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Sustainable Finance: Addressing the SDGs through Fintech and Digital Finance solutions in EU

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List of Abbreviations

OECD – Organization for Economic Co-operation and Development

IMF – International Monetary Fund

SDGs – Sustainable development goals

UNCDF – United Nations Capital Development Fund

UNSG – United Nations Secretary-General's Task Force on Digital Financing of the Sustainable Development Goals

IoT – Internet of Things

AI – Artificial Intelligence

SDFA – Sustainable Digital Finance Alliance

EU – European Union

IS – Innovation Studies

ODA – Official Development Assistance

DAC – Development Assistance Committee

IPR - Intellectual Property Rights

UK – United Kingdom

CDO - Collateralized debt obligation

ZCB - Zero Coupon Bond

SME – Small Medium Enterprise

FDIs - Foreign Direct Investments

NGOs – Non-Governmental Organizations

IBs – Investment Banks

ETF – Exchange-traded fund

FCA – Financial Conduct Authority

SUMMARY

In the last 20 years, the increasing of inequalities, climate change and its consequences, conflicts and instability are undermining the peace and well-being of people worldwide. For this reason, international organizations, big corporations, governments and individual citizens have started to tread a new path, towards a Sustainable Development in order to ensure a future for the next generations.

The mobilization of limited financial resources towards sustainable development programs is one of the biggest challenges of our times. Traditional financial models and instruments have failed to keep up with the current challenges, one clear example is the financial crises of the 2008 with the disastrous consequences caused by it.

Since the technological revolution brought by the ICT, the pace of innovation has been increasing exponentially year by year. Innovations such AI, IoT, Big Data, Machine Learning, blockchain are disrupting every kind of industry and business. In the financial world the combination of financial innovation with technologically advanced solutions has a specific name "Fintech".

Fintech and Digital finance solutions are creating innovative alternatives to traditional financial instruments in all of the areas and sectors, from personal banking to wealth management. One of the main implications of the development of Fintech, is about the grow of the Sustainable Finance eco-system with the rise of numerous applications dealing with energy efficiency, financial inclusion, democratization of investments and mobilization of financial flows towards sustainable projects.

The aim of this research paper is to assess the implications of fintech for a sustainable development and to understand how those solutions are addressing the Sustainable Development Goals in European Union. In order to answer to the research questions, we will proceed with an in-depth analysis of three case studies with the addition of expert interviews and industry analysis.

The results of the research will help to better identify the opportunities, risks and barriers that the diffusion of fintech might have on the sustainable development.

INTRODUCTION

Nowadays there is verified evidence that the old economic development models, based only on the economic growth and capital accumulation, are not adequate for addressing the current challenges. Climate change, growing inequalities and technological shocks are the main threats for ensuring actual well-being and future economic prosperity. For this reason, it is needed a new vision with the idea of sustainable development and social well-being at its center.

The United Nations approved the *Agenda 2030 for a Sustainable Development*, defining 17 Sustainable Development Goals (SDGs) and other 169 sub-goals, in order to contrast the poverty, reduce the inequalities, improve the quality of life and education and spur economic growth (UN, 2015). With the Agenda 2030 the signatory countries aim to answer some of the biggest challenges of our times. Gender Inequality and the problem of discrimination on the workplace. The increasing youth unemployment, that could potentially have disastrous consequences. Hunger and the lack of drinking water are a reality in Third World countries and not only. Terrorism, conflicts and humanitarian crises, that represent threats for a peace spread over the face of the earth.

All the countries, international organizations and companies from all the industries and all over the world are involved in the realization and the development of the Agenda. All the actors should take seriously the challenges and the goals and act in order to make a significant contribution towards a sustainable future.

The financial world has always been at the center of the economic cycles and strong related with the economic development of countries. Nowadays, more than before, the Financial World is called upon to face these global responsibilities for the achievement of a sustainable world; According to many scholar and international institutions the theme of sustainable finance is increasing in relevance, with the start of numerous initiatives taken for sustainable purposes. In the 2017 more than 300 policy measures (UNSG, 2019) were taken in order to enable this change in paradigm and move through a more sustainable path. In the 2018 the UN secretary-general established a task force on "*Digital Financing of the Sustainable Development Goals*", highly financed and supported by the

governments of Italy and Germany, with the aim to enable the financing of the SDGs by the spreading of Digital and Fintech solutions.
The report drawn up by the UN secretary-general task force (UNSG, 2019) helps to identify three central points for understanding the effects of the digitalization on the financial system, regarding the shift towards a more sustainable path. Firstly, the digitalization and Fintech start-up are starting to disrupt the financial industry, fragmentating the market and creating alternative solutions. Cryptocurrencies, innovative cashless payment systems, blockchain based technologies are radically changing the traditional monetary system. Secondly, the introduction of these technologies is impacting the way of how the SDGs are financed, for example through online crowdfunding platforms and digital banks. Financial inclusion and the introduction of new form of financial products are modifying the investor profile and the way the funds are raised. Thirdly, with the increasing relevance of digital and fintech solutions is necessary a better understanding of the implications, barriers and risks of these new instruments. According to many, the development and the diffusion of IoT, Artificial Intelligence and Fintech solutions (e.g. Blockchain) will contribute to transform the financial sector by moving towards a business model based on "*trust, immutability, transparency and traceability in transactions*" (UNEP, 2016).
Sustainable digital finance identifies an application of digital finance or fintech for the achievement of a sustainable development (SDFA, 2018).
According to the Sustainable Digital Finance Alliance (2018), fintech and digital finance are helping to overcome barriers in the mobilization of capital for sustainable investments. The report states that fintech solutions such as Big Data and AI, are enabling investments in sustainable assets through access to information and transparency. Financial inclusion and democratization of investments is one of the main goals behind the development of these innovative solutions; this process unlocks the possibility to create investments flows starting from the bottom (citizens) and directed to sustainable development opportunities. In order to understand how fintech and digital finance is addressing the sustainable change we need a framework for clearly define the areas of interests.
The UNEP (2016) provided a scheme of the challenges faced by the financial world in addressing the SDGs, dividing them in two main categories:

- **Mobilizing finance for sustainable development**
- **Mainstreaming sustainable financial practices**

Mobilizing finance identifies the need of a more inclusive and open access to financial resources, in order to enable investments in strategic sustainable infrastructure and by providing capital for further financial innovations.
Mainstreaming Sustainability is the process of increasing the awareness in the financial industry for what concern sustainable development factors. This challenge may be achieved by supporting sustainable financial practices. One example of successful company addressing this challenge is *Sustainalytics (UK).* The company uses Big Data in order to predict performances and rate listed companies considering their ESG (Environmental, Social, corporate governance).
The impact of these technologies and innovation on sustainability is difficult to predict, due to the fact that most of these fintech solutions are in an early stage of development. (D.Nassairi, 2018). However, the adoption and the diffusion of fintech solutions for sustainability purposes may have a great impact for the achieving of the SDGs as a result of lower costs, financial inclusion and an increased competition in the industry.
The aim of this paper is to assess the current impact of "Sustainable Fintech" and "Digital Finance" applications in European Union, in particular answering the following Research Questions:

- How Fintech and Digital Finance solutions are addressing the SDGs in European Union?
- What are the barriers and the risk associated with the diffusion of Fintech and Digital finance solutions for sustainability proposes?

There is not a wide academic literature in the field, due to the fact that the theme of Sustainability, applied to the financial industry, is relatively new in the academic world. A large number of documents in the field consists of reports and discussion papers drawn up by international organization, with the objective of identifying the current practices and leading examples. According to the SDFA it is needed further research to "*assess the potential of current and emerging digital technologies"* for what concern the addressing of the SDGs and the evaluation of the impact of these technologies.
However, the interests about the themes regarding fintech and financial innovations is growing among IS scholars, especially after the last financial crises. Gomber (Gomber et al., 2018) states that the discussion on fintech related themes it is not even in the academic world, with some area or technology that are attracting more attention compared to others. According to Ozili (2018), further research on the field is required in order to understand the implications of these fintech instruments for what concern the achievement of the Sustainable Development Goals and for understanding how these solutions could address

financial inclusion and growing inequalities. According to the author, it is important to investigate the connections between digitalization in finance and economic crises, in order to identify possible solutions for avoiding or limiting the negative impact on the society of these events (Ozili, 2018).

The choice of focusing on the European Union has been dictated by the fact the EU is in the forefront of this process with several initiatives and plans adopted in order to move towards this sustainable change. The European Commission in response to the Agenda 2030 drawn up by the UN established a work stream in order to understand how finance and fintech could help to reach the SDGs. Among the numerous initiatives taken by the EU there is the creation of a group of high-level experts on the theme of sustainable finance (HLEG). The principal tasks of this group are:

- Understand how direct funds and investments towards sustainable projects
- Identify how financial institutions should act in order to reduce the impact on the environment
- Try to create a unique framework to adopt in all the EU countries

In the 2018 the European Commission, following the guidelines of the taskforce, announced an "action plan on sustainable finance" with the objective of: creating a European taxonomy for the identification of sustainable and green products, also in the form of a label. Introducing ESG indicators in order to evaluate the performance and the grade of sustainability of the products. In the 2019 the EU commission reached a first phase of implementation with the release of numerous regulatory documents. In the same year they announced a Green Deal with the objective of enabling more than 1 trillion € investments in sustainable projects. The European Green Deal in 2020, just after the Covid-19 crisis, launched a Renewed Sustainable Finance Strategy in order to direct the investments needed for the recovery period towards sustainable projects.

In this study we start from a theoretical background that will deepen the concepts of Financial innovation and Fintech with an eye on the implications that these instruments have on the Sustainable development. The next step will be the analysis of a database made of 144 fintech applications to sustainable purposes, followed by the case selection of relevant cases. The case study approach will start from the analysis of the industry in which the case is located, looking at the taxonomy, statistics and regulation in order to understand how the case is positioned in the market and among the competitors. The study of the industry is an important step, because it helps to observe how the financial sector and the several markets in it have been disrupted by the advent of new technologies and understand how that disruption could be directed for the creation of a sustainability path.

The case analysis involves the study of documents such as whitepapers, company statements, website and interviews with the CEOs or high-level managers working in the company. Then will be created a correspondence from the mission and targets of the studied case and the SDGs established by the UN, using a framework in which the most relevant goals for my purpose are classified under two Areas of interests. As a final step we will try to identify the risks, opportunities, limitations and benefit deriving from the adoption of Fintech solutions for Sustainable Development.

1. LITERATURE REVIEW

This literature review will start with defining what is meant for “Financial Innovation”, reviewing some of the more insightful papers in the field. The next step will be the identification of the impact that financial innovations had on the economic development, underling the main actors involved in this process and the more recent innovations in the field. The second part will be referred to a brief review on the definition of “Eco-Innovation”. The last part will be about the themes of Sustainability and Development with a focus on the review of papers dealing with the challenges faced by new financial innovations for the achievement these goals. The last part will be divided in two sub-chapter that represent the two macro areas that are the subject of my study.

Firstly, considering the challenges deriving from the financial inclusion, especially pointing out the effects of fintech and digital finance solutions on inclusion. Secondly, there will be a review of the papers concerning the theme of mobilization of financial resources for sustainable development goals.

1.1 FINANCIAL INNOVATION

There is a wide literature about the definition of the term “Financial Innovation”; according to Tufano (Tufano, 2003) as for other types of innovation also for the financial ones it is possible to divide between process and product innovations, even though for financial innovations could be difficult to clearly distingue between these two types. Financial innovations are often related with a positive impact on the economic system, such as reduction of costs, improvements in reliability and efficiency or reduction of risks. During the last 30 years there have been several examples of innovations in the financial sector in the form of new and sophisticated financial instruments such as: CDOs, ZCB, Green Bonds, options, financial futures and many others. This process of innovation can be attributed to the growing demand for financial and business services started from the early 80s, stimulated by information technology innovations and by the changes in policy regulations (Barras, 1990). According to Barras (1990), technological opportunities, changes in policies, in particular after the so-called Deregulation and the growing demand for new products were the key drivers of this change in paradigm.

Tufano (Tufano, 2003) added that Financial Innovations are often used as a response to market imperfections in order to overcome possible information asymmetries, transaction costs, market failures and technological shocks.

According to Tufano (Tufano, 2003) one of the main drivers of innovation in the financial industry is the introduction of taxes and regulations. This because companies in the attempt to limit the negative effects derived by taxes, in terms of profits, increase innovative activities. The author argues that also regulatory and policies activities are positive correlated with an increase of financial innovations. Other drivers of innovation in the industry, according to Tufano (Tufano, 2003) are the introduction of new technologies or changes in paradigm and the effects related to the globalization.

There is verified evidence that Financial Innovations differ from other types of innovations, for example from manufacturing innovations. According to Lerner (Lerner, 2006) there are three dimensions in which is possible to see this difference and are: appropriability, regulation and collaboration. The author states that the appropriability of the benefits, deriving from an innovation, is more difficult in the financial industry than in the manufacturing, due to the lack of IPR (Intellectual Property Rights) strength in the financial services.

The strong regulation framework in the financial industry plays an important role for what concern investments in R&D and especially it creates a barrier for new possible entrants.

The collaboration is the third point stated by Lerner (Lerner, 2006), the author affirms that the collaboration between different financial institutions is more common than in other industries, in the form of joint-ventures or syndications.

There are several researches that have studied the key actors of the innovation process in the financial industry. The paper of Tufano (Tufano, 1989) investigates the degree of appropriability of innovations carried out by Investment Banks, underlining if there is a first-movement advantage, in the form of a temporary monopoly.

Investment Banks in the period acknowledged by the author (1974-1986) were the major actors for the innovation process within the industry, with an average of $1 Million R&D expenditures. The author concludes that there is no evidence of a real first-mover advantage for Investment Banks due to the ability of imitators to launch on the market similar products in a brief time. Another evidence from the study of Tufano (1989) is that Innovators (IBs) can charge lower prices than the imitators and this could help them to gain high market shares.

According to Barras (1990) the small entrepreneurial firms are more active in the innovative process than the big established firms. The author affirms that these small companies are able to better identify new market segments and niches thanks to their flexible structure. One central factor in enabling this change in the innovation process, from large corporations to small innovative firms, is the diffusion of IT solutions in the Industry during the 80s. The financial industry has always been in the forefront for the adoption of new technologies, such as the first transatlantic cable in 1866 and the early diffusion of computers and spreadsheet software in Wall Street during the 80s (The Economist, 2019). The change in the technoeconomic paradigm carried out by the Information Technology has drastically reduced the barriers for new entrants in the industry, enabling the rising of highly specialized High-Tech companies focused on software and informatic solutions for the financial sector.

Barras in his paper (1990) articulates that these small entrepreneurial firms are enjoying a "significant comparative advantage" in comparison with large established firms; Big corporations in order to survive and maintain their position as a leaders need a change in the organizational structure moving towards a more "flexible and decentralized structure".

FINTECH

In the last two decades this application of Information Technology solutions in financial services has taken the name of Fintech. As we said, this process of transition has begun in the late 80s, with the advent of internet and ICT. According to the IMF (2017), in the last two decades Fintech solutions has been started to disrupt all the functions involved in financial services from wealth management and personal finance to financing or payments solutions. Online stock trading, Robo-Advisors, mobile banking pricing algorithm based on machine learning are only few of the main disruptive products introduced in the industry during the last two decades.

Lee et al. (Lee & Shin, 2018) identified five actors involved in the FinTech Ecosystem: Government, Financial Start-ups, Financial customer, Traditional Banks, Developers.

According to the author the financial start-ups are in the center of this process and are identified as the main drivers of innovations in the financial services. The diffusion of these new instruments and their effectiveness is closely related with the policies and regulation implemented by the national governments. The author articulates that also the Traditional Banks are starting to invest high amount of resources on the explorations of these new technologies, resulting as one of the drivers of innovations in the financial industry.

Gomber et al. (Gomber et al., 2017) provided three main reason behind this shift from the traditional finance to digital and innovative solutions. Firstly, fintech companies offer a new range of products that better address the customer needs. Secondly, the rising of financial online platform provides a new and more efficient way of selling financial products or services online, reducing the transactional costs. Thirdly, the nature of these fintech companies is highly high-tech, for this reason it is easier for them to respond promptly to the challenges of the market.

According to Puschmann (Puschmann, 2017), the diffusion of IT in the financial industry is creating new opportunities in terms of new and improved products, processes and business models. The author states that ICT is disrupting the entire ecosystem behind the financial system starting from the company's structure and strategies to the "consumer behavior".

Puschmann (2017) offers a framework to understand fintech innovations, he divides fintech in three dimensions. Firstly, the innovation could be classified according to the type or the object of the innovation (product, process or business model innovations). Secondly, the author argues that another important aspect to take into account is the "degree" of the innovation, that could be disruptive or incremental. The last dimension concerns the definition of the scope of the innovation, dividing by innovations that are affecting the company structure and other that are changing the sector value chain. (Puschmann, 2017)

Accordingly, there are several challenges that Fintech and financial innovations are trying to address: from customer management to privacy and security issues (Lee & Shin, 2018) but also for what concern financial inclusion and mobilization of capital for sustainable investments. Green Bonds are helping to provide funds for green projects; Financial intermediaries are starting to consider ESG (Environment, Social and Governance) criteria for evaluating the performance of the companies listed;

Blockchain and smart contract are enabling investments in renewable energy projects, by increasing transparency of transactions; Robo advisors and sophisticate algorithms are enabling the people to invest resources on green assets, reducing dramatically the intermediary costs (Blakstad & Allen, 2018).

1.2 ECO-INNOVATION

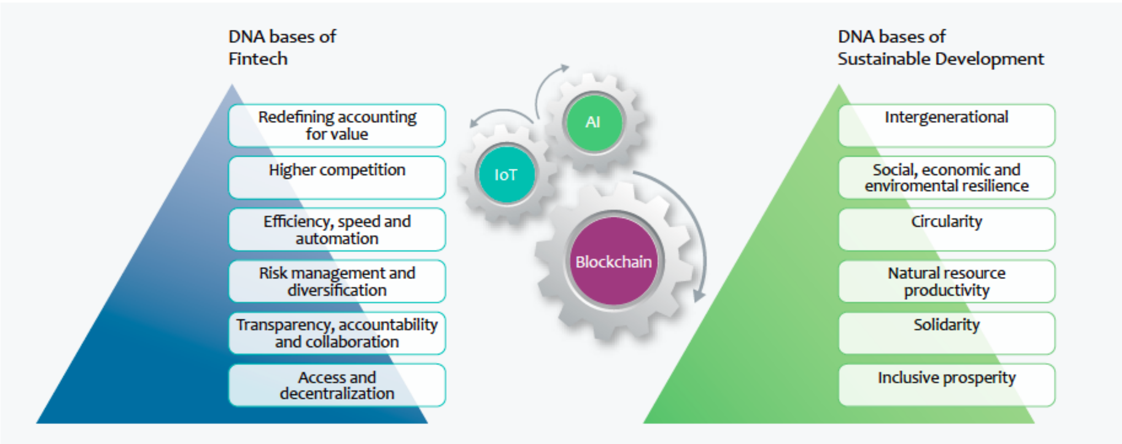
As we seen in the previous section innovative solutions may have a different impact depending on the final scope on which it is built.

In the last two decades great attention has been given to sustainable related innovations, in particular the idea is that the innovation process needs to be directed towards a Sustainable Development, this process is known in the field as “Eco-Innovation”.
According to Rennings (Rennings, 2000), there are two approaches for stimulating the eco-innovations; the first one is based on pushing the development of new technologies that better address the environmental problems, for example giving incentives to R&D in specific projects or by giving clear guidelines to the type innovation required. The author affirmed that there is empirical evidence that this “technology-push” approach, in the form of technical standards, is less effective than using market-based solutions. This second approach means the application of financial instrument in order to stimulate the eco-innovative process, for example by reducing the taxes for sustainable behavior and using other types of financial incentives.
However, stimulating radical innovations towards a sustainable path is one of the key challenges for the future. In this process a fundamental role is played by the financial world, in the form of providing funds for these solutions, for example trough venture capital or new innovative financial products (Green Bond) (Hellström, 2007).
According to Hellostrom (2007), there is a trade-off in stimulating “Radical-architectural innovations”, on the long term these innovations will bring social benefits in terms of addressing the sustainable development goals. However, on the short term this process means the destruction of the actual processes and the disposal of the well-established working plants, this could bring to high costs and an increase in the energy consumption on the short term.
However, this process of changing the paradigm is necessary and inevitable for moving towards this sustainable path and for guarantee a future to the next generations.
This change will be possible only if the final consumer will be aware of the themes and willing to contribute actively to this sustainable development. According to J.Jansson (Jansson et al., 2010) there are two types of behavior regarding sustainable practices. The first type of consumer is defined as a person that is trying to change is day-to-day routines according to more environmentally friendly ways to consume, for example by reducing the usage of electricity, car, water. The second type of consumer contributes to the sustainable development trough purchasing choices, by for example substituting old household appliances, cars and other devices with more eco-friendly solutions.

1.3 SUSTAINABLE FINANCE AND FINTECH

The "*United Nations Environment Program*" released a paper named "Fintech, assessing the implications" in 2016, in which they tried to identify a linkage between Fintech and Sustainable Development. The UNEP adopted an analogy based on the DNA helix structure in order to explain the connection and the opportunities deriving from the use of fintech solutions for a sustainable purpose.

Figure 1*: Fintech and Sustainable Development*



Source: UNEP Inquiry, 2016

On the first helix we can see the principles and effects of fintech diffusion and the second represent the bases of Sustainable Development. Starting from the accessibility and decentralization given by the rise of new solutions that are opening the access to the financial world to a greater audience and enabling a financial prosperity for them. The next principle is related with the increased transparency and accountability of these digital solutions, for example with new technologies based on blockchain algorithms is possible to trace all the actions and movements of the users. With technologies such as Big Data and AI has become easier to analyze high amount of data resulting in more accurate predictions and a decreased risk in the products. Again, the adoption of new technologies in the financial world has improved the efficiency of the service, thanks to automation processes and reduction of intermediaries. Finally, the market entrance of numerous companies and start-ups has increased the competition in the financial industry resulting in lower costs and more choice for the final consumers. Indeed, the financial world has always been dominated by few actors such as International Investments or Commercial

Banks that are now starting to change their business models in order to be competitive with new and young realities that are entering the market.

FINANCIAL INCLUSION

Nowadays, the globalization is helping a great part of the global population to escape poverty conditions. However, there is still a large number of individuals that are completely left behind and cut off from the society. Financial inclusion aims to giving an access to the financial system to people on the margins of the society.
According to Gabor (Gabor & Brooks, 2017), Fintech and digital finance are starting to succeed where other solutions (Microfinance) have failed. The author states that digital finance inclusion will contribute Governments and Institutions to better controlling risky individuals, by recording their identities and transactions.
The digital finance is having a great impact in contrasting the poverty, especially in the developing country. Gomber (Gomber et al., 2017) proposed a framework for understanding the effects of digital finance on different financial areas. The author creates a three-dimensional framework, dividing by the actors, the functions and the technologies adopted for what concern the digital finance. He identified different types of functions in which the financial innovations may have a great impact for what concern the financial inclusion. One of the most common application of digital finance is for what concern the payment system. The digitalization is creating new types of currencies that are deeply affecting the traditional idea of money; by using decentralized structures and blockchain algorithms it will enable more people to access the global market. Blockchain is a new technology already implemented in solutions such as cryptocurrencies (Bitcoin), according to many it will bring transparency and security for transactions especially in countries with weak banking and political infrastructure (Larios-Hernández, 2017). According to Larios-Hernandez (2017), there are several barriers for the diffusion of this type of technology and many challenges: firstly, there is a high part of population, especially between the unbanked, that strictly prefer the cash as a payment method. For this reason, are needed campaigns in order to make the people aware of the benefits deriving by the use of mobile technologies. According to the author another limit and barrier derived from the intrinsic structure of the financial system, that tend to discourage the entrance of new players, resulting in a worst financial coverage for the individuals. In conclusion the author articulates that is needed a joint effort from both public and private

institutions in order to support this shift by support entrepreneurial activities for social themes, such as the financial inclusion. Another function that technology innovations are deeply affecting is represented by the area concerning the financial advice services. According to Gomber (2017), with the development of technologies such as AI, Big Data and IoT the wealth management market is deeply changing. The emergence of Robo Advisors and automatic investing algorithms are drastically reducing the transactional costs, enabling more and more people the access to sophisticated financial instruments (The Economist, 2019).

FINANCIAL INCLUSION AND FINTECH

Ozili (Ozili, 2018) in his paper analyzed the implications of Fintech solutions on the theme of financial inclusion, in terms of positive and negative effects. According to the author one of the main advantages for using Fintech solutions for an unbanked person is the high degree of flexibility, due to the structure of Fintech providers. Indeed, these companies are facing less regulation compared to the traditional banks, and this could help them to focus on the developing of their infrastructure. Another positive aspect listed by Ozili (2018) in his paper regards the fact that Fintech providers are more willing to provide small amount of loans to individuals with low and high volatile income; giving to poor individuals the access to these types of financing will increase the opportunities for them to leave a poverty condition for better standards of living.
S.Blakstad and R.Allen (2018) in their book provided examples of how digitalization is changing the traditional banking; for example digital wallet (e-wallet) are considerably reducing the costs for banked user and increasing the interests among the unbanked. According to the authors the main drivers of the diffusion of digital financial solutions are mobile phones and the access to internet; considering that nowadays large part of the population possesses one of these devices the diffusion of digital financial solutions could occur in a brief time. Ozili (2018) articulates that digital finance solutions will contribute to improve the effectiveness of the entire financial ecosystem,
by reducing the costs for the traditional banking system related to the presence of physical branches and other rigidities. According to the author the introduction of digital solutions is going to facilitate the usage of these financial instruments helping the diffusion of finance in poor or rural regions. According to S. Blakstad and R. Allen (2018) one of the

main barriers to the financial inclusion, especially in the South of the world, is given by the lack of official documents that are attesting the identity of individuals. This problem is deeply affecting the lives of people, that are left behind without the possibility to access to the benefits and duties deriving from belongings to a Society. For example, a large part of people living in poor countries have no access to the education due to these barriers, creating new generations of citizens without the instruments necessary for advancing in social conditions (Blakstad & Allen, 2018).

In developing countries, we can see a consistent rise in digital solutions that enable to collect data and create personalized records for individuals basing on their phone usage (Gomber et al., 2018). According to Gomber et al. (2018), these fintech companies provide the opportunity, for people that are missing of the standard criteria required by traditional banks, to borrow low amount of money. This process is often called "credit scoring", and it helps to saving time and resources for both clients and banks. Gomber (2018) articulates that initiatives in P2P lending are increasing all around the world in form of Microfinance Institutions profit or no-profit (NGOs). Blackstad (2018) provides an overview on the most used instruments adopted for the mobilization of finance for sustainable initiatives. He states that fintech solutions will enable financial flows starting directly from the communities, through the use of crowdfunding and microfinance initiatives. According to the author, peer to peer solutions and the direct involvement of local communities in the financing process, will be the main source of funds for sustainable and eco-innovations, especially in the developing countries.

According to Ozili (2018) the diffusion of digital finance solutions could have also a negative effect for the financial inclusion. Since these Fintech providers are for most for-profit entities, they have the incentives to penetrate the segments more profitable (Medium and High Income) instead of trying to reach low income individuals. Both Gomber et al. (2018) and Ozili (2018) agree that the financial education need to be a priority in poor and developing regions.

According to Lusardi (Lusardi, 2019) the financial education is gaining more and more relevance for the daily choices. The author states that there are several benefits in investing on financial education, in terms of: financial returns due to the possibility to use more sophisticated instruments; debt and income management, thanks to the ability of financial literate to navigate through financial shocks (Lusardi, 2019). Gomber (Gomber et al., 2018) stated that the increase of money lent is connected with an increase in the rate of bankruptcy for low- and middle-income individuals, this could be related to the poor financial background of these individuals.

According to Ozili (Ozili, 2018), there are several challenges connected with the development and the diffusion of Fintech solutions in the financial industry, especially for what concern the financial inclusion. The author states that digital finance products are often used by high risk individuals, that could generate instability in the market by increasing the number of defaults and threatening the system with new financial crises. Other problems identified by the author concern: the rising doubts about the financial sustainability of Fintech providers, in terms of costs and profits; the discrimination in the lending process is not completely addressed by the introduction of these solutions; another point of interest is about the ability of fintech providers to get through periods of crises due to the fact that these companies are not yet subject to stress-test.

FINANCING THE SUSTAINABLE DEVELOPMENT

One of the key challenges for the future of the financial industry concern the mobilization of financial resources for a sustainable development. This process is necessary in order to unlock resources for education, health system, support to SMEs, financing of green practices and projects. Palladino (2019) affirms that there is a need of a democratization of the financial world, he states that nowadays the Economy Equilibrium is highly polarized towards the choices of the rich, countries and individuals. If a middle-low income individual is willing to invest his wealth he can do it only towards financial instruments such as securities that are related only to one part of the economic structure, composed by all the biggest companies that are listed on the market. For this reason, Palladino (2019) argues, there is a need of new instruments that will give the possibility to direct personal investment towards sustainable projects or products. The policy makers will play a fundamental role for supporting these sustainable initiatives.

The idea of "Investment Inequality" is well explained by S.Blakstad (Blakstad & Allen, 2018), he states that most companies on the market are SMEs (Small and Medium Enterprises) and often these types of enterprises are struggling to get the access to financial resources, due to the high risk of their nature. This results in a concentration of wealth in the hand of few big firms, contributing to increase the inequalities among the individuals.

As we said before the mobilization of financial resources will contribute not only for reducing the gap between rich and poor but also for financing the sustainable development goals (green transformation).

According to Yao Wang and Qiang Zhi (Wang & Zhi, 2016), one of the main barriers to the diffusion of renewable energies and green solutions is the lack of financial resources for the development of these projects. The authors argue that in order to direct the finance towards sustainable projects it is necessary a regulatory intervention on the one hand and market solutions on the other hand. Policies are crucial for stimulate and giving incentives to the development of projects for a sustainable development, trough the introduction of regulations and directive. Market solutions, such as Green Bonds, will contribute to mobilize financial resources from private citizens to green projects (Mathews et al., 2010). According to J.A Matthews and S.Kidney (Mathews et al., 2010), this shift towards a sustainable development will be addressed in the future thanks to the mobilizations of private finance, in the form of new and creative financial instruments. In the study of Falcone (Falcone et al., 2018), the author found out that according to financial experts that supporting green finance activities will bring a positive contribute both for achieving a more sustainable world and for a long-term return on the investment.
In order to realize a shift in paradigm it is necessary the active presence of the actors involved in the decision process. According to A.Najam (Najam, 2002), traditional financial institutions, such as big commercial or investment banks, are often focused on large scale projects in terms of profitability and type of clients (large corporations), for this reason there might be a lack of interests from these institutions towards sustainable themes. According to the author is necessary a collaboration from big financial corporations and local organizations in order to mobilize the financial resources for small and medium scale projects. Polzin (Polzin et al., 2016) identifies that financial barriers in eco-innovation projects emerge especially during the commercialization phase, in the form of limited financial resources from both private and public institutions. The author suggests two different approaches for financing eco-innovations, one direct and the other indirect. He suggests that is necessary a collaboration between financers and innovators, in order to reduce information asymmetries. Policies in the area of STI are fundamental in order to stimulate investments for start-up or new projects. Finally, the development of financial instruments represents a direct approach for enabling the financing of eco-innovation projects. Blakstad (Blakstad & Allen, 2018) in his book identifies the main instruments that may result as the main driver for financial mobilization. According to the author there is an increasing number of investors that are considering ESG (Environment, Social and Governance) factors before investing in a company equity. Several governments are starting to launch Green or Climate Bonds, giving discounts for the payment of the taxes. The last point identified by Blakstad (Blakstad & Allen, 2018)

regards the FDIs (Foreign Direct Investments), especially from developed countries to developing or low-income countries. In conclusion the authors states that the increasing awareness concerning sustainable themes, from a large part of population, is increasing the demand for these financial instruments. However, the author articulates that there are several challenges and barriers for the achievement of these goals, especially for what concern the differences between the South and the North of the world in terms of investments.

2. METHODOLOGY AND APPROACH

2.1 CASE STUDY METHDOLOGY

As a leading research method will be adopted a structured multiple case study methodology. According to the OECD (2014) using case study as a methodology is one of the more appropriate techniques for impact assessment of policies, new products or processes. The "how" and "why" research questions are more likely to be answered using case studies, history or experiments due to the explanatory nature of the questions (Yin, 2014). According to Yin (2014), case studies are preferred to history or experiments when the case or event is from a present time and it is not possible to influence it. For this reason, in a case-study research is possible to use different types of information and from different sources. For example, from documents, digital papers, interviews and others.

Gerring J. (2007) in his book tried to find an ultimate definition for the Case Study Methodology. The principal distinction the author gave is among case-study and cross-case study. A case-study could be single or multiple, however the number of cases analyzed should be limited (max.5) because the focus of a case study is the in-depth analysis of the case, looking at the variation within it. While for what concern the cross-case study the approach is different, there could be multiple case-studies with single or limited observations for each of the cases, the scope is to look at differences and variations from a case to another. In this research it is adopted a case-study approach, in which three cases will be analyzed and studied.

Before starting with the study and analysis of the cases there is the selection phase, in which three cases will be selected from a database of applications.

2.2 DATABASE DESCRIPTION AND CASE SELECTION

The aim of this paper is to assess the impact of fintech applications, in the form of particular financial instruments, for the addressing of the SDGs in European Union. Fintech solutions are competing in different markets and industries, for example there are an increasing number of fintech start-ups operating in the energy industry, aid, personal banking, investments and in many other areas. For this reason, there is a need of clearly defining fintech solutions in relation with their scope or targets.

The first step of this research paper is the identification of the actual applications of fintech in EU for sustainable purposes and the creation of unique and distinct categories. In this phase we will rely on the data available in the report of the UN and EIT called "Sustainable Finance and Fintech in Europe". The report is based on a study drawn up the United Nation Environment Financial Centers for Sustainability and the Stockholm Green Digital Finance with the objective of investigate the current situation in European Union for what concern the diffusion of Fintech applications used for Sustainable purposes.

In the study are listed 144 Fintech applications in European Union, for each application is possible to have information about the Country in which those were developed, the category, the website, the applied technologies and a description of how those applications operate.

The European countries are completely covered with at least one application for each of the 28 countries that are part of the Union. Respectively there are: 5 applications for Austria, 4 for Belgium, 1 for Bulgaria, 2 for Croatia, 1 for Cyprus, 2 for Czech Republic, 3 for Denmark, 2 for Estonia, 3 for Finland, 13 for France, 5 for Germany, 1 for Greece, 1 for Hungary, 1 for Iceland, 4 for Italy, 1 for Lithuania, 2 for Malta, 1 for Norway, 1 for Poland, 1 for Portugal, 2 for Romania, 1 for Slovakia, 1 for Slovenia, 11 for Spain, 8 for Sweden, 16 for Switzerland, 8 for The Netherlands, 12 for United Kingdom.

The category represents the type of financial instrument adopted in the application and the market in which the solution is applied. There are 11 categories listed in the report and those are:

- AID
- ANALYSIS
- CROWDFUNDING
- DIGITAL INVESTMENT
- ENERGY TRADING
- FOOTPRINT/OFFSET
- GREEN FINANCE CATALYST
- INSURTECH
- PAY AS YOU GO
- ROBO ADVICE
- SUSTAINABLE CURRENCY

Around 40% of total applications listed in the report are classified under the category Crowdfunding (48 solutions), then we have Energy trading (21 solutions) and Analysis (13 solutions). The applications are then divided by the technologies adopted such as Blockchain, Artificial Intelligence, Big data, advanced analytical tools, digital platforms, robo-advisors (algorithms), websites with library of projects, IoT.

The last information that we can extract from the database is a brief description about the key aspects of the application and about its functioning.

After the definition of the database we proceeded with the selection of cases that will be the core of our work.

The most significant limitation of the Case Study methodology could be the lack of representativeness of the sample due to the dimension of it. For this reason, the case study selection phase is crucial for having a quality research. For the selection phase were considered several variables and after the process three cases were selected. Firstly, was considered the geographical position of the applications, dividing by North, South and East Europe. This division was made considering the differences among the countries in European Union, in terms of regulations, economy models, attention towards sustainable topics and political situation. In this first phase, the Northern and Southern regions were selected as subject of study. This choice was dictated by the fact that the two regions present a more advanced Fintech industry. In the second phase, the categories representing the type of financial instruments were taken into consideration, looking for example at the number of applications for each category and at the relation with the Sustainable Development Goals. As we seen in the first part of the Methodology chapter, more than 40% of applications are Crowdfunding solutions, for this reason it was decided to focus the attention on this industry. Indeed, two cases were selected among the Crowdfunding applications, one case from Southern Europe (Italy) and the second one from Northern Europe (Finland). Another important aspect emerged after the industry desk analysis was the distinction between two types of crowdfunding (Equity and Reward Based). For this reason, it was decided to select the two cases from, respectively, the first and second type, in order to have a better look to the industry. The third case was selected looking at variable such as the match between company vision and SDGs and the variety of technologies adopted. Another variable considered was the geographical location, in particular the solution selected is located in Sweden that is considered to be one of the best examples of a country addressing the sustainable themes in an efficient way.

2.3 FRAMEWORK FOR SDGs RATING

A Framework was created in order to evaluate the performances of the cases studied in the paper in terms of SDGs achievement. The first step is about the selection of the Sustainable Development Goals that, according to the targets and indicators established by the UN, are related and linked with the goals of sustainable fintech solutions. Eight SDGs were selected out of the 17 listed by the United Nations and then divided in two areas. The two main areas were defined after a study on the theoretical background and after the analysis of the database. In particular, looking at the categories in which the solutions were divided in the database (Crowdfunding, Energy Trading,…) it is possible to define two main trends: the first is about solutions in the area of eco-sustainability for example with applications that aim to reduce the CO2 impact or to optimize the energy consumption via sophisticated algorithms. The second trend includes all the solutions that are addressing problems related with the financial inclusion and the democratization of investments, such as digital platforms that enable the citizens the access to profitable investment option or algorithms for an efficient portfolio allocation.

In conclusion, the two Macro-Areas defined are "Eco-Sustainability Choices" and "Financial Inclusion and Democratization of Investments". The goal assigned to each area are:

Eco-Sustainability choices:

- Affordable and Clean Energy (N°7)
- Climate Action (N°13)
- Responsible Production and Consumption (N°12)
- Sustainable Cities and Communities (N°11)

Financial Inclusion and Democratization of Investments:

- No Poverty (N°1)
- Industry Innovation and Infrastructure (N°9)
- Reduced Inequalities (N°10)
- Decent work and economic growth (N°8)

After the analysis of each case, the framework will enable to link the Sustainable Development Goals with the actions and efforts undertaken by the companies. In particular for each goal will be asked "How the solution is addressing the goal" and will be underlined the most important actions. The last column represents the rating of the effectiveness of those action (1-Not Addressed to 5-fully addressed).

Table 1: *Framework*

Goal Number	SDG	How is it addressing the goal?	Rate (1-5)

Source: the author

2.4 EXPERT INTERVIEWS

A central part in the case study methodology was the analysis of interviews with experts and high professionals working in the company analyzed. According to Yin (2014), it is possible using interviews as a source of information in a case study due to the explanatory nature of the method. Using interviews is a time-consuming methodology, for example compared with questionnaires, but at the same time it is possible to conduct an in-depth analysis on the causes and facts under study (Adams, Anne and Cox, Anna L., 2008). Another positive aspect is the opportunity to adopt a semi-structured approach, where the interviewer is following a guide but at the same time, he has the flexibility to deviate from it in order to catch more information as possible.

The principal methodology used in the three case studies analyzed in this paper was based on a semi-structured interview approach. The interview guide is made of 7 questions, divided in 3 sections. In the first section is about understanding the type of business area and the technology adopted:

1. In which Business Area or Industry your company operates?
2. What kind of technology your company is adopting?

These questions are fundamental do identify the core business of the company and the market in which they are positioned. The second section is about understanding the links between the fintech solutions and the two main themes listed in my framework: Financial inclusion and climate action.

3. How is your company addressing the themes of Financial Inclusion and Investments Democratization?
4. How is your company answering to the challenges deriving from the Climate Change?

The last part of the interview is related with my second research question, that is focused on the identification of the risks, barriers and opportunities associated with Fintech. In this part adopting a semi-structured approach is very useful. This section is highly based on the personal experiences and visions of the experts, for this reason often are emerging interesting aspects and thought that were not considered at the beginning; having a flexible structure enable the interviewer to deepen those topics and to gather important information about new trends in the industry.

5. What are the main barriers to the development of Sustainable Fintech solutions?
6. What are the main risks associated to the diffusion of Fintech and Digital Finance solutions?
7. Do you have some estimates about the economic impact that these solutions will have on the Financial Industry in the next years?

2.5 INDUSTRY ANALYSIS

The industry analysis is a fundamental step in order to understand the basics and the contest of the cases studied in the next section. The analysis will be based on secondary sources of information such as leading financial newspapers, global and European database (World Bank, European Commission) and documents drawn up by private companies (Consulting firms) and international organizations.
Firstly, there will be an overview of the actual situation of the industry worldwide, with key definitions and terminology that will be fundamental for the understanding of the case studies. Ultimately, there will be a section dedicated to the situation in European Union with numbers and facts.

3. FINDINGS

3.1 CASE 1: EQUITY CROWDFUNDING FOR SUSTAINABLE PROJECTS

3.1.1 INDUSTRY ANALYSIS: EQUITY CROWDFUNDING

Crowdfunding it is a relatively new Industry and it defines an innovative mechanism of funding for projects, ideas, initiatives. At the base of this mechanism there is the Crowd made by the combination of individuals that independently decide to invest a certain amount of money to a project of interests to them. According to Mollick (2014), there are two aspects that should be present for a common and complete definition of this term, the first is about the specification that the amount of money invested by individuals is often small and for this reason is necessary to reach the “Crowd” through the use of connected platform. The second characteristics of these types of solution regards the disintermediation, in fact through the use of internet platforms is possible to avoid financial intermediaries that were before the principal actors in the funding process. Belleflamme et al. (2014) offers a definition of Crowdfunding in which the central point is an open call for funds launched through the use of internet platforms, in exchange the funders can have some kind of rewards, depending on the type of initiatives and project funded.

There are several types of Crowdfunding and each type defines some specific goal that the funder wants to achieve. For example, there are Crowdfunding campaigns that aim to raise fund for social causes such as for humanitarian purposes. This type of funding mainly concerns NGOs, donors and also companies that wants to raise funds for special projects but without giving any form of economic return. The three main types of Crowdfunding that we see on the market are:

- Reward-Based Crowdfunding
- Equity-Based Crowdfunding
- peer-to-peer lending

Equity Crowdfunding is relatively new, and it differs from the reward-based in the funding process. The preliminary evaluation is needed to establish the initial value of the shares, and this must take into account the future economic returns, growth opportunities and the financial soundness behind the project. For this reason, it is highly dependent on the financial regulation of a Country. In average the target fund for Equity Crowdfunding projects is higher than the other types. Vulkan (2016) demonstrated that the average goal on an Equity crowdfunding platform is above 100 thousand dollars while for platforms like Kickstarter is around 10 thousand. Another important fact stated by Vulkan is that for equity-based crowdfunding the variability is considerable higher, with some projects that are over funded and other that are far below the target.

Crowdfunding platforms and especially Equity-Based solutions are highly innovative, and it is a clear example of how financial innovations are disrupting the industry promoting initiatives such as financial inclusion and democratization of investments. While before the advent of these platform the ability to invest in start-ups and ideas at an early stage was in the hand of few actors (Business Angels, IBs…) nowadays more people can access these instruments and make profit from it. They can act individually without the need of an institution or a financial advisor behind.

CROWDFUNDING IN EUROPEAN UNION

The European Union through his governing bodies is supporting Crowdfunding activities, trying to establish a common regulation and taxonomy in order to enable the development of this Industry. In the 2018 the European Commission proposed a unified regulatory document for governing all the platforms that were acting as a Crowdfunding provider. According to some estimates, brought by the European Commission, in 2015 were raised more than 4 Billion euros using crowdfunding platforms, in the same year there were more than 5 hundred platforms in EU, mostly in UK, France and Germany. The area with the highest value of funds raised was the one related to Loans (3 Billions) followed by Equity with more than 400 Millions euros, for what concern the Reward-Based crowdfunding was raised less than 100 Millions, that proves what demonstrated by Vulkan (2016) that Equity Crowdfunding is characterized by higher volume of funds than reward-based crowdfunding. Large part of the investments is intended for Loans and specifically for "Unsecured Individual Loans" with 178,854 campaigns and 1,266,723,276 EUR raised.

3.1.2 EXPERT INTERVIEWS AND FRAMEWORK RESULTS

For the analysis of the case study was conducted an in-depth semi-structured interview with Chiara Candelise, Partner of Eco-Mill and Senior Research Fellow for Bocconi University in Milan. The main aspects and key points concerning the solution were identified and then after analyzing one by one the goals and targets presented by the company, the framework was applied, trying to create a correspondence between the action undertaken by the company and the Sustainable Development Goals established by the United Nations. From the results we can look at the opportunities, risks and benefit of solutions such EcoMill. One big limitation of Equity-Crowdfunding platforms, especially in countries like Italy, is the scale. The Equity Crowdfunding is still in an early stage in Italy, mainly if compared with realities such UK or USA, this implies that in order to generate a significant impact on themes such as Wealth Inequality, Poverty and Climate Change is needed a more diffuse involvement of citizens and governments. On the other hand, with a broader audience the risks will necessarily increase and for this reason is needed some sort of Due Diligence in order to avoid bad cases that could potentially discredit the instrument itself.

Table 2*: CASE 1: Eco-Mill framework results*

Goal Number	SDG	How is it addressing the goal?	Rate (1-5)
1	No Poverty	• Opportunity to invest small amounts • Positive margins from investments	**3**
7	Affordable and clean Energy	• Portfolio of projects highly focused on Environment, Energy and Territory • More than 800,000€ raised for Energy Efficiency projects	**5**
8	Decent work and economic growth	• Financing the realization of new infrastructures	**3**
9	Industry Innovation and Infrastructure	• Social and Economic Innovation	**4**
10	Reduced inequalities	• Democratization of investments • Redistributed wealth to the Crowd	**3**
11	Sustainable Cities and Communities	• Energy Communities • Citizens can promote and finance projects by themselves	**5**

12	Responsible production and Consumption	• Promoting sustainable projects	**3**
13	Climate Action	• All categories listed in their portfolio have as a prime focus the Climate change	**4**

Source: the author

3.1.3 CASE STUDY DISCUSSION: ECO-MILL

Eco-Mill is one of the first Italian platform that operates in the Equity Crowdfunding with a portfolio of projects that are in the area of Sustainability in particular in the Energy and Environmental sector. The company mission is clear and could be summarized in two main statements. First, the company aims to finance projects with a high social impact by providing an innovative and alternative type of funding mechanism. Second, the company wants to promote the democratization of investments by enabling citizens, families and any kind of enterprise to invest funds for the achievement of these goals. The company is a clear example of how Fintech instruments, such as Crowdfunding platforms could be directed towards the achievement of the Sustainable Development Goals. Eco-Mill has clearly defined and listed the goals that they aim to achieve with their solution. And these goals are:

- Democratization and disintermediation
- Transparency and Information
- Legality
- Supporting the real economy
- Enhancing the territory and local assets
- Respect for the environment
- Fight economic inequalities
- Innovation and Research

DEMOCRATIZATION AND DISINTERMEDIATION

The solution aim to give to opportunity to every individual to be actively involved in the development of new projects by enabling the access to financial investments without requiring intermediaries or high financial resources. This idea came up to the mind of the founder and CEO after studying the Energy Communities, those are defined as all those realities in which an investment in an energy asset is made by the involvement of the citizens:

"... The results of the investment it is redistributed among multiple individuals, that often are those who are mostly interested in the realization of the infrastructure..."

Chiara Candelise, Partner of EcoMill

It is possible for the citizens to invest also small amount of money on these projects and at the same time make profit from it:

"... The logic behind the Equity Crowdfunding is that every type of investor can invest their money on these platforms, both legal entities and physical people... It is a way to canalize investments towards sustainable projects..."

Chiara Candelise, Partner of EcoMill

In other words, through the use of equity crowdfunding platform, investments in infrastructure such as in the energy sector are fragmentated and then distributed among a crowd made by citizens with a normal disposable income.

For what concern the disintermediation, solutions such as EcoMill are offering the opportunity to access investment solutions reducing to the minimum the intermediaries and without relying on traditional financial institutions that are in general source of higher costs and inefficiencies and that are mostly characterized by a policy that tends to discourage small investors for investing their resources in profitable projects.

TRANSPARENCY AND INFORMATION

The use of an online platform in which is present the portfolio of projects with the related information is helpful in ensuring the transparency of this solution. The company offers a very user-friendly interface by which is possible to access several information, data and facts useful to make the decision whether invest or not and also after the investment in order to follow the development of the project in which you have invested your money. Selecting one of the projects you have the ability to see the information about the project, often towards a video, read about important statistics such as: the amount of money raised with minimum and maximum, the target, the deadline, useful financial information about the IRR (Internal Rate of Return), tax incentives and also the impact in terms of reduction in carbon emission. Through the platform is possible to have a direct channel with the

Management of the Company that you are financing, indeed there is a section in which the investor can ask questions and get answers about the Project. Another relevant function is the possibility for the user to get access to updates about the development of the project. The interface is really simple and intuitive and most important easily accessible for everyone. These aspects combined can show us why these platforms are recognized to be the next Big Thing for what concern the investment world. If we compare the processes of Traditional Banks with the ones of Fintech solutions, we see a clear difference in the approach. Platform such as EcoMill are built in order to be simple, intuitive and open to everyone, an investor can get informed, invest and then monitor the investment towards few clicks on the mouse and using a well-developed website. While the logic behind Traditional Banks is still that the investor should be able to read behind the lines and be capable to discern between useful information and not, depending on their need. For this reason, Traditional Banks website often offer a redundant set of information and indicators, resulting in a more difficult and complex interface for the end-user. While solutions such as EcoMill are aimed to offer a more friendly solution with an intuitive interface, for example by giving an explanation of the principal financial indicators, doing so provides more transparency that results in a broader audience.

LEGALITY

The projects listed in the platform are subject to a strict and a careful assessment by the Company that evaluates the growth opportunities, the feasibility of the project, the impact in term of Sustainability and the financial soundness of the business plan. For this reason, EcoMill is trying to ensure that the investor can feel safe and invest his money knowing that at the basis there was a rigorous control by the company experts.

"… Nowadays, one of the main challenges for platform operating in Crowdfunding is about gaining the trust of the investor, sometimes citizens are more comfortable with donations than with investments…"

Chiara Candelise, Partner of EcoMill

SUPPORTING THE REAL ECONOMY & ENHANCING THE TERRITORY AND LOCAL ASSETS

Eco-Mill towards the platform aims to establish an access to credit and funding to all those projects that are struggling to find financial resources to start their idea. One of the main barriers to the development of Sustainable solutions is the lack of resources, traditional banks and financial institutions prefer to invest their money to projects with more consistent financial returns and with larger scale. For this reason, platform such as Eco-Mill are needed in order to enable small scale projects to find the financial resources for the development of innovative and sustainable solutions. The platform offers the opportunity to communities, for example local or regional communities to join and finance projects that are of interest for them, and through equity-based crowdfunding they can be actively involved in the process and in the decision making. If we think about small communities, for example towns or villages, their demands are often ignored by Central Governments or even at the Regional level, because their interests are affecting only small amount of population. Solutions such as the Equity Crowdfunding are giving the opportunity for this communities to contribute for the development of their territory.

RESPECT FOR THE ENVIRONMENT

Eco-Mill through their platform are promoting a green and sustainable economy, following closely the guidelines and the goals established by the United Nations on the theme. The portfolio of projects present in the platform is divided into 8 categories:

- Biogas
- Biomass
- Energy Efficiency
- Wind Power
- Hydroelectric Power
- Sustainable Mobility
- Solar Power
- Renewable energy and Efficiency

Welfare Efficiency Piemonte (WEY) is one of the projects with more success among the portfolio of solutions present on the platform. This project represents a collaboration between an Innovative Start-up, a Bank, a Crowd and Private Investors. The innovative start-up is focused on the development of an efficient energy plant which will provide energy power to a breakthrough Physiotherapeutic Center. This is one of the first Equity Crowdfunding projects in Italy focused on Energy Efficiency applied to a sensible social theme such as the well-being of people. According to the company vison the project is in line with the set goals in the area of Sustainability and Environment through the three central actions:

"… The redevelopment of an abandoned Infrastructure, the energy efficiency of the future project and the launch of an innovative Physiotherapeutic Center in an area where it was absent…"

Chiara Candelise, Partner of EcoMill

FIGHT ECONOMIC INEQUALITIES

The equity crowdfunding platforms enable all the kind of investors to finance, even with a small amount of money, a new project and his development. The logic behind is that the value created from this project is redistributed among a larger number of citizens and investors. The Company offers the opportunity to invest on innovative Start-ups that often offer a higher IRR but with a bigger risk. The second option is to invest on the development of projects carried out by a solid vehicle company.

"… the vehicle company realizes an energy infrastructure such as a photovoltaic plant or in general an energy efficiency project. In the future they will have revenues from the infrastructure, for example from selling energy supplies. The logic is to invest in a vehicle that will have financial returns relatively more predictable and with a lower risk…"

Chiara Candelise, Partner of EcoMill

Another positive aspect deriving from the diffusion of equity crowdfunding platforms on the market is related to the investment portfolio diversification. Citizens and Investors have more than one option when it comes to invest their savings into financial instruments. Diversification in finance means lowering the risk and it is fundamental for the fight against economic inequalities. In the future, with the increase of the number of platform such as Eco-Mill, it will be easier for people to invest in different projects and create an efficient portfolio, thanks to the opportunity, given by these solutions, to invest small amount of money on a project and with few clicks on the mouse.

"*… starting from the point that is possible to invest small amount of money on several projects, it is possible that these solutions will have a positive impact on a systemic level…We can think a citizen as several Venture Capitalists investing on a smaller scale…"*

Chiara Candelise, Partner of EcoMill

INNOVATION AND RESEARCH

The company promote innovative activities in both the Social and Economic sphere. Indeed, the financial innovation it is at the basis of the Equity crowdfunding platforms with Innovative Start-up as one of the main targets of crowdfunding campaigns. The creation of funding flows from the Crowd directed towards early stage start-ups is helping this Universe to grow by providing the required financial resources for these projects to start. In one of the projects present on the portfolio of EcoMill we see the collaboration between a private company a technological center and an association from a local University. The interaction between different actors and the creation of partnerships is a fundamental step in the innovative process and through platforms like EcoMill is possible to support and be part of these initiatives.

3.2 CASE 2: THE BIGGEST FINNISH REWARD-BASED CROWDFUNDING PLATFORM

3.2.1 INDUSTRY ANALYSIS: REWARD CROWDFUNDING

Reward-Base Crowdfunding represent the most widespread and well-known type of Crowdfunding platforms. One of the main platforms that operates in this industry is Kickstarter founded in the 2009 in USA, since then 4,6 Billion dollars has been raised through the use of the platform with more than 180'000 projects successfully funded. The rewards could be various in form and value, from a pre-order of a product to a simple postcard. Belleflamme et al. (2014) tried to explain using a microeconomic model the logic behind the benefit from the entrepreneur in using these types of solutions. Indeed, the author states that an entrepreneur could ask more money for a certain product because it has been demonstrated that the users of Crowdfunding platforms are more willing to pay higher prices for pre-ordering a product compared to the price that they will be willing to pay for a product already on the market. This mechanism gives the opportunity to the entrepreneur to get access to a higher profit, but the ability to ask higher prices is hampered by the fund target that they need to achieve. More funds need to be raised and bigger will be the crowd needed for this achievement, this logic means that the entrepreneur needs to ask lower prices in order to have access to a broader audience. Between Reward and Equity-Based models there are significant differences in both the idea behind and the regulation adopted. The Reward-Based crowdfunding is mostly used by small companies or no-profit organizations or by individuals to promote their business idea or some concept of product. The investor receives some reward that could be various, for example in the form of an early access to a new product or content. Reward-based platforms covers a wide range of fields, from Arts, Illustrations and Comics going through technological and design projects, movies, music and many others. Equity-Crowdfunding uses a different approach from the Reward-Based, this type of crowdfunding is capable to raise a significant amount of funds for the entrepreneur and his idea. In this format, in exchange of money is issued a certain share of equity proportional with the amount of money invested. This share could be traded, and the investor can make profit from it. This approach is more complex under the regulatory aspect and for this reason the rules and policies are different in each country, also in European Union there is not a unified policy about this type of Crowdfunding.

We can identify another type of funding instrument, that is the Peer to Peer Lending. The logic behind this instrument is the same of the other types of crowdfunding that we have analysed, raising funds from individuals for a specific goal. The difference between P2P lending and Crowdfunding (Reward and Equity Based) is that for what concern P2P lending platforms those don't offer equity or any kind of reward but an interest rate for the money invested.

3.2.2 EXPERT INTERVIEWS AND FRAMEWORK RESULTS

For the case study analysis was conducted an in-depth semi structured interview with Pauliina Seppälä, Co-Founder of Mesenaatti.
Mesenaatti is a reward-based crowdfunding company, their portfolio of projects includes initiatives that vary from campaigns in the area of entertainment to eco-sustainability projects.
Comparing Mesenaatti with EcoMill (CASE 1), the first is not focused only on Sustainable Projects but they accept any kind of campaign. However, Mesenaatti is the representation of how a Crowdfunding platform can contribute for the achievement of the SDGs.
The company is very active in the creation of a participatory structure, where several actors can interact and contribute for the realization of a more inclusive society.

Table 3: *CASE 2: Mesenaatti framework results*

Goal Number	SDG	How is it addressing the goal?	Rate (1-5)
1	No Poverty	• Being an investor with less than 20€ • Opportunity to launch small scale projects	**3**
7	Affordable and clean Energy	• Projects in the area of eco-innovation are more likely to reach the target	**3**
8	Decent work and economic growth	• Support to small businesses	**2**
9	Industry Innovation and Infrastructure	• Social and Economic Innovation	**3**
10	Reduced inequalities	• Democratization of investments	**4**

11	Sustainable Cities and Communities	• Participatory structure: local and national bodies, citizens and private companies working together	**5**
12	Responsible production and Consumption	• Promoting sustainable projects	**3**
13	Climate Action	• Offering a direct channel for investing in green projects • Canalizing local initiatives	**3**

Source: the author

3.2.3 CASE STUDY DISCUSSION: MESENAATTI

Mesenaatti.me is a crowdfunding platform the biggest in Finland and in general the largest reward-based service in the Northern Regions. The main characteristic of the platform is the accessibility, indeed a person with a relatively small initial investment can finance the project that he likes the most. According to the company website you can start investing starting from 20 euros, and the platform is open not only to individuals but also to institutional investors, companies and banks that can use this channel for financing their products.

In the portfolio of projects there is space for local, national and international projects but the platform configures himself as a regional service, for this reason is highly probable to find only projects located in Finland. The values at stake are different if we compare local solutions such as Mesenatti and International Players such Kickstarter.

"… Most campaigns are small in reward-based; our (Mesenaatti) medium sum is around 5000€ for a successful campaign and our biggest is around 200'000€, while in KickStarter the biggest sum raised is something around 4 Million €…"

Pauliina Seppälä, Co-Owner of Mesenaatti

REGIONAL AND LOCAL DEVELOPMENT

As we said there are two types of crowdfunding platforms, we have global platforms in which are listed projects that can have a broad and international audience. The second type is about regional or local services that have as a main goal the development and the financing of local projects. However, we can say that also the regulatory framework sometimes acts as a barrier for the entrance of International players in some countries.

"… In the industry there are one or two global platforms, we (Mesenaatti) are protected from companies such as Kickstarter because of the Finnish fundraising law is different, for this reason is more difficult for them to enter in Finland…"

Pauliina Seppälä, Co-Owner of Mesenaatti

Mesenaatti and platform such that are also giving the possibility to find financial resources abroad. Indeed, the platform is completely translated in English and they offer also the possibility to fund projects abroad using credit cards transactions. According, to a Company statement a large amount of funding is coming from abroad.

Nowadays, with the Globalization and the ultra-connected world in which we are living, is difficult for small realities to emerge and make an impact, due to the high competition that is coming from all around the world. Solutions and services such Mesenaatti are playing a fundamental role for the development of small-scale projects and for the creation of alternative financial streams for sustainable projects.

COMMUNITIES AND DEMOCRATIZATION

Behind crowdfunding platforms there is always a participative and democratic logic; everybody can try to start a new project and raise funds or on the contrary to be an investor that is acting as a venture capital looking for interesting opportunities. According to the Company the secret behind the success of a campaign or a project is in the social relations that a person has.

"… If you have a lot of friends it is easy for you to raise money for your project, Crowdfunding is so much about Social Connections, social ways of doing things. It is not about your position as a Company but is more about your connections…"

Pauliina Seppälä, Co-Owner of Mesenaatti

The connection-based mechanism of Crowdfunding is also enabling the creation of communities with the collaboration of people sharing the same interests, giving the opportunity to the members to contribute for the development of their local communities. In Mesenaatti there is one section in their list of Campaigns called "Nordic Campaigns", the aim is to help local businesses or projects to raise the funds from people that are living in the same environment and that will directly experience the results of the campaign.

ADDRESSING SUSTAINABLE PROJECTS

Mesenaatti is a Crowdfunding platform open to every type of Campaigns, for example their catalog is made of different categories: Music, Culture, Books and Magazines, Games, Society, Cafes and Restaurants, Lifestyle, Leisure and Sports, Software and App development, consumer goods, charity, Nordic Campaigns. From that, we can notice that they are not only focused on Sustainable Themes but are covering a wider portfolio of solutions. However, according to the Co-Owner of Mesenaatti, campaigns that are addressing climate change or other sustainable themes are more likely to be funded and to reach the target.

"…if we have a fashion campaign is normally really difficult for them to be successfully funded, but if there is some sort of eco-innovation, for example they use some recycled material, then it is more likely for these campaigns to raise funds…"

Pauliina Seppälä, Co-Owner of Mesenaatti

The awareness about Sustainable themes is increasing and it is demonstrated by looking at successful projects and campaigns funded on platforms such as Mesenaatti. Citizens are not only moved by the desire of possessing a new product or using a new service, but what we are seeing in the last decades is an increasing attention towards social themes such as Climate Change, Sustainability and inclusion. This phenomenon is changing the way people consume and behave, adding different set of variables in the purchasing process.

PARTICIPATORY STRUCTURE

Mesenaatti.me represent a participatory structure that aims to create collaboration involving several actors, such as the crowd made by citizens, but also municipalities, national bodies and organizations. It is fundamental, according to their vision, the involvement of the institutions in the crowdfunding process in order to move larger funds and to give more credibility to the crowdfunding world. Indeed, some of the principal barriers concerns the lack of financial education of the final user and the fact that sometimes citizens are not well informed about the newest trends or technologies, so for them could be problematic to keep up with new regulations and policies. According to the Co-Owner of Mesenaatti, in order to overcome this difficulties and barriers the traditional support system should participate in the development of these platforms by giving their support. For example, giving guidance and help to both citizens who are willing to invest and creators. For what concern the future of the industry the interviewee answered by defining two scenarios:

"…The future of Crowdfunding depends on various factors, such as the involvement of different organizations and the collaboration between the actors… what is going to happen is part of a bigger question about whether we (the industry) are going to be more participatory in our social and economic structure or whether is going to be the old era case with organizations and institutional body outside the movement…"

Pauliina Seppälä, Co-Owner of Mesenaatti

The biggest challenge is about changing the paradigm and the scope in order to move towards a more participatory structure. According to the Interviewee there is also another challenge related with the vision of crowdfunding campaigns; in particular associated with the perception of these instruments. According to the Co-Owner of Mesenaatti, nowadays is more important "who" is doing than "what" is being done.

"…Nowadays we divide "doing" into sectors of people who are doing, you are first, second, third sector, citizens, resident, businesses…While "what is being done" should be supported or not…"

Pauliina Seppälä, Co-Owner of Mesenaatti

This logic implies that at the center of the process should be put the scope, the final goal and not the means. For this reason, solutions such Mesenaatti or other Crowdfunding platform should receive support from institutions in order to create solid instruments at everyone's availability. From the interview emerged also another interesting view on the future of the industry, in particular with the more involvement of all kind of actors and the increase of the participatory structure the outcome could be divided in two scenarios. First scenario sees an ecosystem made by "doers" doing projects and raising funds together or the second scenario sees Big Platforms ruling the industry and citizens as a consumer of these big realities.

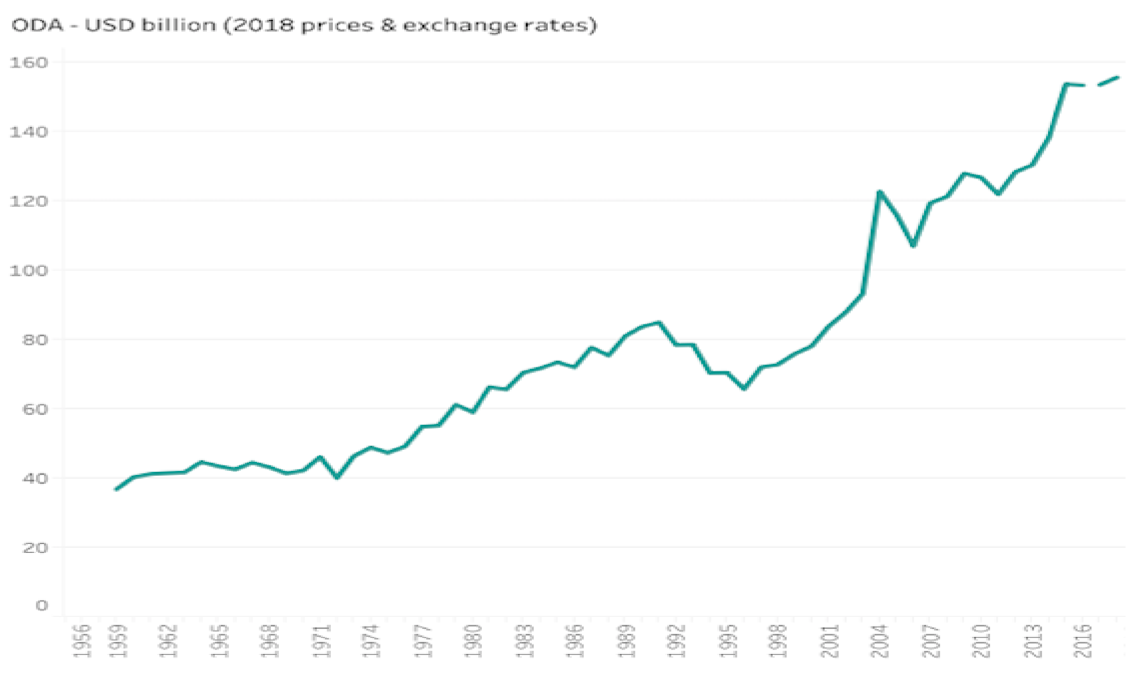
3.3 CASE 3: EFFECTIVE FUNDING OF AID AND SUSTAINABLE DEVELOPMENT

3.3.1 INDUSTRY ANALYSIS: INTERNATIONAL AID

The international aid is defined as all the money flows that are destined to poor or developing countries for financing the construction of schools, hospitals, general infrastructures and in general for improving the life conditions in those areas. International aid has been a matter of discussion for long time for academics and policy makers around the globe.

Official Development Assistance (ODA) is the official term with which the OECD defines flows of money starting from official institutions directed towards development programs. The institutions are identified as foreign governments, international organizations and agencies, NGOs and others. These flows can be in the form of grants, donations, loans or in other types of transfer directed to specific projects or individuals. According to the OECD statistics the top 3 countries for total ODA flows are United States, Germany and United Kingdom with more than 60 billion dollars of private and public flows.

Figure 2:*ODA on a grant equivalent measure by members of the DAC*



Source: OECD, DAC 1: total official and private flows (2014)

The OECD established a series of parameters that those flows need to respect in order to be defined with the term ODA; for example, they issued a list of countries eligible to receive those funds. In particular are not defined ODA all those funds that are destined to finance military procurement or other commercial services.

Starting from the 2016, the OECD, in particular the Development Assistance Committee (DAC), launched a plan with a renewed statistical framework that aims to:

- Improve the ODA loans, increasing the transparency and credibility
- Allocate and direct more resources towards sustainable projects and towards the SDGs

The DAC established a new method for a more accurate evaluation of the ODA flows. This method is called "grant equivalent" and consist in calculating the value of loans not by looking at the actual amount of money but considering the convenience of the terms. For example, if a loan offers very generous conditions, as long terms for repayment and low rates, the ODA value would be high.

ODA IN EUROPEAN UNION

According to the data of the European commission the European Union is at the first place in the world for amount of funds donated in the form of ODA. In particular, in the 2019 the flows from European countries were 75.2 billion more than 50% of the total assistance. In comparison with the European GNI (Gross National Income) the total ODA flows from EU countries is accountable to the 0.5% of the EU GNI and the European Commission is planning to bring it to the 0.7%.

The European Union is not only active for what concern ODA flows, but they are also supporting several initiatives for a sustainable development in partner countries.

3.3.2 EXPERT INTERVIEW AND FRAMEWORK RESULTS

For the analysis of the case was conducted an in-depth semi-structured interview with Númi Ostlund, CEO and Founder of AidHedge.

AidHedge is an analytical company that is not actively involved in the development of sustainable projects or infrastructure around the world. However, solution such AidHedge are playing a fundamental role for the achievement of the SDGs. The AID market can potentially change the lives of billions of people around the world, reducing the poverty and helping to create better life conditions. However, in order to achieve that it is needed a close collaboration between AID actors and fintech and high-tech companies.

Table 4: *CASE 3: AidHedge framework results*

Goal Number	SDG	How is it addressing the goal?	Rate (1-5)
1	No Poverty	• Increasing AID support to poor regions • Reducing the risks and instability	**5**
7	Affordable and clean Energy	• Providing analytical solutions and benchmarks to climate projects • Increase sustainable investments in developing countries	**4**
8	Decent work and economic growth	• Reducing intermediary costs for remittances transactions for foreign workers	**3**
9	Industry Innovation and Infrastructure	• Adoption of sophisticated algorithms	**3**
10	Reduced inequalities	• More investment flows towards developing countries	**5**
11	Sustainable Cities and Communities	• Risk management practices	**4**
12	Responsible production and Consumption	• Reducing the amount of funds lost due to market fluctuations	**4**
13	Climate Action	• Helping developing countries to canalize investments from foreigner countries	**3**

Source: the author

3.3.3 CASE STUDY DISCUSSION: AIDHEDGE

AidHedge is a fintech solution based in Stockholm (Sweden), founded in the 2016. The company aims to provide analytical support to international organizations, donors, NGOs and national bodies in order to optimize the resources and to reduce costs and waste.
The international aid is a growing market that is moving billions of dollars every year, the logic and mechanism behind is really simple: mobilize funds from one point to another, in order to finance sustainable projects or economic development programs in poor countries.
Often international organization and donors are not giving enough attention to risk management problems such as the currencies fluctuations and this results in a very inefficient system where in every transaction there a conspicuous part of money that is lost. At the end of the process this generates billions of dollars lost every year, money that are not reaching the target for which those were destinated.
AidHedge is working with these organization in order to optimize the AID industry and create more efficient flows towards sustainable projects.
The company provides several services to their clients through their platform:

- Reducing transaction costs
- Interests rate
- Project Analysis
- Financial Services
- Exchange rate risk
- Inflation
- Donor Requirements
- Burn rates
- Reporting
- National regulation

One of the main services that the company provides comprise the exchange rate risks. International organizations are often funded with different currencies and for this reason is needed an active and efficient policy in order to evaluate the financial risks and optimize the budget. The company offers a very well-constructed platform that offers the opportunity to use several functionalities such as tools for budget visualizations, recommendations for financial risk management, automatically generated benchmarks, continuous budget tracking, creation of automatic financial reports day by day.
The company is adopting analytical tools and algorithms in their offer, in particular they are applying technologies and analytics that are already used in practice in the corporate sector and tailor making it for the development world. For example, using Monte Carlo

simulation algorithms or risk management analytics packaged and reviewed for helping international organizations.

"…The biggest risk we are working with is the currency risk and every institution or actor that have international dealings is subject to this risk. It is not something unique or complicated, even small and medium enterprises (private) are managing it on a daily basis. However, in the development sector, donors and international organizations have not built up any expertise in managing this risk…"

Númi Ostlund, CEO and Founder of AidHedge

The services offered by AidHedge are directed towards two types of financial transactions:

- Project financing
- Corporate financing

"…Project financing is very common in funding sustainable and aid projects and it differs from corporate financing in two aspects: first the funds are going in one direction and usually the donors have more non-financial and financial requirements to attend. The platform provides budget and risk analysis with a focus on effects…"

Númi Ostlund, CEO and Founder of AidHedge

According to the company statement, one of the problems of international aid funding is the management of the financial risks associated with the mobilization of capital. In particular, there is a high degree of uncertainty due to the unpredictability of the funding flows. There are several causes that are contributing to the increase of the financial risks. For example, according to international organizations and donors one of the problems is to correctly evaluate how much money has been already been raised and the costs incurred.

According to the whitepaper drawn up by AidHedge these risks are not only creating inefficiencies but are also generating costs that according to some estimates are around the 20% of the total assistance funds raised globally; it could be quantified in more than 10 billions of dollars per year lost in the process of mobilization. There are two main challenges that AidHedge is trying to address with its portfolio of services:

- Financial risks: exchange rate, inflation and commodity prices
- Financial Inefficiencies: transactional costs and rates

There are several risks associated with international aid, that are in particular related with the fluctuations of currencies and exchange rates or with inflation changes during the time.

As we said, knowing the exact value of resources is fundamental in order to plan activities and to reduce the risk. According to the whitepaper drawn up by AidHedge, high financial uncertainty represents a relevant barrier for smaller actors in the sector, due to their ability to sustain the risks. The lack of predictability is having a great impact on the Sustainable Development world, due to the large amount of funds and resources that are not reaching the target projects.

High transactional costs are reducing dramatically the funds available for development and sustainable projects, especially in poor countries where 2-3% can really make the difference. AidHedge aims to help international organizations and donors to reduce the costs related with monetary transactions and rate fluctuations in order to optimize the mobilization of funds towards sustainable projects.

FINANCIAL INCLUSION AND DEMOCRATIZATION

The company collaborated exclusively with international organizations, government bodies and NGOs for this reason the impact on financial inclusion themes is indirect.

AidHedge mission is to optimize funds for development solutions, according to the company statement they are not actively involved in the realization of the project but towards their analytical service they are enabling international actors to save important financial resources.

“ For example, an international organization committed 1 million dollar that should go to Uganda, AidHedge calculate the effect risks of working with the local currency, helps the actor to be sure that the money are send to Uganda in an efficient manner…AidHedge aims to make sure that you (actor) get much money as possible to that location.”

Númi Ostlund, CEO and Founder of AidHedge

The company is also considering supporting actively financial inclusion related themes for example by helping the development of remittances solutions. With the term remittance it is meant, for example the transfer of money from a foreigner worker to his family located in his home country. According to the company CEO, AidHedge can support remittance companies by helping them to reduce transactional costs or by benchmarking the price they get for the currency or helping them to lower the risks.

Remittances is seen as one of the more interesting trends for Fintech in the area of sustainable development. Every year these flows are worth more than 700 billion of dollars worldwide. For this reason, saving small fractions of money by reducing the transactional costs can have a huge impact for the development of these countries.

"smaller costs for sending money to poor countries, provides an enormous leverage for those funds, every percentage gain represents a considerable amount of money going in Africa, Latin America, Asia. Those funds are going to real families that will spend those money in the real economy, this mechanism is fundamental for the development of those countries"

Númi Ostlund, CEO and Founder of AidHedge

According to the CEO, acting on sectors such remittances will really contribute for the achievement of large part of the SDGs. In order to have a considerable impact on it it is necessary to promote investments flows from the North to the South of the world by reducing the costs and increasing the benefits. For this reason, solutions such AidHedge are fundamental for providing important instruments and experiences for the development of these sectors.

AidHedge aims to build a transparent platform in order to give the opportunity to donors or organizations to see the better solutions and rates for them. According to the company statement there are two main actions in this regard:

- Implementation of a process for collecting data and analyzing big amount of information in order to provide punctual benchmarks and indicators
- Creation of a service for comparing similar solutions in order to increase transparency and reduce the costs for the users

CLIMATE ACTION

One of the main challenges for the future of fintech, will be related with climate change and specially to increase the investments in climate projects in the developing countries. Nowadays, large part of the world population is living in the so-called developing countries; these countries are responsible for the 63% of the current carbon emissions worldwide. For this reason, in order to deploy active and effective measures for the fight against the climate change, is necessary to put developing countries at the center of the debate.

According to AidHedge, international organizations and companies that are working in those countries are facing several barriers and risks. The CEO affirms that one of the principal obstacles for the spread of sustainable projects is the lack of a solid financial system in developing countries. AidHedge aims to contribute for the resolution of structural problems by:

- Implementing best practices in order to optimize the operations
- Collaborate with local financial institutions
- Create and distribute guides, documentation and provide training programs
- Using the expertise and analytical skills matured by AidHedge in order to help international organizations or local actors

REGULATION, BARRIERS AND OPPORTUNITIES (UK MODEL)

AidHedge is operating as an analytical company, for this reason they are not subject to the regulation designed for financial operators. According to the CEO, this feature is a great advantage for AidHedge because the regulation in several countries of European Union is creating problems and obstacles for the development of these solutions.

"We (AidHedge) do not provide any financial services, we offer analytical tools and services. Positioning us as an analytical company has been a choice dictated by the regulatory barriers presents in our country (Sweden)"

Númi Ostlund, CEO and Founder of AidHedge

According to Numi, the regulatory process can generate inefficiencies for innovative start-ups, especially in the financial area. The European Union is still divided for what concern these matters, often is left to the single countries to regulate new innovations on the market. Some of the countries are adopting a more flexible and dynamic approach in this process. For example, the UK model has been demonstrated to be more efficient and simpler for start-ups and new fintech solutions. FCA Sandbox is an innovative program, launched by the United Kingdom for simplifying the regulatory process for innovative fintech start-ups. Not always it is possible to identify existing rules for regulating innovative solutions, this because often those services are new to the market and for this reason there is no previous experience with similar solutions. In UK through the FCA Sandbox it is possible, for a start-up promoting an innovative solution, to operate without being regulated, inside a so-called Sandbox. The start-up will act as a tester and will work in close contact with the regulator during this period. The regulator will be on board in that project looking at the service and at the risks towards clients and the company. At the end of the process, they will create a new regulation and every solution that respects the criteria could apply for it.

The CEO of AidHedge, affirms that the situation in Sweden is quite different and inefficient.

"The FCA of Sweden is unhelpful in their approach towards new services or new fintech solutions. What they have done in the Fintech world is basically saying that you should know If you need to be regulated and you should know what the needs are to be regulated. If you are a new-to-market service and you don't how to identify your solution you cannot be regulated"

Númi Ostlund, CEO and Founder of AidHedge

For this reason, it is needed a unified approach at the European level, in order to create favorable conditions for the development of the Fintech eco-system. Nowadays, we are living in a period where potentially disrupting technologies are emerging at a fast rate, consequently a rigid and static regulatory system is not suited for the current challenges.

DISCUSSION AND CONCLUSION

In the conclusion chapter we will have a brief overview of the research conducted in the paper, starting from the research questions and arriving to the results and findings. We will go through the key steps of the research paper and understand how the methodology has been applied for the answer of the research questions and the relevance of the results achieved. In particular we will look at how fintech solutions are addressing the SDGs trying to understand through the opinion of experts and high professionals the opportunities, risks and barriers associated with the development of fintech for a sustainable development. We will see how the case studied in the paper are performing in the achievement of the SDGs, using the framework previously presented. Then we will analyze the limitations of the research paper identifying opportunities for future development of the study.

ADDRESSING THE SDGs IN EUROPEAN UNION

The research started with a review of the literature and theoretical background on the field. In particular, focused on the review of papers dealing with themes such Financial innovation and Fintech, fundamental for understanding the dynamics of this industry and effect of technological disruption on the financial world. For what concern the relationship between Fintech and sustainable development very few articles and papers were written in the academic fields. International organizations, such the United Nations and the European Commission, in the last 5 years started several projects and programs for the study of themes related with Sustainable Finance. The principal focus of these reports is the analysis of the relationships between fintech solutions and the sustainable development goals. However, the study on these themes is still at an early stage, with only few working papers that are investigating the effects of digitalization on the financial world. In particular, the literature is very limited for what concern papers that are studying real cases of solutions already presents on the market.

In this research paper we had a look at two main industries/sectors. The Crowdfunding industry and the international aid market. While the first is a relatively new market, born with the diffusion of web platforms and internet, the second is a traditional industry, that remained almost unaffected by the new innovations in the sector. The choice of focusing on two different sectors was dictated by the need of having a wider view on the effects that fintech is generating in the financial world. Furthermore, the analysis of these two sectors was useful for highlining the barriers, risks and opportunities deriving from this technological disruption.

For what concern the Crowdfunding sector, we analyzed one case from the Equity-based form and one from the Reward-based. After the analysis of the two cases and after evaluating the way in which those solutions are addressing the SDGs, we can summarize the results in 3 key points. Firstly, we saw that the Equity-Crowdfunding is potentially more disruptive and impactful for unlocking investments flows towards Sustainable Projects. The amount of funds raised through an equity crowdfunding platform is 10 times bigger in average than what raised through platforms such Kickstarter. Secondly, it is possible to distingue between crowdfunding platforms based on their purpose or aim. We studied two cases that were differing under the point of view of the final aim. The first case (Eco-Mill) is an equity-crowdfunding platform focused only on the financing of sustainable and related projects. The second case (Mesenaatti) is a reward-based platform with a wide portfolio of projects covering several areas of interests.

Thirdly, we adopted a rating scale for the evaluation of the efficacy of those solutions for the achievement of the Sustainable Development Goals; the SDG rating was useful in order to identify the strength and weaknesses of those type of instruments. From the rates of the goals emerged that the equity crowdfunding platform (Eco-Mill) is more driven towards sustainable themes, indeed the projects presents in the portfolio are mostly related with energy efficiency and carbon emission reduction. While, the reward-based platform (Mesenaatti) showed us how a generic crowdfunding platform, that is open to every kind of projects, can contribute for the achievement of the SDGs; in particular the company is really active in the creation of a participatory structure with the idea of sustainable communities and cities at its center.

The third case was about the International aid, a sector that can potentially make an enormous contribution for the achievement of the SDGs worldwide, unlocking important financial resources. However, there are several barriers and system failures that are making this instrument inefficient and useless in the eyes of many. Fintech and financial innovations such AidHedge can really help to overcome these barriers, through the application of technologies, best practices and expertise, that are already present in the corporate sector, to the international aid market. The analysis of the case demonstrated that a close collaboration between international organizations, donors, governments and fintech players is fundamental in order to reduce the risks, inefficiencies and increase the flows of money towards sustainable projects.

RISKS AND OPPORTUNITIES

The second research question at the center of this research paper was about the understanding of risks, barriers and future scenarios involving fintech applications for the sustainable development. From the in-depth interviews with experts of the sector we gain interesting insights on this topic. According to all the interviewees, the main barrier for the development of fintech solutions is the regulatory system. In European Union, due to the different regulations and policies of each Country, is very difficult for start-ups or fintech companies at an early stage to deal with the excessive bureaucracy. For this reason, often these companies remain confined under one or few countries, without having the opportunity to scale up and expand in other markets. Accordingly, innovative start-ups see a trade-off in the regulatory system. If, as we have seen, regulation can generate inefficiencies under another point of view can be seen as an opportunity for fintech start-ups to gain credibility and trust towards customers.

For what concern the risks related with the development of new fintech solutions, the attention is on the level of financial education of the final customers. Indeed, with the development of digital platforms and channels more and more people are starting to have the access to instruments that are really sophisticated and complex in their functioning. For example, there are several platforms that are giving the opportunity to clients to invests their money in the financial markets through ETF, bonds, auto-generated portfolio etc. For this reason, it is needed an increased awareness from the customers towards the risks associated with those instruments and stricter controls from the financial authorities in order to guarantee a proper functioning.

LIMITATIONS AND FURTHER RESEARCH

The aim of the research was to understand how fintech solutions were addressing the SDGs in EU. For this purpose, were taken under study 3 cases from two different sectors. However, there are several markets and categories of fintech solutions that are creating sustainable alternatives. For example, instruments such Robo Advisors, Green Bonds, Digital Banks are contributing in a different way and is it interesting to study the implications and impact on the SDGs. For this reason, is it needed further research on the

topic, in order to get a deeper insight on the phenomenon and to elaborate more general results.
Another aspect to take into account is about the different type of technologies adopted in those fintech instruments, it will be interesting to study how IoT, Machine Learning and blockchain based applications are answering to the challenges posed by the sustainable development.
In this research due to time and resource constraints were taken into account only three cases. Further research can help to better explore this world and the opportunities deriving from the adoption of new technologies for the creation of sustainable fintech solutions.

REFERENCES

Adams, Anne and Cox, Anna L. (2008). Questionnaires, in-depth interviews and focus groups. In: Cairns, Paul and Cox, Anna L. eds. Research Methods for Human Computer Interaction. Cambridge, UK: Cambridge University Press, pp. 17–34.

Barras, Richard, (1990), Interactive innovation in financial and business services: The vanguard of the service revolution, *Research Policy*, 19, issue 3, p. 215-237, https://EconPapers.repec.org/RePEc:eee:respol:v:19:y:1990:i:3:p:215-237.

Blakstad, S., & Allen, R. (2018). *FinTech Revolution*. Springer International Publishing. https://doi.org/10.1007/978-3-319-76014-8

Belleflamme, Paul and Lambert, Thomas and Schwienbacher, Armin, Crowdfunding: Tapping the Right Crowd (July 9, 2013). Journal of Business Venturing, 2014, 29(5), 585-609. Available at SSRN: https://ssrn.com/abstract=1836873

Falcone, P. M., Morone, P., & Sica, E. (2018). Greening of the financial system and fuelling a sustainability transition. *Technological Forecasting and Social Change*, *127*, 23–37. https://doi.org/10.1016/j.techfore.2017.05.020

Gabor, D., & Brooks, S. (2017). The digital revolution in financial inclusion: International development in the fintech era. *New Political Economy*, *22*(4), 423–436. https://doi.org/10.1080/13563467.2017.1259298

Gomber, P., Kauffman, R. J., Parker, C., & Weber, B. W. (2018). On the Fintech Revolution: Interpreting the Forces of Innovation, Disruption, and Transformation in Financial Services. *Journal of Management Information Systems*, *35*(1), 220–265. https://doi.org/10.1080/07421222.2018.1440766

Gerring, J. (2007) Case Study Research: Principles and Practices. Cambridge University Press, Cambridge.

Gomber, P., Koch, J.-A., & Siering, M. (2017). Digital Finance and FinTech: Current research and future research directions. *Journal of Business Economics*, *87*(5), 537–580. https://doi.org/10.1007/s11573-017-0852-x

Hellström, T. (2007). Dimensions of environmentally sustainable innovation: The structure of eco-innovation concepts. *Sustainable Development*, *15*(3), 148–159. https://doi.org/10.1002/sd.309

Jansson, J., Marell, A., & Nordlund, A. (2010). Green consumer behavior: Determinants of curtailment and eco-innovation adoption. *Journal of Consumer Marketing*, *27*(4), 358–370. https://doi.org/10.1108/07363761011052396

International Monetary Fund (2016), Fintech and Financial Services: initial considerations

Larios-Hernández, G. J. (2017). Blockchain entrepreneurship opportunity in the practices of the unbanked. *Business Horizons*, *60*(6), 865–874. https://doi.org/10.1016/j.bushor.2017.07.012

Lee, I., & Shin, Y. J. (2018). Fintech: Ecosystem, business models, investment decisions, and challenges. *Business Horizons*, *61*(1), 35–46. https://doi.org/10.1016/j.bushor.2017.09.003

Lerner, J. (2006). The new new financial thing: The origins of financial innovations☆. *Journal of Financial Economics*, *79*(2), 223–255. https://doi.org/10.1016/j.jfineco.2005.01.004

Lusardi, A. (2019). Financial literacy and the need for financial education: Evidence and implications. *Swiss Journal of Economics and Statistics*, *155*(1), 1. https://doi.org/10.1186/s41937-019-0027-5

Mathews, J. A., Kidney, S., Mallon, K., & Hughes, M. (2010). Mobilizing private finance to drive an energy industrial revolution. *Energy Policy*, *38*(7), 3263–3265. https://doi.org/10.1016/j.enpol.2010.02.030

Mollick, Ethan R., The Dynamics of Crowdfunding: An Exploratory Study (June 26, 2013). Journal of Business Venturing, Volume 29, Issue 1, January 2014, Pages 1–16. Available at SSRN: https://ssrn.com/abstract=2088298

Najam, A. (2002). Financing Sustainable Development: Crises of Legitimacy. *Progress in Development Studies*, *2*(2), 153–160. https://doi.org/10.1191/1464993402ps036xx

Nassiry, D. 2018. The Role of Fintech in Unlocking Green Finance: Policy Insights for Developing Countries. ADBI Working Paper 883. Tokyo: Asian Development Bank Institute. Available: https://www.adb.org/publications/role-fintech-unlocking-green-finance

OECD Directorate for Science, Technology and Innovation(2014), "Assessing the Impact of State Interventions in Research – Techniques, Issues and Solutions", unpublished manuscript.

Ozili, P. K. (2018). Impact of digital finance on financial inclusion and stability. *Borsa Istanbul Review*, *18*(4), 329–340. https://doi.org/10.1016/j.bir.2017.12.003

Palladino, L. (2019). Democratizing Investment. Politics & Society, 47(4), 573–591. https://doi.org/10.1177/0032329219878989

Polzin, F., von Flotow, P., & Klerkx, L. (2016). Addressing barriers to eco-innovation: Exploring the finance mobilisation functions of institutional innovation intermediaries. *Technological Forecasting and Social Change*, *103*, 34–46. https://doi.org/10.1016/j.techfore.2015.10.001

Puschmann, T. (2017). Fintech. *Business & Information Systems Engineering*, *59*(1), 69–76. https://doi.org/10.1007/s12599-017-0464-6

Rennings, K. (2000). Redefining innovation—Eco-innovation research and the contribution from ecological economics. *Ecological Economics*, *32*(2), 319–332. https://doi.org/10.1016/S0921-8009(99)00112-3

Sustainable Digital Finance Alliance, Digital Technologies for Mobilizing Sustainable Finance, October 2018

The Economist (October 2019), Masters of the universe: how machines are taking over Wall Street,23-26

Tufano, Peter, (1989), Financial innovation and first-mover advantages, *Journal of Financial Economics*, 25, issue 2, p. 213-240, https://EconPapers.repec.org/RePEc:eee:jfinec:v:25:y:1989:i:2:p:213-240.

Tufano, P. (2003). Financial Innovation. In *Handbook of the Economics of Finance* (Vol. 1, pp. 307–335). Elsevier. https://doi.org/10.1016/S1574-0102(03)01010-0

Wang, Y., & Zhi, Q. (2016). The Role of Green Finance in Environmental Protection: Two Aspects of Market Mechanism and Policies. *Energy Procedia*, *104*, 311–316. https://doi.org/10.1016/j.egypro.2016.12.053

UN General Assembly, *Transforming our world : the 2030 Agenda for Sustainable Development*, 21 October 2015, A/RES/70/1, available at: https://www.refworld.org/docid/57b6e3e44.html

UNEP Inquiry, *Fintech and Sustainable Development Assessing the Implications,* December 2016

UNSG (June, 2019), *Harnessing the digitalization of finance for the sustainable development goals.*

Vulkan, Nir & Åstebro, Thomas & Sierra, Manuel Fernandez, 2016. "Equity crowdfunding: A new phenomena," Journal of Business Venturing Insights, Elsevier, vol. 5(C), pages 37-49.

Yin, R. (2014). Case Study Research: Design and Methods (5th ed.). Thousand Oaks, CA: Sage Publications, Inc.