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ΣΧΟΛΗ ΟΙΚΟΝΟΜΙΚΩΝ, ΕΠΙΧΕΙΡΗΜΑΤΙΚΩΝ & ΔΙΕΘΝΩΝ ΣΠΟΥΔΩΝ
ΤΜΗΜΑ ΟΙΚΟΝΟΜΙΚΗΣ ΕΠΙΣΤΗΜΗΣ

**ΠΡΟΓΡΑΜΜΑ ΜΕΤΑΠΤΥΧΙΑΚΩΝ ΣΠΟΥΔΩΝ «ΒΙΟΟΙΚΟΝΟΜΙΑ,
ΚΥΚΛΙΚΗ ΟΙΚΟΝΟΜΙΑ & ΒΙΩΣΙΜΗ ΑΝΑΠΤΥΞΗ»**

**ΤΑ ΟΙΚΟΝΟΜΙΚΑ ΤΗΣ ΒΙΩΣΙΜΗΣ ΑΝΑΠΤΥΞΗΣ:
ΑΝΤΑΓΩΝΙΣΜΟΣ, ΚΑΙΝΟΤΟΜΙΑ & ΕΠΕΝΔΥΣΕΙΣ**

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MSc. in Bioeconomy, Circular Economy & Sustainable Development

**THE ECONOMICS OF SUSTAINABLE DEVELOPMENT:
COMPETITION, INNOVATION & INVESTMENT**

By Iliana Papadopoulou

Piraeus, Greece, March 2022

«Αν δεν φυτέψουμε το δέντρο της γνώσης
όταν είμαστε νέοι, δεν θα μας δώσει
τον ίσκιο του όταν θα έχουμε γεράσει».

– Φίλιπ Στάνχοπ

Στην μικρή μου αδερφή

Ευχαριστίες

Το περιεχόμενο αυτής της εργασίας είναι απότοκο των γνώσεων που οι καθηγητές μου μεταλαμπάδευσαν. Θα ήθελα να τους ευχαριστήσω μέσα από την καρδιά μου για την βοήθεια τους. Ιδιαίτερα θα ήθελα να εκφράσω την ευγνωμοσύνη μου, στους μέντορες μου, την κα. Κωνσταντίνα Κοτταρίδη και τον κό. Μάρκο Τσελεκούνη για τις πολύτιμες συμβουλές τους και για την στήριξη τους.

Τα Οικονομικά της Βιώσιμης Ανάπτυξης, Ανταγωνισμός, Καινοτομία & Επενδύσεις

Σημαντικοί Όροι: Βιώσιμη Ανάπτυξη, Νεοφυείς Επιχειρήσεις, Κλιματική Αλλαγή, Ανταγωνιστικό Πλεονέκτημα, Αποδοτικότητα

Περίληψη

Η αειφόρος ανάπτυξη είναι η βάση για την πρόοδο και την εξέλιξη. Η παροχή ολοκληρωμένων λύσεων προστιθέμενης αξίας και η επίτευξη επιχειρηματικής αριστείας έχει γίνει στρατηγική επιλογή, ανταγωνιστικό πλεονέκτημα και ζήτημα εταιρικής ευθύνης. Επομένως, έχουμε παρατηρήσει και από τις δύο πλευρές, εταιρική και ακαδημαϊκή, ότι όχι μόνο οι κυβερνήσεις στον κόσμο αλλά και οι καταναλωτές επιβραβεύουν πάντα μια βιώσιμη νοοτροπία και τις βιώσιμες πρακτικές σε έναν οργανισμό. Σε αυτό το άρθρο, εξετάζουμε δύο περιπτώσεις σε μια προσομοίωση αγοράς, εάν ένας μονοπωλητής θα εξαγοράσει ένα βιώσιμο startup ή θα αγοράσει από ένα προμηθευτή που εφαρμόζει βιώσιμες πρακτικές. Επιπλέον, εξετάζουμε τους λόγους για τους οποίους η αειφόρος ανάπτυξη είναι πολύ σημαντική, αλλά και τους λόγους για τους οποίους οι βιώσιμες νεοφυείς επιχειρήσεις θα οδηγήσουν στην μετάβαση με ουδέτερο ανθρακικό αποτύπωμα.

The Economics of Sustainable Development, Competition, Innovation & Investment

Keywords: Sustainability, Startups, Climate Change, Competitive Advantage, Efficiency

Abstract

Sustainable development is the basis for progress and evolution. Providing complete, value-added solutions and achieving business excellence has become a strategic choice, a competitive advantage and a matter of corporate responsibility. Therefore, we have noticed from both sides, corporate and academic, that not only the governments among the globe but also the consumers always reward a sustainable mindset and sustainable practices in an organization. In this paper, we examine two cases in a market simulation, whether a monopolist acquires a sustainable startup or byes from a sustainable upstream supplier. Additionally, we examine the reasons why sustainable development is very significant but also the reasons why sustainable start-ups will the lead the way to carbon neutral.

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CHAPTER 1: Sustainability significance in distinct areas of business performance

Introduction:

As analyzed in detail, in the context of the conceptual approach to sustainability, sustainable development refers to a model of development that does not undermine the ability of future generations to meet their own needs. It aims to improve the living conditions of individuals while preserving their environment in the short, medium and, most importantly, long-term environment and has a triple goal: economic development that is efficient, socially equitable and environmentally sustainable (Springett, 2018). Essentially, sustainable development arose because of the need to set limits on reckless development, which did not take other factors into account at all. The limits that had to be set on development, due to the environmental, social and other problems caused, gradually created the need for a balanced relationship between economic development, the natural environment and society (Rees, 2016).

This effort was aimed at overturning the one-dimensional view that existed before and was based only on growth through economic growth. So, the factors that were added to the aspect of economic development, were society and the environment (Orr, 2011). According to sustainable development, these three factors should have a balanced interdependence.

The definition of sustainable development provided by the Brundtland report, entitled "Our Common Future", is more widely known, highlighting, among other things, the value of intergenerational solidarity: "Sustainable development is development that meets the needs of the present without undermining the ability of future generations to meet their own needs. " The report clarifies that: "needs are considered the essential needs of the poor of the world, which must be given priority" and implies the restrictions that "must be imposed on technology and social organization, so that the environment can meet the current and future needs ". It also states that "a world in which poverty and inequality are endemic will always be prone to ecological and other types of crises" (WCED, 1987: 43,44).

The general objectives of sustainable development are firmly reflected in the EU conditions. Article 3 of the Treaty on European Union (TEU) refers to the economic, social and environmental aspects of sustainable development, while Article 11 TFEU explicitly states that environmental protection

requirements are incorporated into Union policies and measures. and Member States. Respectively, Article 13 TEU stipulates that the institutional framework of the EU aims to promote its values, pursue its goals and ensure coherence in its policies and actions. In this sense, the importance of sustainability becomes crucial in several areas, such as the below:

- Increased productivity and less energy consumption
- Lower operating costs
- Market competitive advantage and increased revenue
- New ventures and collaborations
- Improvement of value chain
- The relationship between talent attraction and sustainability
- Attraction of responsible investors

1.1 Increased productivity and less energy consumption:

The effort to increase productivity is a critical parameter in modern societies which in the modern globalized environment, are societies of economies of scale. However, this effort should not be to the detriment of sustainable development. This is because economic prosperity is vital and can be achieved if growth offers added value to the economy and society, while substantially improving people's lives, while strengthening resilience to future external shocks and helping to converge need for economic growth and sustainable development. The contribution of sustainable development to boosting productivity has been the subject of research in the relevant field of research (Mudacumura et al., 2016).

It is a fact that the relationship between sustainable development and productivity is two-way. Thus, productivity can support the achievement of the main goals of sustainable development as sustainable productivity is necessary to enhance domestic growth. At the same time, the availability of infrastructure is also important for the continuous enhancement of productivity. This includes transport and energy infrastructure, educational infrastructure as well as health infrastructure. In addition, the quality of work in terms of knowledge and skills are essential factors that contribute to increased productivity. In particular, the quality of education is a critical factor, as a lack of skills would limit the ability of economies

to benefit from technological change, thus limiting productivity growth, particularly in manufacturing, as well as economic diversification (Lélé, 2015).

The focus therefore on sustainable development-oriented productivity provides a broader framework for countries to tackle achieving several of the sustainable development goals. For example, higher productivity levels, especially in the agricultural and agricultural sectors, will help countries tackle poverty, food security, and reduce inequalities (Jucker, 2012).

The relationship between productivity and sustainable development is, however, as mentioned above, two-way, as investing in sustainable development goals in economies can also boost productivity. For example, social policies that contribute to the expansion of investment in health and education undoubtedly ensure the promotion of health at all ages. At the same time, ensuring inclusive access to education promotes lifelong learning opportunities for all. These can boost labor productivity (Jickling, 2015).

At the same time, the design and implementation of investment policies that boost investment ensure access to affordable and reliable energy resources, and create sustainable infrastructure, thus promoting inclusive and sustainable industrialization and innovation. Increasing investment in these two sectors in the light of the principles of sustainable development, contribute positively to improving productivity (Huckle & Wals, 2015).

Finally, the contribution of sustainable development to productivity can also be traced to the field of climate change. Climate change has significant negative effects on productivity, so urgent action is needed to combat climate change and its effects. In this way the contribution of sustainable development to productivity growth is also important, creating a virtuous circle between sustainable development, productivity and economic growth in the global market environment. Thus, investing in sustainable development goals can boost productivity. So, sustainable development presupposes, the development of the productive structures of the economy along with the infrastructure for a sensitive attitude towards the natural environment and ecological problems. Sustainability implies that natural resources are exploited at a slower rate than the rate at which they are renewed, otherwise environmental degradation takes place (Dobson, 2017).

There are especially important reasons that make sustainable development necessary to approach the ecosystem balance and one of them is the contribution of sustainable development to reducing energy consumption. By applying the principles of sustainable development, savings are made in addition to raw materials and natural resources that are usually non-renewable (e.g., oil, minerals) and energy savings. This is particularly important in a time of economic and environmental crisis.

The need for energy savings is imperative, and the facts and evidence in favor of this view are compelling. According to data from the International Energy Agency, global energy demand is projected to increase by 39% by 2040 (International Energy Agency (2014): World Energy Outlook 2014). Most of this increase will come from Asian countries, where energy consumption is driven by strong economic and demographic growth. As the International Energy Agency (IEA) states in its World Energy Outlook 2014 report, "with global energy consumption being based primarily on oil, the global energy system is in danger of failing to live up to its expectations" (WCED, 1987). : 43,44).

So, without improvements in energy efficiency and the costly development of new energy technologies as required by sustainable development, the global energy system would be even more under pressure. Therefore, changes in global trends for a decentralized low-carbon energy system are a priority for sustainable development and are inevitable to ensure access to affordable, reliable and sustainable energy for all today and in the future.

1.2 Lower operating costs:

Investors, customers, governments and the public are increasingly pressuring companies to put sustainability at the heart of their business models and adopt a more sustainable approach. Over the last decade, companies themselves seem to have realized the importance of sustainability and sustainable development, and based on this perception, they develop operational models and plan their strategic action plan (Lee et al., 2011). The Covid-19 pandemic, meanwhile, has put business resilience to the test, making sustainability action imperative. Another reason why companies plan their strategy based on the principles of sustainable development is that it leads to reduced operating costs (Basiago, 2016).

Although for many companies, the financial cost of implementing a sustainability program is a major hurdle to overcome - an issue that has been exacerbated by the financial pressures of the Covid-19

pandemic, it is now understood that the development and implementation of sustainability programs enables the setting of appropriate and ambitious objectives for the implementation of an integrated sustainable development framework for businesses, while at the same time ensuring a coordinated and well-thought-out approach to maximizing revenue and minimizing operating costs (Eccles et al., 2012).

1.3 Market competitive advantage and increased revenue:

As the results of relevant research have shown, eventually, companies that define and implement a strategic plan that focuses on sustainability, strengthen the image of the company which, in turn, maximizes their competitive advantage, as well as trust and reliability. Thus, sustainability today tends to be increasingly perceived as an element that gives a competitive advantage to companies and not as a burden imposed institutionally, from top to bottom. Its main pillars are the digital transition and the green transition, with the result that the goal of sustainable development is a characteristic of companies, a quality that can distinguish them in the global economic development and push them to further development and consolidation and gaining a competitive advantage on their part (Berns et al., 2019).

Thus, responsible companies through the strategy of sustainable development develop points of differentiation which can be competitive advantages over their competitors. These companies also gain significant reputation / reputation as they can build trust with their stakeholders, gain customer referrals and protect themselves from scandals, regulatory challenges and negative publicity (Lindsey, 2011).

1.4 New ventures and collaborations:

To meet the global challenges of sustainability, companies today invest in sustainable development while a substantial proportion of venture capital investments play a key role in the development of particularly sustainable start-ups. One reason for this is the contribution of sustainable development is the innovation of this business model, which contributes to the fact that companies enter into new partnerships (Atkinson et al., 2012).

Start-ups, in particular, are interested in implementing innovative business models, sustainable development, as they provide them with new opportunities to create a new customer base, new ventures

and collaborations. At the same time, business models for sustainable development help companies to reduce financial risk through partnerships, collaborations, new ventures and co-investments aiming to gain a comparative advantage, based on the economic, social and environmental returns of specific business models based on sustainable development (Sheth et al., 2010)

1.5 Improvement of value chain:

Supply chain management is, today, equally vital to the viability of all businesses, regardless of the geographical area in which they operate or the products / services they supply. Different suppliers participate in the procurement process, creating a model through which materials, products, services, systems and information are managed, leading to the delivery of the final product to the customer (Vermeulen & Seuring, 2019).

Given the increasing pressures arising from the current economic, environmental, financial and social conditions in the global market, there is an urgent need for a supply chain management policy, as its successful implementation is a significant competitive advantage in the market where the company operates. Sustainable business models help to strengthen the business value chain which refers to the full lifecycle of a product or process, including material sourcing, production, consumption and disposal / recycling processes (Seuring & Muller, 2018).

1.6 The relationship between talent attraction and sustainability:

It is a fact that the labor market, at the international level, is constantly changing. We are going through a period which has as its main characteristics the innovation, the evolution of technology, the fast paces, but also the intense competition. On the part of companies, the attraction, selection and retention of talents come to the fore more than ever, while their effective staffing remains, at least in most organizations, at the center of their long-term planning and strategy (Alparslan & Saner, 2020).

Employers in companies are looking for people who stand out for their flexibility, team spirit and ability to take initiatives and responsibilities (of course, they must also have a good knowledge of the subject matter), while familiarity with the use of innovative technologies is considered essential. , as well

as the willingness to follow developments and acquire new skills and knowledge. Sustainable companies, however, have the potential to attract more talent in the workplace than conventional, non-environmental, sustainability-oriented businesses. Those companies, have the so called “talent sustainability” (Bhatnagar, 2017).

Talent sustainability is an organization's ability to continuously attract, develop and retain people with the capabilities and the commitment needed for current and future organizational success. Various research has examined the importance of sustainability and social responsibility for attracting talents in a company as also promoting wellbeing. It should come as no surprise, of course, that a strong environmental ethic in an organization is a driving force for many job seekers when choosing where to apply for a job.

Undoubtedly, creating a viability that will shield the business and improve its strategy will certainly bring benefits on many levels including attracting talent. First, businesses will have more opportunities if they demonstrate in their increasingly demanding markets what their sustainable development plan is. Second, innovation will be favored, as a more sustainable business will require re-evaluating and reinventing its values, as well as redefining its approach to things. Third, there is a connection with society, fourth, a sustainable business satisfies current investors and certainly attracts new investors in the future, and fifth, the attraction of talent at work will increase. So, businesses need to figure out what works best for them by combining sustainability with their dreams for the future.

Numerous studies have described in detail how important sustainability really is, in conjunction with social responsibility in terms of attracting business talent and recruitment. It is even characteristic that in some surveys 26% of British workers would be willing to receive a pay cut in exchange for working in a company that acted responsibly in the environment. In addition, 28% would actually consider leaving their current role and moving to one offered by a more environmentally responsible company. Of that 28%, in the 23-28 age range, which hosts a considerable number of millennials, 50% would definitely do so. In other words, 28% would really consider leaving their current role and moving to a role offered by a more environmentally responsible company. It is even estimated that by 2025, the so-called millennials will make up about 75% of the total workforce. This is a group that has also been found to be willing to offer its services at a significantly lower salary to a business that demonstrates environmental care (Alparslan & Saner, 2020).

So very often the majority of talent in the field of business, are excited by the prospect of working for companies that play a positive role in society and want to work in a company with a strong social conscience. In this context, it is an especially important fact for companies as by attracting talents, they gain a strategic comparative advantage over their competitors by attracting key talents in their workplace (Kamble et al., 2018).

This means that companies that are environmentally conscious go clearly beyond the development of an environmental and social awareness and lay the foundations for the development of their business towards competitiveness. Implementing a strategy such as corporate viability is just another form of competitive advantage. Thus, a company that adopts the principles of sustainability will not only attract customers who choose environmentally conscious companies but also the best and most effective talent pool.

According to surveys, about 40% of the staff have stated that they have put more effort into a company they have worked for, and which uses these sustainable development strategies (Banker et al., 2014). In this way, attracting talent results in higher productivity, which saves money for the business and translates into a more satisfied customer. Therefore, the majority of corporate development and management departments around the world are actually modifying hiring strategies to focus on their social and environmental attitudes, aiming to attract talent to the workplace. That is why in the calls for expressions of interest for recruitment, they very often state that they attach immense importance to our social and environmental sustainability and, therefore, in your role you would be expected to repeat this every day (Lebas et al., 2016).

1.7 Attraction of responsible investors:

In the field of sustainable investments, reference has been made for years to the environmental, social and governance criteria that socially sensitive investors set as a condition before investing in a business. The reference to such criteria before investing somewhere becomes increasingly intense mainly by the new generations of investors and entrepreneurs in the developed countries of the world since this category of investors and entrepreneurs is more aware of the wider impact of business on society, the environment and in the ethical dimension of business management and administration. So, these investors are looking not

only for the seventeen goals of the UN Sustainable Development Goals, which for some may even be a marketing ploy for publicity reasons, but also concrete and tangible evidence from companies that they are actually translating these criteria into practice (Hellsten & Mallin, 2016).

As one can easily understand, environmental criteria relate to the way a company treats the natural environment, its energy footprint, its waste management, the saving of natural resources and the treatment of the flora and fauna where it operates. The social criteria examine the company's relationship with the community of its partners and partners and society and the state at large and relate to its relationships with its employees, customers and suppliers, safety and health at work, and in general the social values that the company stands for. And, finally, the administrative criteria concern the ethical management of the company, the transparency in the decision-making process, the management of the conflict of interests and the faithful observance of the law, among others (Hofmann et al., 2019).

Socially, environmentally and ethically sound companies have an advantage over the rest, in attracting reliable investors, as they are less at risk of being exposed to scandals, problems, irregularities, illegalities and mismanagement. For example, a truly environmentally sensitive company would not violate environmental law and would not be able to manage the potential financial, administrative and communication damage that it would certainly inflict on it (Humphrey & Lee, 2011).

The increase in the number and financial footprint of socially, environmentally and administratively sensitive companies inevitably affects the state in which they operate. As taxable entities and productive agents, companies of this type articulate "reason" with their behavior, form the framework of development and economic and political life within societies. This is in line with what international human rights, environmental protection and sustainable development NGOs first claimed in the last two or three decades of the twentieth century. Those who in turn co-shaped the international political agenda that led the UN to the relevant and now widely used and promoted initiatives of sustainable and sustainable development and social partnership of state and business (Hofmann et al., 2019).

1.8 Recap:

Taking the above sections into consideration, there is not development if it is not sustainable, nor growth. Sustainability significance lays between the increased productivity and less energy consumption, the lower

operating costs, the market competitive advantage and increased revenue, the new ventures and collaborations, the improvement of value chain, the relationship between talent attraction and sustainability, and the attraction of responsible investors. A sustainable Organization enjoys the above mentioned as benefits, thus it evolves in the long-term.

CHAPTER 2: Climate Crisis

2.1 Introduction:

Climate change poses a significant threat to Earth and way of life and we are already seeing the effects of a rapidly warming planet, including mass loss of biodiversity, volatile weather-related disasters, stress on food production and water scarcity. According to the Intergovernmental Panel on Climate Change (IPCC), we have until 2030 to reduce carbon emissions to limit temperature increases below 2°C, in line with the Paris Agreement. In order to meet the ambitions of the Paris Agreement, CO₂ emissions will need to fall to net zero by 2050 [IPCC — Intergovernmental Panel on Climate Change].

The global climate has changed relative to the pre-industrial period, and there are multiple lines of evidence that these changes have had impacts on organisms and ecosystems, as well as on human systems and well-being. Human-induced global warming has already caused multiple observed changes in the climate system. Limiting global warming to 1.5°C would limit risks of increases in heavy precipitation events on a global scale and in several regions compared to conditions at 2°C global warming [Global Warming of 1.5 °C (ipcc.ch)- CHAPTER 3: IMPACTS OF 1.5°C GLOBAL WARMING ON NATURAL AND HUMAN SYSTEMS]. Scenario analysis is a technique used to enhance critical strategic thinking. It refers to the process of analyzing and quantifying various possible events that could take place in the future and predicting various feasible results. Scenario analysis doesn't attempt to predict a single possible outcome but rather evaluates a spectrum of different potential situations and outcomes ranging from a best-case to a worst-case scenario.

It is a tool that has been used for over a half-century by corporations worldwide to hold conversations about different potential impacts of uncertain futures. Generally, most changes that drastically impact organizations happen unexpectedly and suddenly, with the global pandemic in 2020 being an excellent example. These changes bring to the fore the need to conduct scenario analysis to analyze and quantify potential business impacts of such events so they can plan effectively. The severe effects of climate change threaten the global economy as well as local communities. A climate scenario analysis is vital in that it helps to clearly define the risks (and opportunities) so mitigation efforts can be developed and applied. TCFD scenario analysis allows organizations to explore and develop an understanding of how a combination of climate-related risks may affect their businesses. Organizations

today are starting to realize the importance of assessing and managing needs (risks) and benefits (opportunities) from identifying climate change risks that their organizations may be exposed to both now and in future. Below I will show you some green risks and opportunities stemming from climate crisis.

2.2 Green Opportunities:

- Market (e.g. green equity indices & bonds 2020 out performance)
- Mortgages & loans (e.g. the market for energy efficient mortgage loans, green commercial building loans, and green automobile)
- Green bonds (e.g. companies ensure material reductions in financing costs in primary markets and greeniums)
- Funds (e.g. significant inflows to green investments and funds with above average sustainability ratings now hold \$ 4.6 trillion)

2.3 Green Risks:

- Physical risks associated with the physical effects of climate change. It's separated in acute (event driven) and chronic (longer-term shifts).
- Transition risks associated with transition to low carbon economy could be forced by a new regulation, government policy, litigation, cut-edge technology or transmit through natural progression.
- Reputational risks, either direct, stemming from a company specific action or policy, or indirect, in the form of public perception.
- Liability risks, legal actions demanding compensation for inadequate disclosure of climate

2.4 Sustainable Finance regulation:

Historical Landscape:

2015→ Paris Agreement (G20 launches Taskforce for Climate Related Financial Disclosures (TCFD)) [The Paris Agreement | UNFCCC]

2016→ EU launches High Level Expert Group on Sustainable Finance (HLEG) & EU's Non-Financial Reporting Directive (NFRD) comes into force. [High-Level Expert Group on sustainable finance (HLEG) | European Commission (europa.eu), Non-Financial Reporting Directive (NFRD) - Directive 2014/95/EU and the proposal for a Corporate Sustainability Reporting Directive (CSRD) | Green Finance Platform]

2017→ Publication TCFD recommendations on climate disclosures & Publication HLEG recommendations; foundation for sustainable finance strategy [High-Level Expert Group on sustainable finance (HLEG) | European Commission (europa.eu)]

2018→ EU announces Action Plan on Sustainable Finance & EU launches Technical Expert Group on Sustainable Finance (TEG) [EUR-Lex - 52018DC0097 - EN - EUR-Lex (europa.eu)]

2019→ EU approves SFRD regulation & Sustainable Finance taxonomy published by TEGC & EU Green Deal announced [A European Green Deal | European Commission (europa.eu)]

2020→ Sustainable finance taxonomy approved by EU [EU Taxonomy Compass | European Commission (europa.eu)]

2021→ SFRD comes into force, CSRD proposal to strengthen NFRD & MiFID, UCITIS, AIFMD, Solvency II, and Insurance Distribution amendments in effect. [Corporate sustainability reporting | European Commission (europa.eu)]

2022→ Taxonomy regulation into force, SFRD annual disclosure into force, & EU Ecolabel expected. [EU Ecolabel - Environment - European Commission (europa.eu)]

The above-mentioned regulations aim to:

- Climate change mitigation
- Protection of ecosystems
- Transition to a circular economy

- Pollution prevention
- Climate change adaptations
- Sustainable usage of water
- The current regulation promotes Europe's sustainable future:
- Increasing the EU's climate ambition for 2030 and 2050

2.5 Recap:

Regarding sustainability disclosures, three are the core EU regulations. Those are the Non-financial Reporting Directive (NFRD)(Q4 2014), the EU Taxonomy (Q1 2020), and the Sustainable Finance Disclosure Regulation (SFDR) (Q1 2021). Below I will shortly explain the scopes of each one.

Non-financial Reporting Directive [Non-financial Reporting Directive (europa.eu)]

Defines the rules on disclosure of non-financial and diversity details by irrefutable large organizations. Assist investors, civil society organizations and other stakeholders to evaluate the non-financial performance of companies and encourages them to act with social and environmental responsibility.

EUTaxonomy[https://ec.europa.eu/info/sites/default/files/business_economy_euro/banking_and_finance/documents/200309-sustainable-finance-teg-final-report-taxonomy_en.pdf]

The EU Taxonomy is a tool to assist investors, companies, issuers and project promoters navigate the transition to a low-carbon, resilient and resource-efficient economy Sustainable Finance Disclosure Regulation. A classification system on which economic activities can be considered environmentally sustainable. Covers climate change mitigation, climate change adaptation, water, circular economy, pollution control, and biodiversity. Its purpose is to promote sustainable practices, protect issuers from greenwashing and organize the transition to carbon neutral.

Sustainable Finance Disclosure Regulation (SFDR) [EU Sustainable Finance Disclosure Regulation (SFDR) - Aviva Investors]

SFDR aims to bring a level playing field for financial market participants (“FMP”) and financial advisers on transparency in relation to sustainability risks, the consideration of adverse sustainability impacts in their investment processes and the provision of sustainability-related information with respect to financial products. The SFDR requires asset managers such as AIFMs and UCITS managers to provide prescript and standardized disclosures on how ESG factors are integrated at both an entity and product level.

NFRD(2018) CSRD(31 Oct 2022)This regulation defines the rules on disclosure of non-financial and diversity information by certain large companies. It assists the green investors, the society the organizations and other stakeholders to evaluate the non-financial performance of companies and encourages them to develop a responsible approach to business. EU Action Plan on Sustainable Finance: Sustainable finance refers to the process of taking ESG considerations into account when making investment decisions in the financial sector, leading to more long-term investments in sustainable economic activities and projects. This Action Plan on sustainable finance is part of broader efforts to connect finance with the specific needs of the European and global economy for the benefit of the planet and our society. Specifically, this Action Plan aims to:

- Reorient capital flows towards sustainable investment in order to achieve sustainable and inclusive growth.
- Manage financial risks stemming from climate change, resource depletion, environmental degradation and social issues.
- Foster transparency and long-termism in financial and economic activity.

(EUR-Lex - 52018DC0097 - EN - EUR-Lex (europa.eu))

EU taxonomy: This regulation refers to a classification system on which economic activities can be considered environmentally sustainable. It also covers climate change mitigation, climate change adaptation, water, circular economy, pollution control, and biodiversity (Delegated Acts in Q4 2021), while it is creating security for investors, and protects them from greenwashing. Moreover, it helps companies to plan the transition, mitigate market fragmentation and eventually shift investments where they are most needed (Disclosure obligations in Q4 2021).

CHAPTER 3: Startups and Big Corporates

3.1 Introduction:

When talking about startup companies, the question arises is how a startup can compete with big companies. The answer of course is by putting customers front and center and establishing an emotional connection with them. International corporations cannot afford to waste time on talking to every customer or respond to every review, but you can. But not only this. Sustainability is a great opportunity for startups to become competitive, in a highly competitive business environment, where they operate together with large companies (Hellsten & Mallin, 2016).

3.2 Competition among sustainable startups and big corporates:

For their part, startups should take advantage of the shift in focus towards sustainability, as an opportunity to rethink their strategy and take structural measures to change their corporate behavior, so that they can ensure their long-term growth and meet the challenges of a competitive environment in which their competitors are large companies. To achieve this, sustainable development needs to be an integral part of their long-term plans. First, the leadership of a start-up company should set a clear and strong relevant goal, and to determine this, it can consider what are the social and environmental issues associated with the long-term development of that business (Miller, 2018).

In addition, it is important for leadership to be committed to formulating the relevant strategy and to closely monitor its implementation and development. Second, with climate change at the forefront, it is time for environmental action to be a binding priority on a startup company's business agenda and not just optional. Third, the importance of the business cooperation with other stakeholders (partners, customers, individuals) is crucial for the implementation of sustainable development plans and maximizing their footprint. Fourth, tangible sustainability goals need to be set, both short-term and long-term for startups. And fifth, it is essential that a regular reporting system is in place to keep track of the progress that the company has made in terms of sustainable development goals. The above strategies will help to make startups competitive and ensure their viability in a highly competitive business environment (Krueger & Carsrud, 2017).

3.3 Competition landscape for sustainable startups:

Sustainable startups today are called upon to operate in a globalized and interconnected market, in which large and established companies must compete. As protective barriers collapse in emerging markets around the world, startups are rushing to find new growth opportunities. The basic idea of entrepreneurship is to redefine existing resources and skills to create an innovative product in a market without competition. (Rees, 2016).

Various studies have shown that exposure to competition in the early stages of a business's life increases the chances of a long-term survival. In particular, according to a survey of the tax data of about 2 million companies in Britain (in the period 1995-2005), companies that began to operate in highly competitive markets were more likely to survive the next three years if they survived the first difficult year. (Orr, 2011).

A competitive environment causes start-ups to focus on meeting customer needs while controlling cost reduction and retention. High competition forces them to create a strategy based on low-cost policy, turning every disadvantage (into a successful marketing strategy). Managers who understand the benefits of early competition manage to create the conditions to strengthen their business. (Jickling, 2015).

By the same token, venture capitalists can pursue a similar strategy by taking care not to over-finance businesses and pressuring them to pursue a low-cost policy. On the other hand, early competition has a disadvantage. Some start-ups fail before they can develop that "immunity". However, smart new business managers must always keep in mind the benefits of exposure to safe levels of external competition or an internal competitive environment as such exposure can have long-term positive effects on business efficiency and survival. (Huckle & Wals, 2015).

Creating a startup business enables a potential entrepreneur to implement his creative idea by setting up a fast-growing business. The difficulty in developing a conventional business data that promotes an innovative product-service, is both the lack of financial resources and the inability to compete in global competition, especially in areas related to technology, information, pharmacy, etc. The growth of start-ups in the modern world is driven by the rapid development of information and communication technology and the digitization of the economy. Along with the difficulties in the field of competition faced by start-

ups, they also have important opportunities to become competitive as their environmental awareness becomes a means of gaining a comparative advantage as customers turn, as mentioned above, more and more to start-ups which are environmentally aware. (Lélé, 2015).

3.4 Efficiency of sustainable startups:

Sustainability is not just a viral ad in today's business world. Global sustainable investment exceeds \$ 40 trillion. (Berns et al., 2019). The start-up sector today is a cutting-edge sector that is constantly evolving, with the result that start-ups are becoming more and more successful. This is because they now include sustainability, both environmentally and socioeconomically, as part of their core offerings to consumers of their products / services. In other words, start-ups today make sustainability part of their mission by constantly reminding their consumers and customers what the company stands for and in what ways it is environmentally aware. (Jucker, 2012).

Of course, it should be noted that start-ups in the early stages of developing new technologies, markets and business models, the viable options they adopt are often more expensive than the alternatives. However, over time, what initially seems to be a disadvantage becomes a significant advantage for start-ups that become efficient, profitable and sustainable. (Dobson, 2017).

So more and more start-ups today are implementing sustainable practices early on, because they find that this gives them a uniqueness that consumers are willing to pay for. Despite the initial difficulties, most start-ups saw viability as a key element of their business success. Start-ups that adopt sustainability practices are successful and effective as they still intend to internationalize in order to be effective and sustainable. (Lindsey, 2011). More and more countries today are also willing to try new products and services that focus on sustainability in various fields. At the same time as consumers really care about these companies and prefer to buy from brands that align with their values. Sustainability has become a priority for many around the world, so start-ups are becoming more and more successful and efficient. (Asiago, 2016). It follows from the above that consumers prefer sustainable start-ups. The question, however, is whether in a monopoly market a company intends to buy from the start-up or from its unsustainable competitor. This will then be examined through the consideration of a related case of

simulation. At the same time, the reasons why sustainable development is very important will be examined, as well as the reasons why sustainable start-ups will lead to carbon neutral.

3.5 Incentives for Mergers and Acquisitions (M&A)s with sustainable startups:

The most solid factor that defines (M&A)s, by big firms, is disrupt innovation, lack of productivity and profitability. Then, other incentives, such as research and development investments, loyal employers, increase of research and development cost, startups flexibility character and attractive prices, follow. Additionally, the increase of market share, the impact of European Antitrust Policy, the relaxed culture and business attire and less bureaucracy and even the jumps of successful people from big firms in startups, the competition and tax relieves, among others, are key incentives for big firms to perform (M&A)s with a sustainable startup.

3.6 Antitrust and market's current state (legislation gaps):

The great importance of successful innovation can be seen in the recent changes in the functioning of markets and economies. Many developed countries have created a variety of supporting programs and institutions dedicated to the promotion, the emergence, and the consolidation of successful innovation strategies. Many of these include incentives and promotion of startups and young innovative companies. For the unfolding and consolidation of entrepreneurial ecosystems the government tools are business incubators and accelerators, university training programs, special visa programs for entrepreneurs, the promotion of academic spin-offs, mentoring programs, networking and cluster initiatives, the development of seed and entrepreneurial capital supply, specific fiscal incentives and public procurement programs. Even though that there is fruitful ground for start ups to bloom, we have not noticed so many lately. Not all mergers and acquisitions need to be analyzed by the antitrust authorities, as they usually establish a threshold for size of firms and transaction value for merger notification. The evolution of antitrust policy and its enforcement are not static or free of tension areas.

Even in the private sector we can see such reactions to innovation, (Jlabs) is a good paradigm. At J&J, the company is building a network of incubators known as JLABS to provide a window for early discoveries. "Every new start-up at JLABS has a J&J mentor who helps them focus on ideas that have potential," said Melinda Richter, global head of J&J Innovation JLABS. To those startups is also given access to J&J's business service team, which assists in managing start-ups and navigating the regulatory and product development process, helping them obtain the licenses and funding they need to grow. The concept is to catalyze great ideas and build businesses around them. Economic renewal is underpinned through policies efforts such as the generation and diffusion of innovations (Schumpeter), the gathering of know-how and existing knowledge, the generation of new highly qualified jobs, the appearance of new sectors and activities, the change in each economy's specialization pattern & the regional development. In competitive terms, in the last decade, given the increasingly global competitive environment, many large firms are looking at startups as a source of innovation and dynamism.

This trend underlines an interaction between large consolidated firms and with the entrepreneurial ecosystem, a.k.a. the startups. Innovation is a driving force and shapes economies and strategies so we believe there are three paths when a large company notices a new sustainable startup entering the market. Below we refer the pathways.

1-Block entrance

2-Acquisition

3-Collaboration & investment

In some cases, we notice an expansion of the activities of these startups and maintenance of their R&D activities, while in many other cases, we see the termination of productivity, in terms of innovation, when startups are being acquired. Indeed, in contexts of scarce or inadequate financing to scale up the business, the takeover may provide the firm with access to fresh funds in order to continue its growth path. However, in terms of public policy perspective, it is important to wonder about the possible result in terms of competition, technological diversity, innovation or welfare⁵ of these mergers. As dealing with mergers in innovative markets is already a challenge, our proposed subject is absent from the current antitrust literature.

In fact, although the acquisition of innovative startups is being increasingly discussed in American, European and Asian specialized IT and business blogs and magazines, there is a lack of articulated academic research discussing this matter. The current conventional approach to antitrust policy is mainly based on a static view of competition and is designed to pursue the goal of achieving a more efficient distribution. In order to achieve the goal of maintaining prosperity, the antitrust authority uses the Paretian criteria. The focus is on reducing "dead weight loss" and, by avoiding over-concentration after concentration, the principle avoids greater dead weight loss or reduced consumer welfare only when it is likely to lead to higher prices, mainly or other forms of abuse of power in the market.

3.7 Examples of Startups acquisition:

Acquisition of WhatsApp by Facebook in 2014 & Position of the EU Commission:

Facebook agreed to spend US\$ 19 billion to acquire the company that offers instant messaging service to 600 million users worldwide. FTC gave the green light to the proposed acquisition without further investigation than the usual first 30-day period to decide whether the Commission would request more information or close inquiries. On the other hand, the European Commission (DG-Comp) took longer to decide whether the agreement should be approved, but ended up allowing it. On the other hand, the European Commission (DG-Comp) took longer to decide whether the agreement should be approved, but ended up allowing it. When assessing the barriers to entry, the Commission found low barriers to entry due to: (i) disruptive innovation, dynamism, and fast-growing; (ii) small initial investments; (iii) no significant barriers in the form of patents, or knowledge/technology access; (iv) absence of risks of foreclosure or increasing of barriers; (v) ease of distribution; (vi) quick growth of consumer base; and (vii) no network effect concern.

Acquisition of Waze by Google:

Google, primarily known for being the largest internet search engine in the Western world, has the reputation of continuously seeking new directions in its growth and its innovation strategy. This growth-by-acquisitions strategy has opened the path for some research in Europe. In 2013, Google bought Waze, a four-year-old Israeli firm that developed a free application currently available for iPhone and Google Android devices, which incorporates real-time GPS data from its nearly 50 million users to deliver highly accurate and useful traffic and navigation information. The FTC announced that they will be re-examining the acquisition of Waze.

3.8 Importance of sustainable startup and Sustainable development goals:

The informality of a startup world and the relaxed atmosphere, while still having the ability to work with highly responsibly, hard-working, and motivated team members who believe in what they do, would be ideal for a productive employer. So, another positive impact of the startup is the lighter dress code and of course a more relaxed culture and the less bureaucracy that does not lag behind in innovation. We noticed people jump in a small startup while being in the center of an empire. Dr. Maureen Cronin is one of those people. The opportunity to participate in the launch of Ava, a medical technology company focused on innovations in women's reproductive health and known as the creator of the cycle tracking sensor bracelet, hit some personal and professional buttons for her, including passion and flexibility. Cronin has strong medicinal roots. She was a member of the executive committee of Vifor Pharma, reporting directly to the CEO and Bayer HealthCare, she was a member of a select panel created by the World Medical Organization following the merger of Bayer Pharmaceuticals and Schering AG. One of Cronin's main interests was to direct many large Phase IV epidemiological studies, mainly in the field of women's health, to better understand the medical needs of patients worldwide. Ava (startup) approached Cronin about joining her team as the organization's chief physician when she finished consulting with them. The San Francisco-based company and Switzerland ended up being a perfect match for Cronin, which at the time had its own consulting firm from its home in Europe. Hired by Ava in February. "In the pharmaceutical industry, I did some really exciting things," says Cronin, recalling being on stage with former Secretary of State Hillary Clinton, who works in Africa to help women gain access to contraception and create

incredible development the area of female reproduction. But for Cronin, leaving her position in the big pharmaceutical industry allowed her to have a better quality of life - both personally and professionally.

Now Sustainability is a long-term project. Since its very definition is not cutting corners, you are in for quite some time. Startups of this kind can take more than 5 years until they reach comfortable success, thus mergers and acquisitions in those startups could be proven easily dangerous for the entire market. Many scientists could change cruising course in their projects, to protect them, in order to avoid a potential acquisition from a bigger firm. Could a successful startup survive in such uncertainty? The answer is negative and additionally the market could not afford such a distractive wound. The Antitrust authorities may not give such attention to small M&As but it should carry out its deed when it comes to sustainable startup acquisitions. Sustainable startups can drive the sustainability transition and only with sustainability, we can reach the pure development in the economy. The sustainable startups provide a sustainable mindset and a long-term success. In times where big firms lack of innovation the smell of long-term success provokes them to attempt a potential acquisition to increase their revenues. We have noticed very many M&As with startups which is very paradox, but still happens.

Building a startup is a terribly hard thing to do. As it requires years and years of hard work, someone will need to love what he does and do what he loves. It's the only way to keep at it. Assuming that someone is fulfilling his dream with his startup, there is no way he is going to sell it to the first person that comes along with an offer. No one wants to see his dreams come to fruition and then sell it. Building a fast-growing startup with the sole goal to sell it at the first opportunity is a terrible motivator to create the best company you can. It is like planting an apple tree, caring for it year after year and then cut it down to get some firewood. Instead, someone could let the tree mature, harvest the apples, use some to plant new trees, sell the rest and buy firewood. In the long run he will have a steadily growing supply of income, firewood and apples.

Sustainable startups allow to build actual relationships with a team. Teammates are going to work tightly together for what will probably be a long time. Facing challenges as a unit will inspire both loyalty to you and your employees. As we said earlier sustainable culture motivates loyal and productive employees.

Leaders of 189 countries signed the historic millennium declaration at the United Nations Millennium Summit in 2000, the MDGs are eight goals with measurable targets and clear deadlines for improving the lives of the world's poorest people. On those eight targets relied the UN, when their era came to an end UN created the seventeen new goals and the UN Agenda. Sustainability depends on those seventeen goals and promotes three pillars, environment, society and economy. The SDGs are anthropocentric, therefore they are very important. As the Earth can survive without humanity it is clear that we have to promote things with the right turn, Planet-People-Profit and SDGs is our weapon to survive by targeting all the three necessary dimensions. Preventing poverty, is a serious issue, which we have to solve in all its forms everywhere, because growing inequality is detrimental to economic growth and undermines social cohesion, increasing political, social tensions and in some circumstances, driving instability and conflicts. We also have to put an end in hunger. Moreover, achieving food security, improving nutrition and promoting sustainable agriculture would boost the economy. Otherwise, we put a barrier to sustainable development, by creating a trap from which the vast majority in developing countries cannot easily escape, plus hunger and malnutrition mean less productive individuals, who are more prone to disease and thus often unable to earn more and improve their livelihoods. Additionally, good health and well-being will help humanity to build prosperous societies, while half the world's population are still without access to essential health services, striving for wellbeing would save lives and properties. Healthy people are the foundation for healthy economies. To this point, to ensure inclusive equitable quality education and to promote lifelong learning opportunities for all, education enables upward socioeconomic mobility, is a key to escaping poverty. Additionally, education is linked with the capability to understand and fight for the other sustainable goals. Education empowers people to foster tolerance and to contribute to peaceful societies. Women and girls represent half of the world's population and therefore also half of its potential, so gender equality has to be replaced. We have to ensure availability and sustainable management of water and sanitation for all, because the demand for water has outpaced population growth, and half the world's population is already experiencing severe water scarcity at least one month a year. Energy is the foundation on which health, private sector, education to agriculture, infrastructure, communications and high-technology rely. Sustained and inclusive economic growth can drive progress, create decent jobs for all and improve living standards. By building resilient infrastructure, we are making sure inclusive and sustainable industrialization and to foster innovation, because economic growth, social development and climate action are heavily dependent on investments in infrastructure, sustainable

industrial development and technological progress. It is a minor issue to reduce inequality within and among countries, because it destroys people's sense of fulfilment and self-worth and after that can give birth to crime, disease and environmental degradation. Making cities and human settlements inclusive, safe, resilient and sustainable is crucial as, cities and metropolitan areas are powerhouses of economic growth contributing about 60 per cent of global GDP, they also produce seventy percent of global emissions. Responsibility in consumption and production is needed because the very systems on which our future development and very survival depend are in grave danger. Last but not least, climate change, issues in the life under water and on land, are now affecting everyone, as, greenhouse gas levels continue to climb, climate change is occurring at much higher rates and by addressing climate change, we can build a sustainable world for everyone. To be essential we have to promote peace and partnerships for the goals.

3.9 Recap:

In other words, sustainability provides long-term success, high revenues, access to funds, increased demand and loyal employers, while a startup provides disrupt innovation and a light culture. Sustainable development and startup, combined in one is a driving force in the market. Sustainability by its self, promotes the social pillar along with the environmental, thus a sustainable startup can easily enter the market and be very competitive.

CHAPTER 4: The Model

4.1 Introduction:

We consider a market where there is an upstream monopolist (U) who supplies an essential input to a downstream monopolist (D). One unit of the input is required to produce one unit of the final good. Consumers place a higher valuation to the final goods that have been produced using sustainable practices. This valuation is assumed to be the same across consumers. All production costs are normalized to zero for simplicity. The extent of sustainability is determined by the upstream monopolist. The adoption of more sustainable production practices incurs a quadratic investment cost in such practices. The inverse demand function for the final good is given by:

$$P = \alpha + \delta - \beta q \quad (4.1)$$

In the remaining part of this section, we study two different cases. First, we consider the case where the downstream monopolist buys the input from the upstream monopolist at the profit-maximizing input price (the “buy” case). Second, we model the case where the downstream monopolist decides to integrate backwards (the “make” case). One way to do so is by acquiring a start-up firm specializing in producing the input. We assume that this firm is more efficient than the upstream monopolist when adopting sustainable practices for the production of the input. Throughout the section, the subscript B (respectively, M) indicates the buy (respectively, make) case. The timing of the game is as follows. First, the upstream supplier chooses its investment level in sustainable practices (and, in the buy case, the input price as well). Second, the downstream monopolist sets the quantity sold in the retail market. The game is solved backwards.

4.2 Buy Case:

The profit margin of the downstream firm is the price it receives for each unit sold minus the input price paid to the input supplier. Therefore, its profit writes:

$$\Pi_B^D(w) = (P_B - w)q_B \quad (4.2)$$

Taking the first order condition of Eq. (4.2) with respect to q_B yields the equilibrium output as a function of the investment level and the input price:

$$q_B(w, \delta_B) = \frac{a + \delta_B - w}{2\beta} \quad (4.3)$$

We notice that the downstream monopolist has higher incentives to increase its equilibrium quantity as the input is produced by adopting more sustainable practices. On the other hand, a higher input price unambiguously reduces the equilibrium output. Substituting Eq. (4.3) in Eq. (4.1) gives the retail price as a function of the investment level and the input price:

$$P_B(w, \delta_B) = \frac{1}{2}(\alpha + \delta_B + w) \quad (4.4)$$

Note that the downstream monopolist manages to pass half of the input price and of the level of investment in sustainability to consumers. The revenue of the upstream firm is the input price times the quantity sold to the downstream market minus the investment cost in sustainable practices:

$$\Pi_B^U(w, \delta_B) = wq_B - \frac{\kappa\delta_B^2}{2} \quad (4.5)$$

Parameter κ denotes the level at which the investment in sustainability becomes marginally more expensive. In other words, this parameter captures the efficiency of the upstream monopolist to adopt more sustainable practices in the production of the input. Substituting in and then taking the first order condition with respect to w gives:

$$w^*(\delta_B) = \frac{\alpha + \delta_B}{2} \quad (4.6)$$

It is interesting to note that the privately-optimal input price increases in the extent of sustainable practices. The retail equilibrium and payoffs are therefore:

$$q_B(\delta_B) = \frac{a + \delta_B}{4\beta} \quad (4.7)$$

$$P_B(\delta_B) = \frac{3(a + \delta_B)}{4} \quad (4.8)$$

$$\Pi_B^D(\delta_B) = \frac{(\alpha + \delta_B)^2}{16\beta} \quad (4.9)$$

$$\Pi_B^U(\delta_B) = \frac{(\alpha + \delta_B)^2 - 4\beta\delta_B^2\kappa}{8\beta} \quad (4.10)$$

Finally, we proceed to estimate the privately optimal investment in sustainable production:

$$\frac{\partial \Pi_B^U}{\partial \delta_B} = 0 \Rightarrow \delta_B^* = \frac{\alpha}{4\beta\kappa - 1} \quad (4.11)$$

The second order condition requires the denominator of Eq. (4.11) to be positive, which implies a positive investment level. The equilibrium of the buy case is as follows:

$$q_B^* = \frac{\alpha\kappa}{4\beta\kappa - 1} \quad (4.12)$$

$$P_B^* = \frac{3\alpha\beta\kappa}{4\beta\kappa - 1} \quad (4.13)$$

$$\Pi_B^{D*} = \frac{\alpha^2\beta\kappa^2}{(4\beta\kappa - 1)^2} \quad (4.14)$$

$$\Pi_B^{U*} = \frac{\alpha^2\kappa}{2(4\beta\kappa - 1)} \quad (4.15)$$

4.3 Make Case

In this case we assume that the downstream monopolist chooses to make the input, as he is more efficient. We assume that this firm does not have the necessary information and knowledge to undertake sustainable practices. Hence, the only ever option being available is to acquire another start-up upstream firm specializing in sustainable practices. We denote the cost of acquisition as F . The demand function of the downstream firm writes as Eq. (4.16):

$$P_M = \alpha + \delta_M - \beta q_M \quad (4.16)$$

We assume that the acquired firm is more efficient than the upstream monopolist, thus $\mu < \kappa_1$. The profit function of the vertical integrated writes as below Eq. (4.17):

$$\Pi_M = P_M q_M - \frac{\mu(\delta_M^2)}{2} - F \quad (4.17)$$

Taking the first order condition Eq. (18) with respect to q_M gives:

$$\frac{\partial \Pi_M}{\partial q_M} = 0 \quad (4.18)$$

$$q_M = \frac{\alpha + \delta_M}{2\beta} \quad (4.19)$$

Then, as previously, we substitute the q_M in the profit function of the vertical integrated monopolist and we take first order condition with respect to δ_M ,

$$\frac{\partial \Pi_M}{\partial \delta_M} = 0 \quad (4.20)$$

to find the optimum,

$$\delta_M = \frac{\alpha}{2\beta\mu - 1} \quad (4.21)$$

Finally, we substitute the optimums q_M and the δ_M in the profit function of the vertical integrated player and we find the below values accordingly:

$$q_M^* = \frac{\alpha\mu}{2\beta\mu - 1} \quad (4.22)$$

$$P_M^* = \frac{\alpha\beta\mu}{2\beta\mu - 1} \quad (4.23)$$

$$\Pi_M^* = \frac{\alpha^2\mu + F(4\beta\mu - 2)}{4\beta\mu - 2} \quad (4.24)$$

4.4 Recap

Now, we have to compare the profit of the downstream firm when choosing to make or buy the upstream input. Let Π_Δ denote the difference between Π_B^D and Π_M :

$$\Pi_\Delta \equiv \Pi_M - \Pi_B^D = \frac{(-2F(4\beta\kappa - 1)^2(2\beta\mu - 1) + \alpha^2(\mu + 2\beta\kappa(\kappa - 4\mu + 6\beta\kappa\mu)))}{(2(4\beta\kappa - 1)^2(2\beta\mu - 1))} \quad (4.25)$$

Recall that second order conditions require:

$$(\alpha) \quad 2\beta\mu > 1 \quad (4.26)$$

$$(\beta) \quad 4\beta\kappa > 1 \quad (4.27)$$

To simplify the analysis, we employ the common assumption that $\alpha = \beta = 1$. Therefore, the Profit Difference function is simplified:

$$\Pi_{\Delta} = \frac{(\mu - 2F(4\kappa - 1)^2(2\mu - 1) + 2\kappa(\kappa - 4\mu + 6\kappa\mu))}{2(4\kappa - 1)^2(2\mu - 1)} \quad (4.28)$$

Second order conditions now require $\mu > 0,5$ and $\kappa > 0,25$. Given that the upstream monopolist is less efficient than the acquired firm in adopting sustainable practices, we have that both κ and μ should be higher than 0.5 with $\kappa > \mu$. Solving Eq. (4.28) for F :

$$F = \frac{\mu + 2\kappa(\kappa - 4\mu + 6\kappa\mu)}{2(4\kappa - 1)^2(2\mu - 1)} \quad (4.29)$$

The figure below (Figure 4.1) provides a 3D plot of F for $\mu \in (0.5, 2]$ and $\kappa \in (\mu, 2.5]$. The diagram shows all F Critical Values for the various values of μ and κ .

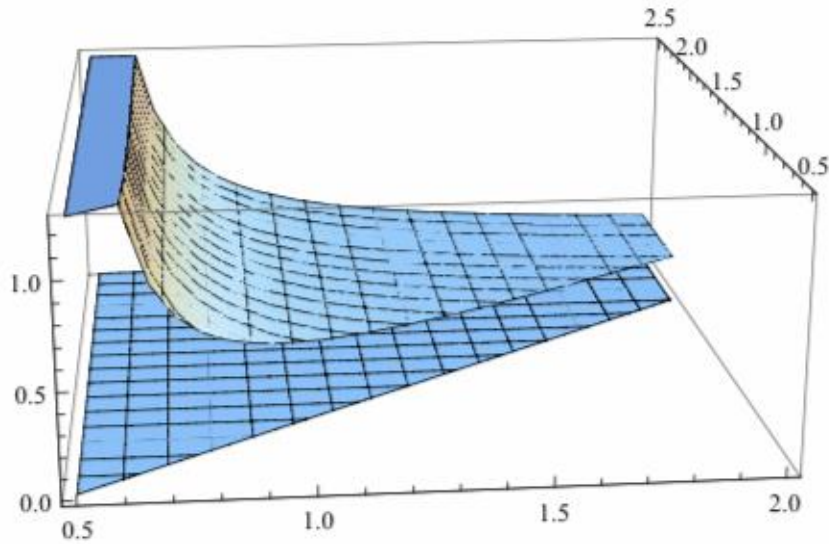


Figure 4.1 Diagrammatic representation of F

We observe that as μ increases the F decreases, but not at an intense rate. We also notice that as κ increases, so does F , but not at a high rate. As μ approaches κ the critical value decreases, this

essentially causes indifference to the possibility of potential acquisition. To better see the above conclusion, below we will give random values in κ and μ .

Let us provide the below normalized numerical example. The figure below provides a 3D plot of F for $\mu=1$ and $\kappa=4$. In this paradigm the value of F is the Eq. (4.30)

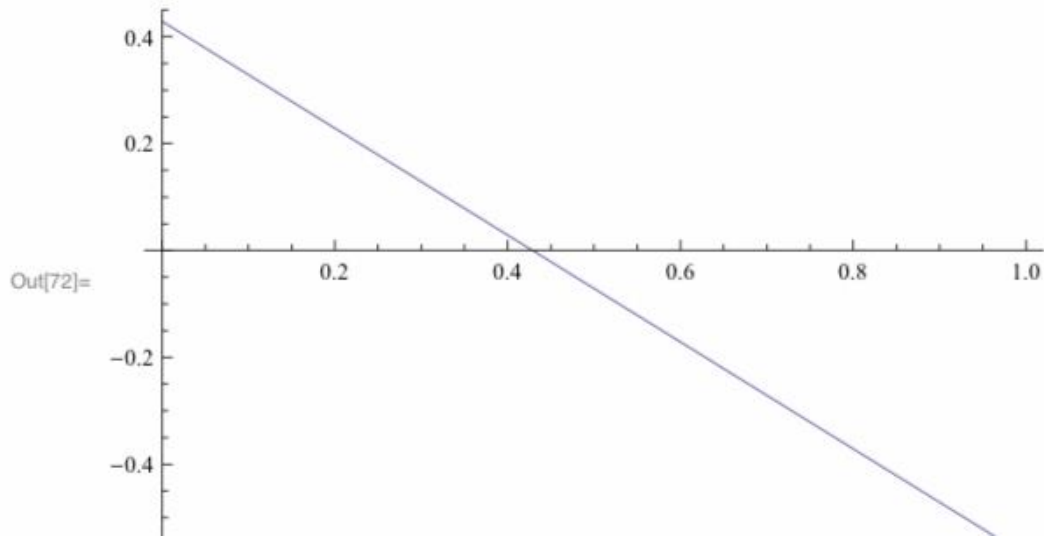


Figure 4.2 Diagrammatic representation of F for $\mu=1$ and $\kappa=4$

$$F \text{ Critical Value}_1 = \frac{193}{450} = 0,428 \quad (4.30)$$

When $F \in [0, F \text{ Critical Value}_1)$, it is in the company's interest to choose “Make”, this means that the downstream firm makes the input, hence acquires the start-up and the acquisition cost is relatively low. When, on the other hand, $F \in (F \text{ Critical Value}_1, \infty)$, the above does not apply, as the acquisition cost is relatively high and the company has an interest in doing “Buy”, which means that that the firm buys the input from the upstream monopolist. This is more profitable when F is high.

We have already stated that $\Pi_{\Delta} = \Pi_M - \Pi_B^D$, thus when $\Pi_{\Delta} > 0$, the Company chooses the “Make” case, as $\Pi_M > \Pi_B^D$ and when $\Pi_{\Delta} < 0$, the Company chooses the “Buy” case, as $\Pi_B^D > \Pi_M$. As long as the function is positive $\Pi_{\Delta} > 0$, the “Make” case is better than the “Buy” case. At this point μ , which denotes the efficiency of the startup, affects way more the choice between Make or Buy. Accordingly, changing μ has more impact on critical F. The blue line presents the range where the difference is positive, where make case is more efficient. In any other case the firm buys the input from the upstream monopolist. Before examining whether to make or buy, the downstream has to carefully take into consideration the level of the efficiency of the sustainable startup and the point where the critical F is positive.

Let us provide an additional numerical example. The figure below provides a 3D plot of F for $\mu=2$ and $\kappa=4$. We continue to maintain parameter κ constant and we change parameter μ . In this paradigm the value of F is the Eq. (4.31.)

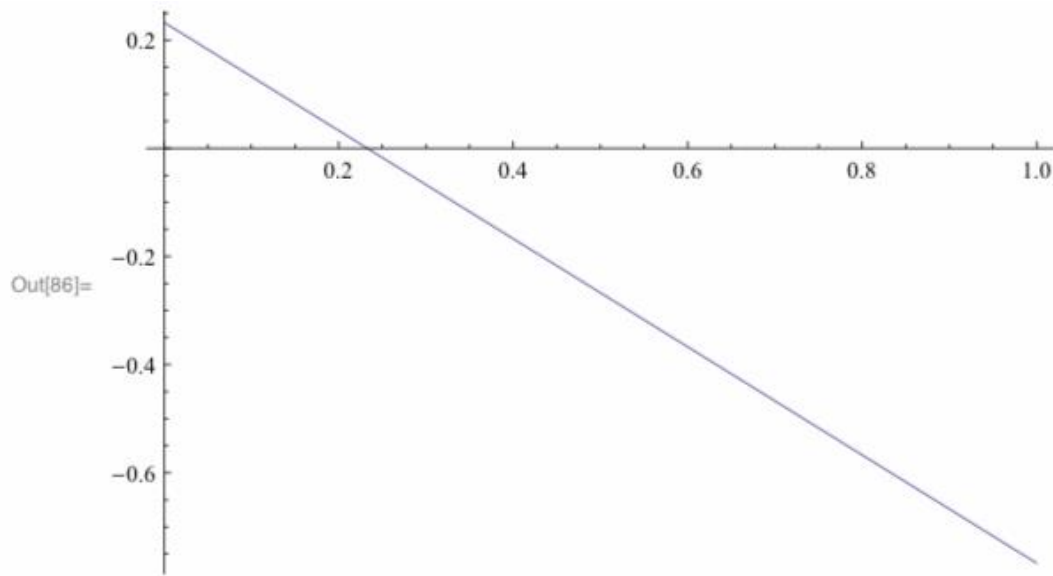


Figure 4.3 Diagrammatic representation of F for $\mu=2$ and $\kappa=4$

$$F \text{ Critical Value}_2 = \frac{59}{225} = 0,262 \quad (4.31)$$

Similarly, when $F \in [0, FCriticalValue_2)$, it is in the company's interest to choose Make, which means that the downstream firm makes the input, hence acquires the start-up. This happens when the acquisition cost is relatively low. When, on the other hand $F \in (FCriticalValue_2, \infty)$, the company has an interest in doing buy. We can see that on the left side of our Critical Value the company chooses the “Make case”, the acquisition cost is relatively low, while on the right side of our critical value the company chooses the “Buy” case, as the acquisition cost is relatively high.

Let us provide an additional numerical example. The figure below provides a 3D plot of F for $\mu=3$ and $\kappa=5$. In this paradigm the value of F is the Eq. (4.32). Here we choose to change both parameters κ, μ .

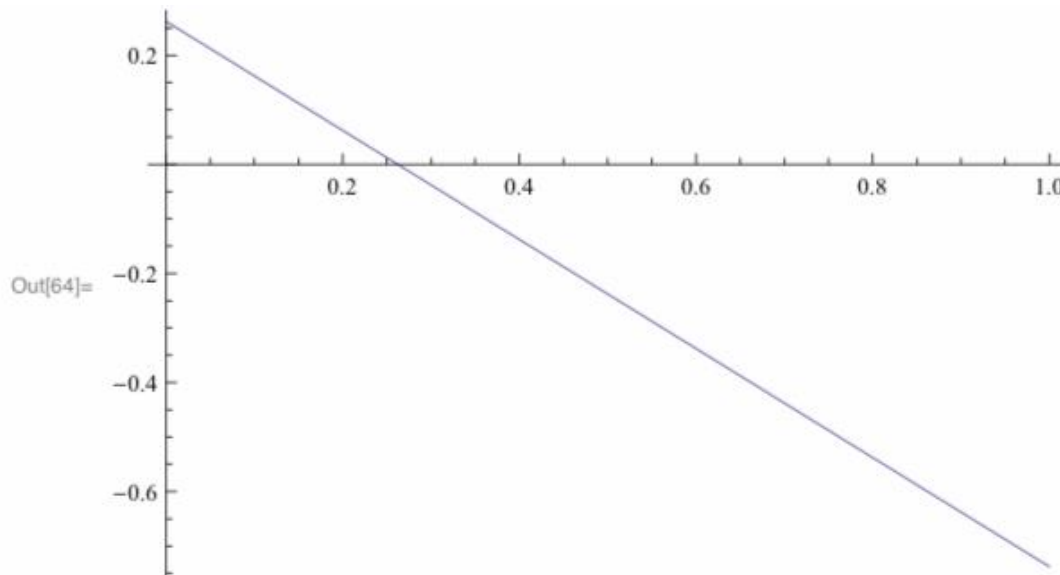


Figure 4.4 Diagrammatic representation of F for $\mu=3$ and $\kappa=5$

$$F \text{ Critical Value}_3 = \frac{833}{3610} = 0,23 \quad (4.32)$$

When $F \in [0, FCriticalValue_3)$, it is in the company's interest to choose Make, as the acquisition cost is relatively low. When, on the other hand $F \in (FCriticalValue_3, \infty)$, the company has an interest in doing buy, as the cost of acquisition is relatively high.

Let us provide an additional numerical example. The figure below provides a 3D plot of F for $\mu=3$ and $\kappa=7$. Here we choose to maintain parameter μ and increase parameter κ . In this paradigm the value of F is the Eq. (4.33)

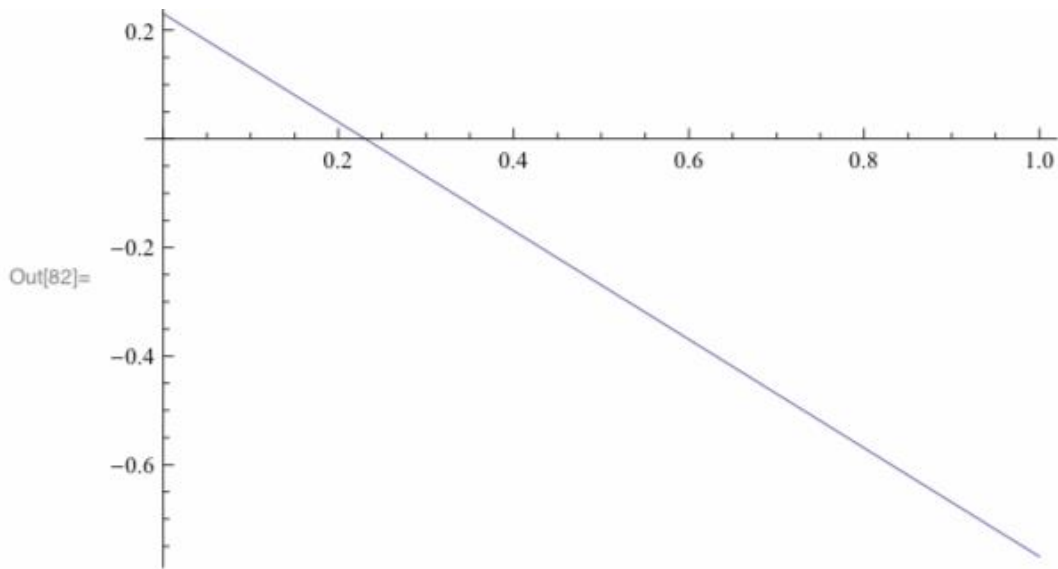


Figure 4.5 Diagrammatic representation of F for $\mu=3$ and $\kappa=7$

$$F \text{ Critical Value}_4 = \frac{1697}{7290} = 0,232 \quad (4.33)$$

When $F \in [0, FCriticalValue_4)$, it is in the company's interest to choose Make, as the acquisition cost is relatively low. When, on the other hand $F \in (FCriticalValue_4, \infty)$, the company has an interest in doing buy, as the cost of acquisition is relatively high. When changing the different values of κ, μ we observe that the effect of parameter κ on F is not as great as that of parameter 's μ . As the gap between μ and κ increases, the greater is the fall of F.

4.5 Conclusion

In the market we examined, both empirically and theoretically through the wide range of bibliography, we noticed that there are Companies that produce inputs and others that prefer to buy them. Sustainability and alliance with the current regulations and international standards, such UN Global Compact increase the efficiency of a Company. On the occasion of the entrance of many innovative startups in the market, we decided to study their interaction other companies in the same market. We considered thus, the case where a Downstream Monopolist chooses to verticalize backwards and attempt to acquire a sustainable startup. We modeled two cases, the “Make” case, where the acquisition cost is relatively low and the opposite case “Buy”, where the Company chooses not to acquire the sustainable startup, as the acquisition cost is high. A very interesting assumption from our analysis is, that when $F \in [0, F_{CriticalValue})$ it is in the company's interest to choose Make (acquires the start-up), as the acquisition cost is relatively low, and the downstream firm makes the input. When, on the other hand $F \in (F_{CriticalValue}, \infty)$, the company has an interest in doing buy, as the cost of acquisition is relatively high, this is more profitable when F is high. Additionally, we observed as we change the parameters κ and μ , the effect of parameter κ on F is not as great as that of parameter μ . Practically, this means that the efficiency of the start has a bigger impact on F . As $\Pi_{\Delta} = \Pi_M - \Pi_B^D$, when $\Pi_{\Delta} > 0$ the Company chooses to make, and when $\Pi_{\Delta} < 0$, the Company chooses the “Buy” case. And observing the diagrams collectively, we see that to the right of the respective critical values, the firm buys the input from the upstream monopolist, this is more profitable when F is high, while on the left of the critical values the company chooses make (acquire the sustainable startup) and produce the input.

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