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Unlocking the Horizons of Harmony: Open Innovation as a Roadmap for Successful Partnerships "University-Company": Analysis of leading global models of cooperation between companies and universities

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Abstract: *This research paper aims to shed light on the partnership between companies and universities through open innovation as a roadmap to foster harmony between them. The importance of this topic is reflected in the potential of this cooperation to achieve a competitive advantage for companies, considering the university as a locomotive for scientific research and the primary generator of knowledge. We employed a descriptive analytical approach to evoke data and information related to the research subject, working to study and analyze it. After studying five (5) leading global models of cooperation between companies and universities, we found that companies pursue various mechanisms to strengthen this partnership. These include establishing research laboratories with academic institutes, launching research initiatives to develop solutions, transferring knowledge from universities through mutual cooperation programs, supporting patents originating from universities, building trust networks, and creating new opportunities for future collaboration.*

Key Words*: Open innovation, Knowledge transfer, R&D, Cooperation strategy, University.*

JEL Classification: *O36, O32, D83.*

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1. Introduction

The world has witnessed a great acceleration in creating value through innovation, which has confined companies to the field of strong competitiveness and compelled them to seek knowledge beyond their organizational borders as a generator of the innovation process. It is not possible, in any way, to understand this mechanism developed by recent studies with the emergence of the concept of open innovation except by comprehending its dimensions and the main factors affecting it. By opting for cooperation and sharing, and considering the position occupied by the university and academic institutes as the driving force of scientific research and the primary generator of knowledge, it qualifies them to be the partners that companies are seeking.

In light of understanding some of the leading global models in cooperation between companies and universities, this can lead us to pose the main problem of the study:

What are the mechanisms adopted by companies to enhance cooperation between them and universities and academic institutes to promote innovation?

To answer the problem of the study, a set of sub-questions were asked:

- How are companies shifting from closed to open innovation?
- What are the main factors influencing open innovation?
- What is the role of the university in engaging companies in open innovation?
- How do leading global models contribute to understanding collaboration between companies and the university?
- How does understanding leading global models lead us to replicate them in Algeria?

❖ **Objectives of the study:**

The study aims to highlight a set of points:

- Highlight open innovation.
- Identify variables affecting open innovation.
- Explore the contributions made by the university to the engagement of companies in open innovation.
- Highlight some of the world's leading experiences in understanding the collaboration between companies and the university.
- Propose a package of solutions and recommendations to enhance cooperation between Algerian companies and the university to promote innovation.

❖ **Limitations of the study:**

- **Objective limits**: The study is limited to initially examining open innovation and highlighting the role of academic institutes and universities in corporate adoption by understanding its mechanisms and the factors affecting it. The scope includes studying some of the leading global models of this cooperation.
- **Spatial boundaries**: The study was conducted on global models of companies engaged in open innovation with universities and academic institutes.

❖ **Curriculum used:**

This research relies on the descriptive analytical approach, involving the retrieval of data and information related to the research subject and the subsequent study

and analysis of them. Based on the above, to achieve the objectives of the study and answer its questions, the research will be divided into four basic elements.

- Open innovation.
- The main factors affecting the success of collaboration in open innovation.
- Open innovation and university management.
- Leading global models in company-university cooperation.

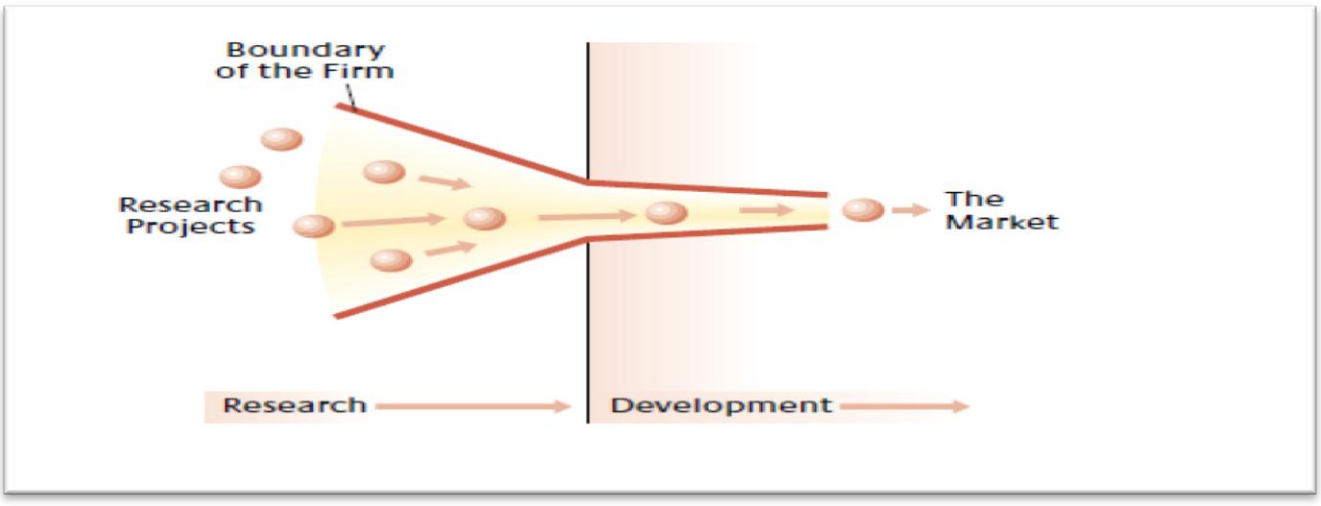
2. *Open innovation*

2.1. The open innovation model

The term "open innovation" first appeared in 2003 when Henry Chesbrough spoke about it in his book "Open Innovation: The New Imperative for Creating and Profiting from Technology." In it, he explained the adoption of open innovation as a strategy to create and benefit from technology. The latter encourages the search for ideas and technologies from outside the boundaries of the organization and cooperation with external stakeholders to promote innovation (H. W. Chesbrough, 2003a) Open innovation came as a revolution that ravaged all the basic concepts in the mechanism of generating innovations, where the old closed innovation was for companies to generate their own ideas, which they would then develop, manufacture, market, distribute, and serve themselves. Figures 1 and 2 illustrate the shift from closed to open innovation.

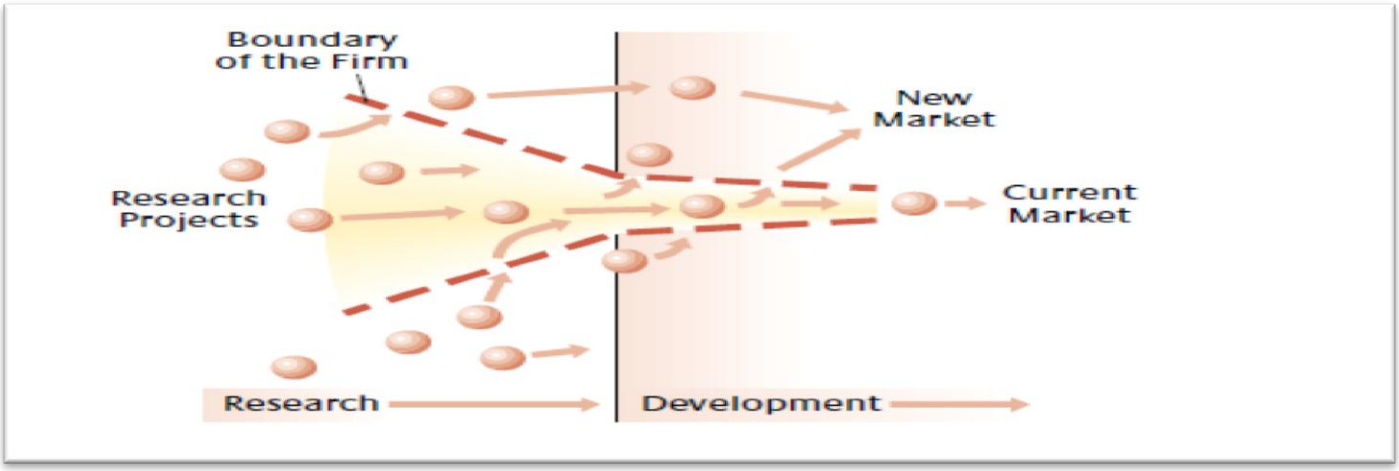
Figure 1 shows that ideas are produced within the organizational boundaries of the organization and flow from the company to the market through the R&D function. In the new open innovation model depicted in Figure 2, the company markets its own ideas while also marketing other companies' innovations and looks for ways to bring its internal ideas to market by expanding paths beyond its existing business. The boundary between the company and its surrounding environment is porous, allowing entry and exit (represented by a dashed line), enabling innovations to move easily from output to interior and from inside to outside.

Fig.1.Closed Innovation Model



Source: (H. W. Chesbrough, 2003b)

Fig.2.Open Innovation Model



Source (H. W. Chesbrough, 2003b)

2.2. Open Innovation Results

According to multiple studies that discuss open innovation, it appears that its results are numerous and varied, the most important of which are:

- Open innovation facilitates the transfer of knowledge through a structured medium, commercializing new ideas (Tabi, 2018).
- By collaborating with external partners such as customers, suppliers, and competitors, businesses have access to a wide range of ideas and perspectives, leading to the development of more innovative products and services (H. Chesbrough, 2019).
- The accumulation and variation of external knowledge positively affect the organization of innovation in companies (Tabi, 2018).
- Open innovation processes combine internal and external ideas to create value and improve innovation success (Bogers et al., 2018).
- By actively researching external ideas and technologies, organizations can accelerate innovation cycles and bring new products and services to market more quickly (Whelan et al., 2014).
- Open innovation can help reduce costs by leveraging external resources and capabilities, rather than relying solely on internal resources (Allen, 2010).
- Open innovation enables organizations to access new technologies and markets through partnerships and collaborations, leading to increased competitiveness and growth (Krstić & Jovanović, 2022).

3. The key factors influencing the success of OI Collaboration

In theory, the adoption of open innovation seems possible, but to achieve the mentioned results, there are many key factors that contribute to enhancing it, the most important of which are:

3.1. Alignment of Objectives and Expectations

Perhaps it is not possible in any way to form cooperation between two parties without the compatibility of goals and expectations of results that are in the form of a win-win deal. This helps the parties engage in open innovation by understanding the goals of these partnerships and knowing the expected results from it. Success in cooperation often depends on a clear compatibility of goals and expectations between universities and industry partners. Different priorities,

timelines, and outcomes can hinder progress, so understanding and negotiating these factors, as shown in Figure 3, explains some of the differences in goals and expectations: (Fassin, 1991)

Fig.3.Difference in Objectives Between University and Industry.

Industry	University
New Apps	**New discoveries**
Added Value	**New knowledge**
Financial profits	**New financial methods for additional research**
Applied Research	**Basic research**
Short-term	**Long term**
Production flow	**Find out how? The what? Why?**
Confidentiality	**Publishing**
Patent Protection	**Freedom and the common good**
Business approach	**Academic freedom**

Source: (Fassin, 1991).

3.2. Effective Communication

Effective communication plays a strategic role in strengthening relationships with external partners in the open innovation process (OI). It can be embedded in the entire process and contribute to the organization's overall communication capability, including trust, transparency, and a cohesive, This holds true not only within the internal environment of the institution or its external environment with its partners (Gutiérrez-García et al., 2020).

3.3. Trust and Relationship Building

Trust is a key concept in the context of open innovation projects. It refers to the belief or confidence of one party in the reliability, integrity, and competence of another party involved in the project. Trust is positively correlated with the level of satisfaction in progressive open innovation projects, suggesting that when trust exists, it enhances the effectiveness of cooperation and collaboration between companies and their external partners(Bahemia & Roehrich, 2023).

3.4. Intellectual Property (IP) Management

IP management in open innovation is complex and requires a sound IP management policy to reduce IP risk. Outsourcing of innovation poses risks to the client when disclosing technological knowledge and intellectual property (IP) to the service provider(Gupta, 2021).

3.5. Cultural and Organizational Differences

Open innovation systems have improved manufacturing performance, but cultural barriers prevent organizations from taking advantage of them. Culture affects regulatory aspects, such as individual culture, perception culture, and market culture, impacting organizational performance through open innovation. However, many institutions are still unable to harness these systems due to cultural barriers(Qureshi et al., 2021).

3.6. Resource Allocation

Resource allocation is closely linked to open innovation. It plays an important role in the selection and implementation of innovative projects in science and

technology. With quotas involving the focus of funding on a number of projects, as well as all the resources needed with stakeholders, open innovation emphasizes the importance of collaboration and knowledge sharing between different stakeholders. By allocating resources in a way that ensures effective and implicit understanding of their distribution, this approach allows for a more flexible and inclusive process with many participants in operation, facilitating faster decision-making and projects. In general, resource allocation within the open innovation community is essential to foster collaboration, accelerate innovation, and maximize the impact of R&D efforts(Graham et al., 2023).

3.7. Government Policies and Regulations

Open innovation systems require support from government public policies to enhance innovation performance, as regulation and finance play a critical role in corporate innovation performance within open innovation ecosystems. Public support in sectors that encourage innovation enhances the results of open innovation strategies. Private and public investments must coexist to boost corporate performance. Government policies are a critical variable in developing an open innovation approach as well as curbing the engagement of institutions in it (Costa & Moreira, 2022).

3.8. Long-term sustainability

In general, the outputs of open innovation promote long-term sustainability. This, in itself, is a decisive factor for companies in deciding whether to take a step, i.e., participate in cooperation. Open innovation and sustainability are two concepts that can be linked in several ways. Open innovation can contribute to long-term sustainability by fostering collaboration and knowledge sharing among various stakeholders, leading to the development of innovative and sustainable solutions. Open innovation can help organizations access external expertise and resources, which can be critical to addressing long-term sustainability challenges. By involving a variety of actors in the innovation process, open innovation can promote the development of sustainable technologies and practices that meet the needs of present and future generations. Open innovation can also facilitate the dissemination and adoption of sustainable innovations, as it allows for the exchange of ideas and best practices between organizations and individuals.(Spencer et al., 2023).

3.9. Evaluating Impact

Stakeholders always seek to assess the impact of open-ended innovation to formulate new strategies. Therefore, assessing the impact of innovation capacity on open innovation is critical to understanding how companies can improve their performance and enhance collaboration with external organizations(Ye-rim et al., 2023).

4. Open Innovation and the Role of the University

The basis of successful cooperation between universities and industry depends on a range of factors, including the participation of researchers, academics, and organizational structures that are supportive, allowing the flow of knowledge to and from the interior. This is manifested in the importance of knowledge transfer and commercialization activities in driving innovation and economic growth. There is a necessity for universities to develop strategies and policies that encourage and

facilitate engagement with industry (Perkmann et al., 2013). All this actually leads us to understand the role of the university and comprehend its contributions through:

4.1. Knowledge Generation Center

Universities with high centralization in university and industry networks tend to have high rates of actual participation in activities, such as knowledge generation and participation in externally funded research projects (Huggins et al., 2020).Open innovation from the university serves as an intermediate variable in this process, and the ecosystem is facilitated through interdisciplinary approaches and technical networks (Lorena, & Rafael, 2021).

4.2. Competitive Research Consortia

Finding business owners sometimes find it hard to allocate resources to research and development, but allocating resources to academia can provide long-term benefits and opportunities. The symbiotic relationship between business and education helps demonstrate research resources, knowledge sharing, mentoring, and future opportunities for students, staff, facilities, and the industry as a whole(DeGrandis, 2022).

4.3. Business incubators and accelerators for launching startups

An incubator at the university is a real step to integrate many institutions and build a cooperative partnership aimed at providing specialized services, such as research and development consulting, through training managers. This contributes significantly to facilitating the transfer of knowledge from the university to startups.(Aladin & Mohamed, 2021).

4.4. Open Academic Research Publication

Open innovation has changed the innovation paradigm by emphasizing the openness of inputs and outputs. Open data provides access to external data (Corrales-Garay et al., 2020), especially from public institutions such as universities, and their outputs from academic research. These outputs address the problems of institutions.

5. Leading global models in collaboration between companies-universities

5.1. Toyota Toyota company

5.1.1 Partnership with the University of Tokyo

Perhaps this collaboration is considered one of the most successful relationships between the world of industry and the university. The establishment of the Joint Research Center and the Toyota Cooperation Center at the University of Tokyo serves as evidence of this partnership. This center functions as a platform for collaborative research projects, facilitating the exchange of knowledge and resources between academic researchers and Toyota engineers.

- ✓ Battery Experience (Ion Fluoride (FIB)): Ion Fluor (KUSASHIO, 2020).
- ✓ Grant AY2022 UTokyo-TOYOTA: Another initiative involves scholarships for students at the University of Tokyo who excel in the field of artificial intelligence or its applications, funded by Toyota (Utokyo, 2022),to study at the Massachusetts Institute of Technology.

5.1.2 Partnership with Stanford University and MIT

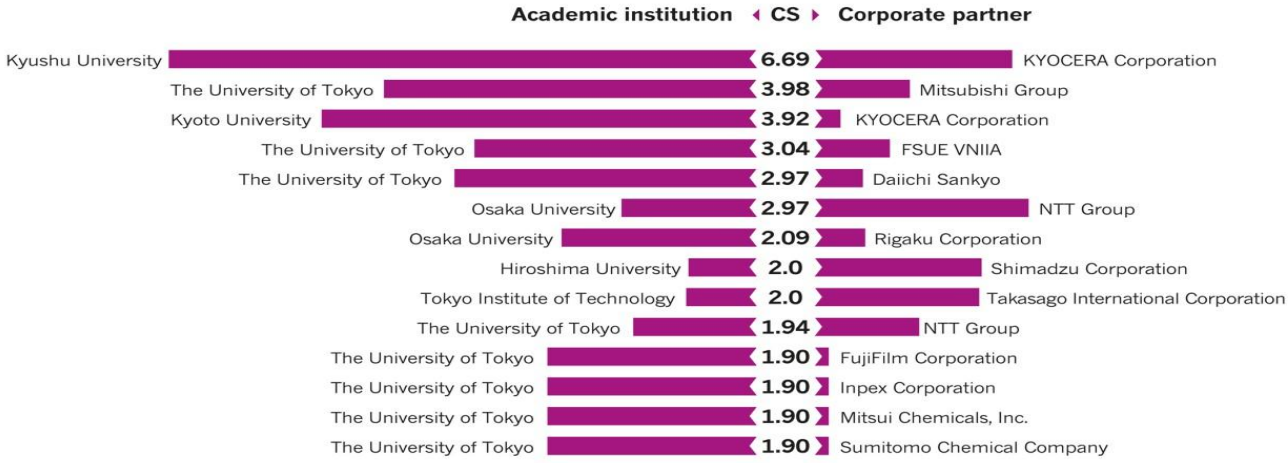
Toyota Announces Signing of Agreements with Stanford University in California and Massachusetts Institute of Technology in Massachusetts. The partnership with these two universities occurred in the year 2015, during which Toyota provided financing up to fifty million dollars ($50 million). The objective of this partnership is to develop self-driving cars and robots to provide assistance around the house (aljazeera.net, 2015).

5.2. Kyocera company

The Nature Index provides simple, transparent, and up-to-date metrics that demonstrate the quality of research and collaboration between companies and universities through independent and data-rich reports. It issues annual reports.(nature.com, 2024).According to statistics in Japan, KYOCERA is considered a pioneer in the field of supporting scientific research and patents that graduate from universities and institutes in Japan. According to Figure (4), the cooperation index reaches 6.69 according to the Nature Index (NATURE INDEX) with Kyushu University and 3.92 with Kyoto University. According to the same statistics, this ranks it as the first company to practice open innovation with the university (Munroe, 2017). This cooperation resulted in:

- ✓ Joint Research Center.
- ✓ Solar energy innovations.
- ✓ Environmental conservation projects.
- ✓ Technology transfer and commercialization.

Fig.4.The Collaboration Index (CS) shows the top 10 universities and companies in Japan for 2016.



Source: (Munroe, 2017).

5.3. Nestlé company:

5.3.1 Partnership with École Polytechnique Fédérale de Lausanne EPFL

Nestlé, the European company in the food and beverage industry, and the École Polytechnique Fédérale de Lausanne (EPFL) – Federal Polytechnic of Lausanne in Switzerland, form a successful collaboration and serve as a model for company-university cooperation. This partnership has resulted in several influential initiatives:

- ✓ In 2019, EPFL and ETH Zurich launched the Future Food Initiative, a Swiss research initiative, in collaboration with Swiss food industry leaders Buehler, Givaudan, and Nestlé. The initiative aims to expand research and education in food science and

nutrition, developing solutions for the grand challenges of current food systems. The program is jointly managed by the Integrative Food and Nutrition Center in EPFL and the World Food System in ETH Zurich (EPFL, 2023).

- ✓ Health and Nutrition Research: The focus of cooperation involves research on health, nutrition, and food technology. Experts from both sides collaborate on research in food, food safety, and sustainable food production methods.
- ✓ EPFL students have the opportunity to participate in internships and engage with Nestlé, aiming to gain experience and contribute to the industry through future projects.
- ✓ Accelerating innovation with various partners to address nutrition-related challenges (Néstlé company, 2019).

5.3.2 Partnership with the University of Ghana

On July 21, 2022, Nestlé and the University of Ghana announced their cooperation aimed at enhancing scientific expertise among local students and building competencies in the areas of innovation and research and development (R&D), with a special focus on food security (Néstlé company, 2022) The collaboration aims to:

- ✓ Enhance the scientific expertise of local students and build competencies in the areas of innovation and R&D with a special focus on food security.
- ✓ Strengthen the innovation ecosystem by supporting budding students and providing them with hands-on learning opportunities in food innovation.
- ✓ Ensure that students and faculty from various technical departments of the University of Ghana continue to have access to Nestlé's strong expertise in science and technology located at the Regional Innovation Centres in Abidjan, Côte d'Ivoire, and its global R&D centres. Additionally, they will have learning opportunities within Nestlé Ghana.

5.4. Novartis international

NOVARTIS is a global health company based in Switzerland that provides solutions to meet the evolving needs of patients around the world. It was ranked first in cooperation with university institutions in the 2017 Nature Index, with a collaboration score of 105.3 with the University of Basel (CS) and 46.2 with Harvard (CS).

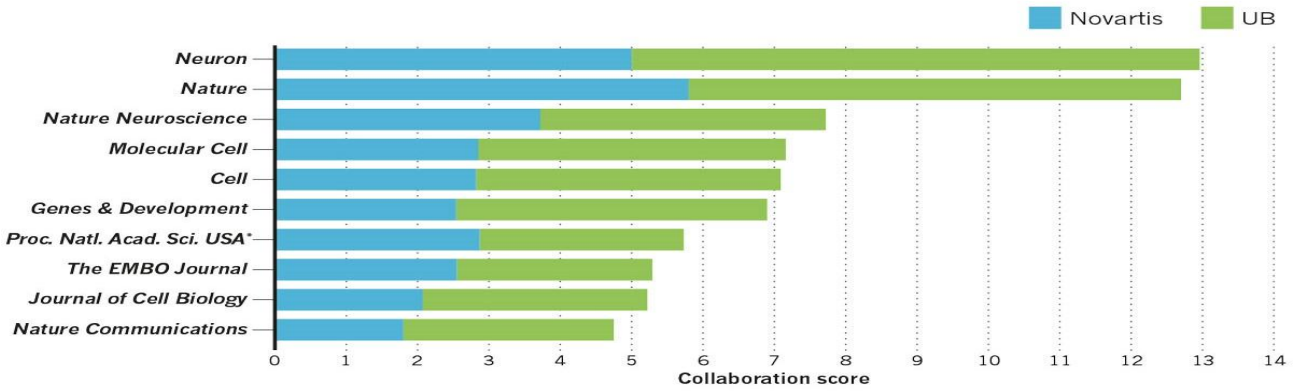
5.4.1 Partnership with the university of Basel

But the key to the partnership lies in the Friedrich Meischer Institute (FMI) for Biomedical Research, an independent institution with long-standing relationships with both the university and the pharmaceutical company NOVARTIS. Co-established as a core research laboratory, where 70% of the funding comes from NOVARTIS, the Institute serves as a driver of innovation in the company rather than relying on acquisitions from biotech companies (Nature web, 2017).

Figure 5 illustrates the Novartis Collaboration Index (CS) with the University of Basel in the field of research papers for various journals. Researchers on both sides appear to work together. Scientific collaboration between companies

and universities is often more productive when partners work on an equal footing, leveraging each other's sometimes contradictory strengths to enhance the understanding of basic principles.

Fig.5.Novartis Collaboration Index (CS) with the University of Basel is illustrated.



Source: (Nature web, 2017).

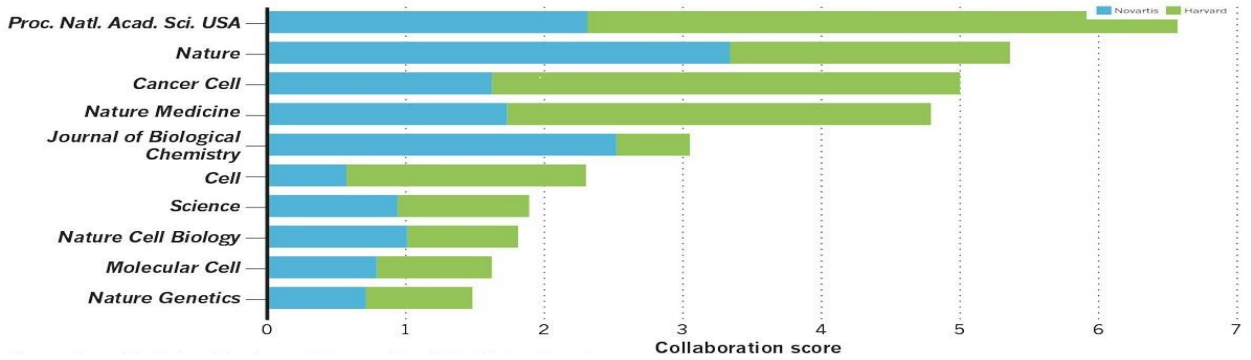
5.4.2 Partnership with Harvard university

Novartis has more than 300 academic collaborations in its global research portfolio, according to a spokesperson for the company(Novartis, 2024a), which includes a pairing of Harvard Medical Campus in Boston. The two institutions have produced a steady stream of research, including 83 papers listed on the Nature Index from 2012 to 2016, making it the third most productive partnership between academia and industry(Novartis, 2024b).

- ✓ The collaboration with Harvard University allows for ideas from different fields. Novartis regularly works with Marc Kirchner, a systems biologist at Harvard University, who designs biological systems using computer simulations.
- ✓ Novartis was not only looking for new drugs but also took a serious interest in its basic research and methodologies. The company was confident that scientists themselves would turn this into something valuable.

Figure 6 shows the Novartis Collaboration Index (CS) with Harvard University in paper research for different journals, where researchers on both sides seem to be working together.

Fig.6.The Novartis Collaboration Index (CS) with Harvard University shows.



Source: (Nature web, 2017).

5.5. The UIDP

UIDP (University-Industry Demonstration Partnership) is a "Pilot Partnership" organization in the United States of America. Representatives from high-profile innovation companies and world-class research universities come together, committed to actively participating in the pursuit of excellence in collaboration and partnership in the user interface. The organization aims to (UIDP.org, 2023b):

- ✓ The UIDP supports mutually beneficial collaboration between universities and industry by developing and disseminating strategies to address cross-sectoral issues.
- ✓ Maximize the potential of existing collaborations and partnerships along the entire chain of partnership.
- ✓ Build new networks and opportunities for future collaboration.
- ✓ Remove obstacles to the success of joint research projects.

Figure 7 illustrates the numerous partnerships between the university world and industry that involve this organization. It engages the university in the world of industry to meet the challenges that bring together diverse experts in science and technology from different sectors to imagine the big ideas that will propel us into the next century.

Fig.7.A showing UIDP partnerships.

Corporate/universities			Corporate/universities
University of Illinois, Urbana-Champaign	Oregon Health & Science University	GlaxoSmithKline (GSK)	**Albert einstein college of medicine**
University of Iowa	Oregon State University	Harvard University	**Amazon**
University of Kansas	Pennsylvania State University	Honda	**Anglo american company**
University of Kentucky	PepsiCo Company	Houston Methodist Research Institute	**Apple corporation**
Maryland University	Pfizer	Howard Hughes Medical Institute	**Aramco**
University of Maryland Eastern Shore	Princeton University	Howard University	**Arizona state university**
University of Massachusetts Amherst	Procter & Gamble	IBM	**Star**
University of Michigan	Purdue University	IHI Corporation	**At&t**
University of Minnesota	Raytheon Techniques	Indiana University	**Auburn university**
University of Missouri, Columbia	Rice University	Intel Corporation	**Australian national university**
University of Nebraska Lincoln	Roche	Investa	**Autodesk**
University of New Mexico	RTI (Triangle Research Institute) International	Loa State University	**Sorry**
University of North Carolina, Chapel Hill	Rutgers, New Jersey State University	GM Smocker	**Bayer**
University of North Carolina, Charlotte	Samsung Semiconductor Company	Jackson State University	**Blackberry ltd**
University of North Carolina, Greensboro	Sanofi	Johns Hopkins University	**Boehringer ingelheim pharmaceuticals**
University of Notre Dame	SAS Institute Company	Johnson & Johnson	**Boeing corporation**
Oregon State University	SOLID STEEL	Kansas State University	**Booz allen hamilton**
University of Oxford	Siemens Corporate Research	Karolinska Institute	**Boston university**
University of Pennsylvania	Sony	KFUPM (King Fahd University of Petroleum and Minerals)	**Bp**
University of Pittsburgh	Stanford University	Kimberly-Clark Company	**California institute of technology**
University of South Florida	SUNYRF (Research Foundation of the State University of New York)	University of Ko Leuven	**Carnegie mellon university**
University of Southern California	Sinopsis, Inc.	Korea America Company	**Case western reserve university**
University of South Carolina	Syracuse University	L3Harris Technologies	**Cisco systems corporation**
University of Tennessee, Knoxville	T-Mobile USA	Lam Research Company	**Clemson university**
University of Texas, Austin	Tennessee State University	Lawrence Livermore National Laboratory	**Colorado state university**

University of Texas, Dallas	Texas A&M University	Lockheed Martin	**Colorado school of mines**
University of Texas San Antonio Health Science Center	Texas State University, San Marcos	Louisiana State University	**Columbia university**
University of Texas, San Antonio	Tokyo Electron Co., Ltd. (TEL)	Mars Incorporated	**Cornell university**
University of Tokyo	Tufts University	Massachusetts Institute of Technology	**Corning**
University of Toronto	University of California at Davis	McGill University	**Csl behring**
University of Twente	University of California at Irvine	Merck Company	**Kurtiva agricultural**
University of Utah	University of California Riverside	Dead	**Dartmouth college**
University of Vermont	University of California, San Diego	Michigan State University	**Deerfield administration**
University of Virginia	UL Research Institutes	Microsoft	**Dell technologies**
University of Washington	University College London (UCL)	Mississippi State University	**Dow chemical company**
University of Waterloo	University of Alabama, Birmingham	Miter Company	**Drexel university**
University of Wisconsin-Madison	University of Alabama, Huntsville	Morgan State University	**Duke university**
Southwest Medical Center UT	University of Alabama, Tuscaloosa	me	**Eastman chemical company**
Vanderbilt University	University of Arizona	North Carolina State Agricultural and Technical University	**Emd group**
Varian, Siemens Healthineers	University of Arkansas	North Carolina State University	**Emory university**
Vertive	University of Cambridge	North Dakota State University	**Epfl (ecole federale polytechnique de lausanne)**
Virginia Tech University	University of Central Florida	Northeastern University	**Fm international**
M-ware	University of Chicago	Northwestern University	**Fidelity labs, llc**
Washington State University	University of Cincinnati	Novartis	**Florida state university**
Washington University in St. Louis	University of Colorado Boulder	Novellace	**Biotechnologies fujifilm deucinth**
Wayne State University	University of Delaware	Nvidia	**General motors**
West Virginia University	University of Florida	Oak Ridge Associated Universities (ORAU)	**George washington university**
Yale University	University of Georgia	Ohio State University	**Georgia institute of technology**
	University of Illinois, Chicago	Ohio University	**Georgia state university**

Source:(UIDP.org, 2023a)

6. Models Analysis

In light of the detailed presentation of the five global experiences (5), it is clear that the companies under study pursue open innovation despite the interaction of the main factors that affect their success. They achieve this through partnerships with institutes and universities, employing various methods to expand the scope of research in the areas of specialization of companies. The goal is to develop solutions addressing challenges related to the industry, sustainability problems, the environment, and others. Companies view the results of these partnerships as a catalyst for accelerating the innovation process, as they recognize that scientists and researchers can transform knowledge into something valuable. Companies seek to push the boundaries of science and engineering to maximize their benefits and ensure leadership in an economy based on innovation and seizing opportunities. The companies under study are illustrated in light of the detailed presentation of the five global experiences (5), it is clear that the companies under study pursue open innovation despite the interaction of the main factors that affect their success. They achieve this through partnerships with institutes and universities, employing various methods to expand the scope of research in the areas of specialization of companies. The goal is to develop solutions addressing challenges related to the industry, sustainability problems, the environment, and others. Companies view the results of these partnerships as a catalyst for accelerating the innovation process, as they recognize that scientists and researchers can transform knowledge into something valuable. Companies seek to

push the boundaries of science and engineering to maximize their benefits and ensure leadership in an economy based on innovation and seizing opportunities. We will explore the primary methods relied upon by the companies under study, as illustrated in Figure 7.

Fig.8. A figure summarizing the classification of partnerships, mechanisms, and objectives for the models covered by the study.

Objective/Expectations	Mechanism	Institute or university	company
• Facilitate the exchange of knowledge and resources between academic researchers and Toyota engineers.	• Establishment of the Toyota Cooperation Center at the University of Tokyo • Offering scholarships to outstanding University of Tokyo students	University of Tokyo	**1: Toyota**
• Develop self-driving cars and robots to provide assistance around the house.	provided funding of up to fifty million dollars (50 million dollars) to the university	Stanford University and the Massachusetts Institute of Technology	
• Benefit from environmental conservation projects. • Benefit from technology transfer and commercialization.	• Establishment of the Joint Research Center	Kyushu University/Quito University	**2: Kyocera Company**
• Addressing the grand challenges of current food systems • Accelerating the innovation process	• Launch of a research initiative, "Future Food Initiative" • Enable EPFL students to participate in internships.	School (EPFL)	**3: Nestlé Company**
Strengthening the innovation ecosystem	• Enhance the work experience of local students and build competencies.	University of Ghana	
• A drive for innovation in the company • Conducting scientific research in cooperation with each other	• Establishment of the Friedrich Meischer Institute (FMI) for Biomedical Research • 70% financing • Researchers work on both sides, working together.	University of Basel	**4:Novartis**
• allows access to ideas from different fields. • Accelerating innovation	• 300 academic collaborations in its global research portfolio	Harvard University	
• Maximizing the potential of existing collaborations and partnerships along the entire partnership chain • Removing barriers to the success of the joint research project	• Mutual beneficial cooperation between universities and industry • Disseminate strategies to address cross-sectoral issues.	American Universities	**5:The UIDP**

Source: Prepared by researchers

7. Conclusion

In conclusion, the adoption of the strategy of open innovation by companies through cooperation with academic institutes and universities opens horizons for harmony that work to enhance the innovation process. This is especially true since the partnership has strategic goals that both parties seek to achieve by overcoming all the complexities in this process, such as the ability to build trust and strengthen relationships, intellectual property

management, organizational differences, and permanent evaluation of impacts and results. Knowledge exchange and research enable the continuous exploration of ideas from different fields to develop solutions that address challenges, supporting scientific research and patents arising from research centers.

Through our analysis of the most important models of cooperation between academic institutes, universities, and the companies under study, we have reached the conclusion that the mechanisms adopted by the companies to enhance cooperation with universities and academic institutes are:

1. jointly establishing research laboratories that receive part of their funding from the company. These laboratories are considered by institutes and universities as a motivation for innovation in the company and the management of intellectual property, rather than relying on dependence on other technology companies.
2. Facilitating the exchange of knowledge and resources between academic researchers and corporate engineers allows for more exposure to ideas from different fields. They work together on research in food, food safety, and sustainable food production methods.
3. Providing scholarships to university students funded by companies.
4. Funding universities and institutes within the framework of the agreements concluded.
5. Launching research initiatives aimed at expanding research and education in corporate areas of specialization to develop solutions that address challenges, as an example of alignment of goals and expectations.
6. Supporting scientific research and patents that graduate from universities and institutes by subscribing to joint scientific articles between corporate engineers and researchers in universities.
7. Enhancing the scientific expertise of local students by allowing them to participate in corporate internships, with the aim of gaining experience and promoting the industry through their future projects.
8. Accelerating innovation in collaboration with a variety of partners to address industry-related challenges, sustainability, and the environment.
9. Engaging in mutually beneficial cooperation programs between universities and industry by developing and disseminating strategies to address cross-cutting issues.
10. Building trust, networks, and new opportunities for future cooperation and its long-term sustainability.
11. Removing obstacles to the success of the joint research project.
12. Taking the Nestlé company model with the EPFL School and the University of Ghana as a rough model applicable in Algeria, as it has formed partnerships outside its geographical area and encouraged local talent in developing countries such as Ghana and Côte d'Ivoire.

Based on the results of the analysis, the study presents a set of recommendations and suggestions that contribute to the development of cooperation between companies and universities in Algeria:

1. Measure the effectiveness of partnerships between companies and academic institutes by assessing their positive impact on open innovation to

enhance the involvement of Algerian companies and universities.

2. Develop a more comprehensive understanding of the cultural and organizational factors of open innovation. Companies and universities also need organizational changes to adopt this innovation model successfully.
3. Enhance Algeria's legislative framework to guide companies in their collaborations with R&D centers located in institutes and universities.
4. Facilitate open discussions between Algerian employers and academics on transforming intellectual property concepts in the era of open innovation, emphasize the protection and security of data flowing between companies, institutes, and laboratories.
5. Transform the role of Algerian universities into centers for the emergence of innovations and technical development, making them attractive to both local and international companies.
6. Continuing the study of successful models both within and outside Algeria for collaboration between companies and universities, and attempting a profound understanding of their involvement in open innovation, especially large companies that allocate significant budgets for this purpose.
7. Conduct a deeper analysis of the obstacles preventing the emergence of companies and cooperatives involved in this type of collaboration in Algeria

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