.	The rise of open innovation in the 21st century begins. 21st century.
Companies practicing this time of innovation notice opportunities much later (or never).	Collaborating companies have access to innovation and information at an early stage.
The strategic thinking is different, to take advantage of R&D, you have to discover/develop/provide everything from inside the company.	R&D centers can create value for their own organization.
Ideas/innovations come exclusively from within.	Ideas/innovations come from both inside and outside.
It is rigid and does not adapt to the external environment.	It is flexible to the external environment.

Source: Adapted from the Chesbrough H., Open Innovation: The New Imperative for Creating and Profiting from Technology, Harvard Business School Press, USA, 2003.

From the perspective of the international literature, we recall that some of the characteristics that are representative of open innovation and/or are found in the concept of "industrial clusters" developed by Porter (Porter, 2008) about two decades before the individualization of open innovation as a distinct concept. However, in the current version of the concept of OI, multiple content aspects have been brought to the current version of the concept that differentiate OI from cluster. The essence of key issues in the evolution of OI (Chesbrough, 2003) from author Chesbrough's perspective, it aims:

- ✓ *Concept definition - the process by which companies share and disseminate their ideas with external parties and integrate external ideas into their own innovation processes*;
- ✓ *Focus on collaboration and partnerships - emphasizes the importance of partnerships with various institutions and beyond (various companies, universities, R&D centers, non-profit organizations, etc.) to integrate external ideas into internal processes;*
- ✓ *Business model change - is seen and exposed as a necessity with the aim of facilitating OI. At the same time, the importance of producing value by licensing technologies, collaborating in R&D activities and exploiting external resources is emphasized;*

- ✓ *Globalization of Open Innovation - this has global potential and can be applied in various contexts and industries around the world.*

Lindegaard S. suggests that (Lindegaard, 2012) it is impossible to position the firm on a middle path with respect to disruptiveness; consequently there are two alternatives: in the first case, the option of disrupting markets or in the drastic case "embracing" the effects of disruption. The approaches that an organization can achieve in today's business environment include managing aspects of: open innovation, creative thinking and disruptive innovation. Undeniably, there are a number of benefits from the OI process, but there are also issues that 'limit' companies' engagement with these strategies. In other words, there are reasons why managers are reluctant to adopt this open process. Some of the most significant reasons are (Pop et al., 2015): the need to disseminate benefits with partners, high costs for coordination, joint decision making is time consuming, actions to implement open innovation strategies are only cost-effective in the long term.
Economic rewards from knowledge are growing (Drucker, 1987), but the penalties for lack of knowledge are increasing in the same way or accelerating. Researchers in the field (Clayton et al., 2016) argue that innovation, as a whole, is difficult to predict and sustain because innovation questions are framed in the wrong way. The literature shows that organizations that possess relevant knowledge are those organizations that are innovation leaders in their industry. Therefore, we can assume/assume that there is an obvious link (Roy & Sarkar, 2016) and clear link between knowledge, innovation and organizations. Starting from this link there are several opinions (Si & Chen, 2020) and interpretations as follows:

- ➢ The disruptive phenomenon is engineered by "outsiders" or outsiders who possess those skills, entrepreneurial experience and detailed knowledge about digital technology. The integration of knowledge causes positive effects on both knowledge specificity and outward-oriented disruptive innovation.
- ➢ Disruptive innovation involves a number of economic actors: the network of suppliers, knowledge distributors and other sources. The ability to acquire and disseminate knowledge has a beneficial and important role in disruptive innovation. Knowledge acquisition also acts as an intermediary (Auliasari et al., 2023) between transformational leadership and disruptive innovation. In order to survive in a dynamic economy, organizations need to hone their knowledge creation and knowledge transfer skills.
- ➢ Being contemporaries in a knowledge-based economy the challenge for the CEO and his team is to design, mix and integrate knowledge assets in order to address gaps and to manage the effects of disruptive innovations. At the same time (Nonaka & Teece, 2001) must take place in an environment where knowledge is accumulated and disseminated at low cost.

3. METHODOLOGY

In the article, we use three different ways to highlight the position of leading companies and/or countries with respect to innovation orientation, R&D investment and other similar indicators at the international level:

- the first method of analysis based on the Boston Consulting Group (BCG) survey for the period 2005 to date, which regularly ranks a number of approx. 20 corporations from all three poles of economic power;
- the second method we propose is based on the Top 100 Global Innovators 2024;
- a third method of analysis is to invoke other rankings/indicators showing the dominance of US MNCs and the recent rise of some corporations and Asia.

The first method, in which we used the BCG Ranking - The most Innovative Companies 2005-2023 reports, provides a broad picture of innovation at the global level. The usefulness of this method is manifold, but first and foremost it can be used to analyze innovation trends. It also highlights innovation leaders and changes in the innovation landscape. This method maximizes the information package needed by investors and business analysts. Information that is needed for investment decisions and market strategies. In essence this method provides a wealth of insights useful for understanding the dynamics of innovation globally and facilitates fundamental business and investment decisions.

The second method using the Top 100 Global Innovators allows a direct comparison of innovative companies from different regions in order to identify the different innovation priorities and strategies adopted by US, EU and Asian companies. It can also track how these companies leverage their resources and competitive advantages. The method also highlights the most innovative industries by region and provides a clearer understanding of how innovation in specific sectors (technology, automotive, energy, etc.) varies according to the regional context. Based on the Top 100 Global Innovators, the method helps to asses s the contribution of each economic pole to global innovation, thus highlighting a region's dominance in certain technologies and sectors.

The third method allows a clear visualization of changes in the global economic landscape, highlighting how American MNCs and Asian companies have evolved in terms of their economic influence and power. Importantly, we can see how Asian companies, through technologies, innovative strategies and partnerships, have been able to rapidly climb the global rankings providing valuable lessons on success in emerging markets.

4. THE POSITIONING OF ROMANIA IN THE CONTEXT OF OPEN INNOVATION

In Romania, according to The Organization for Economic Cooperation and Development (OECD), the innovation ecosystem is immature, many regions in Romania lack the necessary levers to develop an effective innovation strategy. Over the last three decades, the Romanian government has done little to support R&D activity; the percentage of Gross Domestic Product (GDP) allocated to R&D is one of the lowest (whether the funds come from the state or the corporate sector). Analyzing in more detail, in 2011 Romania had only 0.47% of GDP for R&D, a percentage that has fluctuated insignificantly in the years 2012-present. This fact, of maintaining a low percentage of GDP for research, means that at the moment we can only compare Romania with European countries at a theoretical level. In order to develop an innovation network there are some barriers at country level: the decreasing rate of urbanization to which we can add the decreasing population and the large number of young people who prefer schooling and jobs in countries with a higher standard of living, etc. The innovation ecosystem is weak (OECD, 2024), but there are major differences/discrepancies regarding innovation in the Bucharest-Ilfov region and other areas of the country.

It is difficult to fairly compare Romania with other countries in Europe (Germany, Switzerland), the USA or even Asia, which have a disruptive potential or to make a comparison in terms of open innovation. However, there are companies in Romania that can be considered part of the IO sector. A more recent study captures companies (in Cluj-Romania) in the information technology (IT) sector (Nan et al., 2017) which stands out in this sense:

- The IT company "8x8 Research and Innovations" has developed 10,000 projects in 21 years. It is a provider of secure cloud communications solutions for approx. 40,000 companies;
- The company "Ria Solutions" has over 10 years of experience in software and offers infrastructure implementation services, cloud consulting, etc;
- "Accesa IT Systems" is a company with 20 years of experience providing IT consulting services and software development;
- "Artsoft Consult" has 20 years of solid experience in software development, IT services and business process outsourcing;
- "3Pillar Global" focuses on building innovative software that powers global business.

In addition to the aspects already mentioned regarding the positioning of Romanian firms in an IO context, we also emphasize that the development of a knowledge-based economy can ensure (Ruiu, 2002): a better integration in the EU, thus minimizing the discrepancies between Romania and other members, creating a competitive system and at the same time a culture of knowledge motivation, generating competent human resources in terms of knowledge production, especially the appropriate use of knowledge, transforming knowledge into capital and promoting a continuous innovative system.

Assuming that we want to position Romania's situation in the global business environment in terms of innovation intensity, available human resources, government policies and other similar indicators, it is necessary to expand the analysis on this topic. At the international level, data show that countries such as the USA, Japan, South Korea, Germany, Great Britain, France, more recently China, and other Asian countries have top positions in terms of innovation intensity, government policies and corporate strategies applied, and orientation towards open innovation networks towards other stakeholders. This remains valid both from a macroeconomic perspective (positioning of countries on the basis of indicators) and from a microeconomic perspective (positioning of some MNCs on the basis of indicators on innovation intensity, openness to innovation networks, etc.).

5. RANKING AMERICAN COMPANIES VS EUROPEAN COMPANIES VS ASIAN COMPANIES

Since the 1950s, the so-called "Economic Triad" has been established, referring to three poles of economic power: the US, Europe (EU) and Asia. More recently, since 2010, the distribution of economic power within the three poles of the triad has become much more nuanced/shifted as China becomes the world's second largest economy and has a population of 1.4 billion (about four times that of the US). By 2023 (World Bank, 2024), by absolute GDP in nominal prices the top five positions are as follows:

- first place goes to the USA, with total GDP of 27,360 billion USD (GDP per capita);
- second place is held by China with total GDP 17,794 billion USD (GDP per capita);
- third place is held by Germany with total GDP 4,456 billion USD (GDP per capita);
- in fourth position is Japan with total GDP 4,212 billion USD (GDP per capita);
- in fifth place is India with total GDP of USD 3,549 billion (GDP per capita).

Summary in Table 2 (The Boston Consulting Group, 2007) is of maximum interest for two reasons; first of all, there are some companies that are difficult to "take down/defeat" (The Boston Consulting Group, 2013) from an innovative point of view (The Boston Consulting Group, 2008) (this does not negate the understanding of cyclicality, in the sense that some large companies can go through recessions), another aspect is the socio-economic impact.

Table 2. The evolution of the world's most innovative companies 2005-2023

Technologies and Tele-communications	Auto Industry	Consumer goods	Biotechnology and Health	Industry and Energy
2005	**2013**	**2021**	**2022**	**2023**
Apple	Apple	Apple	Apple	Apple
3M	Samsung	Google/Alphabet	Microsoft	Tesla
General Electric	Google/Alphabet	Amazon	Amazon	Amazon
Microsoft	Microsoft	Microsoft	Google/Alphabet	Google/Alphabet
Sony	Toyota	Tesla	Tesla	Microsoft
Dell	IBM	Samsung	Samsung	Moderna
IBM	Amazon	IBM	Moderna	Samsung
Google/Alphabet	Ford	Huawei	Huawei	Huawei
Nokia	BMW	Sony	Sony	BYD Company
Procter & Gamble	General Electric	Pfizer	IBM	Siemens

Source: Adapted from the The Boston Consulting Group, (2024). BCG's Most Innovative Companies Report: The Collection, 2024
https://www.bcg.com/publications/most-innovative-companies-the-collection

Table No 2 gives a clear picture (The Boston Consulting Group, 2024) of the fluctuation of top companies. First of all, Apple stands out as the top company thanks to its innovations and massive investments in R&D. Another important aspect is the year 2021, when we find companies in the Biotech and Healthcare industries. The considerable innovations realized by Pfizer and Moderna companies are explained by the COVID-19 pandemic in response to the global need. We predominantly find companies from the Technology and Telecommunications industry (The Boston Consulting Group, 2006), This primarily emphasizes the demands of the market, which is accelerating various innovations such as Artificial Intelligence (AI) or Internet of Things (IoT). With regard to the automotive industry, Tesla and Toyota are the most notable companies. Some practices are already well known (The Boston Consulting Group, 2005) of these companies (giving away patents for free), but by investing in R&D and OI, Tesla ranks 2nd in the BCG (BCG, 2023) for 2023. Benchmarking the competitive position of US companies in terms of innovation intensity against European and Asian companies shows that (The Boston Consulting Group, 2009), Looking back over the last two decades or more, US MNCs remain by far the most innovative globally, as:

- they dominate the BCG ranking (12 out of 19 companies, the most innovative for the last two decades);
- european companies are very modestly represented (3 out of 19);
- there are some Japanese, South Korean and more recently Chinese companies (4 out of 19, located in all three countries).

As is well known, there is another ranking of the 50 most innovative companies by BCG, a ranking in which we find predominantly American companies among the most internationally known. This second BCG ranking shows that after 2010, some companies from China and other Asian countries are tending to consolidate their global position. The conclusion is that for the time being, American MNCs maintain a dominant position in terms of reputation, innovative capacity, sustainable development, etc. in most of the existing global rankings.
In Table 3 (The Boston Consulting Group, 2024) it highlights the position of American vs European vs Asian companies for three years, namely 2021, 2022 and 2023.

Table 3. The top most innovative companies by pole in the global triad 2021-2023

Year 2023								
Place	**SUA**	**2022-21**	**Place**	**Europa**	**2022-21**	**Place**	**Asia**	**2022-21**
1.	Apple	0; 0	10.	Siemens	+10; +1	7.	Samsung	-1; -1
2.	Tesla	+3; +3	21.	Roche	*; 27	8.	Huawei	0; 0
3.	Amazon		23.	BioNTech	*; *	9.	BYD	*; *
4.	Alphabet	0; -2	25.	Schneider Electric	*; *	20.	Tata Group	*; *
5.	Microsoft	-3; -1	27.	Nestlé	+22; *	29.	Xiaomi	+2; +2
6.	Moderna	+1; +36	37.	Bosch	-11; -7	31.	Sony	-22; -22
11.	Pfizer	+7; -1	39.	Glencore	*; *	32.	Sinopec	*; *
12.	J&J	+15; +8	43.	Mercedes Benz Group	*; *	33.	Hitachi	+6; *
13.	SpaceX	*; *	49.	BMW	*; *	36.	Byte Dance	+9; *
14.	Nvidia	+1; *	50.	Unilever	0; *	41.	Saudi Aramco	*; *
15.	Exxon Mobil	*; *				44.	Alibaba	-22; -30
16.	Meta	+5; *				46.	Petro China	*; *
17.	Nike	-5; +7				47.	NTT	*; *
18.	IBM	-8; 11				48.	Lenovo	-24; -23
19.	3M	+8; *						
22.	Oracle	-3; -7						
24.	Shell	*; *						
26.	P&G	+8; +1						
28.	General Electric	+1; *						
30.	Honeywell	*; *						
34.	Mc Donald's	*; *						
35.	Merck	*; 0						
38.	Dell	-24; -22						
40.	Stripe	*; *						
42.	Coca-Cola	-6; -14						
45.	Walmart	-32; -22						

Source: Adapted from the The Boston Consulting Group, (2024). BCG's Most Innovative Companies Report: The Collection, 2024
https://www.bcg.com/publications/most-innovative-companies-the-collection
* is the representation that the company is not in the top for that year

For 2021 (The Boston Consulting Group, 2021), in the BCG ranking, the US ranks first with 27 companies. In second place is Asia with 12 companies. Europe ranks last with 11 companies. The US pole of strength also includes Disney. It focuses its innovations on media and entertainment, including innovations in marketing and branding. In the reference year, the European companies in this top list come from different industries; from which we can deduce that innovation comes from different backgrounds and industries, which underlines the need to approach open innovation.

In addition to the reasons exemplified above, the US has a favorable environment due to access to capital. In this respect we highlight one of the most developed capital markets globally, namely Silicon Valley. For the year 2022 (The Boston Consulting Group, 2022) The clear positioning of American companies in first place (27 companies), followed by Asian companies (15 companies) and European companies (8 companies). The US also stands out in the medical industry, namely Moderna, Pfizer and Johnson & Johnson. In the more familiar sense, companies stand out for their significant contributions to the medical industry. In a broader sense, companies are considered innovative due to several factors:

- ✓ *diversified portfolio of healthcare services resulting in innovations across multiple areas/sectors of the healthcare industry;*
- ✓ *continuous innovation aimed at improving global health;*
- ✓ *progress and speed in research* (The Boston Consulting Group, 2020) in response to Poandemic COVID-19.

As far as Europe is concerned, Siemens, Bosch, Philips are almost always to be found in the innovation rankings. We also find companies in other industries that stand out for their innovation, such as Adidas. In the FastFashion context, Adidas channels its innovations into design and materials, sustainability, etc.

Similarly, there are some Asian companies that are recognizable and stand out when we talk about innovation, namely Samsung, Huawei, Sony, Sony, Toyota, Lenovo etc.

By 2023 (The Boston Consulting Group, 2023) The ranking of the global innovation triad is well known. In the sense that the USA comes first, followed by Asia and then Europe. Academic sources point to the rise and dominance of the West over the centuries. Of the well-known aspects of Western dominance, we would like to mention and emphasize the following:

- massive investments in R&D, american companies invest colossal sums in R&D. For example, Apple has invested for R&D alone in 2023 the sum of 29.9 billion dollars, up from 2022 where it invested 26.2 billion dollars. Swiss company Roche is designed for innovation, therefore it has autonomous R&D centers and alliances with more than 250 partners.

- infrastructure and business ecosystem, from a business ecosystem perspective Europe may have some shortcomings due to differences in countries e.g. Romania vs Switzerland (by differences we mean different regulations, policies and perspectives).

Regarding Asia, in addition to the companies well known for their interest in R&D activities, we emphasize in particular the Tata Group, which is developing its activities with the aim of designing a future in the world of business without borders.

The analysis performed on the basis of the BCG survey (both types of ranking) leads us to conclusions that are of interest for positioning the most innovative companies globally, in order to further understand the practices that such companies resort to and how they gain competencies in a given industry or market. However, the conclusions that can be deduced from a single study/ranking must be interpreted with caution when comparing innovative entities from all three poles of economic power (it is impossible to precisely quantify the quality or value of a patent obtained by a company; Chinese companies are in the process of catching up with the Western world, which means obtaining a large number of patents in certain industries; Chinese companies are numerically dominant in some industries that rely mainly on lower labor costs, etc.).

In order to capture as clearly as possible the global situation in terms of innovative companies, in Table 4 we analyze the current situation of the global triad based on the Top 100 Global Innovators 2024.

Table 4. Top 10 innovators, selection from top 100 global innovator 2024

Place	Company	Region/Country	Industrie
1.	Samsung Electronics	South Korea	Electronic and computer equipment
2.	Canon	Japan	Electronic and computer equipment
3.	Honda	Japan	Automotive
4.	Toyota	Japan	Automotive
5.	Seiko Epson	Japan	Electronic and computer equipment
6.	LG Chem	South Korea	Chemicals and Materials
7.	Huawei	Mainland China	Telecommunications
8.	FujiFilm	Japan	Electronic and computer equipment
9.	Fanuc	Japan	Industrial systems
10.	RTX	USA	Aerospace & Defense

Source: Adapted from the Clarative (2024). *Top 100 Global Innovators 2024*, 2024 https://clarivate.com/top-100-innovators/

In order to highlight as clearly as possible the top companies by the three poles of power, we make some necessary mentions:

- The US has only 17 innovative companies, ranking third after Asia and Europe. This may be due to factors such as:

- *Increased global competition* - Europe has always been a strong competitor, since Asia has become a strong economy, it has become a real player in the global market.

- *Outsourcing and globalization of manufacturing* - Some of the American companies have outsourced their manufacturing activities (Apple) including R&D activities, the reason being lower labour costs.

- *Economic changes and the different vision of the CEO and his team* - the vision of companies may change depending on the long term goals. For example, companies may choose profit maximization for shareholders at the expense of investment in innovation.

- Europe has a number of 21 companies with a track record of innovation and technological development. Some of the issues that demonstrate the resilience of the global market for innovation:

- *Support for start-ups and entrepreneurship* - European support is also translated into non-reimbursable funds for start-ups in various fields. This in the context of open innovation helps entrepreneurs to enter the market and share their innovative ideas.

- *Focus on sustainability and green technologies* - European legislation imposes regulations and laws, failure to comply with them entails financial and other penalties. So companies are developing technologies for renewable energy, energy efficiency, sustainable mobility, etc. which influence innovation in other areas.

These factors therefore maintain an enabling environment for European companies to innovate.

- Asia has a number of 62 companies, we can think that the number of population in the East is much higher than in the West as a first factor explaining this ranking. The fact that Asia has the highest number of innovative companies in this top can also be explained by a number of key factors:

- *Massive investment in R&D* - Asian countries, notably China, Japan, South Korea and Taiwan, are taking significant steps to increase investment in R&D. For example, even governments are supporting these efforts to develop innovative technologies/products.

- *Favorable government policies - these policies guide, encourage and facilitate innovation. China has launched the Made in China 2025 initiative* (Wübbeke et al., n.d.) to stimulate high technology, specifically, to position China as the world's leading innovator.

- *Focused and dynamic business ecosystem* - Asia facilitates cooperation, in the sense that it continues to develop robust business ecosystems that include technology parks, business incubators and industrial clusters; these create an environment conducive to innovation, facilitating partnerships between various companies, be they competitors (Tesla and Toyota or Tesla and Nissan), universities and research institutes.
- *Educational attainment* - Asia, especially Japan, is well known for the reforms in education in both the 20th century and the 20th century. 19th century and since the 1950s. The education system in Japan, South Korea, Singapore has become among the top ranked globally. Therefore, this can be a factor in generating a well-trained, skilled and innovative workforce.
- *Large and growing markets* - the demand for innovative products and services is "forcing" companies to take the necessary innovation steps to meet market demands.
- *Strategic partnerships* - partnerships with western firms/companies are particularly noteworthy (partnership and adoption of patent strategy in Tesla and Toyota). Thus, input and output of know-how.
- *Innovation-driven organizational culture* - companies such as Samsung, Huawei and Toyota are already well known for their innovative approaches and investments in innovation and R&D. This is evidenced by the dominance of these companies in the top positions.

Taken together, these factors can explain Asia's dominance in this top. All of Asia's endeavors and evolution show the pathway by which it aims to become a global leader in innovation.
In addition to the outlined reminders, Table 4 (Clarative, 2024) and the general analysis carried out on all 100 companies highlights another aspect, out of the total number of companies, a total of 26 are from the Electronics and computing equipment sector. In second place with 13 companies is the Semiconductors industry and in third place the Industrial systems industry with 12 companies. These aspects denote the global interest in technologies especially the interest in innovations in these three sectors.
Assuming that we broaden the perspective of analysis on the role of innovation on the performance of any type of firm (MNCs vs Small and medium-sized enterprises) (SMEs), we will emphasize that the acquisition of new knowledge, the acquisition of core competencies and continuous innovation determine over time other key indicators such as market capitalization, brand value, involvement in Corporate Social Responsibility (CSR), orientation towards sustainable development, social recognition, etc.
In view of the topic of the article, we only include in the analysis the ranking for the top 20 companies with respect to brand value in Table 5.

Table 5. International ranking of MNCs by brand value

No.	Brand (increasing/decreasing position compared to 2022	Sector/ Industry	Country/ Region	Brand value in million euro	% compared to 2022
1.	Apple Inc	IT & Technology	USA	367.834	-8%
2.	Alphabet Inc	IT & Technology	USA	304.759	+1%
3.	Microsoft Corp (+1)	IT & Technology	USA	240.563	+7%
4.	Amazon.com Inc (-1)	Retail	USA	206.372	-15%
5.	LVMH Moet Hennessy Louis Vuitton SE	Luxury	France	135.640	+8%
6.	Alibaba Group Holding Ltd	Retail	China	112.628	+5%
7.	Johnson & Johnson (+1)	Consumer goods	USA	76.121	+10%
8.	Facebook Inc (-1)	IT & Technology	USA	75.938	-29%
9.	Walmart Inc (+1)	Retail	USA	69.540	+10%
10.	Coca-Cola Co (+3)	Consumer goods	USA	66.387	+17%

No.	Brand (increasing/decreasing position compared to 2022	Sector/ Industry	Country/ Region	Brand value in million euro	% compared to 2022
11.	Procter & Gamble Co (+1)	Consumer goods	USA	66.265	+12%
12.	Tesla Inc (+6)	Automotive	USA	64.115	+23%
13.	Saudi Aramco (+7)	Utilities	Saudi Arabia	63.076	+33%
14.	PepsiCo Inc (+1)	Consumer goods	USA	62.577	+13%
15.	Huawei (-6)	IT & Technology	China	53.749	-9%
16.	Pfizer Inc (+5)	Pharma, Health & Biotech	USA	52.885	+12%
17.	Verizon Communications Inc	Telco	USA	50.406	+5%
18.	Berkshire Hathaway Inc (+7)	Financial services	USA	50.353	+13%
19.	Samsung Electronics Co Ltd (-5)	IT & Technology	South Korea	50.338	-10%
20.	Visa Inc (+5)	Financial services	USA	49.919	27%

Source: adapted from Brand Insitute European Brand Corporations, (2023). *Global Top 100* Brand Corporations 2023, 2023
https://www.europeanbrandinstitute.com/brand-rankings-1/brand-rankings-2023-1/

In Table 5 (Brand Institute European, 2023) there is only one company from the European territory (position 5 Louis Vuitton); out of the total of 100 companies in this brand ranking, there are however European companies that are important to highlight: Nestle SA from Switzerland on position 22, Anheuser Busch Inbev SA the Belgian company ranks 29th, Christian Dior SE ranks 32nd, Unilever NV on position 39th, Deutsche Telekom AG is at number 40, Volkswagen AG on position 49, L´Oreal SA on position 54, Novartis AG the Swiss company ranks 57th, Diageo PLC from the UK on position 60, Bayerische Motoren Werke AG on position 65, Daimler AG ranks 66, Hermes International SCA is ranked 67th, SAP SE 68th, Dutch companies Heineken NV and Stellantis NV are ranked 75th and 76th respectively, Vodafone Group PLC is ranked 78th, Ikea 79th, Bosch 81st, Industria de Diseno Textil SA is ranked 86th, BASF SE German company 87th, Red Bull 90th, HSBC Holdings PLC 91st, Roche Holding AG 93rd, Sanofi SA French company 99th (Brand Institute European, 2023).
From the perspective of European companies we observe a high share of Swiss companies. Table No. 5 shows that American MNCs still hold a dominant position globally vs. European vs. Asian companies (16 companies out of the total of 20 listed).

6. HIGHLIGHTS OF THE PAPER

The examples given in this article and the comparisons between the three poles of the global triad reveal some aspects of maximum interest for the economic environment:

- ✓ at global level there is an increased interest in technologies, digitalization, etc., in this respect it is necessary to identify future trends in order to anticipate/respond to market challenges (aspect highlighted by table no.2);
- ✓ American MNCs remain the reference in terms of innovation, but European and Asian influences cannot be ignored/omited (highlighted in particular in Table 4);

- ✓ there has been a gradual rise of MNCs from China and other Asian countries which, after catching up with the West in terms of technology, are starting to hold top positions in various international rankings;
- ✓ the overall position of European MNCs remains relatively modest in terms of innovations and patents obtained in such international rankings;
- ✓ the position of MNCs in Japan and South Korea remains constant with reference to the same international rankings on innovative capacity;

We emphasize the importance of knowledge (Lin et al., 2018) in the relationship between open innovation, disruptive technologies and business networks through the idea that an organization has two fundamental goals generating knowledge and applying the knowledge generated.
OI remains a beneficial process for companies, regardless of the barriers faced by managers. This process is extremely well defined (Chesbrough, 2003) by its promoter. His contribution in this field is a significant one, being also (year 2003) the starting point for many other studies (Vanhaverbeke et al., 2024)related to this topic carried out by other authors.

7. DISCUSSION

The study as a whole emphasizes the transformative role of technology and innovation highlighting the relationship between technological advancement and business success.
The specialized literature (Bonne et al., 2019) provides a wide range of studies, analyses, reports, etc. on innovation as this topic is of utmost interest for business. The study of MNCs in this context provides an extremely varied perspective as MNCs are forced to find solutions to global problems.
The present study highlights the following important points:

- The analysis of MNCs especially on specific sectors (automotive industry) (Baglieri et al., 2014)remains of interest as it pervades clear and complex forms of strategies, forms of innovation and partnerships. These aspects are also highlighted by the complexity of studies in the acdemic sphere;
- The rise of Asia, more specifically China, is well known, thanks to MNCs, they have experienced spectacular growth opportunities (Xie & Niu, 2021) through strategies, innovations, patents and R&D investments;
- European MNCs are influenced by government policies (Vukov, 2023), (aspects that are highlighted by specialized studies) in the same sense, this article also points to a certain maintenance of European MNCs;
- the interest in American MNCs is well known for various reasons, the pioneers in the business environment are US companies, resource management strategies (Edwards & Ferner, 2002) of a tangible/intangible nature and considerable investment in R&D.

8. CONCLUSION

Current international market trends point to the rise of the EV sector due to: decreasing costs of purchasing such a car and therefore greater affordability, government regulations through strict environmental policies, society's awareness of pollution, etc. There are certainly major benefits of applying the open innovation process at both the organization and industry level. However, there are some shortcomings, which we consider important to mention, that need to be realized before approaching this process. In giant companies the benefits are visible also for employees, as open innovation also contributes to knowledge creation and development. But SMEs encounter some issues that slow down this process, in the broad sense that small and medium sized companies may have difficulties in managing knowledge, ideas and innovations.

Although automation and the introduction of robots in all economic processes, production, etc. would lead to efficiency and high productivity, the company has to deal with social disadvantages and challenges: the need for retraining, the changing nature of work, stress, etc.
As a result of this article we can highlight some issues that may arise and at the same time provide a future framework for analysis:

- ✓ effective coordination and management – a robust structure is needed to enable and facilitate collaboration;
- ✓ security through information, data, know-how etc.;
- ✓ impact measurement indices – in the current context, it is difficult to measure/quantify an evaluation of the effectiveness or impact of the innovation, standardized tools are required;
- ✓ level of funding – in the sense that the need to realize disruptive technologies involves some significant financial costs.

In order to benefit from positive effects in the organization and particularly in society we conclude that the following are necessary: developing risk management strategies, investing in staff training, creating a global environment for innovation.
It is important to note that the limitations of the research are of the nature of other studies, rankings or research reports. As mentioned throughout the article the conclusions/interpretations of the results should be made with caution as the rankings used only address certain points of interest. Future directions of this research may involve analyzing the impact of innovation on sustainability and social responsibility. The research could explore how top MNCs realize innovations in line with sustainability goals, assessing the environmental and societal impacts of these practices.

REFERENCES

Auliasari, R., W., Santoso, A. & Setiawan, F. (2023). Transforming Sustainability: The Role of Transformational Leadership and Knowledge in Disruptive Innovation. *Journal of Ultimate Research and Trends in Education*, *5*(3), 231–245. https://doi.org/10.31849/utamax.v5i3.13286

Baglieri, E., Bruno, M., Vasconcellos, E. & Grando, A. (2014). Innovation process in the automobile MNCs: Implications for the role of the international subsidiaries. *International Journal of Automotive Technology and Management*, *14*(1), 82–98. https://doi.org/10.1504/IJATM.2014.058367

Bonne, C., Lokshin, B., Guenter, H. & Belderbos, R. (2019). Top management team nationality diversity, corporate entrepreneurship, and innovation in multinational firm. *Strategic Management Journal*, *40*(2), 277–302. https://doi.org/10.1002/smj.2976

Boston Consulting Group (2005). *Innovation 2005*. https://web-assets.bcg.com/25/0d/308587c24c6a9f3271301b1fc57f/2005-innovation-report.pdf

Boston Consulting Group (2006). *Innovation 2006*. https://web-assets.bcg.com/13/93/70656b8647538e00f75b390bb7a7/2006-innovation-report.pdf

Boston Consulting Group (2007). *Innovation 2007 A BCG Senior Management Survey*. https://web-assets.bcg.com/b0/b2/196ef6254aa5ba31c7485388d312/2007-innovation-report.pdf

Boston Consulting Group (2008). *Innovation 2008 Is the Tide Turning?* https://web-assets.bcg.com/b3/94/4ca895bc43e4a4d10dcf7f3635dd/2008-innovation-report.pdf

Boston Consulting Group (2009). *Innovation 2009 Making Hard Decisions in the Downturn*. https://web-assets.bcg.com/d2/6d/eb16bb8748128cefee93f8e79499/2009-innovation-report.pdf

Boston Consulting Group (2013). *The Most Innovative Companies 2013: Lessons From Leaders*. https://web-assets.bcg.com/img-src/Most-Innovative-Companies-2013_tcm9-93992.pdf

Boston Consulting Group (2020). *Most Innovative Companies 2020 – The Serial Innovation Imperative*. https://web-assets.bcg.com/img-src/BCG-Most-Innovative-Companies-2020-Jun-2020-R-4_tcm9-251007.pdf

Boston Consulting Group (2021). *Most Innovative Companies 2021 – Overcoming the Innovation Readiness Gap*.

Boston Consulting Group (2022). *Most Innovative Companies 2022 – Are You Ready for Green Growth?* https://www.bcg.com/publications/2022/innovation-in-climate-and-sustainability-will-lead-to-green-growth

Boston Consulting Group (2023). *Reaching New Heights in Uncertain Times Most Innovative Companies*. https://www.bcg.com/publications/2023/advantages-through-innovation-in-uncertain-times

Boston Consulting Group (2024). *BCG's Most Innovative Companies Report: The Collection*. https://www.bcg.com/publications/most-innovative-companies-the-collection

Brand Institute European. (2023). *Brand Corporations 2023 Global Top 100*. https://www.rankingthebrands.com/The-Brand-Rankings.aspx?rankingID=221&year=1457

Chesbrough, H. (2003). *Open Innovations The New Imperative for Creating and Profiting from Technology*. Harvard Business School Press.

Chesbrough, H., Vanhaverbeke, W. & West, J. (2014). *New Frontiers in Open Innovation*. Oxford University Press.

Clayton, C., M., Hall, T., Dillon, K. & Duncan, D., S. (2016). *Competing Against Luck-The Story of Innovation and Customer Choice*. HarperCollins Publisher.

Drucker, P. (1987). *The Frontiers of Management—Where tomorrow's decisions are being shaped today*, Heinemann Professional Publishing Ltd.

Edwards, T. & Ferner, A. (2002). The renewed American Challenge': A review of employment practive in US multinationals. *Industrial Relations Journal*, *33*(2), 94–111. https://doi.org/10.1111/1468-2338.00222

Lin, C., Li, B. & Wu, Y., J. (2018). Existing knowledge assets and disruptive innovation: The role of knowledge embeddedness and specificity. *Sustainability*, *10*(2), 342. https://doi.org/10.3390/su10020342

Lindegaard, S. (2012). *Social Media for Corporate Innovators & Entrepreneurs: Add Power to Your Innovation Efforts*. Kindle Edition.

Nan, L., M., Păcurariu, R., L. & Bacali, L. (2017). Open innovation in IT brands in Cluj-Napoca. *MATEC Web of Conferences*, *137*, 07005. https://doi.org/10.1051/matecconf/201713707005

Nonaka, I. & Teece, D. (2001). *Managing Industrial Knowledge. Creation, Transfer and Utilization*. SAGE Publications.

OECD (2024). *Enhancing Srategic Planning and Innovation Services-Supporting Romanian Regional Development Agencies*.

Pop, O., Roijakkes, N., Coita, D., G. & Constantin, S., T. (2015). The Role of Open Innovation in Eastern European SMEs: The Case of Hungary and Romania. *The International Society for Professional Innovation Management*.

Porter, M. (2008). *On Competition*. Harvard Business Press.

Roy, R. & Sarkar, M. (2016). Knowledge, firm boundaries, and innovation: Mitigating the incumbent's curse during radical technological change. *Strategic Management Journal*, *37*, 835–854. https://doi.org/10.1002/smj.2357

Ruiu, N. (2002). *Notes on Knowledge-Based Economy*. The Expert Publishing House.

Si, S. & Chen, H. (2020). A literature review of disruptive innovation: What it is, how it works and where it goes. *Journal of Engineering and Technology Management*, *56*. https://doi.org/10.1016/j.jengtecman.2020.101568

Vanhaverbeke, W., Chesbrough, H., West, J. & Radziwon, A. (2024). Overcoming Organizational Obstacles to Open Innovation Success. *Oxford University Press*. https://doi.org/10.1093/oxfordhb/9780192899798.013.53

Vukov, V. (2023). Growth models in Europe's Eastern and Southern peripheries: Between national and EU politics. *New Political Economy*, *28*(5), 832–848. https://doi.org/10.1080/13563467.2023.2189695

Whelan, E., Parise, S., De Valk, J. & Aalbers, R. (2011). Creating employee networks that deliver open innovation. *MIT Sloan Management Review*, *53*(1), 37–44.

World Bank (2024). *Gross domestic product 2023*.

Wübbeke, J., Meissner, M., Zenglein, M., J., Ives, J. & Conrad, B. (n.d.). *Made in China 2025 The making of a high-tech superpower and consequences for industrial countries*. Mercator Institute for China Studies. https://merics.org/en/report/made-china-2025

Xie, L. & Niu, Y. (2021). A systematic literature review of foreign MNC's knowledge transfer in China. *Asia Pacific Business Review*, *27*(5), 710–730. https://doi.org/10.1080/13602381.2020.1815425