The problem of Adopting Open Creativity in Business Organizations to Support Entrepreneurship
An Analytical Study of the Open Creativity Model at NASA

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Abstract:

This research paper aims to elucidate the correlation between creativity and entrepreneurship, shedding light on the significance and role of the open creativity approachas a means to attract and generate novel ideas within business organizations, particularly in collaboration with external partners. The study addresses how adopting open creativity can assist business organizations, enhance business performance, gain a competitive, advantage and foster entrepreneurship. Analytical and descriptive methods were used in conducting this research. The results indicate that globally comparable data from networks dedicated to promoting creativity demonstrate a substantial worldwide inclination toward embracing open creativity. Moreover, this study recommends the adoption of creative and innovative ideas and their implementation in specialized businesses to pave the way for aspiring entrepreneurs, in leading global organizations such as NASA.

Keywords: Creativity, Innovation, Open Creativity, Business Organizations, Entrepreneurship, NASA.

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I- Introduction:

Today's competitive markets know a new arrangement in the business environment, where in order for the business organization to be at the forefront, it must keep pace with developments through external cooperation between institutions, and this imposes on it the need to open different ways in front of the market by using creative external and internal ideas, as organizations depend on creativity and related investments to improve their competitiveness in a world in line with shorter product life cycles. Where creativity is the main driver in entrepreneurship, especially what is called open creativity, this concept appeared in Chesbrough (2003), where we noticed a great interest in understanding this phenomenon better. Although it seemed like a closed innovation at first, especially among entrepreneurs. This proves that the trend towards open creativity is not a coincidence, as it has become a strategy that expresses the competitiveness of developed countries. (Guerini et El-daoui,2021) Carvalho and Sujano saw entrepreneurship and innovation as the basis for regional and national development (entrepreneurs and startups are protagonists in this scenario). According to the new open innovation model in the literature (according to the studies were few).

Therefore, the aim of this study was to support and highlight the importance of this relationship by putting forward two hypotheses. There is a relationship between open innovation and entrepreneurship (Entrepreneurial orientation). Companies were selected for a case study, located in Minas Gerais, Brazil, The sources of evidence were three, interviews, direct observations, and documentation. The documentation is mainly based on newspaper clippings and other articles appearing in the mass media and the outcome of this paper was imperative. It has been confirmed hypotheses presented (09) the existence of a large positive effect relationship, but the last hypothesis"There is a significant relationship between proactiveness and outsourcing R&D" is more difficult to speculate, So if this hypothesis is confirmed then we need more exploratory studies. (Carvalho et Sugano, 2016) .

Most people would agree that creativity is the most important soft skill of the 21st century. After all, it enables us to develop new ideas and solve problems innovatively, but thinkers have been asking this question exactly in this research paper ;

"**Why is Open Creativity important in Business Organization? And What is the extent of its contribution to supporting Entrepreneurship** ?" .

To be able to answer these questions, it is necessary to ask a set of sub-questions, the most important of which are:

- ✓ How does it explain the relationship between the adoption of open creativity and business organizations?
- ✓ What is the impact of innovation and open creativity in supporting entrepreneurship?
- ✓ What approach should NASA take toward promoting open creativity and innovation? Is it advisable for NASA to overhaul all its R&D processes and adopt the open creativity and innovation model?

This is what made our study examine the hypotheses that included the following:

-There is an impact relationship between open creativity and entrepreneurship.

-There is a relationship with a positive meaning in how to reach entrepreneurs and proactively get creative ideas.

Approved research methodology: The study adopted the descriptive method in describing the importance of adopting creativity in business organizations, as well as highlighting its impact on encouraging and supporting entrepreneurship. As a model, my analysis in this study is the case of open creativity in a leading international organization, NASA, where the mechanism used by NASA to encourage innovative ideas from external entrepreneurs, in particular, was analyzed.

Next, we provide a theoretical background on open creativity in business organizations and entrepreneurship, followed by the analytical section of a case study. Finally, we offer some final considerations and recommendations.

1. The theoretical framework of the study.

Innovation isn't just about coming up with new technologies or scientific discoveries, it's also about finding new ways to innovate, as Einstein said, we can't solve problems using the same thinking that created them, no one process works for all scientific or technological problems, the more open-minded and experimental R&D professionals are, the easier it will be for them to embrace changes in the way they work. (Hila et Tushman et Lakhan, 2018)

1.1. Definition of open creativity approach.

Open creativity is a concept that emphasizes the importance of embracing creativity in response to socioeconomic changes. Companies like IBM, Xerox, NASA, Ford Motor Company, and Procter & Gamble have adopted open creativity to enhance their innovative practices and stay competitive. (Guerini et El-daoui, 2021, P.366)

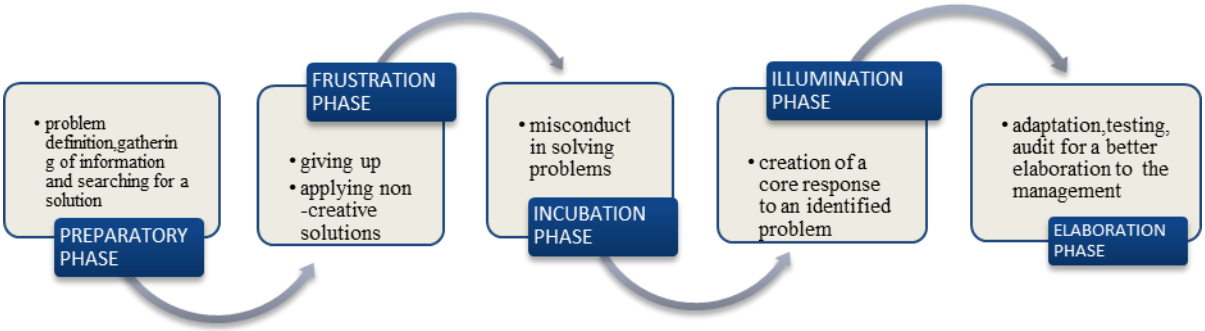
- **Meaning of Creativity**

The term creativity has different meanings, It is considered a puzzle word for many scholars Because it is treated from different angles, We list the most important ones as follows: (Hassan, 2016)

Creativity is a combination of abilities, aptitudes, and personal characteristics that, if an appropriate environment exists, can promote mental processes to lead to authentic and beneficial results for the individual, company, organization, society, or the world, and Creativity is basically a mental property that enables individuals to think unconventionally, or as it is known and currently circulating, "thinking outside the square", and this feature often leads to innovation or the use of different methods, unusual while dealing with a particular task or issue.

Creativity is defined as the creation of a valuable, useful new product, service, idea, procedure, or process by individuals working together in a complex social system. (Woodman, 2014, P.472). Entrepreneur or person who chose to use creativity must also invest in it, which most often means having training in creative and critical thinking.There are five basic phases of a creative process in all models, that is Figure 1. (Van Oech, 2012)

Figure (1): The Figure Creative Process Phases



source : Van Oech, R. (2012) A Whack on the Side of the Head, How You Can Be More Creative, Warner Books.

In light of the previous definitions, it can be said that creativity is that activity that targets the mind primarily with the aim of reaching the development of new innovative methods and ideas that enable the establishment to increase its competitive advantage and create value. (Hassan, 2016)

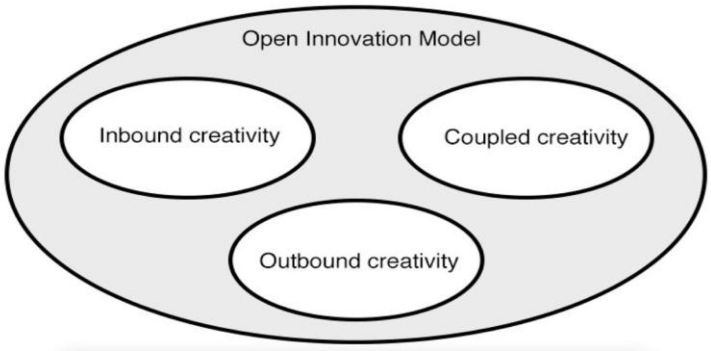
- **Open creativity**

(Chesbrough, West and Vanhaverbeke) 2006, knew it : "A set of practices for leveraging creativity, as well as a perceptual model for the creation of a new Open Creativity, and (Gallagher and West) 2006, knew it: "Open creativity systematically encourages, interprets, and researches a wide range of these practices, It exploits these opportunities on a wide range of internal and external sources of opportunities for creativity and explores them, and consciously integrates that exploration with capabilities and resources.

As he knew the Year 2006 (Henkel's) it: "Openness in the creative processes goes beyond the exchange open creativity is wide through multiple channels, as a tradable good that can be bought and sold in the market under appropriate conditions, it may Technology enterprises are available to the public in order to attract development cooperation. (Guerini et El-daoui, 2021, P.367)

When talking about open creativity, it necessarily means open innovation, and this is due to the inevitable relationship between them, as shown in Figure 2: (Nerone et Osiris et Liao, 2014)

Figure (2): The Figure Creativity levels in the open business model.



source : Rafiq Elmansy, Implementing Open Innovation to Drive Creativity inside Organizations,p .10 [online] www.designorate.com

- **Inbound creativity**

Involves using external knowledge, such as customer feedback, to drive innovation within a company and It improves innovation by monitoring the operating environment and collecting information from partners.

- **Outbound creativity**

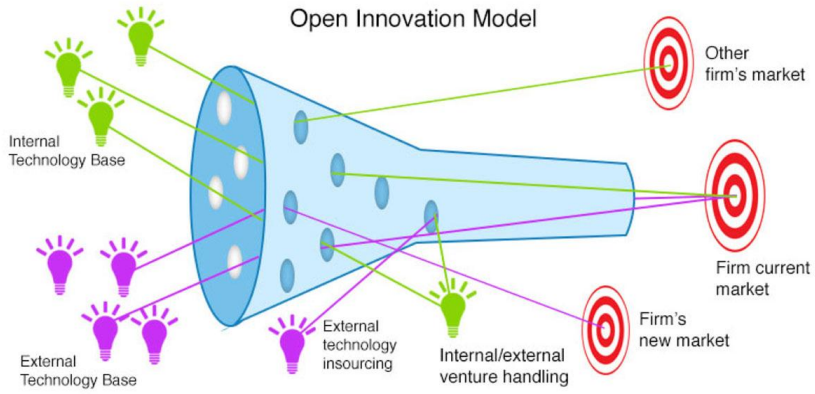
Involves commercializing failed or underutilized innovations through innovative business models outside the company and allows companies to find success for these innovations beyond their existing business models (Chersbrough (2010) also points out).

- **Coupled creativity**

Involves partnering with external entities to gather information and ideas from the operating environment. General Electric's Ecomagination Challenge is an example where they invited stakeholders to present ideas for innovative products that meet market needs. (Rafiq, P.10-P.11)

Creativity and Open Innovation were coined by Chesbrough in 2003, The original definition is as follows: (Chesbrough, 2003): "**When firms commercialize external (as well as internal) ideas by deploying outside (as well as in-house) pathways to the market**", as shown in Figure 3: (Wit et Dankbaar et Vissers, 2007, P.11-P.19)

Figure (3): The Figure Internal and external ideas flow in an open innovation model



source : Rafiq Elmansy, Implementing Open Innovation to Drive Creativity inside Organizations,p .8 [online] www.designorate.com

- **Characteristics of the open creativity and innovation model**

According to Chesbrough's open innovation model enables companies to combine internal and external ideas in order to achieve product innovation in contrast to the closed innovation model, the characteristics can be identified as follows: (Marque, 2014,P.196)

- The closed innovation model assumes that innovative ideas are generated and managed internally within the organization, while the open innovation model recognizes that ideas can come from both internal and external sources.
- The closed innovation model focuses on internal resources to achieve profit and market leadership, whereas the open innovation model values external ideas that can contribute to profit and market advantages.
- Traditional innovation relies on internal resources for idea generation and market

leadership, whereas open innovation aims to combine external ideas with internal management.

- In the closed innovation model, the company prioritizes leading the market with its own ideas, while open innovation encourages companies to engage in basic research and leverage external ideas.
- Closed innovation relies on internal resources to produce the most innovative ideas, while open innovation embraces both internal and external ideas.
- Closed innovation aims to maintain full control over the innovation process, limiting the profit to the company, while open innovation seeks to leverage all available resources for an efficient process.
- The open innovation model allows companies to tap into creativity from both internal and external resources, offering a non-traditional approach.
- However, the open innovation model faces challenges that can hinder creativity within the organization. It is essential to have a clear understanding of the company's boundaries and identity to assess its creative potential effectively.

- **Applying open innovation in different business models**

Innovation links to closed and open business models based on the creativity level described earlier in the creativity levels in the Innovation section in this report; inbound creativity and outbound creativity, Coupled creativity can be considered a type of inbound creativity. (Nerone et Osiris et Liao, 2014)

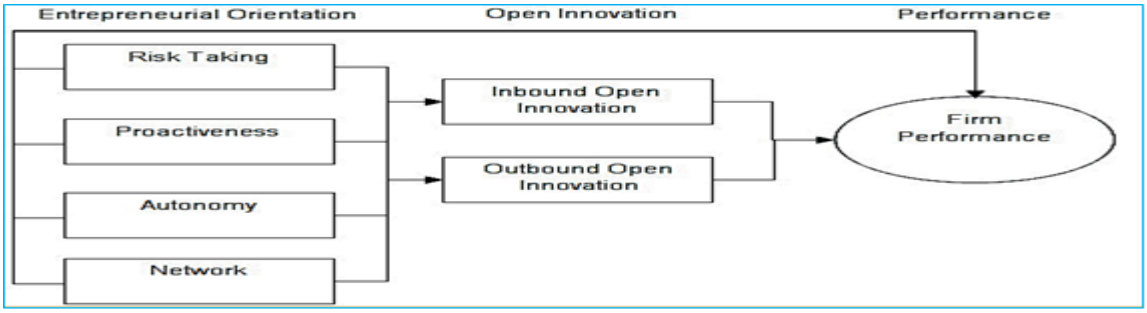
- **Inbound open innovation**

(Chesbrough & Vanhaverbeke, 2014), Open internal innovation combines external knowledge with a closed business model because it enables companies to leverage external resources to develop new products and business opportunities, an example of this is P&G incorporating innovative ideas from external partners and opening the Apple iPhone to third-party applications. (Rafiq, P.12)

- **Outbound open innovation**

External open innovation involves transferring unused knowledge to external parties in a closed business model. It can also be used in open business models to share internal knowledge for new business opportunities. This approach maximizes innovation potential and minimizes risk by leveraging external resources and business models different. (Henkel, 2006,P. 953-P.969),Figure 4 shows that.

Figure (4): The Figure Proposed Model for employing the types of Open Innovation



source : Eduardo.G.Carvalho & Joel.Y.Sugano,(2016), Entrepreneurial orientation and open innovation in brazilian startups: a multicase study, INTERAÇÕES, Campo Grande, MS, vol 17(3), P.454.

- **The Impact of open innovation in business organizations**

Open innovation is a new model that focuses on the increasing role of external sources of innovation compared to the internal capacity for research and development, as it has a tangible impact on innovation performance in organizations: (Alloun et Al-Sabti, 2019,P.157)

- ✓ Availability of several sources to obtain ideas and knowledge.
- ✓ Sustaining the innovation process in the organization and increasing opportunities.
- ✓ Enhancing the protection of intellectual property rights (which may seem contradictory to the nature of this type of innovation, but openness requires Care and commitment on the part of each party in this regard.
- ✓ Sharing and sharing risks.
- ✓ The ability to increase patents owned.
- ✓ Keeping the organization aware of research developments and raising its research competencies.
- ✓ Enhancing the culture of innovation within the organization and creating a spirit of initiative and self-motivation among human resources.
- ✓ Positive impact on the reputation and image of the organization.
- ✓ Improve creativity and strategic intelligence.
- ✓ Discovering and developing new business models and exploiting opportunities.

In addition to other advantages:

- ✓ Valuing investment in the field of research through the dissemination of knowledge on the one hand between academic research centers and organizations and between organizations on the other hand.
- ✓ Rationalizing the research and development process by reducing costs.
- ✓ Acquisition of skills along the value chain Innovation Cost divisions Purchasing a licensed Investment in capital Risks.
- ✓ Accelerate the innovation process.

Organizations have realized the importance of coordinating their efforts with other entities to navigate the evolving business environment. With this, they aim to turn potential threats into opportunities that can be taken advantage of. Open innovation, also known as crowdsourcing, allows organizations to gain valuable knowledge and experience. This approach helps support the development of entrepreneurship.

1.2 Definition of Entrepreneurship

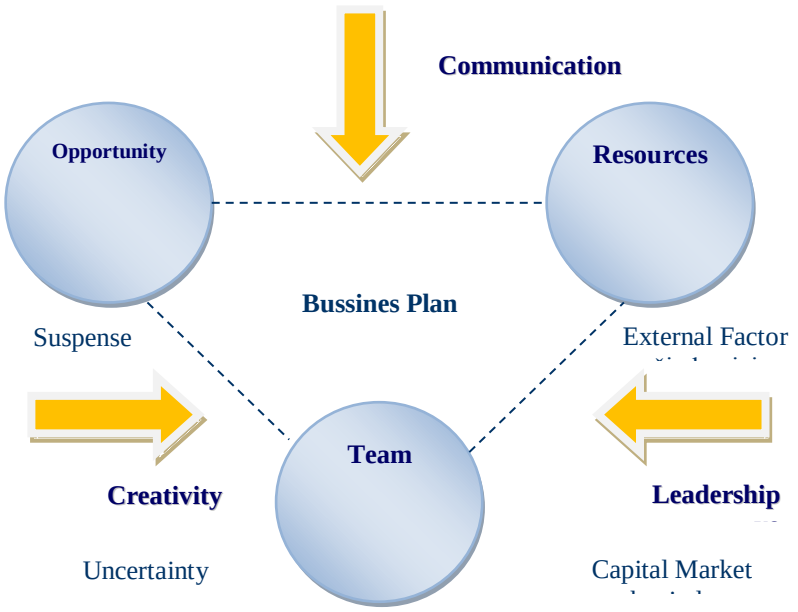
We can not give a unified definition for entrepreneurship, as it is a multi-dimensional phenomenon and therefore it is complex and heterogeneous, but we will provide the most important definitions of entrepreneurship in the following:

Entrepreneurship is defined as: "a combination of innovation or creativity, uncertainty, risk, and managerial or commercial capabilities," as (Alan Fayol) defines entrepreneurship as: "a set of activities and steps that contribute to the establishment and development of the company." (Kharkhahce et Zellagui, 2021, P.112)

The creative processes in entrepreneurship, according to Kaplan (2003), can be summarized as follows: analyzing opportunities, developing a business plan, securing funding, identifying required resources and an implementation plan, and selecting an entrepreneurship development strategy (Kaplan, 2003).

Essential elements of the entrepreneurial process are highlighted in the Timmons model as show Figure 5: (Timmons et Spinelli, 2006)

Figure (5): The Figure Timmons Model of the Entrepreneurial Process



source : Timmons, J.A., Spinelli, S. (2006), New Venture Creation: Entrepreneurship for the 21st century, New Delhi, India, McGraw Hill, 7th edition

- **The dominant conceptions of entrepreneurship**

Alain Fayol and Vestrett (2005) identified four models that make it possible to define the field of research in entrepreneurship as follows:

- **Business opportunity paradigm** :

Among the most important pioneers of this trend are Shane & Venkataraman, who defined entrepreneurship as that process through which discovering, evaluating and exploiting opportunities that allow new products and services, the contractor works to seize the opportunity that urges the presence of unmet needs in the market On the other hand, for Alain Fayolle, the entrepreneurial opportunity is built during the process of creating the activity and not that it is the starting point to be discovered in this process. (Laviolette et Loue, 2006)

- **Paradigm of creating an organization**

This trend is led by Gartner, who considers entrepreneurship to be the creation of new organizations, which include the totality of practices carried out by the contractor in terms of collecting and organizing various resources, whether financial, human, informational, material, etc., in order to create a new institution. (Verstraete et Fayolle, 2005,P.37)

- **Paradigm of value creation**

This trend is led by Bruyat, who considers that entrepreneurship revolves around studying the relationship between the individual and the value that he creates.

- **Innovation paradigm**

Schumpeter was the first to focus on creativity and entrepreneurship, who considered that the term creativity is the result of creating a new method or system in production that leads to changing the components of the product and the way it is designed. (Ganoun, 2019, P.09)

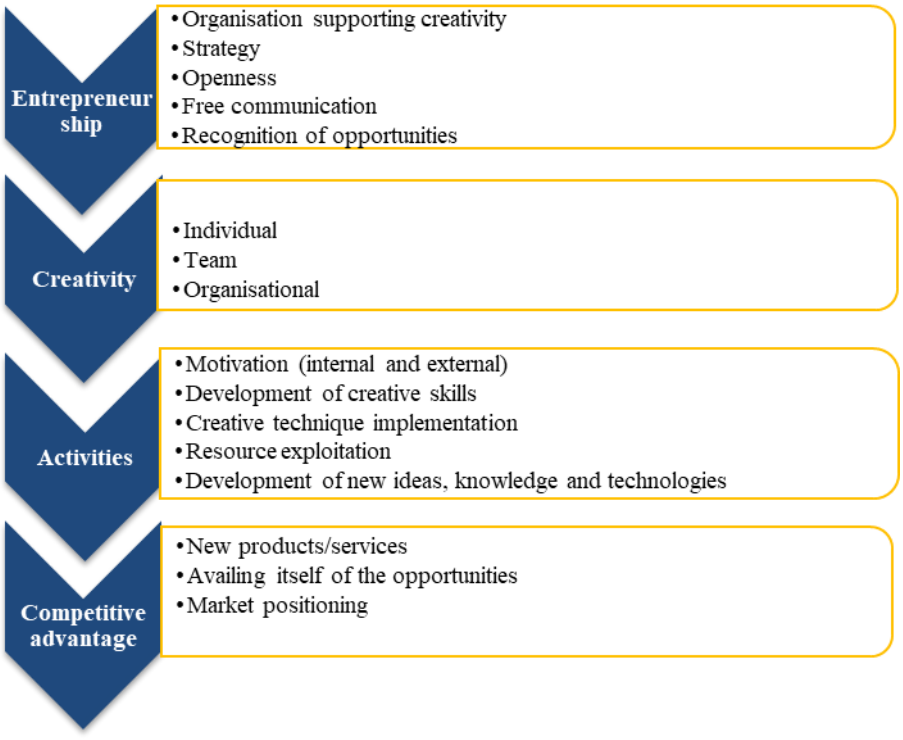
- **Entrepreneurial creativity elements**

All of the foregoing elements make a framework within which, in an entrepreneurship that supports creativity along with openness and free flow of information and which is focused on the quality and with motivation as an activity and implementation and development of creative techniques and skills, a competitive advantage is reached by creating new products and services which are efficiently positioned in the market, What is important for entrepreneurship is to have a vision and skills to stimulate co-workers to accept and follow it. (Ines et Danijela, Unpublished)

Entrepreneurial Creativity can be defined as: "that desire to form or create new businesses or projects, through the development of new products or new services, or by creating a new and completely different institution. (Chiavu et Suechin, 2019,P.286-P.289)

The indication that entrepreneurial creativity is no longer limited to individual work, but rather went beyond by focusing on the creative work of collectively organized organizations through the development of teamwork, skills development, operational functions, style Leadership, the culture of work teams, the organizational climate and everything that would create precedence and excellence for business associations. (Allahar, 2019,P.43-P.52). The following Figure 6 shows the main elements which, based on the implementation of creativity in entrepreneurship lead to reaching a competitive advantage.

Figure (6): The Figure Entrepreneurial Creativity Elements



source : Ines.M&Danijela.M(Unpublished), IMPORTANCE OF CREATIVITY IN ENTREPRENEURSHIP

After the theoretical presentation of each of open creativity and entrepreneurship, the impact relationship between them is studied through the analytical study that follows this axis, which centered on the reality of adopting open innovation in NASA.

2. The experimental framework for the study (The Reality of Open Creativity at NASA)

This analytical study, according to the analytical approach and the descriptive method, explains the reality of adopting open creativity in NASA, a leading international agency under the slogan"The Space Life Sciences strategy involves developing collaborative business models to drive innovation."

2.1 History of NASA

NASA is the National Aeronautics and Space Administration, NASA's headquarters is located in Washington, the capital of the United States of America, a US government agency that began its work on 1 October 1958 after the era of space conquest began with the launch of the Soviet satellite Sputnik in 1957, as the aim of its founding was to explore space and conduct aeronautical research, NASA has 20 centers and facilities across the United States of America, and employs approximately 18,000 employees.

The missions of NASA are as follows : (MIRIH.M, 2022)

- Planetary Science: One of NASA's missions is to study the planets in our solar system.
- Space Launch System (SLS): NASA launched the Space Launch System initiative that aims to produce launch vehicles that can explore space with high-mass spacecraft.
- Orion Program: A NASA project, a specially designed reusable low-Earth orbit space capsule modeled after the Boeing 787 Dreamliner.
- Return to the Moon: NASA aims, through its Artemis program, to land again on the moon, but on the south pole of it, This program is supposed to include at least one female astronaut, to be the first woman to set foot on the moon.
- Mars Exploration: NASA aims to send humans to Mars.

In the realm of space exploration and the space economy, technology plays a pivotal role, To maintain American leadership in space and drive future missions, NASA's Space Technology Directorate (STMD) has been entrusted with the responsibility of transforming the space industry, The STMD is currently working on the Artemis program, which involves the development and testing of various technologies that will be crucial for the next era of space exploration, including missions to the Moon and Mars.

To achieve its goals, the STMD supports and funds innovative ideas from entrepreneurs, researchers, and innovators across the country.This research and development work takes place at various institutions such as NASA centers, universities, national laboratories, and small businesses, Additionally. The STMD benefits from partnerships with other government agencies and business partners, which enables them to progress quickly and showcase comprehensive capabilities.

Investments in America's revolutionary space technologies not only provide solutions in space but also have real-world benefits that are accessible to commercial companies. By making these innovations available to commercial companies, NASA is helping to generate real-world benefits that can be applied to various industries, both on the ground and in space. (Sean.P, 2021)

- **Impact in culture**

The shift toward open innovation at NASA presents both opportunities and challenges, On the other hand, open creativity can bring a wealth of knowledge and experience from outside the organization, which can accelerate innovation and lead to breakthroughs at a much lower cost, On the other hand, it can also disrupt the organization's entrenched culture and processes, which can create resistance and conflict among R&D professionals, To successfully implement open creativity and innovation at NASA, the organization needs to address the structural and cultural aspects of change, This means breaking down knowledge boundaries and encouraging R&D professionals to become more open and collaborative while creating processes and incentives that support and reward open innovation. In addition, NASA needs to communicate the benefits of open innovation to its R&D professionals and address any concerns or resistance they may have.

One way NASA is dealing with these challenges is by organizing some of its internal divisions differently, such as the Department of Human Health and Performance, which is now more open to collaboration with outside partners, NASA is also taking steps to make its internal development program open source, which will enable knowledge to flow more freely within the organization and NASA is working to integrate and use external knowledge received through its open innovation platform.

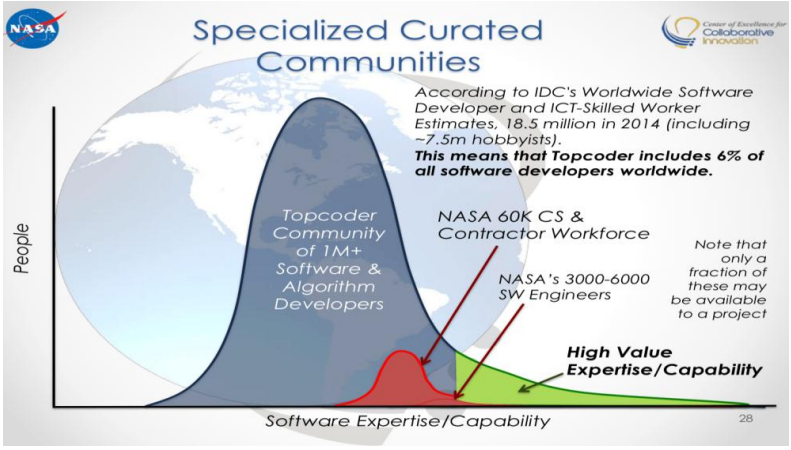
Open innovation and creativity present both opportunities and challenges for NASA, as NASA needs to address the structural and cultural aspects of change and communicate the benefits of open innovation to R&D professionals. By doing so, NASA can continue to push the boundaries of science and technology and stay on the cutting edge of space exploration. (RLT, 2018)

2.2 Open creativity challenges at NASA

NASA has a proud legacy of attracting some of the best researchers in the world, resulting in numerous groundbreaking solutions and intellectual property that have given the United States a technological edge over the past six decades, Nevertheless, even with a highly skilled team of scientists, companies can still benefit from the unique perspectives and creativity offered by Open Innovation and recognizing the value of public ingenuity in tackling complex challenges, NASA has turned to Open Innovation platforms such as Topcoder to access a broader pool of software developer expertise,this approach allows NASA to tap into the diverse skills and perspectives of a large community of developers who are passionate about solving problems related to space exploration and innovation.

Figure 7 shows the success of NASA's Open Innovation approach through its partnership with Topcoder, The platform has enabled NASA to engage with a much larger pool of talented developers and has facilitated the creation of innovative solutions to complex challenges. This approach not only helps NASA to accelerate its mission but also provides opportunities for developers to showcase their skills and gain valuable experience. (SORIANO, 2018)

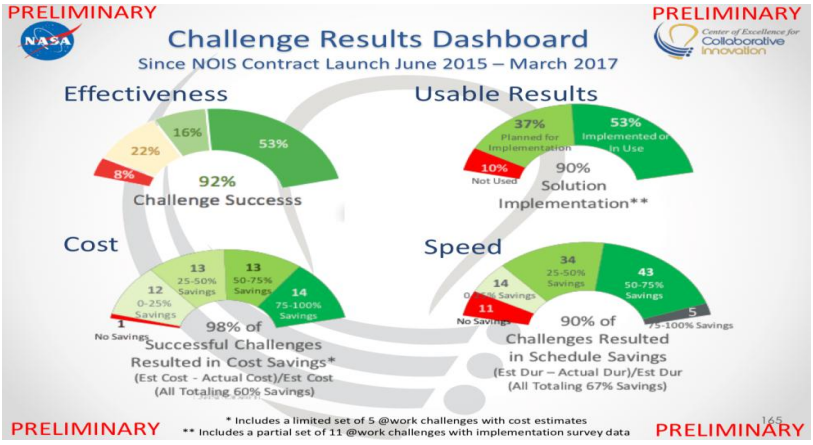
Figure (7): The Figure Distribution of the number of people and expertise, Topcoder vs. NASA



source : (SORIANO, 2018) [online]https://d3.harvard.edu/platform-rctom/submission/expanding-open-innovation-at-nasa

It is correct that NASA established the Center of Excellence for Collaborative Innovation (CoECI) in 2011 to encourage individuals and organizations to solve complex problems through challenges in exchange for a financial prize. These challenges have had a significant impact on NASA's role, shifting it from an orchestrating/directing role to a facilitating one, particularly in the low-Earth orbit (LEO), The challenges hosted by CoECI have been successful in delivering rapid and cost-effective solutions to complex problems, with the added advantage of only paying for successful outcomes. The NASA Open Innovation Service (NOIS) contract launch reported that 98% of the challenges resulted in cost savings, and 90% resulted in time savings, as depicted in Figure 8. (SORIANO, 2018)
These impressive results demonstrate the value of Open Innovation in enabling NASA to engage with a wider pool of innovators and experts, leading to the successful resolution of complex problems, By leveraging the expertise of external individuals and organizations, NASA has been able to accelerate its mission and bring significant cost and time savings, further reinforcing the value of Open Innovation in driving innovation and progress.

Figure (8): The Figure Challenge Results Dashboard



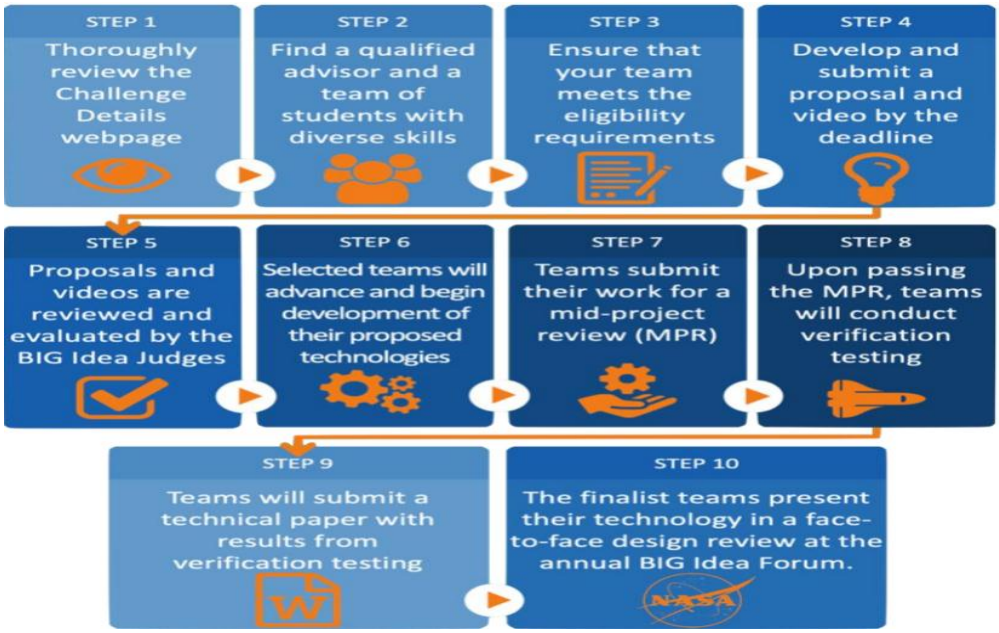
source : (SORIANO, 2018) [online] https://d3.harvard.edu/platform-rctom/submission/expanding-open-innovation-at-nasa

- **How to Compete in the BIG idea challenge in 2023**

It's interesting to hear that NASA is exploring a new approach to intellectual property and innovation through a venture capital unit, this could provide an avenue for more open collaboration and bring in fresh perspectives and ideas, It's important for NASA to continue to evolve and adapt to new challenges and opportunities, and this could be a promising strategy for staying at the forefront of innovation in the years to come. However, it's also important for NASA to carefully consider the potential risks and challenges associated with such a shift, such as maintaining appropriate levels of control and protection over sensitive information and ensuring that any new collaborations align with the agency's overall mission and values. (Schlieder, 2022)

NASA is working with universities to come up with ideas for the Artemis program through The 2023 BIG Idea Challenge, This competition challenges university teams to propose innovative and affordable technologies and systems that will allow us to manufacture structures on the moon using metals that can be extracted from the moon's resources (called ISRU) , The goal is to create a sustainable infrastructure that can support long-term exploration and research missions on the moon, the Figure 9 as shows.

Figure (9): The Figure Stages of following up on Innovative Ideas in the 2023 BIG Idea Challenge



source : The team of NASA (Jan. 24, 2023), NASA's BIG Idea Challenge, National Institute of Aerospace, P 7.

A schedule of dates to be adhered to when submitting proposals by entrepreneurs to present their projects in The BIG Idea Challenge in 2023. (team NASA, 2023,P.10)

Table (1) : Table Dates and Deadlines

Rolling, until Jan. 24, 2023	Notice of Intent Deadline
October 20, 2022	Q&A Session for interested teams
January 24, 2023	Proposal and Video Deadline
March 2, 2023	Teams are notified of their selection status
Mid-March, 2023	1st installment of development stipends sent, as appropriate
June 7, 2023	Deadline for Mid-Project Review (MPR) submission
June 27, 2023	Teams are notified of Pass/Fail status
Early July, 2023	2nd installment stipends are sent as appropriate from SG directly to schools
June - August, 2023	Summer work
September – October 2023	Fall work (technology verification demonstrations)
October 2, 2023	Deadline for Forum Registration and Payment
October 14, 2023	Deadline for Forum Hotel Reservations
October 23, 2023	Deadline to submit Technical Paper and Technology Verification Demo
November 12, 2023 (PM Eastern Time 4:00)	Deadline to submit Presentation Chart Deck and Digital Poster
November 15-17, 2023	2023 BIG Idea Forum (Glenn Research Center, Cleveland, OH)

source : Author's researchers depending on (team.NASA, Jan. 24, 2023)

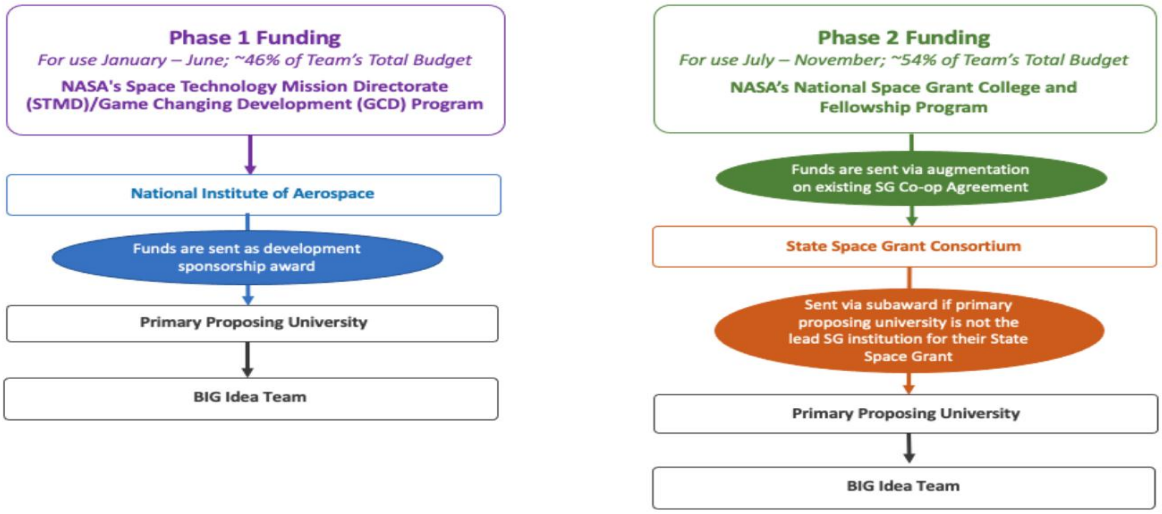
- **Funding structure for final teams**

It is made from two sources: (team NASA, 2023, P.10)

- Phase 1 STMD Funds: The first tranche of funding will be sent immediately upon selection for the finalist teams to begin developing their project proposal, and will amount to 46% of the total budget requested. These funds are provided directly to the initial proposed university, from the National Space Institute (on behalf of NASA STMD GCD Program).
- Phase II Space Grant Funds: The second tranche of funding (i.e. the remainder of the total funds required) will be provided after teams successfully complete their mid-project review in June.

Whereas these funds are provided directly to the State Space Grant Consortium of the Master Proposing Institution from the NASA STEM Office (National Space Grant Program), by augmenting the State's Primary Space Grant Award and channeling it to the Master Proposing University to challenge the idea of BIG via a sub-prize, Figure 10 shows that.

Figure (10): The Figure Funding Structure



source ：The team of NASA (Jan. 24, 2023), NASA's BIG Idea Challenge, National Institute of Aerospace, P 10.

This study differs from previous studies on the subject of open creativity and its adoption by organizations. As this research study is considered a new study and the first in the field of analyzing open creativity in a leading international organization such as NASA because space for some is a field that is far from being studied, but it is more correct that it is a field for seeing ideas Creative and innovative in various disciplines.

Conclusion

The research paper presented a model for attracting and generating ideas and how to transform development from within organizations to the search for development through the liberation of ideas because the complexity of creative processes requires cooperation between organizations and even competition for them to improve their competitive position in an era in which international competition has risen and the geographical boundaries between markets have shrunk. Open creativity This is what international organizations have adopted, especially those looking for excellence and leadership, as the business environment has a new global orientation that serves common interests, although industries such as chemicals, pharmaceuticals, and information and communication technology usually show a higher level of open creativity, as well as The data is that large companies innovate more openly than startups.

Among the most important results of the study are as follows: Creativity is a critical factor for the continuity of the institution and its survival in an ever-changing environment; And it represents one of the competitive performance measures of the organization for growth in the market and wealth creation, where it is necessary to exploit external knowledge alike with internal knowledge in creativity (open creativity), especially in light of the knowledge economy, and practices of this type of creativity, internal open creativity and external open creativity. This is what NASA showed by adopting this model. NASA has recognized the value of engaging with a broader community of innovators, scientists,

and engineers to access diverse perspectives, ideas, and experiences. As NASA was able to take advantage of a wide range of talents for entrepreneurs, due to the complexity of the problems that NASA seeks to solve or seek to control space, as was recently distinguished by the "Miles" project, Ziad Al-Tayeb (a young Tunisian 32), on the axis of the artificial intelligence system that operates on developing it. Developing a sense of touch for robots using brain signals will enable NASA to send a robot into space and then communicate with it in a human-like way. Which won the interest of the International Space Agency (NASA) to join the astronauts in the future. Given this trend, Open Innovation will be an important driver of NASA's research strategies, giving it access to more advanced solutions and technologies that may not be available through traditional channels. The need to move from closed to open creativity for organizations, and adopt the latter as a competitive strategy for them;

- ✓ The necessity of resorting to the use of external ideas and knowledge as well as internal ideas and knowledge of organizations;
- ✓ The need to work on providing the appropriate environment for the investment activity of open creativity in organizations.
- ✓ Working on organizing competitions and opening the way for emerging entrepreneurs as opportunities to present creative ideas.

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