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Conceptualising Sustainability in the Fintech Sector

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Conceptualising Sustainability in the Fintech Sector

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TABLE OF CONTENTS

INDEX OF FIGURES 7

INDEX OF TABLES 8

I. INTRODUCTION 9

I.1. Relevance of the research 13

I.2. Research method 15

I.3. Research findings 16

I.4. Recommendations for future research 18

II. LITERATURE REVIEW 20

II.1. The role of corporations in sustainable development 20

II.1.1. Business strategy and sustainable development 21

II.1.2. Stakeholders and corporate sustainability 25

II.1.3. Innovation for sustainable development 29

II.1.4. Sustainable business models 32

II.2. Traditional banks and sustainable development 35

II.2.1. Sustainable development and banking strategy 36

II.2.2. The role of stakeholders in banks' sustainability 39

II.2.3. Sustainability frameworks for banks 44

II.2.4. Shifting toward alternative business models and digitalization 48

II.3. Fintechs and sustainable development 52

II.3.1. The emergence and growth of Fintechs 52

II.3.2. The actor-based evolutionary approach of Fintechs 60

II.3.3. The resource-based approach of Fintechs 61

II.3.4. Social and environmental impact of Fintechs 65

II.3.5. Sustainability frameworks for Fintechs 73

II.3.6. Potential risks of Fintechs in relation to sustainable development 75

III. RESEARCH DESIGN 78
III.1. Research questions 79
III.2. Research methodology 80
III.3. Research process 81
III.3.1. Interview preparation 84
III.3.2. Pilot period 86
III.3.3. Initial sampling 87
III.3.4. Memo creation 87
III.3.5. Comparison of data 88
III.3.6. Coding 88
III.3.7. Theoretical sampling 88
III.3.8. Theoretical saturation 89
III.3.9.Theory, concept development 89
III.4. Research boundaries, limitations, and distortive effects 90
IV. RESEARCH RESULTS 94
IV.1. Overview of research data 94
IV.1.1. Company attributes 94
IV.1.2. Interviewee attributes 96
IV.2. The triple-bottom-line concept in Fintech companies 97
IV.2.1. Core categories and sub-categories of Research Question 1 97
IV.2.2. Impact of company operations 98
IV.2.3. Product and service development 102
IV.2.4. Impact of Fintech products and services 114
IV.3. Motivations and barriers in the Fintech sector 134
IV.3.1. Core categories and sub-categories of Research Question 2 135
IV.3.2. External Stakeholders 136
IV.3.3. Internal Stakeholders 145
IV.3.4. Technology 149
IV.3.5. Global Events 152

V. DISCUSSION OF RESEARCH RESULTS 155

V.1. Discussion of Research Question 1 155

V.2. Discussion of Research Question 2 160

V.3. Discussion of the sub-questions of the research 165

V.4. Triple-bottom-line concept map of Fintechs 168

VI. CONCLUSIONS 172

VI.1. Overview of the research 172

VI.2. Methodological significance 173

VI.3. Theoretical significance 174

VI.4. Recommendations for future research 177

VII. REFERENCES 179

VIII. APPENDICES 201

INDEX OF FIGURES

Figure 1: Resource-based pyramid of Fintechs 61

Figure 2: Core categories of Research Question 1 98

Figure 3: Sub-categories of Company Operations 99

Figure 4: Sub-categories of Product and Service Development 103

Figure 5: Sub-categories of Fintech products and services 115

Figure 6: Core categories of Research Question 2 136

Figure 7: Sub-categories of External stakeholders 136

Figure 8: Sub-categories of Internal stakeholders 146

Figure 9: Sub-categories of Technology 149

Figure 10: Sub-categories of Global events 153

Figure 11: Generic concept map of Fintechs 169

Figure 12: Triple-bottom-line concept map of Fintechs 170

INDEX OF TABLES

Table 1: Threats associated with avoiding SD considerations 36

Table 2: Four strategic phases of corporate sustainability transformation 38

Table 3: Key sustainable banking frameworks 46

Table 4: Definitions of the Fintech sector 53

Table 5: Key value drivers of Fintechs 65

Table 6: TBL elements in financial products 66

Table 7: Example of Fintech companies with a TBL impact 72

Table 8: Managing GTM validity risks 91

Table 9: Attributes of Fintech companies in the research 95

Table 10: Interviewee attributes of the research 96

Table 11: Core and sub-categories of Research Question 1 97

Table 12: Core and sub-categories of Research Question 2 135

Table 13: Assessing key value drivers behind Fintechs in 2017 and 2022 166

Table 14: Research findings related to ‘Pioneering services’ 167

Table 15: Research findings related to ‘Human-centered design’ 168

I. INTRODUCTION

More than 50 years ago, in *The Limits to Growth*, the Club of Rome published a warning. The authors forecasted that if the present growth trends in the world population, industrialization, pollution, food production, and resource depletion continued unchanged, the limits to growth on this planet would be reached within the next one hundred years (Meadows et al., 1972). The report received considerable attention. Environmentalists applauded the report, but other stakeholders, such as politicians, companies, and economists, were less enthusiastic about the concept of a zero-growth economy (Colombo, 2001). The report's key message was that the continued growth of the global economy would lead to overshooting planetary limits by the twenty-first century, leading to a potential collapse of the population and economy (Turner, 2008).

The Limits to Growth attracted attention to the importance of 'sustaining' but the term sustainable development (SD) became popular only 15 years later. The United Nations, in its report "Our Common Future", made sustainable development its core principle. The report, known as the "Brundtland Report", proposes long-term strategies for achieving sustainable development. The report defined sustainable development as development that meets the needs of the present without compromising the ability of future generations to meet their own needs (Brundtland, 1987).

Lélé highlighted the importance of taking a holistic approach to sustainable development and that corporations and society must work together (Lélé, 1991). Businesses need to support sustainable development, irrespective of their operating sector. To do so, they must reinvent how they create and deliver value (Cooper, 1994). Elkington created the triple-bottom-line (TBL) concept to help corporations operationalize the concept of sustainability. The triple-bottom-line concept assumes that a company's strategy should rely on three main pillars: economic, environmental, and social value creation. Sustainable organizations understand that pursuing financial profit involves obligations toward internal and external stakeholders, society, and the environment (Elkington, 1997).

Sustainable development has become key to changing the unsustainable structure of the current economy and more sustainably distributing resources (Van den Bergh, 2007). Sustainable development requires a complex approach to balancing economic growth and environmental and social improvements (Charter et al., 2008; Hall et al., 2010). Social expectations and customer demand play an important role in how companies conduct their business. To meet customer demand, companies must include sustainable development considerations in their strategy-making and day-to-day activities (Birkin et al., 2009). All stakeholders must support sustainable development to achieve systemic changes. Stakeholders include the public and private sectors and developed and developing countries (Perrini, Tencati, 2006; Ashoka, 2010; Fisac Garcia et al., 2013).

Banks are a key part of the private sector. Banks significantly affect sustainable development through their social and environmental impact and intermediary role between savers and borrowers. A bank's mission is critical to its social and environmental impact, as it has a cascading effect on its strategy, business models, and executable business roadmaps (Dees, 1998). Several banks have recognized the increase in demand for social and environmentally conscious services and strategically shifted to integrate more sustainability-related aspects into their businesses (Neven - Droge, 2001).

The scope of the responsibility of banks is widening, from social inclusion and environmental protection considerations to providing their products and services to socially and economically underprivileged groups. There is a critical need for a more integrated and sustainable financial system that includes new mechanisms for enhancing global financial security (Peeters, 2005).

Changing stakeholder expectations, such as an increase in the attention to labor practices, the preservation of cultural heritage, addressing climate change and wealth inequality, require banks to broaden their understanding of sustainability-related areas and their role in the process (Bromund, 2014). Banks have both direct and indirect social and environmental impacts. Banks have a direct impact via their operational activities. Direct impacts, for example, include the environmental impact of office buildings, brick-and-mortar branch networks, physical IT infrastructure, travel, paper use, waste management, and energy consumption. Their indirect impacts are more significant. These include the criteria they use for project finance, the development of new financial products and

services, and the bank's impact on social inclusion, environmental protection, and preservation (Jeucken and Bouma, 2017).

Banks also play an important role in supporting sustainable development via their financing activities. Sustainable development requires significant mobilization of capital. The United Nations continues to play an important role in sustainable development with several key initiatives. The 2030 Agenda for Sustainable Development highlights the need to create an efficient and sustainable economy for supporting sustainable development and defines 17 Sustainable Development Goals (SDGs) and 169 targets (Mika and Farkas, 2017). The SDGs will play an important part in global sustainability-related initiatives and rely on public and private financing. SDGs include both social and environment-related goals.

The Paris Agreement, which targets a subset of sustainability – climate change – was concluded in 2015 to limit the maximum rise in global temperature to a maximum of 1.5-2 degrees Celsius. Scholars estimate that approximately three trillion USD in green investments are required globally in a year to reach the ambitious target (Schmidt-Traub, 2015; Schmidt-Traub and Sachs, 2015; Puschmann et al., 2020; Bhowmik, 2022). Estimations of the total amount of investment required vary from 20 to 23 trillion USD (Ethical Markets Media, 2011), to 53 trillion USD (Dhungel, 2022) until 2030.

Evidence shows that banks have not fully lived up to their expected role in supporting sustainable development. It is estimated that in 2021, 632 billion USD was invested into green initiatives, far less than the required three trillion USD a year (Clark, Reed, Sunderland, 2018; Dhungel, 2022). Banks have also failed to reach and involve a significant part of society in the financial sector. In 2013, the World Bank Group set the challenging target that all of the two billion unbanked adults should have a bank account by 2020 (Michael et al., 2022). This goal was not met: Demirgüç-Kunt et al. estimates there are still 1.4 billion unbanked adults worldwide (Demirgüç-Kunt et al., 2022).

Sustainable development requires systemic innovation (Boons et al., 2013). Newly emerging financial technology companies – Fintechs – have started filling the gap by leveraging information and communications technology (ICT) and new financial business models. Fintechs started gaining momentum almost fifteen years ago as a result of the

global financial crisis in 2008, when traditional banks held back from providing financial services (Arner et al., 2016). Since then, Fintechs have become a powerful driver of technological change in the financial sector. Fintechs have grown significantly in the past years, and today there are almost 19,000 Fintechs globally (CB Insights database, 2022). Total investment into Fintechs reached approximately 214 billion USD between 2010 and 2021 (Statista.com, 2022), and now almost 300 Fintech companies have been valued at at least one billion USD (FintechLabs.com, 2022).

Fintechs have successfully entered many core areas previously dominated by banks and could change the public perception of financial services. Research by PwC, an international professional services firm, confirmed that one in every three Millennials does not think they will need a traditional bank to help manage their finances (PwC, 2016).

The social impact of Fintechs has already become evident. Fintechs have seen the market opportunity in the currently underbanked population. The perceived lack of empathy and proximity of traditional banks to underbanked users creates a market opportunity for financial inclusion, where Fintech companies may prosper (Tate and Bals, 2016). There are already more than twenty Fintech companies with an active user base of more than one million users, and some Fintech companies have more than 100 million users (CB Insights Database, 2022).

A recent global event further highlighted the need for fully digital financial services. COVID-19 resulted in a global pandemic, and people needed to stay home. As coronaviruses can survive for several days on the surfaces of items, including fiat money, customers started to use cashless payment methods more often. The pandemic resulted in substantial growth in Fintech services (Singh and Sharma, 2022). COVID-19 has increased the need for digital financial services and highlighted the need for digital financial inclusion (Tay et al., 2022). Due to the pandemic and the ongoing climate, inequality, and sustainability crisis, the importance of SD has further increased. It has also become more obvious that finance needs to become more resilient and have means of supporting SD efficiently. COVID-19 has also reinforced the importance of technology and the digitalization of processes (Arner et al., 2022).

I.1. Relevance of the research

The literature – as presented in detail in Section II – highlights that while a large body of knowledge is available about the role of corporations and traditional financial institutions, such as banks in supporting sustainable development, our understanding of the sustainability implications of Fintechs is still limited.

The research also identified numerous definitions of Fintechs, demonstrating an overlap between Fintechs and traditional banks. The author provides a detailed overview of definitions of the Fintech sector in Section II.4. Most definitions focus on the technological aspect of Fintechs, and do not distinguish Fintechs from traditional banks. However, this distinction is necessary for examining the environmental and social performance of Fintechs separately from traditional banks. The author addresses the shortcomings of current definitions of Fintech in the research by providing the following definition:

Fintech refers to ventures without a banking license whose goal is to develop and provide novel, technology-enabled financial services with a value-added design that will transform current financial practices.

The literature review also revealed that while numerous sustainability frameworks have been designed for traditional banks, there is no detailed understanding of the social and environmental impact of Fintechs and their role in supporting sustainable development. Arner et al. provide a comprehensive overview of how Fintechs have emerged from an actor-based evolutionary perspective (Arner et al., 2015). The present author has published a complimentary resource-based evolutionary perspective (Varga, 2017). These articles are useful from a sector evolution perspective, but they do not provide a conceptual understanding of the sustainability performance of Fintechs.

Researchers have examined the banking sector's environmental and social impact. Banks' direct environmental impact is primarily due to the physical conditions of banking operations, the branch networks of banks, their energy and paper usage, and the environmental burdens that are generated during their operations. The indirect impacts are more difficult to measure. Banks have an indirect social and environmental impact via their products and services. To whom funds are provided, under what conditions, and for what purpose affect the indirect social and environmental impact (Jeucken and

Bouma, 2017). Several international organizations have issued guidelines for banks to help them standardize sustainable lending methods, such as the Equator Principles and the Global Alliance for Banking on Values. Banks can voluntarily join an organization and start implementing the guidelines provided by them. More than ten major international organizations have created a sustainability framework for banks to increase their direct and indirect social and environmental performance (Varga, 2018).

Fintech companies also have a direct and indirect environmental and social impact. On the one hand, Fintechs typically operate with less physical infrastructure and fewer offices and do not operate branch networks. Their processes are primarily digital and paperless. On the other hand, Fintechs can have a large indirect impact. Fintech company successes – such as M-PESA – show that Fintech products and services can effectively reach younger generations and serve as payment infrastructure for entire countries (Mas and Radcliffe, 2010).

The present research aims to fill a gap in the current literature concerning the understanding of how Fintechs incorporate environmental and social aspects into their operations, products, and services. The literature review, as described in Section II, validates the relevance of the research questions. In terms of impact understood from a sustainable development perspective, it is important to distinguish Fintech companies from banks: Fintechs are normally of a different organizational size, have different resources, and operate in different regulatory environments (Jagtiani and John, 2018). The literature review reveals that:

1. No studies have comprehensively examined the social and environmental impact of Fintechs in terms of their operations and product and service development;
2. Few researchers have examined how Fintechs incorporate social and environmental aspects into product and service development;
3. No qualitative exploratory research is available on Fintechs and their impact on sustainable development.

The author developed two main research questions to fill the gaps:

- Research question 1: How does the triple-bottom-line concept appear in the operations (direct impact) and the products and services (indirect impact) of Fintech companies?
- Research question 2: What are the motivations for and barriers to incorporating triple-bottom-line aspects into the operations and product and service development of Fintech companies?

I.2. Research method

The research is unique in the literature on Fintechs as it is the first to use grounded theory methodology (GTM) to examine Fintechs from the perspective of their direct and indirect social and environmental impact. The author decided to conduct exploratory research to fill the gap in the current understanding. The 'Research methodology' section gives a detailed overview of the research design. The author describes the design and the execution of the GTM research in detail to support the validity of the results and make it possible for future researchers to replicate the research.

The research followed the principles of GTM as Glaser and Strauss defined them (Glaser and Strauss, 1967) and leveraged the literature regarding implementing GTM in other contexts.

The research can be classified as cross-sectional, as the data collection took place at one time, lasting for three months (Babbie, 2003). The author used unstructured interviews during the initial sampling period, as proposed by Duffy et al., 2004, Charmaz, 2006 and Falus, 2014. The interviews shifted to being semi-structured during the theoretical sampling phase to inquire more deeply into specific areas. Probes – follow-up clarification questions – were used during the unstructured and semi-structured interviews as recommended by Duffy et al. (2004), Easwaramoorthy and Zarinpoush (2006), and Breckenridge (2014). The author also leveraged Charmaz's recommendation of using the technique of intensive interviewing (Charmaz, 2006).

The research applied GTM by going through the phases of the pilot period, initial sampling period, theoretical sampling period, and theory development. During the

iterative research process, the author created field notes and research memos to capture ideas that emerged during the research. Each interview was analyzed iteratively by leveraging open coding and axial coding. Almost 230 pages of verbatim interview transcripts were created and analyzed during the interview stage using the qualitative software package NVivo. The research progressed through 15 interviews from the initial and the theoretical sampling periods until it reached the point of theoretical saturation.

I.3. Research findings

The detailed findings of the research can be found in the 'Research Results' and the 'Discussion of Research Results' sections.

The Fintechs included in the research were from Europe (Hungary and Switzerland), Asia (Hong Kong and India), and North America (Canada, Cayman Islands, and the United States). Some of the Fintechs included in the research were small private companies, but large, already public Fintech companies with thousands of employees were also included. The research included Fintechs from various domains, such as payment and lending, capital markets, green and ESG, crypto, and Web 3.0. The author also included company representatives from Fintech advisory, cloud system integrator, and money markets domains.

The interviews made it apparent that while some respondents were familiar with the terms sustainable development, sustainable development goals, or the triple-bottom-line concept when speaking about sustainable development in the financial sector, the concept of Environmental, Social, and Governance (ESG) was used most frequently. The author made sure that respondents received the necessary introduction to the terms before the interviews started to ensure that when speaking about ESG, respondents were thinking about the subject holistically.

The research successfully delivered answers to both research questions. Addressing Research Question 1 resulted in three core categories: the impact of company operation, product and service development, and the impact of Fintech products and services.

From a direct economic impact perspective, company revenues and employee ownership emerged as sub-categories. Market efficiency, access to markets, ecosystem development,

financial fitness, illegal activity and fraud, green economy, and the token economy emerged as the areas where Fintechs have the largest indirect economic impact.

From the perspective of direct social impact, company culture and structure play a significant role in Fintechs. From an indirect social impact perspective, Fintechs affect financial inclusion, financial education, the labour market, environmental awareness, digital society, the democratization of access, fraud, speculation, and indebtedness.

The direct environmental impact of Fintechs was strongest in the areas of cloud and IT infrastructure, office space, employee traveling, digital, paperless processes, and environmental awareness. Fintechs also have an indirect environmental impact via digitalization, green project development, product technology, and speeding up economic transactions.

The research results show that Fintechs have significant direct and indirect social and environmental impacts.

Research Question 2 was also associated with meaningful findings. Based on the answers, it became clear that the motivation of Fintech to adopt triple-bottom-line aspects within their operations, products, and services can be described by leveraging stakeholder theory. From the external stakeholder perspective, customers, regulators, standard organizations, suppliers, society, external auditors, and the United Nations emerged as critical stakeholders. Founder-managers, employees, and company investors were the important stakeholders with a strong motivational impact on Fintechs.

Global events, such as COVID-19, the war in Ukraine, and the financial crisis in 2008, emerged as important external events. New technologies were important sources of motivation. New technologies such as blockchain, smart contracts, cloud technology, APIs, and artificial intelligence impacted the development of new Fintech products and services.

The author combined the research results into a single ‘Sustainability concept map of Fintechs’. The concept map illustrates the direct and indirect economic, social, and environmental impact of Fintechs, and their key motivational factors, including

stakeholders, global events, and technology. The 'Sustainability concept map of Fintechs' is a holistic illustration of the findings that can support later researchers to create formal theory about the impact of Fintechs on sustainable development.

I.4. Recommendations for future research

Fintech is still under-researched from a sustainable development and TBL perspective. The current research could fill some of the existing gaps in the knowledge regarding the environmental and social impact Fintechs have through their operations, products, and services. Some areas identified during the research could serve as focused guidance for future research. Suggestions for further research can be summarized as follows:

1) The current research did not result in formal theory. The author strove to develop substantive theory that – together with further research – could contribute to a more comprehensive, conceptual-level understanding of Fintechs. Glaser and Strauss describe substantive theory as the formulation of concepts and their interrelation into a set of hypotheses associated with a given substantive area. They underline the importance of substantive theories, as the latter are required to establish the baseline knowledge within a substantive area, motivate researchers to create formal theory, and can also help overcome the difficulties associated with empirical research in unknown research domains (Glaser, Strauss, 1965). The current research and its design could serve as a baseline for creating formal theory if the detailed research design were extended to cover a representative global sample of the Fintech sector.
2) Leverage the learnings from the current research and future formal theory to create a Fintech-specific TBL value-creation framework that provides guidance and measurement criteria for Fintechs to ensure they can maximize their positive TBL impact while minimizing negative ones.
3) Undertake focused research in the areas that emerged during the current research where Fintechs could potentially have a negative TBL impact and use the findings to create executable action plans to ensure Fintechs are positively contributing to the economy, society, and the environment. Some potential threats are i) the lack of regulation and a common taxonomy of Fintechs with a special focus on the emerging crypto market, and ii) an examination of the impact of Fintechs and BigTech on the stability of the wider financial market.

4) The author suggests keeping the research on the TBL impact of Fintechs alive. A permanent forum could be created at which the stakeholders identified in the current research could evaluate and discuss research directions regarding Fintechs and their involvement in SD on a regular and recurring basis. Discussions between the key stakeholders need to be captured in the form of executable global roadmaps in which progress against goals is continuously measured.

II. LITERATURE REVIEW

Corporate sustainability is a complex and far-reaching concept, including ecosystem and environmental issues, supply chains, lifecycle and value networks, sustainable entrepreneurship, management systems, strategy, innovation, and business models (Amini and Bienstock, 2014). To support sustainable development, companies must contribute to solving economic, social, and environmental challenges in the short, medium, and long term and manage the conflicting demands of various time horizons (Morioka et al., 2016).

The literature review provides an overview of relevant disciplines that are interconnected with corporate sustainability and describes the role of traditional banks and Fintechs. The literature review analyzes and links together multiple research areas to provide an overview of and identify gaps in the current knowledge about Fintechs from an economic, environmental, and social impact perspective. The following sections describe the role of corporations, traditional banks, and Fintechs in supporting sustainable development.

II.1. The role of corporations in sustainable development

Sustainable development has come a long way since the Brundtland Report popularized the concept (Brundtland, 1987). Lélé warned that while poverty was largely responsible for environmental degradation, thus increasing economic output seems to be a rational solution to it, economic growth alone will never be the sole cause of sustainable development (Lélé, 1991). Elkington's work helped to link the concept of corporate growth with the sustainability performance of corporations by creating the concept of the triple bottom line. The TBL further highlights the importance of the role of corporations and provides a framework whereby, besides economic goals, corporations should equally pay attention to their environmental and social impact (Elkington, 1997).

From the perspective of definitions, researchers have agreed that corporate sustainability refers to meeting current stakeholders' expectations without compromising the ability of future stakeholders to meet theirs (Dyllick and Hockerts, 2002). Corporations must be able to operate over a long period, with the main objective of value creation (Perrini and Tencati, 2006). Authors such as Ny have highlighted that overly philosophical

sustainability definitions need to be translated into more practical, business-related concepts to support the corporate measurement of sustainability performance in a targeted, industry-specific way (Ny, 2006). The diversity of corporate sustainability standards and schemas (such as ISO 9001, ISO 14001 and SA8000, AA1000, AS/NZS 4801, EMAS, and OHSAS 18001) is making it hard for corporations to obtain a unified view of their sustainability-related performance (Mulgan, 2010; Siew, 2015; Egler, 2016; Grimm et al., 2016).

Schaltegger et al. concluded that "corporate sustainability can be understood as the successful market-oriented realization and integration of ecological, social, and economic challenges to a company" (Schaltegger et al., 2013).

II.1.1. Business strategy and sustainable development

It is not one of the goals of the current research to provide an extensive overview of the literature about corporate strategy, as other researchers have already done this. However, it is important to highlight elements of corporate strategy from the corporate sustainability perspective, as this creates a useful background for understanding how banks and Fintechs may rely on corporate strategy to pursue business cases with a positive environmental and social impact.

The application of classical strategy-formulation frameworks has been a primary means of creating new business opportunities for decades. Four popular strategy frameworks companies could use to create their corporate sustainability strategies are described in what follows. Grant's framework recommends that companies need to evaluate five factors when creating their corporate strategy: 1) identify and classify the firm's resources and appraise strengths and weaknesses relative to its competitors, 2) identify the firm's capabilities: what can it do more effectively than its rivals?, 3) appraise the rent-generating potential of resources in terms of their potential for sustainable competitive advantage and their returns, 4) select a strategy which best exploits the firm's resources and delivers value to its customers, and 5) identify resource gaps which need to be filled and improve core competencies (Grant, 1991).

As Prahalad and Hamel claimed, the job of management is to create a strategy that builds on the organization's core competencies and to link these competencies with the creation of end products (Prahalad and Hamel, 1990). Only those companies can sustain their strategic advantage that can maximize the use of their intangible resources, such as internal knowledge, in their operations and development process (Hall, 1993).

A company's strategy breaks down the company's vision into manageable business models and executable business roadmaps. For example, social businesses consider the social mission of the company to be a fundamental factor in strategy formulation (Dees, 1998).

Robèrt also provided a practical framework by which corporations can design their sustainability strategy. Robèrt proposed the consideration of five interdependent but separate levels when designing corporate sustainability strategies: 1) clarifying the social and environmental impact of the company, 2) specifying success criteria, which involves listing the key criteria by which the company can assess its progress towards its sustainability goals, 3) defining strategic guidelines with a core guiding framework, 4) defining actions, which are the concrete steps required to implement the strategy, and last, 5) identifying the tools by which the company can monitor its progress in the previously defined four areas (Robèrt, 2000).

Epstein and Roy proposed another five-component framework for strategy execution, where sustainability-related decisions became part of the company's boardroom discussions: 1) management needs to define a corporate sustainability and business unit strategy, 2) sustainability actions should be determined: this includes developing plans and programs and setting up the appropriate structures and systems, 3) a sustainability performance system should be implemented, 4) stakeholders reactions should be monitored, and 5) corporate financial performance should be evaluated (Epstein and Roy, 2001).

Companies may also rely on Porter's diamond model to maneuver their business environment to achieve a competitive advantage. This involves: 1) revisiting the company's strategy and underlying structure, 2) identifying market and customer demand conditions, 3) factoring in the conditions and resources that are available to the business,

and 4) identifying the opportunities in related and supporting industries. Continuous reassessment of these factors can help companies better understand the options for making a strategic shift (Neven and Droge, 2001).

The effectiveness of corporate sustainability strategy can be measured using the six criteria described by Dyllick and Hockerts. The latter authors described the six criteria in 2002 in their publication “Beyond the business case for corporate sustainability”. The concepts of eco-efficiency, eco-effectiveness, socio-efficiency, socio-effectiveness, sufficiency, and ecological equity describe a corporation's sustainability strategy impact.

Eco-efficiency is achieved by creating competitively priced goods and services that improve the quality of life, meet customer needs, and are produced with a declining ecological impact and resource intensity. Eco-effectiveness refers to the fact that processes need to be designed to be sustainable and renewable (DeSimone and Popoff, 1997; Dyllick and Hockert, 2002).

Socio-efficiency involves minimizing the negative or maximizing the positive social impacts of the value-creation process. Socio-effectiveness implies that companies should be judged not on a relative scale but on their absolute social impact. As stated by Dyllick, Hockert, and Oxfam, a large proportion of what Hart and Prahalad (1999) called the ‘bottom of the pyramid’ (of the global population) is excluded from even the most basic services and products such as food, health, and financial services or communication (Dyllick and Hockert, 2002, Oxfam, 2001).

Sufficiency and ecological equity describe the interactions between a company and society from an environmental point of view. Sufficiency relates to the demands and perceptions of customers towards the company. Sufficiency refers to the power of customers over companies through their purchasing power. If customers reject a company’s product, this generates a strong incentive for the company to adapt to meet expectations about sufficiency. Ecological equity refers to how companies ensure that their current environmental footprint will not jeopardize the access to natural and social capital of future generations and thus hinder the sustainable use of natural and social capital (Dyllick and Hockert, 2002).

Larson highlighted that company management needs to continuously evaluate strategic options by leveraging real options strategies to adapt to rapidly changing market demands and innovate products and services with positive social and environmental impact (Larson, 2000). Strategy creation and execution help companies increase their positive social and environmental impact. However, the lack of sustainability-performance goals can mean that the impacts of strategy creation are only of short-term benefit. Figge et al. propose that company measurement frameworks, such as balanced scorecards, should not only include financial-, customer-, internal process-, and learning perspectives but also be expanded with social, economic, and environmental criteria (Figge et al., 2002).

Corporations could decide to be reactive or proactive in terms of balancing their financial goals and sustainability-related performance. Aragon-Correa and Sharma have claimed that environmental regulation could increase competitive advantage, but the benefits of sustainability-related investment largely depend on the company's business environment. Overly proactive environmentalism may not improve competitiveness (Aragon-Correa and Sharma, 2003).

The corporate strategy defines the organization’s role in its physical and social environment (Mansfield and Fourie, 2004). Corporations rarely want to degrade the environment intentionally. However, corporations are not perfectly efficient and have an environmental impact during their production processes. These externalities are often not accounted for in their product-pricing mechanisms, leading to a non-sustainable supply-demand situation and a non-sustainable environmental strategy (Cohen and Winn, 2007). To decrease the uncertainty of unproven sustainability business strategies, companies can make small, non-binding investments to examine how the market will react to a new business strategy (Vanhaverbeke et al., 2008).

Corporate strategies can lead to systemic change. Meyskens categorized systemic change into five categories: 1) redefining the linkages and interaction among various market systems, 2) impact on public policy, 3) the impact on the relationship between companies and the public, 4) reaching out and integrating marginalized populations, 5) impact on improving the concept of social entrepreneurship (Meyskens et al., 2010).

Strategies must be designed to improve performance in predefined areas, but environmental and social performance is often excluded from strategic objectives. Corporations can choose from four strategic approaches in terms of dealing with sustainability: 1) introverted, focusing on mitigating risks and meeting minimum legal standards, 2) extroverted, focusing on external relationships, 3) conservative, focusing on efficiency through cleaner production or 4) visionary, creating a holistic corporate strategy where competitive advantage is derived from TBL considerations (Baumgartner and Ebner, 2010). Sustainability strategies to be effective must be supported by a clear business case to have longevity (Porter and Kramer, 2006; Carroll and Shabana, 2010).

Management needs to find a positive business case to ensure their stakeholders receive their sustainability strategy well. Schönbohm and Hofmann found that environmental and social performance reporting occurs less frequently in the technology sector than in the manufacturing sector. Many companies do not report how sustainability is incorporated into their vision and strategy (Schönbohm and Hofmann, 2012).

Gond et al. state that corporations should implement measurement, control, and reporting systems to supplement their rhetoric about sustainable development. Companies need to implement management and sustainability control systems to support data-driven strategy-making (Gond et al., 2012).

Another helpful tool to measure the corporation's strategy from a sustainability impact perspective is environmental management accounting (EMA). Commitment from management to continuously monitor and counteract the uncertainty caused by the changes in the physical environment can improve the company's positive environmental impact (Wijethilake and Lama, 2019).

II.1.2. Stakeholders and corporate sustainability

Researchers agree that corporations play an important part in sustainable development. Stakeholder theory has become a key concept for helping understand how corporations can be motivated to improve their sustainability-related performance.

Researchers highlighted that stakeholders such as investors were already examining companies from a sustainability-impact perspective. Investors started to associate

companies with a clear corporate sustainability strategy with delivering more predictable results (with fewer surprises or less bad news) (Knoepfel, 2001).

The role of external stakeholders has received considerable attention ever since. Frickel and Davidson underlined that companies will only support sustainable development if they include all the relevant actors (Frickel and Davidson, 2004). Carpenter and White added that companies with positive social and environmental performance could make a favorable impression on their stakeholders (Carpenter and White, 2004).

Steuer et al. highlighted that companies must create value for their stakeholders. As the demand from stakeholders changes, companies will need to find an acceptable balance between economic, social, and environmental goals. Therefore, stakeholder relations management is important from a sustainability perspective. When corporations do not respond adequately to the expectations of their stakeholders, customers may choose not to buy their products and become alienated from the company, resulting in a decrease in market share (Steurer et al., 2005).

To meet stakeholders' needs, Perrini and Tencati suggested mapping and monitoring the relationship between company and its stakeholders from a sustainability performance perspective using quantitative and qualitative measurement (Perrini and Tencati, 2006).

Muldoon focused on customer demand as an important motivational factor. It is not enough that corporations become more conscious about their environmental and social impact. Their customers need to embrace sustainable principles in their consumption and buying decisions. Environmentally conscious consumption – when consumers exercise their purchasing power to influence corporations to become more sustainable – can significantly affect businesses (Muldoon, 2006). As customer demand changes, companies must adapt quickly yet efficiently to remain competitive. More adaptive corporations will find new market opportunities, while incumbents will face ever-growing challenges from their more agile competitors. Corporations will need to shift towards robust sustainability approaches, whereby natural capital is considered non-substitutable by any form of financial capital (Steurer et al., 2005).

Vermeir and Verbeke also confirmed the importance of customers in motivating companies to improve their sustainability-related performance, and raised attention to the attitude-behavior gap of customers when buying products. This gap occurs when customers who otherwise support sustainability principles do not factor sustainability perspectives into their buying decisions. The lack of availability of green products and the behavior gap weakens the effect of customers (Vermeir and Verbeke, 2006).

Birkin et al. claim that social expectations and stakeholder demand will play an increasing role as education about sustainability reaches a threshold in large stakeholder groups. This change in demand will incentivize organizations to adapt to new expectations (Birkin et al., 2009).

Other external stakeholders on the international and national levels also play an important role in motivating companies to increase their positive social and environmental impact. Biermann et al. argue that global reforms are needed to improve sustainable development efforts, including the creation of a global sustainability framework (Biermann et al., 2012).

The EU and the United Nations (UN) are key stakeholders at the supranational level. The United Nations (UN) is trying to play a global governance role in sustainability, but it has been criticized for its failure to live up to the promise of its mission. Rasche and Waddock emphasize, however, that while there are gaps between the planned and actual effects of the UN, it has successfully bridged the communication gap between corporations, governments, and civil society (Rasche, Waddock, 2014). Through its initiatives, such as the 2030 Agenda for Sustainable Development, the UN has made it clear that corporations must play a significant role in achieving the 17 Sustainable Development Goals (SDGs). SDGs can be categorized into five main categories: 1) basic human needs, 2) equality and justice, 3) efficient, sustainable economy, 4) protecting vulnerable environments, and 5) cooperation towards common goals. Corporations are responsible for creating an efficient and sustainable economy but must also support the other four categories (Mika, Farkas, 2017).

The EU also emphasizes strengthening linkages between corporate governance, entrepreneurship, innovation, and sustainability. As a result, Corporate Social

Responsibility (CSR) programs enjoy strong support from the EU. CSR is an important corporate tool for engaging in sustainable development, although the related programs usually only create incremental change (Wagner, 2012).

Nation-states have also emerged as important stakeholders in promoting corporate sustainability. Nation-states can create the necessary sandbox for developing corporate sustainability standards, which can later be adopted by other countries or supranational organizations (Manning et al., 2012). Nation-states recognize the need to engage in sustainable development. For example, China has recognized the importance of making pro-environmental changes. The country has grown unprecedentedly over the last two decades, resulting in an accumulation of major environmental challenges and unsustainable patterns of wealth distribution. However, Chinese policies have significantly shifted to encourage the Chinese economy and society to be more sustainable and engage in the necessary economic and social reforms (Sanders and Yan, 2007). China is ranked in 14th place on the Global Competitiveness Index (Schwab, 2016) but ranks unfavorably on the global environmental index, listed in 120th place out of 180 countries (Li et al., 2022).

The role of internal stakeholders has also been closely examined. Hart and Christensen write that companies do not need to compromise growth at the altar of sustainable development. Managers can increase their company's revenues and strengthen their market position by creating new social and environmentally conscious products and services to reach new customers who are underserved by the present market players (Hart and Christensen, 2002). Management can also act as a motivational factor in the corporate ecosystem. A company's management can drive other companies to increase their sustainability-related performance to remain part of their supply chain (Dauvergne and Lister, 2012).

Critics have warned that it is wishful thinking to depend solely on the initiatives of internal stakeholders to foster better sustainability performance, as the ultimate goal for many companies is to sell more goods. Thus, no management is likely to over-extend itself due to the risk of decreasing its financial competitiveness (Dauvergne and Lister, 2012).

Internal stakeholders have also received criticism for participating in greenwashing. Checa Vergada and Agudo defined greenwashing as a set of deceitful behaviors or practices that intentionally mislead consumers about the ecological activities of an organization, or the environmental benefits of a given product, which appear to be sustainable but are not (Checa Vergada and Agudo, 2021).

II.1.3. Innovation for sustainable development

Innovation is a key enabler for supporting the holistic approach of Lélé, who claims that corporations and society must work together to support sustainable development (Lélé, 1991). Furthermore, companies have realized that successful product innovation ideas come from interacting with their stakeholders in 80% of all cases, thus including them in the innovation process is important (von Hippel, 1988).

There is a consensus among innovation researchers that innovation includes the creative process of creating new products or significantly improving the functionality of an existing product. Innovation is complete only if the creative design process ends in a commercialized and available product. Innovation includes ideation, design, implementation, hardware, and software elements during the innovation and productization phase (Rogers, 1998; von Stamm, 2003; Bátiz-Lazo and Woldesenbet, 2006; Van der Meer, 2007; Ibrahimov et al., 2019). Corporate innovation requires a trial-and-error approach (Cooper, 1994) and can create horizontal and vertical collaboration among market participants (Mytelka and Farinelli, 2000).

Open innovation (OI) has become an important innovation approach for facilitating interactions among market participants. This concept describes when stakeholders work together to increase innovation capabilities and find new marketable products and services. OI describes using purposive inflows and outflows of knowledge to accelerate internal innovation and expand markets for the external use of innovation, respectively. Open innovation builds on the understanding that good ideas can arise outside a firm's boundaries. OI can help to increase a company's innovation capacity by generating a framework of cooperation and a rationale for idea-sharing with other market players (Chesbrough, 2003; Chesbrough et al., 2006; Chesbrough, 2007).

Companies actively looking for ways to collaborate with other market participants can increase revenue and innovate new products faster. Innovation is a key enabler for corporations that wish to increase their market share by improving existing products or creating services for previously unreachable market segments (Chesbrough and Crowther, 2006).

There are three core directions of OI approaches: i) the outside-in process, ii) the inside-out process, and iii) the coupled approach. The outside-in approach is the most common, with deep historical roots in corporate venturing. Companies that act as knowledge brokers in their field for other companies have high knowledge intensity and build highly modular products. The benefits of outside-in innovations are earlier supplier integration into development, shorter time to market, customer co-development, and reduced risk and uncertainty. The inside-out process is more common in research-driven companies that want to use their internal IP base. IP licensing can substantially increase revenue. Companies that engage in both directions can gain strategic flexibility, improve the returns on their innovation efforts, and build an advantage over competitors by becoming involved earlier with disruptive technologies (Gassmann and Enkel, 2004; Vanhaverbeke et al., 2008; Enkel et al., 2009).

Innovation for sustainable development is a subcategory of corporate innovation. Charter et al. define Innovation for sustainable development as a process by which sustainability considerations (environmental, social and financial) are integrated into company systems from idea generation through research and development (R&D) and commercialization. The innovation process supporting sustainable development applies to products, services, technologies, and new business and organizational models. In addition, innovation for sustainable development includes systemness and radicalness that go beyond regular product and business development and are future-oriented (Charter et al., 2008).

Companies should implement socially and environmentally conscious innovations by following an iterative, lean approach to ensure a business case is always present (Mulgan et al., 2007). Innovation for sustainable development has two major characteristics: 1) they are intended to reduce environmental impact, and 2) the scope of the innovations may go further than minor process or product improvements and influence broader social and institutional structures as well (Carrillo-Hermosilla et al., 2010).

The Panacea Hypothesis claims that companies can lead positive societal and economic transformation. However, this transformation will not happen overnight; it will be slow and gradual. Hall et al. drew attention to the fact that there has been a lack of knowledge about the circumstances under which companies provide sustainable products or services, the conditions needed for companies to pursue sustainable innovation, and the public policy conditions needed to promote sustainable entrepreneurship (Hall et al., 2010).

Literature about innovation for sustainable development since then has established a direct linkage between successful sustainable innovations and business models. Researchers admit that businesses are crucial for identifying sustainability solutions and companies need to interact with their customers during the process (Lee et al., 2010). Co-creation has become a term used to describe a process whereby companies innovate with their users and involve them in their product and service development processes (Martovoy and Dos Santos, 2012).

Innovation is a core business necessity. The Oslo Manual categorizes innovation into four types: 1) product or service innovation, 2) process innovation, 3) organizational innovation, and 4) marketing innovation. Corporations pursue innovation to improve their product or service offerings, improve quality, enter new markets, and improve efficiency (Csizmadia and Grosz, 2012). Innovation can be disruptive and systemic or incremental, improving existing practices. Boons and colleagues argue that supporting sustainable development requires systemic innovation (Boons et al., 2013).

The importance of corporate innovation in supporting sustainability is unquestionable. However, what makes innovation pro-sustainable is disputed. Two streams of literature can be identified: 1) innovations aimed at reducing the environmental impact of economic activities, and 2) innovations that foster environmental protection independent of the original goal of the innovation (Zilahy and Széchy, 2012). Innovation for sustainable development is associated with many definitions that are used interchangeably, which can lead to confusion (Carillo-Hermosilla et al., 2010; Boons and Lüdeke-Freund, 2013).

After analyzing the literature on sustainable innovation, Goyal et al. categorized findings into three core focus areas. First is the importance of local capacity building with regard

to human capital, social capital, and organizational resources. Local engagement is important when designing products and solutions that will be adopted. Second is to build or integrate with local networks. Partnerships include cooperation with government institutions, NGOs, communities, and other market players. Third, innovation must be rooted in grassroots initiatives and field-based experimentation. Solutions that work in one market might not in another (Goyal et al., 2014). The marketing of services also needs to be changed, with messages such as thinking together, learning and doing, building social capital, building connectivity, integration, and illustrating with examples (Bharti et al., 2014).

Large corporations are easier to study from an innovation approach perspective, as they have more resources to structure their innovation processes (Lee et al., 2010). However, having more resources does not necessarily mean that larger firms are better than small ones in terms of innovation. Small- and medium-sized enterprises (SMEs) or startups can also rely on the benefits of opening up their innovation processes (Keupp and Gassman, 2007).

SMEs have the advantage of being able to be more radical in their innovation processes due to their flexibility and capabilities, and can establish outside connections with external networks more flexibly (Laursen and Salter, 2004; Edwards et al., 2005; Lee et al., 2010). Van de Vrande et al. found that small companies usually take advantage of their employees and non-R&D workers to identify new ideas, or involve their customers in co-creation processes, partly by observing what modifications the users make to their products to align them better with their needs (Van de Vrande, 2009). As a result, SMEs can rapidly become global players by innovating radically (Geels, 2005; Grin et al., 2010; Boons et al., 2013).

II.1.4. Sustainable business models

The previous sections described positive business cases and innovation as an important part of corporate sustainability strategy. Business models support the operationalization of strategy, innovation efforts, and the business case related to the company's day-to-day activities.

Morris et al. proposed a six-component framework for describing the business model. The framework is general enough to be tailored to specific company needs. The six components include 1) stakeholder identification, 2) value creation, 3) differentiation, 4) vision, 5) values, and 6) networks and alliances (Morris et al., 2005).

Business models help companies to compete based on an exceptional value-to-price ratio. Companies with a strategic approach to business models are more likely to look for differentiation factors that appeal to environmentally or socially conscious customers (Csutora et al., 2006).

The purpose of a business model is twofold: 1) it creates a series of activities and defines how an organization delivers value to its end users; 2) it captures value by maintaining and improving major resources, partners, and assets to establish a competitive advantage on the market (Chesbrough, 2007). Business models have evolved in the last decade and have become among the most important tools for creating products and services with a favorable sustainability performance (Doganova and Eyquem-Renault, 2009).

A business model describes how an organization creates, delivers, and captures value (Osterwalder and Pigneur, 2010). Business models play an important role in creating a bridge between shareholders and stakeholder expectations and the company. Business models can link the company's economic, social and environmental performance with the expectations of their stakeholders (Boons and Wagner, 2009).

Osterwalder and Pigneur improved the practical application of business models by establishing a framework with nine major building blocks, which include the following elements: 1) customer segments, 2) value propositions, 3) channels, 4) customer relationship, 5) key resources, 6) key activities, 7) key partners, 8) cost structure, and 9) revenue streams. Business models enable new market structures to come into being and make previous structures obsolete (Osterwalder and Pigneur, 2010).

Stakeholders play an important role in the company's business model formation. Companies that come under pressure from stakeholder groups, including environmental organizations, NGOs, local civil society, and customers, are more likely to adopt business

models that take into account their social and environmental performance. Regulators also play a role in influencing company business models (Széchy, 2012).

Schaltegger et al. state that although many publications claim that a business case for sustainability exists, companies cannot adopt a 'universal' business case. Instead, companies need to create and then systematically evaluate their strategic objectives. Companies can take one of four approaches to adjust their business model to their strategic objectives: they can 1) can make minor adjustments to their existing business model, whereby the value proposition of the business model remains unchanged, and only minor modifications occur, 2) imitate competitors' business models, 3) make substantial improvements, whereby the business model is adjusted substantially, or 4) redesign their business model to create a new value proposition and entirely new business case (Schaltegger et al., 2012).

The importance of business models in product and service development is undisputed among scholars. How to build sustainable business cases, however, remains to be determined. The business case for integrating sustainability into corporations still needs to be more evident. The apparent existence of a positive business case could motivate companies to move away from a perspective of 'necessary evil' to a more constructive approach, from end-of-pipe innovation through the entire process and business model redesign (Zilahy and Széchy, 2012).

Boons and Lüdeke-Freund found that the current business model literature is not explicit enough for helping combine the business model concept with firm sustainability performance. To improve the concept of business models, they propose using a four-element framework: 1) improve the value proposition to embed social and environmental value in the company's product or service, 2) involve the supply chain – suppliers, production, and marketing to support the company's sustainability initiatives, 3) improve the customer interface – implementing the relationship with customers from a social and environmental perspective, and 4) design financial models – examine and modify cost and revenue structure to develop business models associated with positive social and environmental value creation (Boons and Lüdeke-Freund, 2013).

According to Amini and Bienstock, corporations cannot positively contribute to sustainable development if they fail to link their business strategies to sustainability initiatives and design the appropriate business models to achieve this (Amini, Bienstock, 2014).

As Sinkovics et al. described, a pro-sustainable business model can emerge from a variety of building blocks. Revising the company's business can create a strategic roadmap for further developments. The continuous evaluation of the business model can create an opportunity to redefine how organizations create value for customers with environmental and social values. A sustainability-conscious business model must adequately respond to the needs of its stakeholders and local communities (Sinkovics et al., 2014).

The growing field of business model research shows that business models can be among the most effective tools for achieving system-level change (Doganova, Eyquem-Renault, 2009; Bocken et al., 2014; Yip, Bocken, 2018). For example, the sharing economy and industrial symbiosis are two profitable new business models that could significantly modify an industry's social and environmental footprint (Zilahy, 2016).

II.2. Traditional banks and sustainable development

Banks significantly impact sustainable development efforts due to their intermediary role between savers and borrowers and their role in financing economic projects, corporate innovation, and investments. In addition, banks have historically considered themselves part of an environmentally friendly industry, as their direct activity is not associated with a large emission or pollution impact

Banks have both a direct and indirect social and environmental impact. The direct effects are easy to identify: office buildings, bricks-and-mortar branch networks, physical IT infrastructure, travel, paper use, waste management, and energy consumption. Banks also have an impact on the lives of employees. Compared to such direct impacts, indirect impacts are more significant in the case of banks. They include the criteria for project finance, the development of new financial products and services, and the bank's impact on social inclusion, environmental protection, and preservation (Jeucken and Bouma, 2017).

II.2.1. Sustainable development and banking strategy

A bank's mission is a critical element of its commitment to sustainable development, as this has a cascading effect on its strategy, business models, products, and services (Dees, 1998). Measuring the societal and environmental aspects of banks is difficult. While environmental and social considerations are often missing from the strategy-making of banks, a growing number of banks are responding to the increasing demand for social and environmentally conscious services and are making a strategic shift to integrate sustainability into their businesses (Neven and Droge, 2001).

Banks must overcome their organizational challenges and establish appropriate company policies and incentives to support their sustainability efforts (Fiksel et al., 1998). For example, the African Development Bank created an integrated approach to building environmental and social impact considerations into the bank's financial institution procedures. During the loan application, repayment and loan monitoring process, the bank and the borrower must work together to meet environmental and social expectations. Borrowers are responsible for measuring and reporting the defined social and environmental parameters (African Development Bank, 2001).

Azapagic has identified five areas of potential risk for banks if they do not consider sustainable development principles in their operations: 1) technical risks, 2) legislative risks, 3) environmental risks, 4) social risks, and 5) others. The following table describes the key risks in each area:

Risk	Impact
Technical risks	● Loss of productivity and financial and environmental efficiency due to use of outdated technology ● Lack of awareness of how science and technology can improve the company's TBL ● Lack of research and development (R&D) effort into more sustainable and efficient technologies
Legislative risk	● Increased costs due to green taxes such as carbon tax ● Risk of not conforming to current or future legislation or inability to actively shape legislation ● Revoking of operating license
Environmental risk	● Increase in fines and long-term liabilities due not conforming to environmental legislation and standards

	● Environmental incidents due to careless planning ● Inability to improve internal efficiency due to lack of environmental impact and data ● Loss of competitiveness due to lack of understanding of relationship between potential environmental impact and business profitability
Social risks	● Image and brand reputation harm due to disputes and conflict with communities ● Inability to hire or attract talent due to bad reputation and public image ● Inability to ground business deeply in local communities and create services/products that meet their needs
Other	● Loss of partners, suppliers, and other value-chain actors due to stigmatized public image, or lack of ability to meet specific environmental and social-impact screening criteria ● Inability to execute long-term business strategy as short-term thinking impacts the organization's future health ● Loss of potential new markets due to poor market image

Table 1: Threats associated with avoiding SD considerations (Azapagic, 2003)

The impact of banks on sustainable development has been increasing since the 1980s. The scope of the responsibility of banks is widening, from social inclusion and environmental protection considerations to providing products and services, including credit to socially and economically underprivileged groups. As Peeters claimed, there is a critical need for a more integrated and sustainable financial system with sound new mechanisms for enhancing global financial security (Peeters, 2005).

The International Finance Corporation (IFC) defines sustainability as ensuring long-term business success while contributing to economic and social development, a healthy environment, and a stable society. The IFC's definition of sustainability, as applied to financial institutions, encompasses four sustainability dimensions of banks' performance: 1) the financial sustainability of the financial institution and its client companies so that they can continue to make a long-term contribution to SD, 2) the economic sustainability of the projects and companies the financial institution finances, 3) environmental sustainability through the preservation of natural resources, and 4) social sustainability through contributing to improved living standards, poverty reduction, concern for the welfare of communities, and respect for fundamental human rights (Gwin and Libman, 2007).

Banks typically go through four strategic phases in terms of increasing their sustainability: In phase 1, banks start with defensive banking, whereby the bank is a follower and aims only at legal compliance. Phase two involves preventive banking, when the bank identifies cost-saving opportunities and implements internal measures to make savings such as reducing the use of paper and energy. Phase three involves offensive banking, which focuses on the external market and looks for viable and sustainable business models. Phase three may include launching environmental funds and new savings and loan products. Phase four, the final phase, involves sustainable banking – when the bank streamlines its internal and external operations and creates a clear strategy built on the organization's role in fostering SD (Jeucken, 2010).

The table below presents two approaches banks can take in their strategic transformation when dealing with sustainability. Baumgartner and Ebner's framework is more general, yet can be applied to banks. Jeucken's research specifically examined banks. While there are differences in the exact content of the phases, the overall findings are strongly correlated.

	Baumgartner and Ebner, 2010	**Jeucken, 2010**
Phase 1	Introverted strategy, with a focus on risk mitigation and meeting minimum legal compliance.	Defensive banking, when the bank only does the absolute minimum to meet regulatory expectations.
Phase 2	Increasingly extroverted strategy, with improved external relationships and networks (e.g. NGOs) associated with sustainability.	Preventive banking, when the bank identifies cost-saving opportunities and implements measures associated with its own operations (e.g., reducing paper use, or energy consumption).
Phase 3	Cleaner production by removing waste creation throughout the entire lifecycle.	Offensive banking is when the bank includes sustainability in its external marketplace and identifies viable business cases.
Phase 4	Holistic corporate strategy wherein competitive advantage is derived from TBL considerations.	Sustainable banking is when the bank streamlines all its operations and defines a clear strategy for promoting SD.

Table 2: Four strategic phases of corporate sustainability transformation (source: Author's construction, based on Baumgartner and Ebner, 2010; Jeucken, 2010; Varga, 2017)

The banking sector is one of the key drivers of economic growth and should play a strategic role in promoting environmentally and socially responsible development

(Biswas, 2011). Banks have a special role in supporting the transition of the global economy and deploying enough financial funds to create new economic pathways. Therefore, policies that ensure the financial sector is actively engaged in supporting sustainable development are important. Such policies require the coordinated regulatory work of financial authorities and the surveillance and quantification of financial products' environmental and social impact (Carnicer and Penuelas, 2012).

Banks try to rationalize their involvement in sustainable development, but the relationship between economic, social, and environmental perspectives and financial return is complex. To succeed, banks need to integrate the three building blocks into their strategies: 1) they need to voluntarily support sustainable development and understand the motives for such initiatives, 2) they must identify a business case with positive and observable economic benefits for the bank, and 3) they need to embrace such business cases at the strategic level (Schaltegger et al., 2012).

Banks can adopt environmental and social principles into their strategies to support their competitiveness. This can help them to reduce their operational costs and attract new customers (Carrillo-Hermosilla et al., 2010). Furthermore, banks can avoid risks and negative impacts if they broaden their understanding of sustainability-related areas, such as labor practices, the preservation of cultural heritage, and changing social expectations, and make social and environmental considerations part of their strategies (Bromund, 2014).

II.2.2. The role of stakeholders in banks' sustainability

The involvement of banks in increasing their sustainability performance must be supported by key stakeholders. The three key stakeholders levels are 1) the systemic level, which focuses on financial policymakers and regulators, 2) the national level, which includes the interaction of banks within their jurisdiction, and 3) the consumer level, which focuses on the demand for the financial products and services offered by banks (Wachenfeld et al., 2016).

The overarching level is the systemic level, which includes protecting consumers and investors against fraud, market manipulation, and the unethical promotion of harmful financial products. The latter activities support and raise confidence in the financial

sector's health and promote systemic stability. They also ensure that individual banks operate in a safe and sound way. Policymaking must also ensure competition, promote sustained financial development, and ensure financial inclusion and access. Unfortunately, the key international financial regulatory framework, the Basel Framework, still falls short of including environmental, social, and human rights when assessing the systemic health of the financial sector (Wachenfeld et al., 2016).

According to the UN and the World Bank, sustainable finance must support the advancement of all SDGs, including, but not limited to, environmental, social, and economic goals (Maimbo and Zadek, 2017).

Initiatives, such as the United Nations' Principles for Responsible Banking, or the OECD's Green Investment Incentive Scheme, show Western economies' increased focus on improving global financial inclusion and banks' role in social and environmental value creation. The United Nations Environment Programme Finance Initiative (UNEP FI) plays a growing role in promoting sustainable banking. Sustainable banking involves all levels of the organization, and banks must take proactive measures and discover their business case when engaging with sustainable development. Banks must also frequently engage with their stakeholders and shareholders, and they need to consider including sustainability principles into their business portfolios and when creating new products. Banks should also shift towards more sustainable value chains, operations, and risk management (UNEP FI, 2016).

Elevating SD concerns on the agendas of banks can also have tangible benefits from a risk evaluation and management perspective. Environmental and social risks impact the health of banks, even if they are not consciously aware of such impacts. By emphasizing the need for the evaluation and understanding of environmental and social risks, banks can reduce the likelihood of potential negative consequences. Risks can be direct or indirect. Direct risks are related to the bank's operations and include a lack of compliance with regulations, disclosure of information about suppliers, carbon obligations, and other operational aspects. Indirect risks are related to banks' clients' activities. Banks can be impacted in terms of client solvency and credit risks through their lending activities, especially when they finance sectors with greater exposure to environmental issues. Financing sectors such as forestry, mining, and agriculture can involve serious

environmental risks. Such risks can result in losses of collateral value/asset value, the borrower's inability to repay loans, reduced competitiveness and increased business risks, revoked operating licenses, and the inability to meet regulatory requirements. All these can negatively impact banks' operational health if not monitored closely and consciously during the loan application and auditing process (UNEP FI, 2016).

Furthermore, as J Nieto has stated, there is growing evidence that climate change and other environmental factors can seriously impact the financial stability of the entire financial system. Therefore, the need to understand banks' direct exposure to significant environmental risks and evaluating environmental aspects should be included in a revision of the Basel Core Principles. It is estimated that the financial sector currently has loan exposure to high environmental risk projects of 1.35 trillion euros (J Nieto, 2017).

To ensure the required finances are available for global initiatives such as the fight against global warming encapsulated in the Paris Agreement, the European Commission launched a Sustainable Growth Action Plan in 2018, focusing on the involvement of banks and financial companies. The ten initiatives target the following key areas: 1) the creation of a unified green taxonomy at the European level; 2) creating standards and representing green bonds and green financial services with an eco-label; 3) promoting sustainable projects for investment; 4) making ESG part of investment management; 5) creating sustainability benchmarks; 6) adding sustainability consideration to the financial rating and market research process; 7) defining expectations and obligations for asset managers and institutional investors regarding ESG finance; 8) creating prudential rules for banks and insurance companies regarding SD; 9) strengthening sustainability and accounting rules for non-financial reporting, and 10) promoting ESG and long termism (Manta, 2022).

To support the Sustainable Growth Action Plan, the European Commission also launched the Strategy for Financing the Transition to a Sustainable Economy initiative in 2021. The initiative aims to extend the EU taxonomy framework, increase the eco-labeling of financial products and services, and include ESG risks in credit ratings (Manta, 2022).

It is estimated that approximately three trillion USD in green investment is required globally each year to achieve the ambitious targets defined by the Paris Agreement alone

(Schmidt-Traub, 2015; Schmidt-Traub and Sachs, 2015; Puschmann et al., 2020; Bhowmik, 2022). However, estimates of the required total investment vary. Estimates by the International Finance Corporation and Ethical Markets Media suggest that 20-23 trillion dollars' worth of climate investments will be required from 2016 to 2030 (Ethical Markets Media, 2011), while Dhungel et al. estimates that the required investment will be approximately 53 trillion USD (Dhungel, 2022). Although green finance is growing significantly, in 2014, 'only' 361 billion USD was invested in green finance, of which only 124 billion USD came from the private sector. The number has grown to 632 billion per year by 2021, which is still far below the required three trillion USD yearly (Clark et al., 2018; Dhungel, 2022). Such a challenging goal cannot be achieved without the strategic involvement of the entire financial sector.

At the national level, nation-states are also becoming more conscious about banks' role in financing the transition to a green economy. Most nation-states run big deficits regarding their investments in sustainable-development-related initiatives. Nation-states have realized that without private investment it will not be possible to move towards the two-degree Celsius compatible pathway required to avoid the worst effects of climate change. Standardizing green finance practices could foster green investment, leading to economic growth and job creation (Alloisio et al., 2017).

One of the critical challenges for the financial system is mobilizing private capital investment to support sustainability and TBL. The G20 Green Finance Study Group and the Sustainability Finance Study Groups highlighted four key barriers to scaling sustainable finance: 1) the failure to internalize environmental and social externalities and lack of assessment of investment in relation to social and environmental impact; 2) maturity alignment: inadequate supply of long-term funding of sustainability-related projects; 3) information asymmetry: lack of reliable identification of TBL-related financial products; and, 4) lack of analytical capabilities: no real-time, reliable framework for measuring the actual impact of financial investments (Bayat-Renoux et al., 2018).

Banks are increasingly aware of sustainability and are integrating environmental, social, and governance (ESG) criteria into their decision-making and operations. Unfortunately, there is no consensus about which ESG criteria banks should apply on a mandatory basis or how to measure them reliably. Metrics and underlying screening techniques must be

improved (Busch et al., 2016). Sustainable investment selection criteria need to be created which incorporate sustainability-related returns and investments into the selection criteria associated with financial products and project finance (Kudratova et al., 2018).

The current barriers to investing in the green sector include information and financing gaps, short-termism, the undervaluation of natural capital, and a lack of voluntary financial commitments. As investors seek to maximize their returns on their investments, they allocate funds to the best investment opportunities, but not necessarily the most sustainable ones. Strong evidence of successful projects, monitoring, reports, and addressing information gaps is needed to help rationalize the benefits of green finance (Clark et al., 2018).

In order to unlock the potential of banks to support sustainable development, national policies need to be adjusted. Three national-level areas require attention: First, government and policy reforms are required to create a positive, self-reinforcing investment environment that incentivizes banks to move beyond meeting mandatory commitments. Second is creating a dedicated central body responsible for collecting and synthesizing resources, projects, and best practices. Third, evidence and data about the impact of sustainable and green financial practices should be gathered (Clark et al., 2018).

Besides the international and national levels, the client level is also crucially important. The client level refers to the products and services offered by banks. Banks are liable to create the most significant impacts through their financing activities. According to UNEP, banks must include the factors of human rights and risks in their risk assessments when deciding to work with their clients. These due diligence processes must also cover human rights, social impact, and other sustainability-related factors (Wachenfeld et al., 2016).

The client level also includes an increase in the focus on currently underserved or unbanked populations, extended consumer protection, and a shift from a pure know-your-customer (KYC) approach to a more human-centric, respect-your-customer model. This includes consideration of financial inclusion in all banking areas, such as loans, MFIs, and the design of financial services capable of assessing and improving consumers' financial literacy or ease of access to financial services (Wachenfeld et al., 2016).

By adopting green banking and sustainability principles, banks can widen their target client base by offering specialized, environmental, and socially conscious product messaging. Including green features in banks' marketing messages can enhance brand recognition and positive brand image (Maulani and Ekuitas, 2015). From an analysis of publicly available data about 713 banks from 75 countries taken from the MSCI ESG Research database between 2013-2015, Nizam et al. found that banks' return on equity is significantly positively correlated with their sustainability-related financial practices (Nizam et al., 2019).

Whether banks implement sustainability-related initiatives or those that do not have at least the same or better economic performance is still an ongoing debate. The findings are presently inconclusive and limited. Nizam et al. found that scholars' opinions on the impact of sustainability-related initiatives on banks' financial performance vary. Simpson and Kohers (2002), Aebi et al. (2012), and Esteban-Sanchez et al. (2017) identified a positive correlation between banks' financial performance and their involvement in social and environmentally conscious activities. However, such positive results are inconclusive, as some research has revealed a more neutral or slightly negative correlation between financial performance and social and environmental activities. Soana (2009), Nollet et al. (2006), and Chih et al. (2010) found no significant relationship, or even a slightly negative impact (Nizam et al., 2019).

The analysis of the sustainability impact of the financial sector is still problematic, as many banks do not publish detailed sustainability reports on their websites (Korzeb and Samaniego-Medina, 2019). The annual sustainability, CSR, and other ESG and SDG-related reports issued by banks do not give a comprehensive overview of activities undertaken by banks outside of their core business area. In addition, sustainability reports rarely mention the sustainability impact of their product offerings (Nizam et al., 2019).

II.2.3. Sustainability frameworks for banks

Specific external global stakeholders, such as regulators, international standards organizations, and global NGOs, also play an important part in supporting banks in their sustainability journey by providing sustainability frameworks and guidance for them.

Sustainability frameworks can support banks to design the necessary corporate strategy, policies, business models, and daily operational activities to increase sustainability performance. Adopting a sustainability framework must be aligned with the organization's current vision, strategy, and structure. Implementing sustainability-related initiatives normally includes 1) the creation of a sustainability policy, 2) alignment and planning in line with the bank's strategy and vision, 3) implementation, 4) communication, and 5) continuous feedback and monitoring (Azapagic, 2003).

Adopting a sustainability impact measurement framework is not straightforward due to the overarching nature of banks' core areas of impact. Scholtens and Dam analyzed the impact of adopting one of the most widespread frameworks, the Equator Principles (EP), based on data from 50 banks that joined the initiative. On the one hand, the Equator Principles requires projects of at least 10 million USD value. Therefore, it is only applicable to larger banks. On the other hand, banks that adopted the EP had stronger corporate social responsibility (CSR) programs and policies and seemed to have a more balanced risk profile than those that did not. On the other hand, it seems that some banks that have adopted the principles used them to improve their public image and for greenwashing purposes. From the cost perspective, adopting the EP seemed to be correlated with higher operating costs, but the results were inconclusive. Adopting the EP did not result in increased shareholder value or stock evaluation, but nor did it result in a decrease (Scholtens and Dam, 2007).

Besides the Equator Principles, several impact assessment frameworks are available to support banks in fostering and standardizing their approach to managing their social and environmental impact. Many large banks have already started using some of these. Banks have chosen to adopt impact assessment frameworks for various reasons: to prove the positive impact of their support for sustainable development and their triple bottom line performance, to ensure they are aware of and can mitigate the negative impact of climate change, to enhance the positive social and environmental impact of their activities, to check progress against specific targets, to strengthen relationships with stakeholders, to improve processes and efficiency, and to be able to benchmark their organizations against other companies in the industry (Chappel, 2012).

Another framework, the Global Alliance for Banking on Values (GABV), provides six principles for banks to consider in their sustainability journey: 1) social and environmental considerations must be at the heart of the bank's business model; 2) the bank needs to be grounded in local communities; 3) the bank must work on building a long-term relationship with its clients and have a direct understanding of their economic activities and the risk involved with those activities; 4) the bank needs to be self-sustaining, and resilient to outside disruptions; and 6) the bank needs to embrace the five principles within the culture of the bank (Bromund, 2014).

Several other sustainable banking frameworks and organizations are working to provide guidelines for sustainable banking. Some of the most important ones include the Alliance for Financial Inclusion, the Equator Principles, the Global Impact Investing Network's Impact Reporting, and Investment Standards, The London Principles of Sustainable Finance, the SIGMA Guiding Principles, the UNEP's FI Statement by Financial Institutions, and the US's Social Investment Forum. A summary of the key sustainability-related bank frameworks is provided below:

Organization / Principles	Description
Alliance for Financial Inclusion (AFI)	A global knowledge exchange platform for improving financial inclusion policy and helping policymakers to increase access to quality financial services for the poorest populations.
ASPIRE	A sustainability poverty and infrastructure routine for evaluation - a framework developed by Arup and Engineers Against Poverty includes a fourth factor: institutions. The framework includes the following elements: ● Economic impact: equity, macro, micro, viability ● Social impact: population, culture, services, stakeholder, health, vulnerability ● Environmental impact: materials, biodiversity, water, land, air, energy ● Institutions: governance, transparency, structures, skills, policies, reporting
Equator Principles (EPs)	EPs apply to Project Finance Advisory Services when total project capital costs are US$10 million or more; Project Finance with total project capital costs of US$10 million or more; Project-Related Corporate Loans of an aggregate amount of at least 100 million USD. Ninety-two financial institutions (EPFIs) have adopted the EPs in 37 countries.
Global Alliance for Banking on Values (GABV)	A network of banking leaders from around the world committed to advancing positive change in the banking sector, in which the TBL approach sits at the heart of the business model.

Global Impact Investing Network (GIIN)	Network for impact investing is powered by investors who are determined to generate social and environmental impact and financial returns. The five key values of GIIN are responsible leadership, intellectual rigor, curiosity, excellence, and learning.
GRI Sustainability Reporting Standards	The most widely adopted global standards for sustainability reporting. Ninety-three percent of the world's largest 250 corporations report on their sustainability performance based on GRI (GRI, 2008)
OXFAM	Oxfam International has created its general purpose framework. Oxfam's Poverty Footprint Methodology for example combines local assessments of livelihood impacts, value chain analysis, and an assessment of economic contributions. The five research areas are: value chains, macro-economy, policy, social implication and environmental practices, product development and marketing (Oxfam International, 2009)
Social Return on Investment (SROI)	SROI was developed by the Roberts Enterprise Development Fund (REDF) in the United States in the mid-1990s. It focuses on expressing social benefits in monetary terms by using contingent valuation methods, such as willingness to pay and willingness to accept.
The London Principles of Sustainable Finance	The London Principles were launched by Tony Blair at the Johannesburg summit in 2002. The goal of the London Principles is to demonstrate good practice through case studies of a number of UK-based financial institutions through a voluntary code and set of seven principles for financial institutions.
The SIGMA Guiding Principles	The SIGMA Project was launched in 1999 by the British Standards Institute, Forum for the Future, and AccountAbility with the goal of preserving the five capitals: Natural capital, Social capital, Human capital, Manufactured capital, and Financial capital.
UNEP FI Statement by Financial Institutions	Members include 200 financial institutions, including banks, insurers, and investors, working with UN Environment to understand today's environmental, social and governance challenges.
US Social Investment Forum (US SIF)	The goal of US SIF is to advance sustainable, responsible, and impact investing across all asset classes in the US, focusing on long-term investment and the generation of positive social and environmental impacts. Members include investment management and advisory firms, mutual fund companies, asset owners, research firms, financial planners and advisors, broker-dealers, community investing organizations and nonprofit organizations.
World Bank Environmental and Social Framework	Defines the World Bank's criteria for assessing projects to end extreme poverty and increase shared prosperity. The Environmental and Social Framework requires borrowers to report on: ● Assessment and Management of Environmental and Social Risks and Impacts; ● Labor and working conditions;

	● Resource efficiency and pollution prevention management; ● Community and health safety; ● Land acquisition, restrictions on land use; ● Biodiversity conservation; ● Indigenous peoples, underserved traditional local communities; ● Cultural heritage; ● Financial intermediaries; ● Stakeholder engagement. (World Bank, 2017)

Table 3: Key sustainable banking frameworks (Varga, 2018)

Findings about sustainability frameworks for banks reveal their limitations, as most frameworks fall short of including social or environmental considerations beyond the scope of the financed projects. Social inclusion, social impact, and the effects the bank's activity has on broader social and environmental factors are not measured. The current frameworks also lack guidance on how banks can design new financial products and services that include social and environmental considerations, or what those considerations from a practical perspective should be. Furthermore, sustainable banking frameworks are not readily adoptable by small companies, such as most Fintechs, as the operational and financial overheads required to comply with such frameworks is disproportional to the resources of Fintechs.

II.2.4. Shifting toward alternative business models and digitalization

As a result of changing stakeholder expectations, some banks have started to consider adopting environmental management systems and creating financial products and services that support social and environmental considerations to improve their sustainability performance (Biswas, 2011). A bank's triple-bottom-line impact can be assessed from two angles:

1) Direct impacts: direct social impacts include the number of people employed, the quality of life of employees, education programs provided to employees, and other employee initiatives. Direct environmental impacts are the results of the operational activities of the bank, such as physical branches, electricity use, and others.
2) Indirect impacts: the social and environmental impact of the bank's products and services. Indirect impact includes loans for project financing and services provided to underserved social groups (Gradl et al., 2009; Chappel, 2012).

According to the authors, banks create externalities with broader social and environmental implications. In addition, banks can also have transformative or systemic impacts, which refers to fundamental changes in the sector/industry in which the company operates due to new business models introduced by banks (Gradl et al., 2009; Chappel, 2012).

The birth of microfinance institutions (MFI) such as Grameen bank is a good example of successful business model innovation in the traditional financial sector with a high triple-bottom-line impact. MFI business models focus on local communities' needs and have a large indirect economic, social and environmental impact (Sinkovics et al., 2014). Prof. Yunus, founder of Grameen, was awarded the Nobel Peace Prize in 2006 due to the positive impacts of the MFI business model. MFIs have become widespread since their early days, and there are now more than 3,300 institutions globally. Since its establishment in 1976, Grameen has grown into a group of companies and organizations and provided loans to 75 million people previously excluded from financial services by traditional banks (Yunus et al., 2010).

While MFIs are successful at providing specific services – micro-loans to the previously unbanked – there are also limitations to such products. First, a credit-driven service such as a micro loan is not affordable to the poorest individuals who do not want to burden themselves with debt further or lack the business acumen to start a micro business. Second, MFIs also depend on external financing and need to collect funds to distribute through their lending activities. Third, MFIs need to repay their investors with profit, resulting in higher-than-market interest rates for their customers. There is a growing literature about the adverse or potentially negative side effects of providing loans to previously underbanked populations, which can result in further indebtedness (Hammill et al., 2008; Hammond et al., 2008; Moro Visconti, 2019).

Changing customer demand, driven by increased environmental and socially conscious market and customer sentiment, has created a market niche for new financial business models. New financial services, products, and asset classes have emerged as philanthropic, high-net-worth individuals, institutional investors, and social banks, alongside specialized intermediaries and impact investors became more dominant in the

financial sector. Social banks are another business model innovation that is becoming important in sustainability within the traditional financial sector. Evidence shows that the repayment rate of loans is higher in social banks than in traditional banks, and social banks are trusted more by communities. Understanding community values can result in improved product development processes. Social banks are also less subject to moral hazard and defaults (Cornee and Szafarz, 2013).

While there are examples of successful business model innovations in traditional banks, most traditional banks do not feel the pressure to examine and adjust their business models continuously. These traditional bricks-and-mortar banks maintain a sophisticated but costly branch infrastructure and build their sales organizations around in-branch sales channels. Such banks may have accumulated significant technology-related debt by running on legacy IT systems that are expensive to support, weakly adaptive to new customer needs, and commit the bank to pursue non-digital initiatives. These banks will be most affected by the rapid growth in digitized and more efficient financial players.

Banks that have already started experimenting with redesigning their business models to some extent but have not yet entirely digitized their processes and modernized their IT systems can be referred to as transformational banks. These institutions can steer their business strategies in a more sustainable direction associated with better social and environmental performance. By leveraging their advanced infrastructure, large client bases, abundant funding opportunities, and preexisting regulatory compliance, transformational banks can play a significant role in the financial sector's evolution (King, 2014).

The most advanced and already highly successful transformational banks that have arrived at the end of the digital transformation process and made it their business as usual to innovate in the digital space may be called digital banks or neo-banks. Digital banks are not vastly different from Fintech companies as they typically use advanced, highly digitized core banking systems that can rapidly implement new services. In addition, digital banks are familiar with digital channel management and have a significant digital footprint with sophisticated non-branch strategies. Moreover, digital banks comply with stringent banking regulations, and many have solid and profitable business models (King, 2014).

Digital banks are emerging rapidly as many Fintech companies have decided to move in this direction and have applied for banking licenses. These digital banks may be able to capture many of the positive benefits of Fintech while also working transparently under the eyes of regulators (King, 2014).

Banks must evaluate their digital readiness, IT and internal capabilities, existing business processes, and stakeholder expectations to move along the pathway of sustainable value creation (Morioka et al., 2016).

Banks have no unified approach regarding their sustainable development initiatives and business models. Most banks create their own approaches to measuring their social and environmental impact. For example, Charity Bank, a UK-based loans and savings bank, provides loans primarily to charities and social enterprises working to create lasting social change. The way the bank decides if a borrower satisfies the bank's expectations regarding the use of the loans is based on three criteria: 1) Mission: does the organization have a clear idea of what they are trying to achieve?; 2) Capacity: does the organization have the right people, expertise, and a sound governance system?; 3) financial resources: does the organization have the finances necessary to service the loan? The bank works with the beneficiaries to create a set of social and environmental metrics to report on (Charity Bank, 2017).

Banks are similar to other companies that pursue innovation, as their survival depends on it. Competitors like Fintechs obtain competitive advantages by better understanding geographical boundaries, local specialties, and topological attributes and incorporating these insights into their product and service development (Langley, 2018).

BigTech companies have also started entering the banking sector and becoming digital banks. Leveraging their expertise in technology product development, BigTechs have started providing services in all significant banking areas, such as payments, lending, asset management, and other financial services. BigTechs combine and leverage information about their users that is gathered through the various services they provide to them to provide highly tailored and customized services. Some BigTechs have already

acquired a banking license. BigTechs will likely play a growing importance in banking in the future (Bains et al., 2022).

Authors describe BigTechs using various acronyms, such as GAFAM (Google, Amazon, Facebook, Apple, Microsoft), or MAMAAs (Meta, or Apple, Microsoft, Amazon, Alphabet) or China's BATs (Baidu, Alibaba, and Tencent) (Bethlendi and Szőcs, 2022).

From an environmental impact perspective, Alibaba, a Chinese BigTech firm with a banking license, relies heavily on technology to improve its financial service offering. Through its subsidiary, Ant Financial, Alibaba has combined technology with actual, in-the-field sustainability projects. Ant Financial has created its Ant Forest program to prevent land degradation and support SDGs. Users can collect green energy points while using the Ant Financial application to reduce their carbon emissions, such as by buying green products, walking, or using public transport. Users can redeem the points in the form of parts of a tree plantation in the Ant Forest. Since its establishment, 100,000 hectares of forest have been planted containing 100 million trees (Kai Yeh et al., 2017; Zhang et al., 2021). Ashfaq analyzed the motivation of Ant Forest users for using the service. It became apparent that adding in-built gamification elements into financial applications increased satisfaction and delight. Introducing green activities in a gamified format can increase user engagement in green activities (Ashfaq, 2022).

II.3. Fintechs and sustainable development

II.3.1. The emergence and growth of Fintechs

The financial sector is going through a major transformation as the use of information and communications technology (ICT) has brought a new class of financial service providers to life. The term 'Fintech' has appeared in journals to describe the disruptive challenge of introducing faster, cheaper, and human-centered financial services to the financial sector. The Fintech sector has been evolving rapidly in recent years, also attracting the attention of scholars. As a result, many Fintech definitions have been created in academic practice and business journals. Stakeholders agree about the core elements of the term, but there is still no unified definition of Fintech (Ye et al., 2022).

Some of the most common Fintech definitions are summarized below:

Definition	Source	Year
"Financial technology" or "FinTech" refers to technology-enabled financial solutions. The term FinTech is not confined to specific sectors (e.g., financing) or business models (e.g., peer-to-peer (P2P) lending), but instead covers the entire scope of services and products traditionally provided by the financial services industry.	Arner, DW; Barberis, JN; Buckley, RP	2015
Financial innovation can be defined as creating and then popularizing new financial instruments and new financial technologies, institutions, and markets. It includes institutional, product, and process innovation.	Farha Hussain	2015
Fintech is a service sector that uses mobile-centered IT technology to enhance the efficiency of the financial system.	Kim, Y., Park, Y. J., & Choi, J.	2016
An economic industry composed of companies that use technology to make financial systems more efficient.	McAuley, D.	2015
Fintech is a portmanteau of financial technology that describes an emerging financial services sector in the 21st century.	Investopedia	2016
FinTech describes a business that aims at providing financial services by making use of software and modern technology.	Fintech weekly	2016
Organizations combining innovative business models and technology to enable, enhance and disrupt financial services	Ernst & Young	2016

Table 4: Definitions of the Fintech sector (Varga, 2017)

There is definitional consensus that Fintechs focus on improving financial products and services and products by relying on the intense use of ICT. As a result, fintechs have become the most important means of applying technology to access financial products in financial markets (Ye et al., 2022).

Each definition has its merits and serves the purposes of the authors' research or business objectives. Arner et al. were some of the first scholars to examine the evolution of Fintech. Using a broad definition, they proposed that all financial service providers could be regarded as Fintech, regardless of their size, business model, or product portfolio. Their approach was helpful in their research for examining the evolutionary aspect of Fintech innovations.

Hussain, Kim et al., and McAuley defined Fintech as companies that not only use IT as a differentiator but also strive to provide more efficient services, streamline processes, and enter traditionally non-banking markets.

Investopedia and Fintech weekly, two specialized media outlets, use a similarly broad definition to that of Arner et al. but focus more on the new technological premises of Fintech, viewing the related companies as new market players for the twenty-first century.

Ernst & Young is a global professional services company with a broad clientele made up of large companies, including banks and insurance companies. Their definition of Fintech implies that all organizations, not just startup companies but also traditional banks, telecommunication companies, and utilities, can become part of the Fintech phenomenon if they can craft innovative business models and the related supporting technology. Accordingly, their approach focuses on the business models of Fintechs.

Arriving at a standard definition is very important as Fintech companies already provide financial services to millions of people and are transferring, exchanging, or lending billions of dollars. However, as the economic and social impact of Fintechs grows, it is increasingly difficult for legislators to communicate their expectations towards them, leading to confusion and potentially opening up dangerous loopholes in the financial system.

One of the largest gaps in current definitions is that there is no consensus about whether traditional banks may also be regarded as Fintech if they create a new, innovative, technology-based financial service or product.

The lack of distinction between Fintechs and banks is a critical gap. Legislators impose transparent and rather strict rules on banks in the various areas of risk, liquidity, and balance-sheet management, as well as legal compliance, and require them to set aside large sums of money to hedge credit default events. To comply with IT regulatory expectations, banks have to continuously improve their IT security systems using funding that may be equivalent to the total equity of smaller Fintech startups.

Legislators are facing a challenge to fit Fintechs into existing legal frameworks, as the current legal frameworks were designed for large, traditional financial institutions. As a result, too much regulation can burden financial innovation efforts. At the same time, under-regulation can impose an unfair advantage on new entrants due to their lower legal costs and overheads and create higher social costs due to fraudulent activity and non-existent customer protection (Douglas, 2016).

In an attempt to address the shortcomings of current definitions, this research uses the author's definition to distinguish Fintech from banks. The definition emphasizes the importance of technology, product, service, and business model design and the regulatory environment concerning Fintech companies. The aim is to solidify understanding for further studies and to provide a broad enough definition that captures all the current economic activities of the sector. The proposed definition is also aligned with regulators' efforts to strike a balance between traditional banks and Fintechs:

Fintech refers to ventures without a banking license, whose goal is to develop and provide novel, technology-enabled financial services with a value-added design that will transform current financial practices.

This definition of Fintech has been adjusted since the author initially created it in 2017 (Varga, 2017). However, based on feedback from fellow researchers and field research with traditional banks and Fintechs, the original definition needed to be modified to adapt to the recent structural and regulatory changes in the Fintech sector.

Distinguishing between banks and Fintechs has become more important. Many Fintechs that started as new ventures in 2017 have decided to continue as digital banks and acquired banking licenses. The original definition stated that Fintech refers to non-or not fully regulated ventures, which limited the inclusion of Fintechs that complied with updated regulatory frameworks such as e-money licenses.

In the current research, Fintech refers to ventures which are not banks but may have other non-bank licenses that permit them to operate as financial service providers. Some Fintechs will never become banks. Fintechs that were once Fintechs but have acquired a

banking license are classified as banks. BigTech companies that have already started to set foot in the financial sector but have not yet acquired a banking license are considered Fintechs. BigTechs with banking licenses are classified as banks.

Fintechs have started developing new services and products in all core banking domains (KPMG, 2017; CB Insights, 2017; Kerényi, 2017). Fintechs generally work in one of six financial areas: payment, lending, capital markets, wealth management, crowdfunding, and insurance services (Lee and Shin, 2018; Gomber et al., 2017; Ranchber, 2018).

The Fintech sector attracted more than 214 billion USD between 2010 and 2021 (Accenture, 2015; Let's talk payments, 2016; Statista.com, 2022). Data about the total number of Fintech companies varies based on the research approach, but it is estimated that there are approximately 18,000 - 19,000 Fintechs globally (CB Insights database, 2022). There are also approximately 300 unicorn status Fintechs whose market valuation surpassed 1 billion USD (CB Insights database, 2022). As a result, the total market value of Fintechs is estimated to be 1.7 trillion USD (FintechLabs.com, 2022).

The lending practices of traditional banks have been widely researched regarding the cost and efficiency of information-gathering about clients, decreasing information asymmetry, and collecting other soft client data during relationship banking practices. In addition, extensive physical branch networks have provided a way to decrease borrower-lender distance, reduce moral hazard, and acted as a significant barrier to entry to aspiring financial institutions with less capital resources (Chan and Thakor, 1987).

Reducing information asymmetry is an important part of lending, as this helps improve information gathering for lenders and borrowers. Research shows that banks have been willing to lend to customers about whom they had better information, mainly gathered via their close relationships with clients. Large banks that acquired other banks have increased their concentration in specific areas (Bikker and Haaf, 2002; DeYoung et al., 2006) and further centralized their power to use information about borrowers. The provision of credit to small businesses is a key economic driver, and borrowers better known to banks were in a better position to obtain funds (Agarwal and Hauswald, 2010).

The global financial crisis in 2008 increased banks' aversion to providing loans, making it much harder for customers to finance their personal or business needs. The unexpected event of the global financial crisis triggered the growth of Fintechs. The crisis raised concern about the lack of transparency and misconduct of the traditional banking sector, significantly damaging public trust. Fintech companies rapidly gained market share over the latter banks, which, as with the whole financial sector, had been on the verge of collapse, mainly for the following reasons: 1) public and corporate lending dried up during the financial crisis due to an increase in risk aversion in the traditional banking sector, 2) interest rates moved close to zero, and were sometimes negative – discouraging the accumulation of wealth in savings accounts, 3) the public image of banks was severely damaged, 4) technology companies gained momentum by disrupting traditional capital-and-property-intensive industries such as the hotel industry and transportation sector, and 5) the number of tech billionaires increased significantly – Facebook alone was associated with ten billionaires at the time of its IPO (Business Insider, 2012) – suggesting to investors that technology-enabled disruptors were a high-risk but high-reward investment.

Fintechs realized the opportunity of unmet credit demand, and the first peer-to-peer (P2P) online lending platforms started operating. The information asymmetry gap and disadvantage of not personally knowing customers has been overcome by superior data analysis and by using internet-based platforms to decrease the distance between lenders and borrowers. Fintechs have successfully provided loans through their superior product and service design (Bachmann et al., 2011).

Fintechs soon understood that the public disappointment in banks had created an opportunity for better services and more user-centric innovation. Fintechs saw the opportunity to build a community of lenders and borrowers and innovated the platform-based lending business model. Platform-based lending benefits individuals with a lack of funds by giving them access to capital at reasonable interest rates and creating a revenue stream for lenders who can obtain above-average yields on their funds. This competitive edge and tackling lending in a modular fashion – operating within a small domain – has created significant advantages in terms of the ability of Fintech to compete with large financial institutions (Haas et al., 2015).

Lending platforms have improved the lender-borrower relationship by decreasing the distance between counterparties, but they have also introduced risks that banks previously managed. Lending platforms allow non-professional investors and households to fund borrowers through peer-to-peer (P2P) business models. While P2P may generate extra income for families, the overall risk level is higher, in addition to the moral hazard, as households may lose money on the loans they have supplied if borrowers default or stop payments (Haas et al., 2015).

One report by PwC indicates that 20% of the revenue stream of incumbents will be at risk from Fintechs in the coming years. More strikingly, banking and payment-related revenue is also at risk (28%, and 22% higher risk, respectively) in areas such as insurance, asset, and wealth management (PwC, 2016).

Researchers often describe Fintechs as companies that focus on the highly digitally literate members of the Y Generation. This is because many Fintechs first started by offering native mobile applications in the payments and lending areas. Fintechs apply new ICT and business model innovations strategically to their processes and products to win over customers by reducing operating costs and providing cheaper services. Fintechs often use big data, machine learning and artificial intelligence, cloud computing, robotic process automation, and Application Programming Interfaces (APIs) to streamline their processes and leverage technology in their product development (Bayat-Renoux et al., 2018).

Fintechs have gained traction in sustainable development and green finance as they have seen an opportunity to connect traditional financial products with social and environmental principles. Fintech companies are at the intersection of traditional financial services and sustainability, and green finance-related initiatives can be called green Fintechs. Green Fintechs are a subset of the growing Fintech industry. Green Fintechs may have a major systemic impact potential from a sustainable development perspective; research has not yet examined this area in the required detail (Ranchber, 2018; Puschmann et al., 2020).

Fintechs have also become a driver of the modernization of payment services. Bank customers had the strongest negative perceptions of payment services. For example,

payment products offered by traditional banks – especially international remittance transfers – have historically been expensive and slow, taking up to several business days to execute. Fintechs have been able to improve remittance transfers and decrease transfer times and costs. The remittance transfer application Wise has achieved a four billion USD market valuation. Since its launch, Wise has been continuously challenging banks on remittance transfer speed and prices, and now six million people are using the service to send/receive money from abroad. Wise saves its users a yearly one billion USD in remittance transfer costs (Wise, 2022).

Fintechs have popularized new business models in finance and became key players in digital marketplaces, platforms, and transaction processing (Laidroo et al., 2021). Such an impact can also favorably affect traditional financial institutions by increasing the pressure to innovate. The competitive pressure caused by Fintechs can support innovation throughout the entire financial sector (Caragea, 2022).

Fintechs can contribute to the growth of financial services with higher sustainability performance by motivating banks to engage in green technology innovation. Fintechs have raised attention to three important factors regarding the promotion of green technology innovation: the need to have sufficient green funding, the importance of leveraging scientific and technological advancements, and the need to have a clear regulatory framework (Xue et al., 2022).

Attention to the influence of Fintechs on green development is increasing, but this is still an under-researched area. Fintechs can play their part by promoting green credit and investments, as eliminating the economy's 'black footprint' is a growing focus (Zhou et al., 2022). Unfortunately, global, cross-country analyses of Fintechs are still largely lacking; therefore, there is no unified view about the sustainability-related impact of Fintechs on a global scale (Laidroo et al., 2021).

As Fintechs are already having a significant impact on one of the most important legacy industries in the world – finance –, it is important to understand how this new financial sub-sector has emerged. Two different but complementary evolutionary approaches can help explain how the Fintech sector has increased its market presence over the last couple of years and the drivers behind the innovations in the Fintech sector. Arner et al. offer an

overview of financial innovation from an actor-based evolutionary perspective. The author supplements the actor-based evolutionary approach with a capability-based evolutionary perspective, as additional valuable information and viewpoints emerge by focusing more on the underlying capabilities and knowledge than on the actors (Varga, 2017).

II.3.2. The actor-based evolutionary approach of Fintechs

The work of Arner et al., classifies the evolution of Fintech into three distinct phases. The first stage is Fintech 1.0, which lasted from 1866 to 1987. During this period, the physical foundations of modern telecommunication infrastructure were laid down across the globe (including important milestones, such as the installation of transatlantic transmission cables). This stage was necessary in terms of the establishment of correspondent banking and increasing the global interconnectivity of financial institutions. This infrastructure is still in use by banks that seek to provide reliable services to their customers. Without this investment into infrastructure, the fertile ground for the current phase of current innovation would not exist.

The second stage, so-called Fintech 2.0, started in 1987 and lasted until 2008, the starting point of the financial crisis. During this stage, the traditional financial sector was developed. Banks became increasingly digitized and built significant IT infrastructure to support their operations, while ATMs and other innovative financial products and services were created. Central clearing houses, stock exchanges, and international correspondent banking became widespread, and regulatory standards were drawn up. Fintech 2.0 involved the birth of modern banking with its branch-focused business models that are used today by many banks. A great deal of innovation occurred during this phase which was regarded as disruptive at the time. However, banks relied too much on their previous successes, and formerly adequate systems became obsolete.

The current stage, Fintech 3.0, is ongoing and involves both newly emerging technology-enabled financial service companies and traditional banking institutions. The authors also call attention to traditional banks' low level of IT literacy. Although new Fintech startups may be the cradle of new financial technologies, there is no reason to excoriate traditional financial service institutions.

The study comprises an insightful analysis of the evolution of Fintech and highlights a pragmatic, actor-based evolutionary approach. Focusing on the role and value-added of different stakeholders, one can see how the main driving force behind financial innovation has shifted throughout the years from large infrastructure providers to banks and Fintechs (Arner et al., 2015).

II.3.3. The resource-based approach of Fintechs

The resource-based approach employs three evolutionary layers – ecosystem development, pioneering services, and human-centered design – to supplement Arner et al.'s phases of the evolution of Fintech. Each evolutionary layer has added different value to the presently evolving financial sector. The concept of layers comprises a holistic resource and knowledge-based approach to the topic.

Understanding the three layers explains how the Fintech sector has grown dramatically over the past years. The key value drivers in each of the layers can be identified.

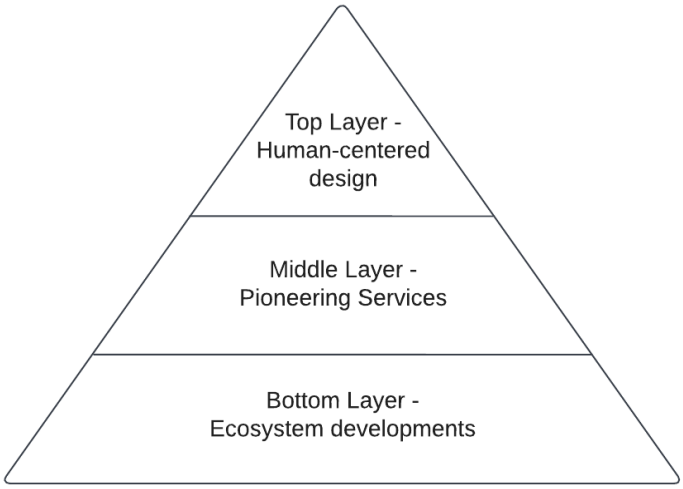

Figure 1: Resource-based pyramid of Fintechs (Varga, 2017)

The first layer of innovation is the creation of an ecosystem fostered by technological progress and the cheap availability of basic telecommunication and IT services. This ecosystem layer includes developments in IT hardware and software technology, such as affordable computers, mobile phones, rapid internet penetration, and primary areas of knowledge, such as programming skills. Ecosystem enablers include advances in computer technologies such as cheap hardware, including desktop computers, laptops,

and tablets, making it possible for Fintech to obtain market share due to the low barriers to entry. Telecommunications infrastructure has been installed in all the world's major cities, and experiments with internet-transmitting satellite drones are also at an advanced stage. They may provide free internet to people currently without access to it. Mobile phones, including simple ones with basic features and smartphones, have become cheap commodities but increase the opportunities individuals have to interact in a deep, more connected way with others and with modern payment infrastructure. Fintech has also been supported by the less visible but equally important development of infrastructure, such as new banking systems that are not yet widespread but will replace legacy core banking systems in the future. New banking and financial systems with open APIs and plug-and-play solutions are technical enablers specific to the financial and Fintech sector.

Cheap hardware has made it possible for lower-income individuals to learn the new craft of computer programming, even using free educational materials available on the internet. Countries such as India have built a modern economy by recognizing the importance of creating reliable and cheap programming capacity. They have specialized in outsourcing services to companies with a demand for IT workforce. Fintech is presently enjoying several advantages over the traditional banking sector. First, it is not reliant on core legacy systems (many of which are 30 years old and have been repeatedly patched with new additional services). Banks' legacy systems are heavy burdens on innovation as their core functionality and the underlying infrastructure is becoming obsolete. On the other hand, changes to legacy systems and infrastructure are costly and impose operational risks on incumbents, often representing barriers to innovation.

Fintechs build their business models around state-of-the-art technology and software. Fintechs understand that IT is a major driver of success, so they invest heavily in programming capabilities and building their core competencies in software development (Haas et al., 2015). In contrast, the IT departments of traditional banks are not prepared to respond quickly and typically require almost a year of preparatory work (involving the development of IT roadmaps) before the beginning of each new business year. Modifications not scheduled for the year typically have to be accepted through extraordinary approvals, in many cases requiring CEO approval. Due to this lack of agility and quick-to-market processes, banks are slower at responding, and their capacity for experimenting is weaker than Fintechs.

ICT supports the scaling of Fintechs in five ways. It: 1) enables fast and adaptive needs recognition of targeted customers, 2) allows for rapid, iterative product and service development, 3) creates opportunities, 4) allows for fairer access to markets, 5) can increase inclusion and social capital. Once social entrepreneurs and socially sensitive businesses succeed in their local test environment, they often aspire to have a global impact and scale up their local solutions to a global level. By leveraging ICT, Fintechs can dematerialize access, execute transactions without intermediaries, democratize financial services, and thus increase financial inclusion (Tello Gamarra et al, 2022).

The second evolutionary layer concerns pioneering services built with the help of innovative business models and an open, innovation-focused approach. Business models help to link economic performance, innovation, and organizational strategy (Boons and Wagner, 2009). Cheap mobile phones and computers, the internet, and new business models have made it possible for Fintech to grow exponentially and reach millions of users cheaply. Fintech companies' ability to scale up globally and cost-effectively leaves traditional banks lagging behind.

Pioneering services had success reaching some unbanked or underbanked populations in sub-Saharan Africa and India. Building extensive branch networks in poor rural regions has not been considered profitable by banks, which generally decided to avoid such markets. Traditional brick-and-mortar banks simply could not generate enough revenue on the micro-remittances individuals wished to make. Nor did lending to the underbanked appear profitable as such individuals traditionally could not meet the strict credit risk assessment criteria. While banks abandoned these regions, Fintechs were keen to exploit the business opportunities. Using technology and the preexisting infrastructural backbone built by telecommunications companies and banks, Fintech could offer a previously underserved customer segment convenient and easy-to-obtain financial services at affordable prices. Low operating costs made it possible to generate sufficient profit by innovating new business models, cooperating with other industries, and listening to the actual needs of customers and end-users.

The third evolutionary layer consists of the development and targeted use of human-centered design by providing toolsets and experimental frameworks in addition to

business models and open innovation. Fintechs started to invest time, money, and effort into innovating new and distinctive service designs, understanding customer journeys and mapping out routes for a frictionless user experience. Design thinking was a key element of this process. Design thinking refers to more than the conventional use of graphics and objects typically associated with designers. The most successful business design companies long ago moved from designing artifacts to designing complex client experiences and new services. This holistic approach to design thinking may incorporate how a company reaches customers, what value proposition it offers, what the underlying business model is, and how the customer journey is built from the first encounter through to all the touch points by which customers interact with the service.

User experience is a key area in which Fintechs became superior to traditional banks. Frictionless, well-designed, rapid services are the key success factors in the rapid growth of cloud-enabled Fintech companies. Fintechs design their services to be available from all types of digital devices, including mobiles, tablets, and smartwatches. Customers no longer have to wait in bank branches to make simple credit transfers or to open bank accounts. Millennials (i.e., those born in the 1980s and 1990s) seek different, more personalized, and convenient services from their banks. Research by Viacom Media found that 53% of Millennials do not think their bank is more special or offers something different from other banks. More interestingly, 71% would rather go to the dentist than listen to what banks say, and 33% would be willing to switch banks within the next ninety days. Meanwhile, disruption is welcome: the research also states that 73% of this young generation would be excited by a new financial service offering from a trendy, non-financial service provider (Viacom Media Networks, 2013).

Personal financial management tools help customers manage their money more wisely with automatic warnings about potential overspending. Crowdsourced solutions that give customers more control of their financial decisions are gaining traction. The first peer-to-peer lending platform in the world gained momentum by developing a risk model that more accurately predicts credit defaults than banking systems do (King, 2014). Since the platform's launch in 2005, the company's algorithms have analyzed data about customer behavior and even social media presence to establish individual risk profiles for each user to provide them with competitive lending opportunities. The platform provides lenders and borrowers with the opportunity to interact and engage in business transactions with

each other under tolerable conditions of risk. Loan defaults are less than 0.5%, compared to the 7.6% incurred by the average British bank, while average margins on loans are 3%, much below the average 8% of their brick-and-mortar counterparts. The lending platform has grown 60% year-on-year since its inception and now owns 3% of the U.K. retail lending market, having lent 400 million GBP so far (King, 2014).

Fintechs obtain market share by offering personalized, point-of-purchase solutions based on analytics, the extensive use of multi-source data mining, and pattern recognition. Rich and reliable data and efficient algorithms can contribute to sustainable financing. For example, index companies that support green investments by creating sustainability scores based on benchmarks can increasingly leverage third-party data providers to feed their algorithms with a reliable source of information (Lee et al., 2022).

A summary of the value drivers in each layer is presented below:

Layer	Key value drivers
1st Layer (Top layer) - Human-centered design	● State-of-the-art customer and data analytics ● Superior user experience ● Experimenting, design-thinking approach
2nd Layer (Middle layer) - Pioneering services	● Rapidly scalable services ● Open innovation approach ● Disruptive business models
3rd Layer (Bottom layer) - Ecosystem developments	● Cheap mobile phones and internet access ● Cheap IT hardware and software ● Global telecommunication infrastructure

Table 5: Key value drivers of Fintechs (Varga, 2017)

II.3.4. Social and environmental impact of Fintechs

As described in the previous sections, Fintechs understand the key areas of corporate sustainability, including the importance of stakeholders, strategy, innovation, and innovative business models. Fintechs rely on ICT to scale the adoption of their digital financial products and services. Fintech have realized the market gap highlighted by Hughes and Lonie: namely, that existing 'first-world solutions' are inefficient in underserved markets and do not meet local stakeholder expectations (Hughes and Lonie, 2007).

Although economists agree that social and environmental value is a challenging concept to evaluate in finance, there is a consensus that access to financial services can improve living standards. Financial inclusion can improve individuals' health, well-being, and financial status (Mulgan, 2010; Vanclay, 2003; Fisac Garcia et al., 2013).

Mulgan also highlighted the challenge of designing financial products with a positive social and environmental performance because of the lack of available empirical literature on the subject. As Mulgan claims, the social and environmental aspects of financial product design and the expected outcomes of design decisions is hard to measure as they are not objective, fixed and stable, but subjective, malleable, and variable (Mulgan, 2010). The lack of commonly agreed terminology and assessment methods concerning the social and environmental impact of financial products has thus been a barrier (Reeder and Colantonio, 2013).

From an empirical perspective, Fintechs have already demonstrated their potentially positive social and environmental impact. From the social impact perspective, new native mobile-phone payment solutions and remittance transfers developed by Fintechs are powerful examples of financial inclusion and, through reduced costs, economic savings. Fintechs can help improve the financial inclusion of people by supplying usable, simple, affordable solutions and creating an efficient financial market which is critical from a sustainability perspective (Beck et al., 2011).

Fintechs focus on maximizing the positive outcomes of products and services and what is good for their target users. This approach helps to increase the inclusion of customers and can result in better environmental and social performance (Fisac Garcia et al., 2013).

Drobnjaković has made a preliminary list of observations regarding financial services and products in terms of where they have involved positive social or environmental design elements:

Product/service	Social or environmental element
Bank Accounts	● Online/paperless account opening process ● Online bank account statements

	● Elimination of branch-based account opening and account management processes ● Extensive online and mobile first experience
Payment	● Online/paperless process for initiating payments ● Incentive to spend more consciously or to select certain sustainability conscious products/services ● Incentives for offsetting the environmental impact of purchases
Savings	● Online/paperless process for initiating payments ● Special green or sustainability-conscious saving products, access to green bonds or investments
Lending	● Special credit line for investing in energy-efficiency upgrades ● Credit-cards co-branded with environmental charities
Investments	● Mutual funds with a green investment focus

Table 6: TBL elements in financial products (source: Drobnjaković, 2013)

Fintechs understand that companies need to practice 'servant leadership' to be successful. Attributes of servant leadership include listening, empathy, healing, awareness, persuasion, conceptualization, foresight, stewardship, a sense of community, and commitment to the growth of employees (Gupta, 2013).

Fintechs first set foot in some of the largest financially underserved markets, where the competition from banks was lower. The most severely unbanked regions are Sub-Saharan Africa, the Middle East, Latin America, and Asia (McKinsey, 2010). There are approximately 1.4 billion adults in the world without access to banking services, according to the latest 2021 Global Findex report (Demirgüç-Kunt et al., 2021). This is a significant decrease compared to the 2.5 billion unbanked in 2011 and represents significant progress toward providing financial services to people living in poverty (Mundial, 2014).

Africa was host to some of the first examples of Fintech innovation associated with high social and environmental performance, through the targeting of the underbanked. With a population of 55 million, Kenya was significantly underbanked because banks found it unprofitable to open branch offices for low-income people (FSD, 2016). Working and making a living required breadwinners to leave their homes to work in larger, more

industrialized cities. However, remittance transfers in Kenya were costly and difficult to make, causing great inconvenience to both senders and receivers. M-PESA launched an innovative new service and business model in 2007 to remediate the problem in the form of an electronic money account linked to the user's mobile phone number. The solution only required users to have a cheap feature phone and network coverage to make peer-to-peer payment transfers. The payment service became a huge success, with 14 million active accounts processing more than 425 million USD in payments – equivalent to 17% of total Kenyan GDP – in 2010 alone, becoming Kenya's largest money transfer service (Mas and Radcliffe, 2010).

Some generalizable learnings can be derived from the success of M-PESA from a sustainability-conscious financial product-design perspective: 1) Fintech's general target audience or customer segment may be a demographic group with lower socioeconomic status than the one traditional financial institutions typically serve due to the lower costs of scaling via technology, 2) Mobile phone penetration enables rapid customer adoption, 3) A generally younger population group in a country can foster the adoption of new technologies, 4) Hosting large technology companies such as Google is an indicator of whether an economy is already on its way towards having a digital economy, 5) Whether a country's population has access to fast internet due to appropriate network infrastructure is a relevant factor (Blythin-Hammond and Van Cooten, 2017).

India is another country where Fintechs are working on new business models to financially include the currently underserved population. The country's population is 1.311 billion, and approximately 420 million people are considered vulnerable. In India, nearly 90% of payments are made in cash, indicating huge potential for growth in electronic transactions. Mobile penetration is close to 60% of the population, and there has been rapid growth in the number of users with online data packages (Bhandari, 2016; Jutla and Sundararajan, 2016).

Fintech's focus on customer centricity, market research, and data mining allow them to design financial products with higher environmental and social performance. Fintechs understand that reaching new customer segments requires that their products are superior in terms of their ability to increase inclusion (Kilara and Rhyne, 2014; Bhandari, 2016).

Research by Waema and Omwansa explains that the key factors that will enable Fintechs to design products and services for vulnerable social groups are: 1) reliability: the products must be available, well tested, and deliver the promised service level at the promised price, 2) convenience: rapid and private ease of access to the product and service, 3) flexibility: ease of use and tailored service in terms of the required functionality, 4) structure: the built-in ability to foster self-discipline when using the service, e.g., the technology discourages overspending (Waema and Omwansa, 2014).

Fintechs use technology as an enabler, a way to provide previously non-available services to underserved people. Through Fintech services, more of the under or unbanked population obtain access to financial services such as micro-loans, current accounts, and remittance transfers. Such citizens can improve their finances by taking out a micro-loan to start their businesses (Haldane, 2016).

Fintechs are looking to increase their business by responding to the critique of traditional banking that banks have failed to adapt to the real needs of the developing world. Bank-developed financial applications were useful for only a subset of the population and rarely became the primary means of ensuring financial inclusion. Additionally, the delivery method of financial applications has dramatically changed due to the use of mobile phones, while the design of actual financial products has not. This created the business opportunity for Fintechs to increase their positive impact on financial inclusion and revenue (McCaffrey and Schiff, 2017).

Although increasingly successful in terms of financial inclusion, Fintechs must overcome the ‘invisible’ obstacle of alternative financing opportunities. Financial services offered by Fintechs often compete with loans from friends and neighbors. In terms of being able to increase their positive social impact, including financial inclusion, Fintech is normally superior to traditional banks in the following four areas: 1) the processes and platform that are used to provide loans, 2) the cost of loans, 3) the provision of additional non-loan-related benefits, and 4) convenience (McCaffrey and Schiff, 2017).

Regarding overcoming alternative financing options, Greger’s research on payday loans offered by Fintech startups reveals that incorporating ethnographic approaches and the marginalized voices and stakeholders into the product design process led to more

innovative, sustainable, and socially relevant Fintech solutions. Fintechs often employ social impact designers to increase the impact of their social impact on the targeted social groups. Some Fintech companies use interdisciplinary designer teams, including product designer anthropologists and psychologists, to research and design innovative market products. Social impact design is an emerging trend and is reaching out to areas where Fintechs believe they can capture additional market share: low-income communities that are underserved by the current financial system (Greger, 2017; Greger, 2019).

Greger suggests that to achieve a positive social impact Fintech companies need to pay attention to four factors: 1) Fintechs must start by listening to the historical, cultural and deeply rooted social aspects of their targeted user group, 2) Action must be taken slowly and assessed continuously to build rapport with vulnerable groups. Action should not be derailed by profit-maximizing efforts or entering the market quickly and in a predatory way, 3) Fintechs should work closely with a wide group of experts and stakeholder groups and listen to marginalized voices, 4) They should reflect on achievements and be open to discovering blind spots, where the implemented design fails to live up to its promise (Greger, 2017; Greger, 2019).

Scaling of the social and environmental impact of Fintechs can occur in two dimensions: 1) depth scaling: increasing the fit of a product or service value proposition by more accurately and rapidly recognizing needs and mobilizing about social and environmental issues, resulting in the creation of more adaptive products and services; 2) breadth scaling: increasing access to service to individuals, creating synergies and networks, and improving access to unserved beneficiaries. Digital transactions are up to 90% cheaper to process than traditional transactions. Bayat-Renoux et al. estimate that 1.4 billion out of the currently un-or underbanked population can use financial services by 2025 due to traditional banks or Fintechs (Bayat-Renoux et al., 2018).

Fintechs can capture a larger market share and generate more profit and customer loyalty by designing more relevant financial products. This involves aligning their internal capabilities when designing and launching new, innovative, yet sustainability-conscious products (Iheanachor et al., 2021). The adoption of Fintech services is largely dependent on their perceived usefulness by users. Positive customer experiences increase perceived usefulness and help increase adoption (Slazus, 2022).

Micro Fintechs – Fintech companies operating in the microfinance domain – rely on technology to decrease the cost of loans and provide cheaper, more sustainable alternatives to currently underserved people. Microfintechs use ICT to save costs and improve their credit-rating processes by using artificial intelligence and big data solutions, automating loan applications, and reducing physical branches. Micro Fintechs can reduce costs by moving to more digital processes (Moro Visconti, 2019). Fintechs increase access to funds for micro-merchants by helping to close the information asymmetry gap by using new technologies and data sources such as digital credit scoring (Benami and Carter, 2021; Mu et al., 2022).

Under or unbanked populations require different solutions tailor-made to their needs. Low-income groups tend to prioritize products that enable them to improve their financial stability, make plans for long-term savings, and desire services that automatically adapt to their quickly changing circumstances (Balasubramanian et al., 2021).

The role of Fintechs in supporting sustainable development is growing rapidly, as financial inclusion can be a key enabler of welfare and poverty elimination. Access to financial products and services can help mitigate economic shocks and support social security and the foundations for economic and social growth (Pinto, Arora, 2022). Traditional, often regional finance cannot fully close the gap in terms of the larger geographical differences and support for sustainable development. The digital financial services offered by Fintechs can overcome geographical boundaries more efficiently (Li et al., 2022).

Some Fintechs have started to specialize, with some solely focusing on providing services that support sustainable development goals. Puschmann et al. define such Fintechs as green Fintech. Green Fintechs supply innovation that addresses environmental protection and helps respond to climate change. Green Fintechs have the potential to foster the transformation of the financial system by demonstrating the viability of new, sustainability-related business models. They can have a significant economic impact on customer-to-customer direct transactions and cooperation among other industries (Puschmann et al., 2020).

Fintech products can positively impact the environment as they grow rapidly in niche areas such as clean energy trade, carbon credit trade, and climate or green finance (Li et al., 2022; Tao et al., 2022). Current studies show that the direct and indirect impact of green Fintechs can help reduce carbon emissions by approximately 12.4% through reducing fossil fuel use and financing decarbonization efforts (Khan et al., 2022; Hoang, 2022).

Fintechs can support developing countries mee the significant challenges they face in transitioning in a more sustainable economic, social, and environmental direction. Developing countries are still beginning to strengthen and build up their economies. However, they need to shift and finance green initiatives to ensure they can meet the goals associated with the Paris Agreement (Zhao et al., 2022). Developing countries will increasingly rely on developed countries and alternative funding channels to obtain the required funds. Fintechs can act as an extension to the current financial system and use new technologies and services to efficiently channel funds into the green initiatives of developing countries (Metawa, 2022).

During preliminary desk research in 2018, hundreds of Fintechs were analyzed by the author to identify those whose operations or products and services could directly or indirectly be associated with a TBL value-creation element. Examples of some Fintechs with a TBL element are shown below, for each business domain:

Business domain	Example of Fintech
Capital Markets	Abacus, Abra, Acorns, Kapitall, Lelapa Fund, Socure, Taqanu, WeSwap
Crowdfunding	GoFundMe
Lending	Aire.io, Avant, Bondora, Borrowell, Branch, CommonBond, Credit Karma, Earnest, GuiaBolso, Harmoney, Tala, Kiva, Kreditech, Landbay, lantouzi.com, Lenddo, Lendify, LendingWorks, LendInvest, LendUp, Lendwithcare, Lufax.com, MaTontine, Mimoni, OnDeck, Payoff, Peerform, Progressa, Prosper, RateSetter, Sindeo, smava, SocietyOne, Sofi, Tala, Umati Capital, Upstart, Wonga
Payment	Aspiration, Azimo, BitPesa, bKash, Bloom, Doxo, Dwolla, Even Financial, ftcash, Humaniq, Jimu, Juba Express, M-Pesa, MODE, Modest Needs, Money Forward, monyq, N26, Paganza, PaySe, Pennies, PesaPal, Perfios, Prism, Remitly, Simpl, Simple, Slicepay, TransferWise, WorldRemit, Xoom

Wealth Management	Betterment, digit, DriveWealth, eToro, Hedgeable, Koho, Levanto Financial, Motif, Nest Wealth, Robinhood, SigFig, Stash, Stockpile, Tink, Wealthfront, Wealthsimple, WiseBanyan
Other	Amply, DueDil, Onfido, Trulioo

Table 7: Example of Fintech companies with a TBL impact (Source: Author's construction using data collected from public sources, Varga, 2018)

II.3.5. Sustainability frameworks for Fintechs

The EU, an important external stakeholder, has realized the importance of supporting Fintech-based innovation. The Fintech Action Plan and the Sustainable Finance Strategy are part of the EU's financial policy agenda. The EU has understood that Fintechs can support access to finance for both retail and corporate customers and improve ESG reporting and disclosure practices. It seems that the promise of the green Fintech revolution is growing. The European Commission has created a 10-step action plan to foster green Fintech innovation: 1) establish a clear EU classification system to be able to assess sustainable activities, 2) create of a label for green financial products, 3) drive investment into sustainable/green projects, 4) make sustainability assessment a part of financial advisory and portfolio management, 5) create sustainability benchmarks, 6) clarify the duty of the financial sector, 7) integrate sustainability aspects into market research and financial ratings, 8) include sustainability as an element of operating prudentially, 9) strengthen sustainability disclosure, and 10) foster ESG practices within companies (Macchiavello and Siri, 2020).

Promoting universal access to financial services is an important initiative of the World Bank and the International Monetary Fund (IMF). Fintechs can support top-down policymaking by demonstrating actual market-led initiatives and their impact on transforming the financial sector. The example of financial liberalization through entrepreneurial financial technology innovations, such as mobile money payment in Africa, is a good example (Burns, 2016). Fintech companies must adopt a servant leadership model if they want to achieve success with currently underserved groups. A sense of community and commitment to community growth is important (Gupta, 2013).

While there are initiatives aimed at supporting Fintechs in their green efforts, all current major sustainability-related financial frameworks were designed to support large

traditional, bricks-and-mortar banking and project financing of millions of dollars in project size. The limitations of these frameworks are apparent: they create extra planning, reporting, and execution overheads for companies, thus only large banks can use them. Their use in Fintechs is restricted due to their size, the available resources, and organizational maturity. While the frameworks include elements related to the direct and indirect factors that affect the TBL of financial institutions to varying degrees, these are mostly related to tangible internal and external impacts and exclude factors such as social scaling and financial inclusion. The inclusion of indirect factors such as dynamic capabilities, innovation, knowledge, human resources, intellectual capital, and information technology, among others, are often missing from the guidelines (Tsai et al., 2013).

Frameworks that focus on large banks are not useful for assessing the impact of Fintech companies that often provide loans to the value of 25 dollars towards projects, and have a total project value of a few thousand dollars. Environmental impact analysis, land acquisition, or biodiversity conservation must be assessed differently with such projects. It is necessary to have a smaller scale yet effective framework for Fintechs, as these companies are often the first entry point for the involvement of the previously non- or underbanked (Xue et al., 2022).

One of the TBL frameworks for Fintechs that is available was created by the present author. It is not a focus of the current research to validate the author's previous TBL framework for Fintechs, thus a detailed overview of the framework will not be presented. However, the current research suggests that such a framework could be revisited, adjusted, and examined for real-world validity with Fintechs to achieve its original goals.

A TBL impact analysis framework for Fintechs should be designed, and the following key principles adopted by the majority of the Fintech sector: 1) Easy to understand: TBL perspectives should be organized according to the three major categories, economic, social, and environmental value creation; 2) Gradually adoptable: to promote uptake of the framework it should define areas in which companies can voluntarily improve their TBL impact; 3) Focus on controllable factors: current sustainability banking frameworks often focus on factors that are either taken out of context or not viewed holistically. The strategic elements which are under the control of the company must be prioritized when

attempting to improve the TBL impact of a company, as these factors will inherently change all related factors and procedures as well. Such an approach will enable companies to integrate TBL principles into the core of their operations and their product and service development; 4) The framework should include clear measurement methods that are lightweight and tailored to Fintechs. Fintechs can use their results for benchmarking against other Fintech companies using a global database (Varga, 2018).

II.3.6. Potential risks of Fintechs in relation to sustainable development

Fintech is an evolving concept with increasing historical evidence of success during the past 15 years. Signs are already emerging that Fintechs can positively improve current banking and financial practices and may empower individuals currently underserved by traditional banks (Beck et al., 2000). While there is a growing academic literature on the potential positive impact of Fintechs from a sustainability performance perspective, the literature review has also revealed some areas associated with potential risk:

First, researching Fintechs is challenging. Validating the claims of Fintechs is hard, as they are mainly private companies. The lack of larger (and chronologically longer) datasets prevents the implementation of econometric techniques that might support claims of causality. Samples used in papers on Fintech are often limited in scope as they typically rely on limited datasets. Non-standard data provides a rich understanding of different platforms, but renders results difficult to compare across studies (Bollaert et al., 2021).

Second, measuring the impact of Fintechs is not straightforward, despite the various methods that are available. The first problem is the ambiguity and lack of definition of what social or environmental impact exactly is. Social and environmental impacts can be widespread, with multiple factors that are hard to associate with specific activities or organizations. For example, the phenomenon of multi-causality – when a combination of accounted and un-accounted direct and indirect impacts lead to specific outcomes – makes it hard to distill the impact of a single action (Fisac Garcia et al., 2013).

Third, it is not yet historically proven to what extent Fintechs can support SDGs. It is unclear whether Fintechs can support all seventeen SDGs (Hoang, 2022) or only a limited number. Fintechs today are mostly linked with social and environmental goals (SDG 11-17) and not many economic ones (Michael et al., 2022). Fintechs cannot solve the challenge of connecting sustainable and green initiatives and finance alone. Banks and

local banking networks will remain critical for supporting SDGs (Bertuch-Samuels, 2019).

While Fintechs seemingly have great potential to support SD, some authors are cautious about jumping to conclusions too early. Michael et al. claim there is no clear evidence that Fintechs will create the opportunity to increase SD. They claim that many authors have started writing about the positive impact of Fintechs on SD without waiting for empirical evidence or results. In their opinion, the impact of Fintechs on SD is liable to take the form of a U-shaped curve, like many other policies or innovations. To a degree Fintechs support the achievement of SDGs, but too much Fintech might hinder this (Michael et al., 2022).

Economic growth can come at high social and environmental cost. Whether Fintechs can achieve their potential in terms of positively impacting SD or will be associated with the potentially negative aspects of technological development is not yet known (Popkova et al., 2022). Fintechs may thus be a double-edged sword. On the one hand, they may reduce costs and improve efficiency. On the other hand, there may be a rebound effect, whereby due to a rise in efficiency the total demand for goods and services will increase, along with the use of natural resources (Zhou et al., 2022).

From the environmental impact perspective, some technologies Fintechs use are known for their excessive energy usage. The energy usage of blockchains has attracted the attention of environmentalists and communities in recent years (Tao et al., 2022). Blockchain can be efficiently used to increase access to funding, improve the distribution of funds, eliminate middlemen, and make transactions immutable and more transparent. Blockchain can also enable smaller market players to obtain access to markets, decrease transaction costs, and enable the secondary market trading of purchased tokens (Horváth, 2022).

Fourth, there is still a large gap in terms of the regulation and taxonomy of Fintechs. Authors warn that before jumping to conclusions regarding the hypothetical positive impact of Fintechs (i.e., relying on cherry-picked positive cases and jumping on the bandwagon), regulators should wait and examine their broader impacts (Michael et al., 2022). Regulators should not blindly accept the potential benefits of Fintechs. Regulatory

sandboxes can have a risk-washing effect, whereby the sandbox's stamp of approval can increase the systemic risk associated with an unproven technology. Before acquiring sandbox approval, Fintech solutions should be validated by NGOs, especially in relation to vulnerable populations, as well as by experts in ethics, political economy, economic sociology, and social studies of science and technology (Brown and Piroska, 2022).

A unified green credit policy and taxonomy are required to avoid potential loopholes related to greenwashing and to encourage companies to engage in green project developments to access better financing opportunities. Regulators must ensure the application of a consistent terminology and mandatory taxonomy for companies wishing to use green, ESG, or other sustainability-related contexts regarding their operations or services (Arner et al., 2022; Zhou et al., 2022).

Other authors claim that Fintech is not yet mature enough to have a significant direct impact on ESG issues (Najaf et al., 2022), and estimate that about 30% of Fintechs still operate without complying with any regulations (Merello et al., 2022).

A fifth risk is the potential systemic risk introduced by Fintechs and BigTechs as they aim to become banks themselves. Some BigTechs and Fintechs have already obtained banking licenses in various countries. While obtaining a license increases regulatory scrutiny, it is associated with significant value. While a banking license can foster access to low-cost deposits, allow for the elimination of partner banks, and lead to higher market valuations, it can also introduce systemic risks such as the following: (1) potential conflicts of interest among the subsidiaries of BigTechs; (2) an erosion of competition, and concentration of power; (3) the accentuation of systemic risk and contagion; and (4) the inhibition of effective consolidated supervision (Zamil and Lawson, 2022). Furthermore, the current regulatory system might not be able to meet the challenges related to BigTech as it operates on a supra-national level (Bethlendi and Szőcs, 2022).

III. RESEARCH DESIGN

The research design section describes the problem statement, research questions, methodology and process, research boundaries, and limitations.

According to the previous sections, the literature supports the claim that traditional banks have a significant social and environmental impact through their direct and indirect activities. This research focuses on a much less researched but rapidly emerging subject: the social and environmental impact of Fintech companies. The research explores how Fintech companies – which have grown significantly in number and market size over the past ten years – consider sustainability in their operations and product and service development. The following brief summary describes the rationale for conducting the research:

- The economic, social, and environmental impact of banks is already well researched. Banks support the economy by conducting financial transactions, managing accounts, providing loans, and additional financial services. These services are fundamental to the functioning of the modern economy. In connection with the banks' direct environmental impact, this is primarily due to the physical conditions of banking operations, the branch network of banks, their paper and energy usage, and the environmental burdens that occur during their operations. The indirect environmental impacts of banks are even more significant as they are linked to the main activities of banks: the provision of financial services and lending, involving the questions to who, under what conditions, and for what purpose is bank financing awarded.
- Banks can receive support in their sustainability journey as many international organizations provide sustainability frameworks that banks can adopt. In the case of Fintech companies, such frameworks are not available, and the focus on the sustainability-related performance of Fintechs is still an under-researched area.
- The literature review demonstrates that for Fintech companies no such comprehensive knowledge is available about the social and environmental impact of Fintechs as for banks.

- In terms of social and environmental impact, Fintechs can be regarded as David, versus Goliath, the latter referring to larger traditional banks. Yet smaller does not necessarily mean less capable. From a social and environmental impact perspective, case studies have already demonstrated that Fintechs can effectively reach the younger generations and significantly enhance access to financial services and the use of capital in many countries.
- It is important to understand how Fintechs perceive and integrate social and environmental considerations into their operations, products, and services. Fintechs have the ability to increase the financial inclusion of 1.4 billion people globally who still do not have access to financial services (Demirgüç-Kun et al., 2022).
- Unlike banks, Fintechs are not bound to publish detailed reports about their financial and non-financial activities, unlike most private companies. No similar data is available for Fintech companies as there is for banks. There is a gap in current knowledge about how the Fintech sector impacts society and the environment. This knowledge is required, as there are potential risks associated with the uncontrolled growth of the Fintech sector.
- It is justifiable to differentiate banks from Fintechs, as banks and Fintech companies have different organizational sizes and resources, and they are subject to different regulations which can significantly affect the appearance of social and environmental aspects in their product and service development processes.
- The research is exploratory as there is an insufficient amount of information about how social and environmental considerations appear in the operations, products, and services of Fintech companies. The conceptualisation of sustainability in the Fintech sector is required.

III.1. Research questions

The exploratory research aims to answer the following research questions:

- Research question 1: How does the triple-bottom-line concept appear in the operations (direct impact) and the products and services (indirect impact) of Fintech companies?

- Research question 2: What are the motivations for and barriers to incorporating triple-bottom-line aspects into the operations and product and service development of Fintech companies?

The main research questions have been divided into the following sub-questions:

- Are Fintech companies aware of the triple-bottom-line concept in relation to their operation and financial product and services?
- Can any best practices of Fintech companies from a triple-bottom-line perspective be identified in relation to their operations and product and service development that can be applied by the Fintech community or even by traditional banks?
- What sources of motivation or barriers help or hinder the consideration of triple-bottom-line issues in the operation and product and service development of Fintech companies?
- Is it possible to construct any concept or theory based on the interviews that can be used to develop a general framework regarding the use of the triple-bottom-line concept in the operations and product and service development of Fintech companies?

III.2. Research methodology

The research is exploratory in nature as there is currently there is an insufficient amount of detailed research available about the workings of Fintech companies concerning their social and environmental impacts. The papers that are available are mostly case studies, where the researcher tries to draw conclusions by observing a Fintech company from the outside. Due to the research topic's novelty and the insufficient amount of literature sources, the author chose a qualitative research method.

Due to their exploratory nature, qualitative methodologies provide an opportunity to learn more about and get a better understanding of the subject and lay the foundations for future research. The exploratory nature of qualitative research helps to understand the topic in depth (Sajtos and Mitev, 2007).

The author chose to follow the approach of other articles in the area of finance and technology where the researchers faced a similar challenge after realizing that there is an

insufficiency of structured assessments and research on the topic. Stoeckli et al. selected grounded theory methodology to explore InsurTech innovations and to understand the underlying transformational capabilities (Stoeckli et al., 2018). Bhal and Leekha used grounded theory to gain a better understanding of moral logic and software piracy (Bhal and Leekha, 2008). Pramani and Iyer found a gap in the understanding of why the adoption of payment banks in India is not growing as fast as was expected and used grounded theory to reveal some answers (Pramani and Iyer, 2022).

Grounded theory became the forerunner of qualitative research as a result of work by Glaser and Strauss in 1967. The purpose of creating grounded theory methodology (GTM) was to provide researchers with a methodology that would enable them to create smaller, substantive theories. Such a substantive theory can contribute to a more comprehensive, conceptual-level understanding of Fintechs. Glaser and Strauss described substantive theory as the formulation of concepts and their interrelation into a set of hypotheses associated with a given substantive area. They underlined the importance of substantive theories, as these are required to establish baseline knowledge within a substantive area, motivate researchers to create formal theory, and can help overcome the difficulties of empirical research in unknown research domains (Glaser and Strauss, 1965).

Opponents of qualitative methods may prefer the use of positivist research techniques, but grounded theory is a well-accepted research methodology for exploratory research. Grounded theory research has been supported and published by leading academic journals, including but not limited to the Journal of Business Ethics, Journal of Financial Services Marketing, Journal of Evolutionary Economics, Journal of Management Inquiry, the Academy of Management Journal, and the American Economic Review.

III.3. Research process

Substantive theories can only be interpreted in a typically limited social context, thus, these are separated from the formal, conceptual level. Grounded theory can deepen the understanding between theory and practice. Therefore, the grounded theory methodology is particularly applicable in areas related to management research, such as decision-

making or the process of creating financial innovation and the associated criteria thereof (Glaser and Strauss, 1967, Horváth and Mitev, 2015).

Grounded theory is suitable for exploring the research questions thoroughly because it is structured according to the following guidelines (Charmaz, 2006; Horváth and Mitev, 2015):

- GTM makes the research process transparent and thus traceable, which makes the results that are obtained authentic and credible.
- GTM is agile and based on continuous analysis of the data, which determines the next step of the research.
- GTM supports research in new areas where the researcher does not have comprehensive information in advance, so the given area can be discovered by them during the research.
- GTM research develops dynamically; the big picture is built from collected data using a step-by-step approach.

In order to ensure the validity of the research, the author followed the grounded theory methodology as constructed by Glaser and Strauss (Glaser, Strauss, 1967). The author also reviewed and leveraged guidance from leading grounded theory practitioners such as Clarke, 2003, Duffy et al, 2004, Mack, 2005, Charmaz, 2006, Boyce and Neale, 2006, Easwaramoorthy and Zarinpoush, 2006, Ardichvili et al, 2009, Mavetera and Kroeze, 2009, Mason, 2010, Breckenridge, 2014, and Foley et al., 2021.

The agility of the grounded theory complicates the work of the researcher, as it is not possible to foresee when the research will achieve the required theoretical saturation and thus be capable of defining substantive theory. Because of this, the methodology is time-consuming, so researchers often turn to other options (Horváth and Mitev, 2015). Based on a review by Mason, theoretical saturation can usually be achieved at between a minimum of 5 and a maximum of 60 interviews (Mason, 2010).

The author examined the professional debate that developed among the creators of GTM after the methodology was published. After the development of grounded theory, Glaser and Strauss expressed differing views about several points (Kucsera, 2008; Horváth and

Mitev, 2015). The research took into account the key cornerstone of GTM that was identified by Glaser: the purpose of the research is to create theory, not to justify theory.

The research process that was designed relied on the grounded theory methodology process defined by Strauss and Corbin and experts in GT methodology (Kucsera, 2008; Horváth and Mitev, 2015; Mason, 2010; Bhal et al., 2008; Ardichvili et al., 2009). The research design also relied on the recommendations of Charmaz (Charmaz, 2006). It is important to highlight that grounded theory is not a sequential research method, but the theory is formed through an iterative approach, thus many of the steps outlined below are continuously repeated (Urquhart et al. 2010):

1. Interview preparation: gather expert feedback in connection with the research plan, the research questions, and the target group of the research. Based on the results that are obtained, the research plan, the question and sub-questions of the research, the questions in the interview guideline, and the research target group may also be partially refined and changed.
2. Pilot period: Zohrabi suggested using pilot interviews to manage the validity-related risks of the research and to ensure respondents understand the research area (Zohrabi, 2013).
3. Initial sampling: start the sampling process based on the researcher's decision guided by their pre-existing knowledge of the research area and the literature review findings. The target group for future theoretical sampling is defined on the basis of the outcome of the initial sampling interviews (Charmaz, 2006).
4. Memo creation: memos capture the author's ideas during data collection and analysis. Memos are used to help identify gaps in the collected data and guide decisions about the theoretical sampling process (Charmaz, 2006).
5. Continuous comparison of data: According to Glaser, the formation of categories cannot be the result of coercion, so the former requires, among other things, the continuous comparison of cases, of data, and of different interviews and views.
6. Coding process:
    a. Open coding: this is the initial phase when the goal is to create the categories. In open coding, the sentences and paragraphs in the interview transcripts are first labeled in a way that describes the given case or idea. Similar cases are given the same name (comparison). The many concepts

developed during labeling need to be categorized, which means grouping concepts belonging to the same case.

b. Axial coding: this is the middle phase when the categories are linked. This phase helps to define a relationship between the categories, taking the following into account:
    - factors that cause the case;
    - the central element of grounded theory, which defines the operation of a group of actions and interactions;
    - strategies: actions and interactions resulting from the central case;
    - context: locations, events, others, which form the conditionality of strategies;
    - intervening conditions: these shape, help, or hinder strategies;
    - consequences: the results of the subjects' strategies

c. Selective coding: the final creation of the categories and determination of the core categories

7. Theoretical sampling: a flexible research phase depending on the data that is obtained. The next step of the research is based on previous data until the theoretical saturation necessary for creating the theory is achieved.
8. Theoretical saturation: data collection continues until reaching the point of theoretical saturation. Theoretical saturation is achieved when further interviews do not contribute new information to the theory that has emerged. It is not possible to determine the number of interviews in advance, as this needs to be determined by the interpretation of the data, the empirical boundaries of the data, and the density of the network of categories formed during the theory development.
9. Theory, concept development: developing a theory or concept that can be applied in practice and appropriately interpreting the subject of the research.

III.3.1. Interview preparation

The research can be classified as cross-sectional research as the data collection process took place once and lasted for three months (Babbie, 2003). The interviewing technique and the type of the interviews are critical factors in grounded theory. Interviews can be structured, semi-structured, or unstructured (Burns, 1999). Due to their exploratory nature, structured interviews are not optimal for GT (Duffy et al., 2004; Charmaz, 2006;

Breckenridge, 2014). Unstructured and semi-structured interview designs are both suitable for use with grounded theory, and there are numerous examples of semi-structured interviews in GT (Solt, 1998; Bhal and Leekha, 2008; Stoeckli et al., 2018, Pramani and Iyer, 2022).

Unstructured interviews can be regarded 'as a conversation with a purpose', allowing the respondent to define answers in their own way and for raising ideas that the researcher previously had not thought about. As in GT little is known about the research subject, unstructured interviews are advantageous for discovering the areas of research (Duffy et al., 2004; Charmaz, 2006; Falus, 2014). In semi-structured interviews, the interviewer is focused on asking questions to gather specific information. More focused interview questions are consistent with the grounded theory approach, but they are generally used at the theoretical sampling stage (Duffy et al., 2004).

The method of conducting valid grounded theory interviews has been addressed by some prominent researchers. Duffy et al., and Easwaramoorthy and Zarinpoush suggest a hybrid interview approach. They recommend using unstructured interviews in the initial sampling stage. At this point, the author has the least guidelines and predetermined questions. The interviewer should ask broad questions and engage in a spontaneous discussion. As data saturation grows, and some groups emerge during the initial coding period, the author should shift towards semi-structured interviews and ask interviewees about specific areas based on the interview guideline. Probes – follow-up clarification questions – should be used during unstructured and semi-structured interviews (Duffy et al., 2004; Easwaramoorthy and Zarinpoush, 2006; Breckenridge, 2014).

Charmaz, who created one of the most well-recognized practical guidelines for GTM research, made specific recommendations about interviewing. Charmaz proposes the technique of intensive interviewing, which refers to a gently guided, one-sided conversation that explores research participants' perspectives about their personal experience with the research topic. The structure of intensive interviews can be loosely guided or semi-structured. A key difference between intensive and traditional unstructured or semi-structured interviews is that the interviewer can encourage the interviewee, besides listening. According to Charmaz, the researcher should express interest and want to know more. Questions that might be thought rude or areas glossed

over in amicable agreement in ordinary conversation, even with intimates, becomes grist for exploration. Research participants often expect their interviewers to ask questions that invite reflection about a topic. Rather than uttering 'uh huhs' or nodding (as if meanings are automatically shared), an interviewer can encourage respondents to say more about a given subject (Charmaz, 2006).

The author followed recommendations by Duffy et al., 2004, Easwaramoorthy, Zarinpoush, 2006, Breckenridge, 2014 and Charmaz, 2006 during the initial and theoretical sampling stages and used loosely guided unstructured interview techniques combined with intensive interviewing.

III.3.2. Pilot period

Two pilot interviews were conducted to ensure that the respondents would understand the loose interview guide created by the author and that the responses received would be in the area of interest. The validity and relevance of the research questions during the pilot interviews was validated. The author also validated with experts the usefulness and purpose of the research. The comprehensibility and simplicity of the interview questions were also tested to see whether the answers that were received would be liable to contain the appropriate data.

The participants of the pilot period were:

- A Fintech sector analyst who writes detailed analyses in the area of Fintechs and has a broad understanding of the Fintech sector;
- A Fintech sector advisor who works with multiple Fintech companies and has a broad understanding of the market.

The author successfully used the pilot interviews to validate the clarity of the explanations of the research to interviewees to avoid irrelevant research questions, the guidelines of the interview being incomprehensible or containing mistakes. The author paid attention to avoiding all validity-related risks during the interview process.

III.3.3. Initial sampling

The target group of the research was Fintech companies from various business domains and different geographical distributions. The research started with initial sampling and eventually led to theoretical sampling (Charmaz, 2006).

The author used stakeholder mapping and the literature review to select the participants for the interviews in the initial sampling period. The latter included five interviews with Fintech representatives with a broad domain of knowledge.

The participants of the initial sampling period were:

- A founder of a Fintech company in the field of investments; the goal was to learn about the motivations of founders when establishing a Fintech company and if they have environmental and social considerations regarding their Fintech;
- A founder of a green Fintech company which provides environmental footprint analysis and a carbon-credit-offsetting scheme to its customers;
- A representative of a Fintech company operating in the crypto area. As crypto is a growing area of Fintech, obtaining information and perspective from a crypto Fintech company was necessary during the initial sampling period;
- A representative of a publicly listed Fintech company with thousands of employees and a multi-billion USD company valuation;
- A founder of a Fintech company with a business-to-business Buy-Now-Pay-Later (BNPL) and factoring service.

All interviews were conducted online via Zoom video-conferencing software, and all were recorded and transcribed with the permission of the respondents. Coding of the interview transcripts was undertaken using the NVivo qualitative software package. Based on the initial sampling period, the research proceeded to the more targeted selection of interview participants based on the emerging concepts, sub-categories, and categories.

III.3.4. Memo creation

During the research, the author collected all the ideas that arose during the data collection process and analysis. Memos were used to help identify gaps in the collected data and guide decisions about the theoretical sampling process.

The author used the resulting memos throughout the writing process (the research results, discussions, and conclusion sections) to ensure all key ideas were captured.

III.3.5. Comparison of data

According to Glaser, the formation of categories should not be the result of coercion. This requires, among other things, the continuous comparison of cases, data, and different interviews and views.

The author continuously compared the emerging research data with the field notes, memos, and the codes and categories that emerged through the coding process. Comparison of data helped finalize the codes, resulting in the core and sub-categories. Continuously reviewing, comparing, and analyzing research data was required to identify gaps in the emerging theory and to select respondents for the theoretical sampling period.

III.3.6. Coding

The coding process followed the GT methodology and went through a process of open coding, axial coding, and selective coding. The fifteen interviews resulted in close to 230 pages of transcripts. Additional notes were made by the author during the interviews and memos throughout the entire research period.

Codes were continuously created throughout the interview process. Similar codes were grouped to form sub-categories. Sub-categories were continuously compared with each other to form core categories. Over eight hundred initial codes were captured across two thousand references during the research. By continuously comparing and categorizing the coded sections, thirty-seven sub-categories and seven core categories emerged.

III.3.7. Theoretical sampling

Theoretical sampling is emergent (Charmaz, 2006), as it results from the learning and gaps identified during the initial sampling period. Participants engaged in the theoretical sampling period were selected based on the emerging concepts, sub-categories, and core categories associated with the research. The theoretical sampling followed an iterative approach.

The theoretical sampling period included eight interviews. The author selectively reached out to Fintech representatives to include them in the research and learn about their perspectives concerning particular areas. In the theoretical sampling period, Fintech representatives were selectively included based on the learnings from the initial sampling period.

Based on the research memos and the emerging theory from the initial sampling period, the theoretical sampling involved the following respondents: Fintechs who provide market infrastructure services, Fintechs from the Green and ESG domain, Fintechs from the crypto and Web 3.0 markets, and a Fintech that provides micro-loans for underserved micro-merchants in India. The theoretical sampling also took into account the involvement of Fintechs from multiple jurisdictions and strove to balance the representation of gender, insofar as this was possible.

III.3.8. Theoretical saturation

The author continued the additional interviews and iterations until the propositions (the generalized relationships between the core categories, and sub-categories categories) were formed based on the emerging picture of the codes (Bhal and Leekha, 2008).

Theoretical sampling continued until information saturation was reached, and when further interviews did not provide additional insights.

III.3.9.Theory, concept development

Once the interviews yielded no further information and the relationship between the core categories was established, the author could identify the central concept based on the continuously evolving categories. Theory development increases the generalizability and theoretical integration of the emergent theory (Stoeckli et al., 2018). The theory or prepositions indicate the generalized relationships between (Bhal and Leekha, 2008).

The author successfully used GTM to create a concept map, to specify the generalized relationship between the categories and the concepts, and capture these in a 'Triple-bottom-line concept map of Fintechs'.

III.4. Research boundaries, limitations, and distortive effects

The focus of the research was to conceptualise sustainability in the Fintech sector, as depicted by the research questions. The research only covered Fintechs and not the entire financial system. The research did not aim to create formal theory that would be true of the whole of society or a population. The author strove to develop a substantive theory that – with further research – could contribute to a more comprehensive, conceptual understanding of Fintechs (Horváth and Mitev, 2015, Glaser and Strauss, 1967).

With qualitative research, the most critical risk is a decrease in the research's validity. The methodology- and validity-related risks of qualitative research have been examined in several international studies. According to Merriam, qualitative research can provide a holistic description of reality that is constantly evolving and changing. For this reason, it is the researcher's responsibility to identify and manage the appropriate validity-related risks at each stage of the research, thereby establishing that the research is credible and true and that it analyzes what it is intended to analyze (Merriam, 1998).

Grounded theory methodology can involve validity-related risks. Such risks can be grouped according to the following categories (Zohrabi, 2013):

1. Structural validity: concerning the validity of the main points of the research plan; whether the question asked in the research plan is answered; whether the questions in the interview guideline or the selected target group are appropriate.
2. Internal validity: how realistic are the research results obtained through the filter of reality?
3. External validity: to what extent can the results be generalized to other conditions or tested subjects? Can the research plan be used to conduct similar research and examine the wider population?

According to Hayashi, the following validation techniques should be used at the different stages of the interviews to maintain structural, internal, and external validity. Based on the recommendations of Hayashi, the author carefully paid attention to applying the appropriate validation techniques throughout the research (Hayashi, 2011):

Before data collection:

- Getting to know more about the research area;
- Pilot testing.

During data collection and analysis:

- Detailed documentation of the research fieldwork;
- The researcher's deepening in the field for a longer period;
- Achieving information fullness.

After the analysis:

- Check by experts, peer check.

The expected validity-related risks of the research and the methods used to manage the latter are presented in the following table:

Validity risks	**Methodology of risk management**
Irrelevance of the research question	● Conducting pilot interviews with experts ● Researching international and Hungarian literature
Questions in the interview guideline are incomprehensible or contain mistakes	● Conducting pilot interviews with experts ● Omission of jargon ● Testing the questions in the interview guideline
Selection of the research target group	● Undertaking stakeholder mapping ● Pilot interviews ● Continuous adaptation
Inappropriate interviewee	● Performing stakeholder mapping ● Pilot interviews
Inaccuracy of data collection	● Adherence to qualitative research methods ● Adherence to the interview guideline ● Recording the interviews with a Dictaphone ● Making verbatim transcripts
Losing information	● Making notes and memos during the fieldwork ● Recording the interviews with a Dictaphone ● Making verbatim transcripts

Interviewee behavior, green- and bluewashing	● Clarification of roles ● Using non-manipulative questions ● Paying attention to inconsistencies and contradictions during the interview ● Querying details ● If possible, checking the information - especially in suspected cases of green- and bluewashing
Mistakes in data analysis	● Validation of results with interviewees
Contradiction of results with reality	● Validation of results with interviewees ● Comparison of research results with theory
Inadequate documentation of research methodology and steps	● Undertaking detailed and precise research audit ● Documenting the research methodology and its steps ● Compliance with repeatability criteria
Theory making	● Auditing the methodology of data analysis ● Compliance with coding rules ● Maintaining personal distance from the research area

Table 8: Managing GTM validity risks (Zohrabi, 2013)

During the research, all validity-related risks were continually mentored and eliminated. Following the inductive logic, the author made memo notes after each interview, which were also used during the analysis. Following the grounded theory methodology, the memos described the external circumstances and impressions encountered during the interviews and the ideas that helped the author in the analysis and theory-making (Horváth and Mitev, 2015).

The video interviews were recorded using the Zoom videoconference software, which helped avoid losses of information and reduced the author's influence as an interviewer later during the analysis (Solt, 1998). Since an interview is the result of the mutual interaction of two people, the interviewee may want their answers to agree with those of the researcher who is conducting the interview – this bias can be reduced through maintaining the least amount of intervention (for example, avoiding value judgments).

Due to the 'coercion of compliance' involving the interaction of the interviewee and the interviewer, interviewees may not tell the truth. The author employed two methods to

prevent this: attention was paid to possible inconsistencies throughout the interview, and if the author had already discovered an inconsistency or felt that something did not fit the facts or narrative, the interviewee was asked for further details, helping to reveal the truth as perceived (Solt, 1998).

During the research, attention was paid to detecting the appearance of greenwashing as information about the sustainable development and environmental and social impacts of companies can pose significant reputational risks, and it may be assumed that some of the interviewees would consciously try to create a positive external image.

Due to the use of the mitigation strategies described in the section above, the research and its results are believed to meet the structural and internal and external validation requirements of grounded theory.

IV. RESEARCH RESULTS

This section provides a detailed description of the research results, including the characteristics of research data and the results for the two research questions. The section describes the emerged core and sub-categories as an outcome of the coding process. The results presented in this section inform the 'Discussion of Research Results' section, in which the findings are summarized and illustrated via the 'Triple-bottom-line concept map of Fintechs'.

IV.1. Overview of research data

IV.1.1. Company attributes

The research included Fintechs from various domains with diverse products and services. Most interviewed Fintechs were private companies, but the research also included two publicly listed companies. The company value of the private Fintechs is not known. The publicly listed Fintechs analyzed were both multi-billion dollar companies: Company 6's current market value is above 15 billion USD, while Company 10 is worth more than 5 billion USD.

The interviewed Fintechs are engaged in various financial activities in the payment, lending, green and ESG, capital markets, money markets, system integrator, crypto, and Web 3.0 domains. Their number of employees ranges from single-digit to thousands of employees. The interviewed companies were selected to cover a large geographic distribution. Fintechs from North America, Asia, and Europe were interviewed.

The following table shows the company attributes of the Fintech companies involved in the research:

Fintech company attributes							
	Domain	**Key products and services**	**Customer segment**	**Number of customers**	**Place of incorporation**	**Number of employees**	**Sampling period**
Company 1	Crypto	News, analysis	Corporate, retail	1,000+	United States	150	Pilot period
Company 2	Advisory	Fintech startup advisory	Corporate	10+	Hungary	3	Pilot period
Company 3	Green and ESG	Carbon credits	Corporate, retail	1,000+	Hong Kong	28	Initial sampling
Company 4	Capital markets	Alternative investments	Retail	5,000+	Switzerland	12	Initial sampling
Company 5	Crypto	Investments	Corporate	50+	Cayman Island	14	Initial sampling
Company 6	Capital markets	FICC technology	Corporate	1,000+	North America	10,000+	Initial sampling
Company 7	Lending	BNPL, Factoring	Corporate	100+	Hungary	16	Initial sampling
Company 8	Web 3.0	DEFI protocol	Corporate, retail	N/A	Switzerland	40	Theoretical sampling
Company 9	Claims	Claim management	Corporate, retail	1,000+	Hungary	8	Theoretical sampling
Company 10	Capital markets	Stock exchange	Corporate	1,000+	North America	1,500+	Theoretical sampling
Company 11	Crypto	Exchange	Corporate, retail	N/A	United States	10	Theoretical sampling
Company 12	Money markets	Cash in Transit	Corporate	1,000+	Hong Kong	1,400+	Theoretical sampling
Company 13	System integrator	AWS, Alibaba Cloud, GCP	Corporate	2,000+	Hong Kong	100+	Theoretical sampling
Company 14	Green and ESG	Green data and analytics	Corporate	10+	Hong Kong	20+	Theoretical sampling
Company 15	Green and ESG	Green data and analytics	Corporate	100+	Hong Kong	10+	Theoretical sampling
Company 16	Payment, Lending	Payments, Loans	Corporate	60,000+	India	350+	Theoretical sampling

Table 9: Attributes of Fintech companies in the research

IV.1.2. Interviewee attributes

The research aimed to reach a coherent set of Fintech representatives, including both founders-managers and employees in order to learn multiple perspectives on the TBL impact of Fintech companies. The following table shows that most Fintech representatives had diplomas and spent an average of almost nine years in the Fintech sector. Eight out of the fifteen representatives were founders-managers, while seven were employees. Interviewee 13 had recently changed jobs from a Cash in Transit company to a System Integrator company. The interviewee was willing to do two interviews, as both companies were related to the research subject.

Interviewee attributes					
	Sex	**Position**	**Age**	**Education**	**Years in Fintech**
Interviewee 1	Male	Analyst	40-50	Ph.D.	4
Interviewee 2	Male	Co-founder	50-60	MBA	20
Interviewee 3	Male	Co-founder	30-40	MSc	10
Interviewee 4	Male	Co-founder, CTO	40-50	Ph.D.	7
Interviewee 5	Male	Co-founder, CTO	40-50	BSc	4
Interviewee 6	Male	Director	30-40	IB	10
Interviewee 7	Male	Co-founder	30-40	MSc	6
Interviewee 8	Male	DeFi Partnerships Lead	30-40	BSc	5
Interviewee 9	Male	Co-founder, COO	30-40	BSc	2
Interviewee 10	Male	Head of Sales	50-60	BSc	20
Interviewee 11	Male	Co-founder, CPO	30-40	BSc	8
Interviewee 12	Male	Transformation Manager, Sales Manager	40-50	BSc	10
Interviewee 13	Female	Business Development Lead	20-30	MSc	6
Interviewee 14	Male	Assistant Director	40-50	PhD	3
Interviewee 15	Male	Co-founder	40-50	BSc	15

Table 10: Interviewee attributes of the research

IV.2. The triple-bottom-line concept in Fintech companies

This section provides answers for Research Question 1.

IV.2.1. Core categories and sub-categories of Research Question 1

During the coding process, the interview transcripts were analyzed, compared, and categorized into continuously emerging core and sub-categories. As the research reached theoretical saturation, the categories became more fixed, and the interviews added some final details. The core and sub-categories revealed a pattern where the responses could be used to answer both research questions.

The following table shows the core and sub-categories that emerged during the research regarding how the triple-bottom-line concept appears in the operations (direct impact) and the products and services (indirect impact) of Fintech companies (Research Question 1)? The 'Transcript' column indicates how many interview transcripts included references in the relevant core and sub-categories. The 'References' column describes the number of references in the transcripts emerging during the coding process that resulted in the final core and sub-categories.

Core category	Sub-category	Transcript	References
RQ1 - Operations and product and services		15	1437
Impact of company operations		15	175
	Economic impact of company operations	6	10
	Environmental impact of company operations	13	76
	Social impact of company operations	12	82
Product and service development		15	659
	New business models	9	43
	Capital markets products development	5	25
	Crypto product development	6	29
	Ecosystem and partnerships	11	22
	Green and ESG product development	11	91
	Innovation	13	90
	Lending product development	8	60
	Payment products development	8	33
	Product development principles	12	87

	Product marketing	12	40
	Value proposition	13	87
	Web 3.0 product development	7	25
Impact of Fintech products and services		15	606
	Economic impact	15	240
	Environmental impact	14	83
	Social impact	14	283

Table 11: Core and sub-categories relating to Research Question 1

The three core categories of Research Question 1 have been identified as follows: company operations, product and service development, and products and services. An explanation of each core category and its sub-categories is provided below with quotes from the respondents (where relevant). (The respondents will be indicated in a standardized format: the interviewee number as described in Table 10 followed by the company domain and position in the company. For example: Interviewee 1 (Crypto, Analyst)).

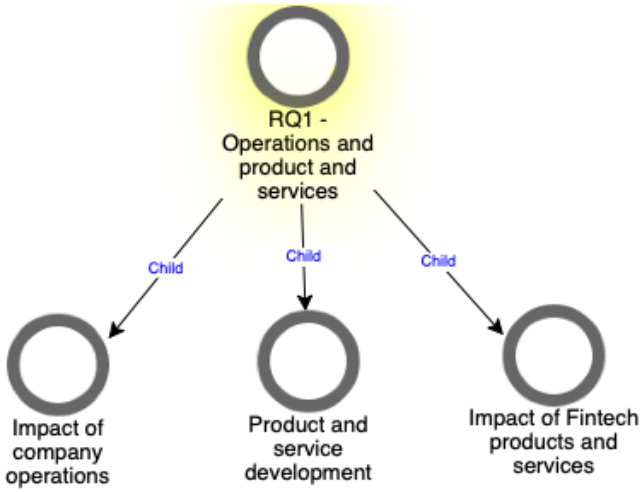

Figure 2: Core categories of Research Question 1

IV.2.2. Impact of company operations

Three sub-categories within the core category of **'Impact of company operations'** have emerged: the economic impact of company operations, the environmental impact of the company operations, and the social impact of company operations.

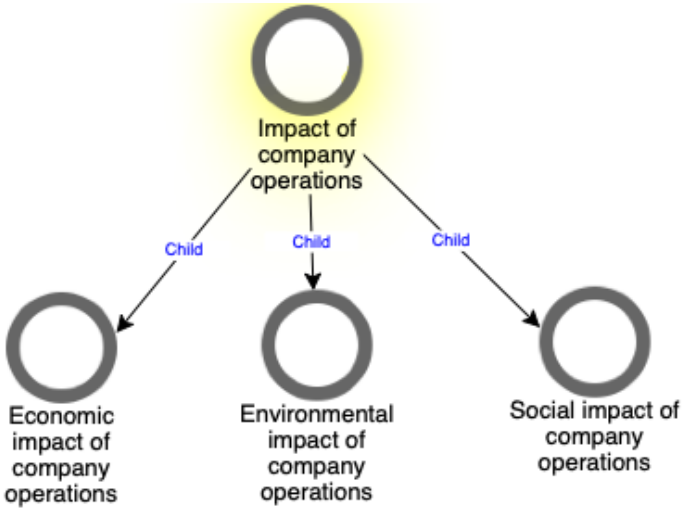

Figure 3: Sub-categories of Company Operations

The sub-category of 'Economic impact of company operations' contains two key areas: company revenues and employee ownership. The interviews demonstrated that Fintechs are primarily focused on increasing their company's revenues. Economic growth is a key concern of founders, managers, and employees.

Fintech employees are motivated by the company's growth, as many receive shares in the company. Increasing the company valuation and, thus, the shareholder value directly impacts the financial worth of founders, managers, and employees.

The 'Environmental impact of company operations' is a sub-category created based on the interviewees' feedback regarding their observations about their company's environmental impact.

The environmental impact of cloud and physical IT infrastructure was mentioned as the most significant direct environmental impact of Fintechs. Fintechs typically move away from traditional physical hardware-based infrastructures and run their software solutions using cloud infrastructures. Fintechs must also maintain physical, on-premise data centers in certain jurisdictions. Based on the interviews, BigTech cloud providers such as Amazon Web Services (AWS), Google Cloud (GCP), Microsoft Azure, and Alibaba

Cloud are among the key cloud providers used by Fintechs. As Interviewee 12 (Money markets, System integrator, Manager) pointed out, “Fintech has transferred the pollution factor or energy consumption factor to the cloud. So, the remaining question is whether FinTech can be environmentally friendly. It relies on how the data center operator - the cloud provider - powers their data centers. If they're using renewable energy or not”.

Based on the responses, the direct environmental footprint of Fintechs through their physical office environment is still visible, although to a decreasing extent. Fintechs in the research were striving to have a global presence, and some are still maintaining representative offices. Respondents mentioned that offices became smaller, and their companies started using ‘hot desking’ systems, meaning that the available seats are available on-demand for people who choose to go to the office on a given day. Fully remote or hybrid work had already become widespread before COVID-19, but since then, almost every Fintech has shifted to a remote-first culture. ‘Working from home’ has become the new standard. The reduced direct environmental footprint due to the lesser use of physical office space was mentioned by ⅔ of respondents.

Being remote increases the need for occasional in-person meetings and travel. The employee traveling footprint for Fintechs is a recognizable direct environmental impact. Respondents mentioned conscious planning to decide if an overseas trip is required, mainly from a cost-consideration perspective. The large, public Fintech companies mentioned a heavier reliance on travel for meeting colleagues or business partners. Company gatherings are also organized to build social bonds and discuss projects in person.

Environmentally conscious behavior is directly encouraged within some of the Fintechs. For example, in one company, vegetarian meals are ordered for employees to reduce the environmental footprint of meat consumption. Another Fintech - whose core mission is to tackle climate change - provides carbon footprint offsetting for all its employees as an employee benefit.

Lastly, one significant direct environmental impact of the interviewed Fintechs is their efforts to eliminate paper-based processes. Due to the high-efficiency level and digital processes, Fintechs try eliminating manual and paper-based processes. Leveraging digital

solutions, such as DocuSign, to electronically prepare, store and sign all legal contracts have a significant direct environmental impact. Although the exact figures were unknown to the respondent, a public Fintech company with more than 10,000 employees and 1,000 customers fully eliminated paper-based contracting.

The **direct social impact of Fintechs** is the one they have on their employees and their families. Respondents highlighted two areas where Fintechs have an impact on their lives: company culture and company structure.

When speaking about the **company culture** of Fintechs, respondents highlighted the importance of topics such as gender equality, gender neutrality, equal salaries, a politics-free and anti-harassment environment, and the fact-driven direct feedback culture. Avoiding “playing blame games” was how a Fintech founder summarized it.

Creating a remote-first culture with strong cultural values and principles is important. Respondents mentioned elements related to the company's culture, such as self-sufficiency, transparency, openness, honesty, responsibility, and accountability. Employees are encouraged to work on items they enjoy and to indicate if they have physical or mental tiredness so they can take some time off from their daily work. Mutual trust and avoiding micromanaging employees were mentioned as part of a positive culture.

Most respondents also highlighted the importance of an energetic work environment and diversity. Interviewees gave examples of the core value of their company. Employees are often involved in a certain level of decision-making within the company or consulted about the strategic directions of the management. Mental health and social isolation played a large part in the past two years. Many Fintech tried to increase social cohesion, looked after their employees regularly, or encouraged online social activities.

Respondents said they felt valued by the company and that the company regarded its employees as its core assets. Free training programs and structured career developer coaching are available in larger, public Fintechs. Such formalized processes do not exist in the smaller Fintechs. Career advancement and the involvement of younger, not yet graduated students are also encouraged through internship and internal mentor programs.

In some Fintechs, company culture is centered around sustainable development principles. The company organizes environmental and sustainability-themed company programs and social events.

Other direct social impacts of Fintechs include more flexible salary models, for example, allowing employees to request weekly salary options or providing health and pension savings plans to employees.

The **structure of the company** supports the company culture. Fintechs create a remote-first organization structure where all meetings and company events occur online. The virtualization and decentralization of the work environment can create more employee flexibility. Both managers and employees said being remote allows for a better work-life balance and helps to avoid burnout. Being remote has some negative consequences: communication is more fragmented, and employees find it harder to interpret other employees' actions or as Interviewee 8 (Web 3.0, DeFi Partnerships Lead) said: “figure out if you are pissing someone out”.

Respondents deemed the flat organizational hierarchy as a positive favorable organizational structure that allows one to “get easily connected to others at any level in the company”. COVID-19 further reinforced the need to work in a less bureaucratic format and to improve information flow in a remote environment.

IV.2.3. Product and service development

Product and service development and the impact of the company’s products are closely related sub-categories. Product and service development is the process of creating new fintech products and services. Based on the interviews, the following sub-categories have emerged as key elements of the product and service development of Fintechs: innovation, product development principles, value propositions, new business models, product marketing, ecosystem and partnerships, and the actual development of the products: lending, payment, capital markets, green and ESG, crypto and web 3.0.

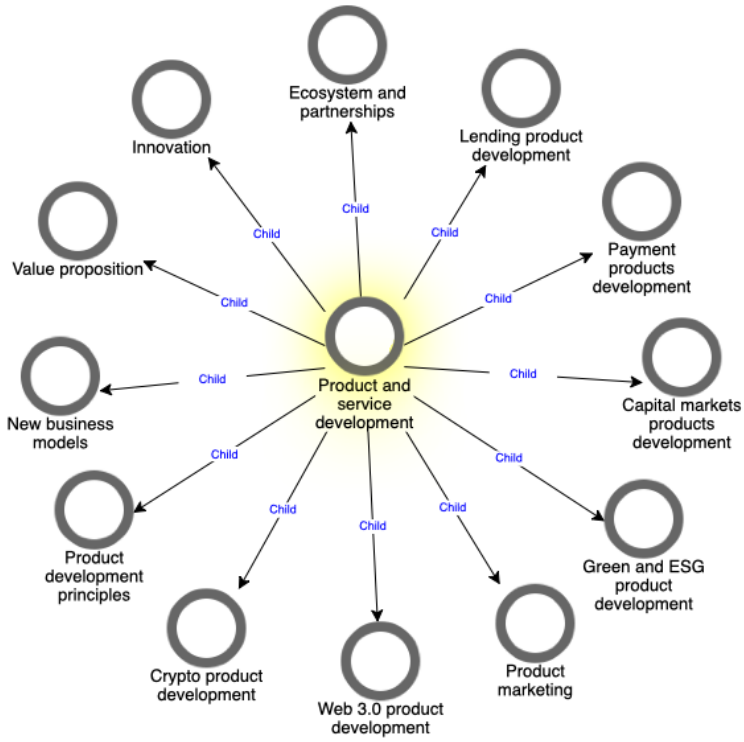

Figure 4: Sub-categories of Product and Service Development

Product development principles are key drivers of how Fintechs create new products and services. Compliance with security and legal frameworks has become increasingly important and includes performing anti-money laundering (AML) or know-your-customer (KYC) verifications of the users of Fintech's products. Respondents mentioned that preventing fraud is becoming a significant effort as cybercrime is putting the security standards of Fintechs to the test every day. As the interviewed Fintechs offer financial services to their clients in various financial areas, compliance with payment, lending, and other related regulations is increasingly important.

Product development ethics emerged as the second most cited concept within product development principles. Product development ethics includes interacting with reputable suppliers during the product development lifecycle and avoiding using suppliers with a negative reputation. Ethical product development emphasizes transparent communication and educating customers about the potential risks of using a product, for example, when applying for a loan or making an investment.

Interviewee 1 (Crypto, Analyst) mentioned that some Fintechs mislead their customers and use a method called ‘Shilling’ as part of their product development strategy. Shilling refers to the unethical practice that became prevalent in the crypto sector. Shilling is an undisclosed advertisement to lure users to a new crypto product or cryptocurrency without revealing the advertiser's interest in the product.

Another negative ethical issue mentioned by one of the respondents was that although the Fintech company they work for has a growing set of ESG and sustainability-related products, the company still does not ban trading products in tobacco or fossil energy companies.

Agile product development is a central tenet of all interviewed Fintechs. Agile product development includes “making rational decisions based on hypothesis, data, and product validation” as Interviewee 4 (Capital markets, Co-founder, CTO) explained. Constant product feature prioritization ensures that Fintechs focus on value-added functionality customers want to use. Being flexible yet pragmatic is an important element of agile product development. Fintechs need to respond to market demand quickly and reflect it in their product development decisions. Working iteratively, normally in 2-week cycles called sprints, allows Fintechs to frequently review their already planned product functionalities, called their product backlog. “Moving fast and breaking things as opposed to doing much research” as Interviewee 9 (Lending, Co-founder, COO) explained, builds on the principle of frequent customer feedback and actual learnings from the customers' interaction with the products.

Two additional areas were mentioned about product development principles: the importance of scalability and the widely adopted ‘10x rule of product development’. Scalability refers to the solution being designed to serve a globally distributed and rapidly growing customer base without changing the application's overall design or any significant modification to the implemented software. According to multiple respondents, as Fintechs aim to achieve global presence, scalability is an important product development principle right from the beginning.

The ‘10X rule of product development’ refers to the need for Fintechs to solve real problems by achieving either 10x efficiency over the currently available best solution or a 10x reduction in cost compared to the current best options.

Almost all respondents mentioned **innovation** and experimentation. Innovation is the backbone of creating new products and services, and interviewees put a high value on innovation. Innovation in Fintechs leverages product development principles and acts as a pragmatic funnel from idea to productization. Some respondents mentioned trying to set foot in niche, underdeveloped business areas. As Interviewee 8 (Web 3.0, DeFi Partnerships Lead) said, “competition with the mainstream is always going to be very tough and we are looking for ways to get around that".

Some of the innovative niche areas the analyzed Fintechs engage in involve Decentralized Finance (DeFi), carbon markets, crypto investments, claim collection, factoring, and data. Innovation is an important element behind the success of Fintechs and is part of the DNA of the companies. Fintechs are regarded as pioneers in creating new markets, which might become more mature and mainstream later.

Respondents mentioned open innovation and co-creation as interacting with traditional financial services providers, such as banks. Innovating together or leveraging banks to meet regulatory requirements can be a key enabler for many early-stage Fintechs. As Interviewee 15 (Payment and lending, Co-founder), Co-founder of one of India’s largest micro-merchant payment and lending provider platform explained: “...a lot of the innovation from Fintechs came to life by maneuvering the walled garden set by regulators by piggybacking on existing incumbents. For example, if you want to do remittances, you need to find somebody who has a license and allows you to piggyback your solution on their license before you become big enough to get your own license”.

Interviewee 2 (Advisory, Co-founder), who provides advisory services for Fintechs pointed out that most Fintech founders have a background in traditional finance. The relationships they accumulate during their traditional financial sector years are often used when they create their Fintech companies. This Fintech-traditional banking cooperation was a recurring theme of the interviews.

Fintechs also face barriers when innovating. It became apparent that Fintechs find it hard to attract the necessary talents with the required technology and financial background experience. It is hard to innovate in finance without previous financial market experience, therefore Fintechs must rely on becoming attractive to the new generations and subject matter experts with a financial background.

The interviews reinforced what the Fintech literature has already captured in other studies regarding how Fintechs leverage **new business models and create compelling value propositions** during their product and service development. Some new business models the interviewed Fintechs are focusing on are tokenization and platform creation. Tokenization is an emerging trend that Fintechs champion, but it is already getting adopted by traditional banks. Tokenization enables the digitization of traditional and new assets in the form of fungible or non-fungible tokens (NFTs). Tokenization enables the creation of new asset classes, such as cryptocurrencies, virtual land, virtual art, or the digitization of previously non-digitized assets, such as royalty rights or carbon credits. The growth in tokenization can be seen as a strong indication of an emerging Fintech focus area. Four of the fifteen respondents mentioned that their company is involved in tokenization.

Platform creation is a large, complimentary area of business models mentioned by respondents. Platforms are double-sided business models where the service providers and the customers use the platform to facilitate their business needs. The platform operator can make revenue via multiple streams, e.g., taking a fee for providing, operating, and validating transactions on the platform. E-commerce, lending, crypto, and carbon credits-related platforms were the key business models pursued by the Fintechs involved in the research. Tokenization and platform creation are often combined: the company first creates a tokenized asset such as carbon credits, cryptocurrency, or NFT and also creates a platform to enable the buying, selling, lending, or collateralizing of the given asset.

In the case of Fintechs, **product marketing** often focuses on creating simple, clean messages about how Fintech's product can enhance the lives of its users. Being trustworthy is required to be adopted by users, therefore Fintechs try to establish themselves with an authentic voice on the market. Respondents said that creating educational materials tailored to the process the user goes through while using the product

- the so-called user journey - is a key part of demonstrating the benefits of their products. Respondents mentioned relying heavily on referral marketing and social media to relay their specialized content to potential users. Having an organically growing user base is important from a sustainable growth perspective.

Financial marketing is increasingly using green and environmentally conscious ESG messages. A respondent mentioned the hype around ESG and greenwashing: “Every big bank has a department that's doing ESG. Why? Because it is a trend. It is a trend, and more and more people are identifying with the narrative that we should care about it, and because of that, you can market it, and use it as part of your brand affinity marketing approach”. Within the interviewed Fintechs, the overuse of ESG-related communication or a sense of false ESG reporting was not present; only the Fintechs who work on green products use ESG in their marketing. Other respondents clarified that ESG is not part of their communication strategy as it is not part of their value proposition.

The respondents mentioned **ecosystems and partnerships** as a way to grow the overall market and help to increase the adoption of digital services. Creating ‘multi-platform’ strategies, where multiple Fintechs cooperate, each adding their products and services to the platform, is increasingly popular. Interviewee 9 (Claims, Co-founder, COO) described a multi-platform strategy as providing a one-stop shop for their clients, where their client can not only manage their claims but can also access other Fintech services such as billing.

Interviewee 15 (Payment and lending, Co-founder) highlighted that they are closely cooperating with other Fintechs: “India today has a bunch of Fintechs, right? Several of them have become unicorns, and several are on their way to becoming one. But the Indian market is so huge, that I think there is room, if not more than enough room for everybody. From that perspective, I think that several of the startups that we work with, collaborate with one another. We obviously understand that at some point, we're competing with one another, but at the same time, we're collaborating with one another exchanging ideas, and trying to develop an ecosystem, because at the end of the day, we're all focused on serving the underlying consumer, which is currently not served. We all understand that there are learnings that we can share with one another and it's going to make us better as a whole rather than just better individually”.

Fostering the growth of ecosystems and partnerships became easier with the widespread adoption of APIs. Fintechs leverage API gateways to create connections with each other. From a user perspective, such a growing system of interconnected applications and functionalities makes adopting Fintech services easier. It benefits all Fintechs involved in such a partnership with a growing user base.

Some Fintechs in the research also interacted with external stakeholders, such as NGOs and other banks, to co-create services. For example, the Hong Kong-based carbon credits tokenization Fintech company is focusing on building extensive relationships with retail stores, airlines, and even the World Wide Fund (WWF) to adopt their carbon offsetting services.

All product and service development efforts serve the purpose of creating marketable products. The result of the process is a set of new financial products created by Fintechs. Two of the sixteen interviewed Fintechs are developing **lending products**. One of the two companies is a Buy-Now-Pay-Later (BNPL) and digital factoring provider, and the other is one of the largest Indian small and micro merchant payment and lending platforms.

BNPL products are lending products where the buyer can purchase goods with a delayed payment arrangement for an interest fee added to the original price. The founder of a Fintech startup explained that their company is solely offering business-to-business BNPL products, as businesses purchase goods with more responsibility and for the reason to support their business growth. The company does not provide loans for retail BNPL purchases as they consider it socially irresponsible.

Based on Interviewee 7 (Lending, Co-founder), business-to-business BNPL can increase companies' cash flow. The Fintech company is financing the loans using European-based refinancing traditional bank partners, from whom they borrow money at a lower interest rate than they are lending to their borrowers. The same company also provides factoring services to their clients. In factoring, companies can receive the value of their already delivered goods, for example, if they are delivering to a large hypermarket, in which case

their payment period could be as long as 90 or 180 days. Factoring allows companies to increase their turnover and de-risk their operations by having a more stable cash flow.

The same Fintech offers lending and payment in some cases. The Indian payment and lending Fintech is providing its services to underserved micro and small merchants, which are “primarily family run business, husbands and wives, fathers and sons” who do not have access to the traditional financial system in India. The company has started its operations in the payment area by providing payment gateways for micro-merchants to process digital payments made by their customers. “The premise was if you are a merchant, and you have a bank account, and you have a feature phone, we will allow you to accept digital payments. We said we will keep it very simple. You scan the QR code, and it's going to point you to a website, you enter the amount and you could pay the merchant digitally using a credit card, debit card, any of the mobile wallets. The merchant is going to get a confirmation on the feature for the confirmation”. The service became very popular rapidly, enabling the company to expand its services to provide loans as well.

As Interviewee 15 (Payment and lending, Co-founder) explained, “despite the presence of large banks, and even with an available banking footprint by these micro-merchants, they don’t really have access to financial services in the truest sense of the word. Merchants wanted micro-loans for their business. They wanted loans to expand their business, but never had anybody to provide them that block of capital to increase their business”.

Today, the company serves over 60,000 micro-merchants and processes 50 million USD in payments and loans yearly in India. The cost of the loan is 2% of the provided capital each month. The company has created a solution where the merchant can continuously repay the loan by taking a small amount from each electronic payment the merchant receives from its customer. Merchants are also allowed to repay their monthly installments the traditional way at the end of each month.

The claim management service provider Fintech operates in the traditional business domain of claim management and collection. The company's key competitive advantage is to replace the currently highly paper-based and fractioned claim collection procedure

and offer a fully digital service to its customers. The solution is fully compliant with the local and EU legal framework. Interviewee 9 (Claims, Co-founder, COO) explained that their product brings all involved stakeholders of the claim management process to the same platform: lenders, borrowers, legal advisors, and notaries are all represented in the same platform. The company's goal is "to provide a simple, digital end-to-end marketplace where the lender can select from three claim collection services and use the platform to start, follow and get notification of all started claim collection processes".

Capital market products is a specialized Fintech domain, where two of the three respondents are more mature and already established Fintech companies. Most companies participating in the research were startups or scale-ups - where the company is still ahead of significant potential growth. The interviews in the capital markets domain were done mostly with large public Fintech companies. One of the companies is a large financial market infrastructure (FMI) operating a major global stock exchange. The other company is a large public company that provides software solutions to its clients to facilitate financial market transactions, including trading on stock exchanges or making their post-trade, settlement, and securities lifecycle processing.

The stock exchange offers financial market products in Fixed Income, Currency, and Commodity (FICC). FICC includes Initial Public Offerings (IPOs), investment products such as stocks, bonds, electronically traded funds (ETFs), and also the ability to list Special Purpose Acquisition Companies (SPACs). Interviewee 10 (Capital markets, Head of Sales) explained that the exchange offers all traditional exchange-based products to its corporate clientele: banks, brokerages, and custodians. Recently the exchange also started introducing ESG and green financial products, such as green bonds and a green index with a selection of ESG-compliant companies.

The other public company interviewed is a large Fintech software and solution provider with more than ten thousand employees and above 15 billion USD in company valuation. The company provides its FICC technology products to many of its buy-side (asset managers, pension funds, investment banks) and sell-side clients (brokers, custodians) and financial market infrastructures (stock exchanges, clearing houses, central security depositories). The company provides software products for the entire value chain of trading, clearing, settlement, and securities lifecycle events. Interviewee 6 (Capital

markets, Director) summarized the company's core strengths and advantages: “we provide everything from front office trading solutions to post-trade processing, reconciliations or payment processing. There is a huge variety of different products that the company offers. Where we differentiate is that all of our solutions are multi-asset focused”.

The company builds strong partnerships with other Fintechs who provide certain technologies, such as smart contracts and distributed ledger platforms. One of the company’s products is particularly significant from an environmental footprint perspective. Proxy voting, which allows company shareholders to participate in the yearly company annual general events (AGM), is currently a heavily manual and paper-based process, which generates a large environmental footprint. The company offers a fully digital alternative for proxy voting, which brings great efficiencies in processing speed and transparency but also has an important positive impact from an ESG perspective.

Another Fintech in the capital markets domain is working on a less established but emerging new investment trend called alternative investments. Alternative investments are new opportunities for investor clients to invest in physical assets such as barrels of whiskey, wine, arts, expensive watches, or cars that have traditionally gone up in value. The company offers fractionalized alternative investments, where the investor can purchase the legal ownership of a fraction of the total asset for a fraction of the price. Buying the entire asset might be overly expensive for a single investor and would exclude a large portion of non-high-net-worth individuals from the market. As Interviewee 4 (Capital markets, Co-founder, CTO) explained: "We use the economics of scale. A single investment item might cost tens of thousands of dollars. Most investors don't have that lying around. I don't know about you, but if I can own a fraction of it, and I have 100 dollars at the end of the month, I can buy one, two or three shares of this alternative investment asset”.

Green and ESG products are increasing in their popularity. Three of the sixteen companies involved in the research are green Fintechs. Based on the interviews, the carbon credits market and the related ecosystem emerged as a key area for green Fintechs. Carbon credits cover the entire lifecycle, from green project selection and evaluation,

green data collection, carbon credits calculation, carbon credits registry, carbon credits marketplace, trading, and advisory.

One of the Hong Kong-based Fintech companies is offering carbon footprint calculation services to both individuals and corporations as an entry-level service to help calculate and offset the environmental footprint of both individuals and companies. The company is already working with some key Hong Kong-based shipping and real estate developer companies, offsetting more than a million tonnes of CO2 a year. The company is also progressing towards creating an Asia-based high-quality carbon registry leveraging only projects with high additionality. As Interviewee 3 (Green and ESG, Co-founder) explained: “Among other key criteria, we also focus on what's called additionality. The projects have to prove that they have demonstrated additional improvements as opposed to the existing improvements, which would have happened anyways. We focus on projects with high additionality to maximize the per-dollar impact that goes into these carbon projects”.

The author interviewed two other green Fintechs to learn more about the sector. One of them is providing similar carbon credit offsetting services to project owners, but with a heavier focus and data-driven advisory and calculating the required carbon offsetting for companies. The company supports its clients by providing calculations available via a digital dashboard where their clients can review their carbon offsetting goals and the composition of their environmental footprint. Project owners can use the calculations to reduce emissions and receive specialized green subsidies to finance their decarbonization initiatives.

The third green Fintech provides real-time green data by leveraging smart sensors, the Internet of Things (IoT), and blockchain technology. The company is working with green project owners, many of whom have already participated or are about to participate in green bond issuance. Providing accurate, real-time green data information about a project's performance is becoming increasingly important as investors want to see verifiable, immutable, and reliable data about the impact of financed green projects. The company also offers a tokenization platform for green bond issuances and tokenized carbon credits trading.

Crypto became an umbrella term for a rapidly growing new high-tech market leveraging two new technologies: smart contracts and distributed ledger technology. Blockchain technology is a subset of distributed ledger technology. Crypto companies are still Fintech companies, but while traditional Fintechs leverage Web 2.0 technologies, Crypto is focused on decentralized Web 3.0 technologies. Among the sixteen interviewed companies, four Fintechs are operating in the crypto area. One focuses on crypto-related investments, another on building a decentralized crypto exchange, another on Web 3.0 product development, and the fourth is providing news and analysis services.

The Cayman Island-based crypto investments Fintech offers crypto investment and management to institutional and professional investors. They are managing various open-ended mutual fund products to allow their investors to get exposure to cryptocurrency investments and algorithm-based crypto trading.

The decentralized crypto exchange (DEX) startup launched its product before the interview. During that week, the news was loud from the mismanagement and fraud which resulted in the bankruptcy of the second largest global centralized crypto exchange (CEX), FTX. The company's core value proposition is to create an environment where the CEX frauds, such as FTX, are eliminated by design, and losing ownership over the invested financial assets is impossible. The company started offering its first exchange product to enable trading between Ethereum and Solana, two major cryptocurrencies.

Web 3.0 is a sub-category of the overall crypto markets. Web 3.0 includes services and products that rely on the infrastructure and the increasing popularity of the cryptocurrency markets. Web 3.0 includes the metaverse and decentralized finance. The Fintech in the interview is working on a decentralized finance (DeFi) protocol, where tokenized assets can be used as collateral to receive loans from lenders, all facilitated automatically via the DeFi protocol, without any human intervention. The DeFi protocol is a smart contract-based, fully automated computer program which governs the collateral and loan facilitation between lenders and borrowers. The company is supporting asset owners to convert their real-world assets into tokenized non-fungible tokens (NFTs) to facilitate the interaction with the DeFi protocol and to be able to use those real-world assets in Web 3.0 transactions.

As the crypto sector grew, the traditional financial market and the public increased their interest in learning about the new technology and associated opportunities and risks. A United States-based but global Fintech built its business by providing high-quality crypto news and analysis products. The company uses a freemium business model, where news or analysis is freely available to anyone. They also offer a paid premium service. The company provides analysis for traditional financial institutions, mostly banks and institutional investors, to understand the phenomena happening in the crypto markets. Interviewee 1 (Crypto, Analyst) explained: "We are a crypto news outfit mainly. We have three main product lines. It's crypto news, like the Bloomberg of crypto news, then we are providing data on our website, and the third product is research. We carry out crypto research and create reports for our customers".

Enabling services is increasingly important for Fintechs. Although not strictly a Fintech product, based on the interviews, most Fintech companies rely on running their IT infrastructure in a cloud-based environment. Setting up a cloud-based IT infrastructure has many benefits but requires specialized IT knowledge. When a Fintech company does not have an internal IT operations specialist (DevOps), a system integrator company can support them in their journey. The research also involved a specialized system integrator company. The company offers Fintechs a wide range of cloud-based services, such as setting up and managing their Amazon, Google, Alibaba, or Microsoft-based cloud environment.

Providing advisory services to Fintechs is a growing business area. As Interviewee 2 (Advisory, Co-founder) explained, "Fintech founders are often driven by the love for technology and to 'break things fast'. Meanwhile, 'breaking things fast' enables Fintechs to improve their innovation capabilities, advisors with a great deal of financial background and managerial experience also support most of the successful Fintechs". Advisors offer their services in return for a fee, a portion of Fintech's company share, or assets, such as cryptocurrencies.

IV.2.4. Impact of Fintech products and services

The **'Impact of Fintech products and services'** emerged as the third core category supporting the answer to Research Question 1. This core category includes the economic, environmental, and social impacts of the products and services offered by Fintechs.

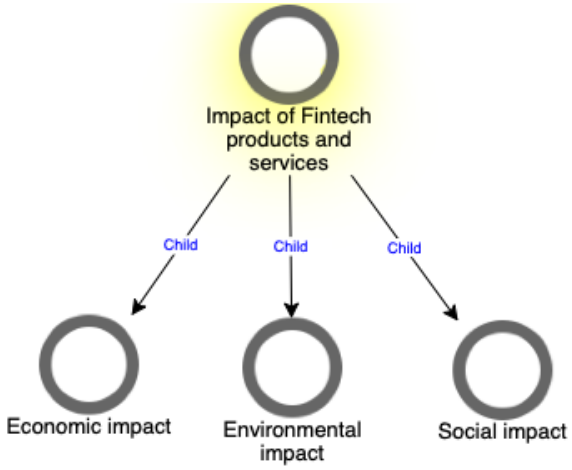

Figure 5: Sub-categories of Fintech products and services

The core category of 'Impact of Fintechs products and services' supplements the direct economic, environmental, and social impact of Fintechs described in the core category of 'Impact of company operations'. The impacts that emerged from the interviews regarding the 'Impact of Fintechs products and services' can be regarded as the indirect impacts of Fintechs. Based on the number of associated quotes between the indirect and direct impact of Fintechs, the operational aspect of Fintechs is a smaller category with 172 associated quotes. The core category of the 'Impact of Fintech products and services' is a larger category, with 659 mentions. The 'Impact of Fintech products and services' core category has three major sub-categories: economic impact, environmental impact, and social impact.

The **'Economic impact'** sub-category is a collection of responses where the respondents provided their views about how the products and services of Fintechs impact the overall economy. During the interviews, the respondents spoke about the impacts of Fintech products and services on the economy: market efficiency, green capital, ecosystem development, access to markets, illegal activities, and fraud and financial fitness.

Fintech products and services have an indirect impact on **increasing market efficiency**. Eleven respondents spoke about how their product or service is increasing market efficiency. According to Interviewee 8 (Web 3.0, DeFi Partnerships Lead): "there are no

standardized marketplaces. Because we're a global DeFi protocol, we can bring transparency to the market. Currently it is a really siloed, really inefficient infrastructure".

The impact of Fintech's products and services in increasing market efficiency emerged in other interviews. Respondents mentioned digital services and supporting market standardization as key drivers behind market efficiency. Interviewees mentioned fractioned, siloed, and inefficient market processes as barriers to creating a more transparent, fluid, and digital customer experience.

Nine out of fifteen interviews mentioned **supporting the green economy** as a recurring element. As green and ESG-conscious sentiments rapidly grow, Fintechs are looking at ways to participate in the emerging green and ESG economy. Through their products and services, Fintechs can support the green economy in various ways: driving the adoption of ESG and green financial products by adding them to the Fintechs' product offering, business model, and value proposition. Fintechs see their role in supporting the green economy in various ways. Interviewee 8 (Web 3.0, DeFi Partnerships Lead) explained: "The ESG space is really interesting because it is underfunded today, it's kind of a niche product offering, it's not mainstream. There's still plenty of opportunity for a platform like ours to start building around it. We're not competing with the major market players, and I think it is a really interesting narrative for our vision and what we're trying to do."

The motives for supporting the green economy can be various. It can be altruistic or to exploit a business opportunity. According to Interviewee 11 (Crypto, Co-founder, CPO): "You know, the environment, it's not going anywhere. People do choose to care about it because they want to preserve it, or at least, there's this human feeling of wanting to preserve it. So, when we're introducing something new, I think of ESG like a selling point".

Some of the interviewed Fintechs support the green economy by filtering to whom they provide their services. Interviewee 15 (Payment and lending, Co-founder) highlighted: "There are certain industries that we do not lend to. It could be industries that are polluting nature, or have a detrimental impact on the environment. From the credit decision perspective, there are a few pillars that we check". The indirect impact of not providing funds to market players with a large environmental footprint incentivize companies to be

more conscious about their role in the environment and society and support their involvement in the green economy.

The interviews confirmed that customers are important stakeholders in motivating Fintechs to participate in the green economy. Interviewee 12 (Money markets, System integrator, Manager) mentioned that ESG was becoming a critical customer question. “The very second question they will ask as long as they are a listed company in Hong Kong, is if there is any ESG element or story behind the service or product. They ask for bullet points that could lead them to fill up or enrich their annual ESG reports that they must submit”. Based on the respondent Fintechs and large companies were consciously trying to improve their products and services to have a green element.

Fintechs in the capital markets domain mentioned the increasing green elements in their products and services and their impact on the green economy. According to Interviewee 10 (Capital markets, Head of Sales): “As an exchange, we need to find out what the demand is, and every exchange has the same issue of trading the new next big thing”. ESG is becoming more mainstream, and exchanges are driving adoption and supporting the green economy by introducing new investment vehicles to the market.

Interviewee 6 (Capital markets, Director) who works at a Fintech with FICC technology products confirmed that exchanges play a key role in the mainstream adoption of supporting the transition to a green economy. “You can get ESG style indexes, you've got bonds and futures, and a number of exchanges are driving new ESG products. There is a lot of talk about ESG products at conferences and so on. They are still fairly light in volume, but there is definitely a lot of interest. Exchanges and marketers are pushing these ESG products to investors”.

The interviewed green Fintechs highlighted that developing products and services that benefit the green economy and are designed with ESG considerations is a key part of their DNA. The three Green Fintechs in the research covered carbon markets, decarbonizing companies' environmental footprint, and green data. By providing services for project owners to sell the carbon credits generated via their green projects, green Fintechs can significantly impact the standardization of how carbon credits can be measured, traded, and used for decarbonization efforts.

Ecosystem development emerged as an indirect impact of the products and services offered by Fintechs. Fintechs use the term ecosystem development to develop the business ecosystem around Fintechs. By operating on a platform-based business model, Fintechs are incentivized to improve cooperation among the various market players to increase the value they can offer their end customers. Interviewee 8 (Web 3.0, DeFi Partnerships Lead) explained: “We are responsible for that the platform is designed to help and facilitate interaction among different ecosystem providers and work towards doing projects together”.

The BNPL and factoring solution provider also emphasized the importance of facilitating ecosystem cooperation and development. According to Interviewee 7 (Lending, Co-founder): “We are building a seamless connection between the lenders and borrowers. We are working together with traditional financial institutions as refinancing partners and use the funds to provide cash flow optimization to companies with our factoring service”.

Trust is becoming an increasing concern, especially in loosely regulated Fintech areas, such as the crypto markets. The decentralized crypto exchange aspires to foster ecosystem development by providing a product where the owner of the financial asset has no counterparty risk and remains in full control of their assets. Interviewee 11 (Crypto, Co-founder, CPO) described it as: “What we're building and what we think is really interesting from a product perspective is unlocking that ethos, that I should be able to do a transfer, no matter what, as long as the majority of the network agrees that we're good actors”. Solutions where the end user cannot be blocked from withdrawing their investment, as happened with the fraudulent centralized crypto exchanges, can increase confidence in the emerging crypto ecosystem and support its long-term adoption.

Interconnectedness and the importance of growing the Fintech ecosystem together might bring greater benefits to Fintechs and help to outweigh the risks of losing out to competition by working together. As Interviewee 2 (Advisory, Co-founder) said: “Professional and technology silos, which acted as walls among ecosystem players, are starting to break down. New technologies enable the development of the financial sector like never before. There is a growing pressure on traditional financial institutions to start cooperating to increase the benefits for the end customer”.

Improving access to markets and decreasing the barrier of entry is another important indirect economic impact of Fintechs. By democratizing access to financial services, such as new investment vehicles or services that can improve companies' cash flow, Fintechs impact the well-being and growth of the macro and micro economy. The traditional financial sector was the bank's privilege, with some services only available to high-net-worth individuals. The interviewed Fintechs are already improving access to previously unavailable markets. As the representative of the alternative investment Fintech, Interviewee 4 (Capital markets, Co-founder, CTO) described: “If you invest a million dollars and you hire somebody to do it for you, then it's worth doing it by yourself. But if you don't have a million, and you only have a few hundred dollars, it's not worth it. You are excluded from these investments. So we do that for you, we use economies of scale to do it, by offering the investment to hundreds or thousands of people”.

The Fintech company with the factoring solution entered the market because of the previously high barriers of banks that excluded a large part of the companies who could have benefited from factoring services. Interviewee 7 (Lending, Co-founder) explained: “Factoring was offered only to bank clients who met a certain, very high threshold of invoices from a single customer. The threshold was around thirty to fifty thousand dollars worth of orders. This policy prevented access to factoring services for many small and medium-sized enterprises, which could not benefit from cash flow optimization, resulting in a loss of competitiveness. With our services, companies who previously had no access to such services can benefit from factoring as well”.

Technology can increase access to the market by decreasing the barriers of entry. There is no need anymore to have a large physical branch network or expensive headquarters to create financial services. As Interviewee 2 (Advisory, Co-founder) described: “If we take a look at what options were available ten or twenty years ago and today to do a financial transaction, we will see that the adoption of new technologies enables for new ways of managing financial transactions, that with legacy technology would not have been possible. Fintech became a huge area involving everything related to financial transactions. Many previous banking experts moved to Fintechs to create new financial services as the technology today allows for starting a financial company with fractions of

the investment it required in the past. Fintechs today offer services that historically were the privilege of mega-corporations and banks".

Fintechs have an impact on creating new economic areas, previously non-existent. The new **token economy** is a key example of a shift that can impact the overall economy. Tokenization includes traditional financial assets, supply chains, ownership rights, identity, and access. Tokenization already acts as the foundation for a new digital economy. Cryptocurrencies, a sub-segment of the token economy, have a market capitalization of 855 billion USD as of December 2022 (CoinMarketCap, 2022). The implication of the token economy is broader than cryptocurrencies. For example, token holders can influence the company's decision-making via tokenized voting rights.

As Interviewee 8 (Web 3.0, DeFi Partnerships Lead) explained: "Having a DeFi protocol that we think will be pretty successful, owned by a single company doesn't really meet the vision of making equitable and fair finances. What would be more in that vision is having a community participatory model and then a protocol where no single entity owns the protocol, but it's collectively owned. Theoretically, it could create more equitable and fair outcomes. That's our vision".

Tokens are already changing how Fintechs serve their customers. For example, the Fintech company which provides news and analysis about the crypto sector is already experimenting with other companies to create a token that combines all subscriptions and service accesses a person has. Interviewee 1 (Crypto, Analyst) added: "We have started to participate in this new tokenomics idea. We recently announced that we will allow subscriptions to the pro-website using a token model, where other news outfits could also participate. I like this a lot because this is really in a way, trying to be part of this crypto experiment. To see if we can provide better service, by using tokens in the subscription model, where all these middlemen that eventually take a cut, let's say, payments companies, when you pay with your credit card are disintermediated. So, if you do all this with a token, how will this work? It's an experiment, it's a risk that the company is taking, but if this works out, I think this could really have a positive impact not only on the economy but also on society, something becomes more efficient and it's a new model that is being developed".

Fintechs also have an impact on the **financial fitness** of companies. The term financial fitness appeared during the interviews with the Fintech startups, which provided BNPL, factoring, claims management, and payment and lending services for micro-merchants. Fintechs realize that a large part of micro, small and medium enterprises are excluded from the services offered by traditional banks, and they started offering their services specialized to the needs of these underserved segments. As Interviewee 7 (Lending, Co-founder) explained: “It is our mission to work for the financial fitness of businesses. This is an overarching vision that drives us every day”.

Fintechs provide a wide range of benefits for their users, but some of the new technologies and markets created by Fintechs can have a potential negative macroeconomic impact. **Illegal activities and fraud**, mostly as a result of the currently opaque and less regulated crypto markets, were raised as a negative economic impact by a large number of respondents. The respondents particularly called out fraudulent activities that left investors losing their money. Examples of crypto frauds and crashes like Quadriga CX, Mt. Gox, the Celsius Network, Voyager Digital, Terra Luna, FTX, and BlockFi were mentioned by the respondents as fraudulent or high-damage activities done by major crypto market players. Investors who invested money with the above Fintechs lost their investments without much hope for indemnification.

As Interviewee 1 (Crypto, Analyst) explained: “So, when the crypto crash happened, and all the values went down, then people wanted to withdraw their money from the Celsius Network, and Celsius just stopped withdrawals and said the money is not there. You can think of it like a bank run without a lender of last resort. So, in the past, this led to people queuing up at banks before there was deposit insurance. In the case of Terra Luna, this was a big element of the downturn, you have news that people committed suicide, and people who put their money into so-called savings accounts thought, this must be like deposits. That's a savings account and it was advertised as being safe and stable and then all of a sudden, they lost all their money”.

Furthermore, as many of the cryptocurrencies are pseudonymous they became a vehicle for supporting gray and black market activities. Interviewee 12 (Money markets, System integrator, Manager), who worked in the Cash in Transit (CIT) business where physical cash is transferred in armored vehicles, mostly between ATMs and stores, explained:

“You may not be so aware but I was in the business. We were pretty sensitive, and we could spot the trend on a monthly one to two occasions. Some people were using a suitcase or plastic bags bringing millions of cash doing face-to-face meetings to buy cryptocurrency, no matter if it's Bitcoin or other kinds of cryptocurrency. Sometimes, they were just wronged by the seller. There is quite a large number of people whose fundamental wish is to avoid taxes and avoid tracking where their money comes from. That is why we could see some of the crypto trade robberies happen”.

The **‘Environmental impact’** sub-category is a collection of areas where Fintechs indirectly impact the environment via their product and services. Based on the interviews, respondents mentioned the following areas where they considered Fintech products and services to have an environmental impact: digitalization, the impact of product technology used by Fintech products and services, supporting green project development, and the environmental impact by making the economy faster.

Digitalization, eliminating paper use, and printing are among the most apparent indirect environmental impacts of Fintech products and services. Eliminating paper use has a significant global impact. According to the website of theworldcounts.com, the environmental effects of paper production include deforestation, the use of enormous amounts of energy and water, air pollution, and waste problems. Paper accounts for around 26% of total waste at landfills (theworldcounts.com, 2022).

During the interviews, Interviewee 9 (Claims, Co-founder, COO) highlighted the following digitization efforts: “We are creating a fully digital platform, which is compliant with the EU and local legal standard of claim collection. The entire process can be managed digitally via our digital product”. Another mentioned, “Our Customers don’t need to physically go to the bank anymore or print our paper-based documents. The entire process is done online, and we are eliminating about 50-60 pages of printed paper with each new customer order. It is sufficient to sign a contract electronically today”.

The Fintech company, which provides its new electronic proxy voting services to its customers, added the most striking example of positive indirect environmental impact. Interviewee 6 (Capital markets, Director) said: ”proxy voting is a traditional service, where everything was done paper-based. Our company became the largest client for the

country's postal service by sending paper-based documents to our clients via traditional mail. With the new digital service, we don't need to print and post paper anymore and everything can be done electronically without any paper-based processing".

Interviewee 10 (Capital markets, Head of Sales), who worked for the exchange operator Fintech explained that all their marketing materials are only available in a digital format: "You know, sometimes we went to events, and we had printed brochures. We are now only creating QR codes, and clients can take a picture with their phone, and then they can look at the marketing materials anytime".

The **impact of product technology** also has a significant indirect environmental impact. Respondents highlighted two areas where Fintechs utilize energy-intensive technologies: cloud technology and blockchain. Cloud technology was discussed already under the 'Impact of company operations' core category. Blockchain emerged as the most significant indirect environmental impact of some Fintech products and services. Blockchains use various protocols to determine if a transaction submitted by the product or service application is valid and, therefore, can be recorded on the blockchain or invalid and therefore needs to be rejected. The so-called 'Proof of Work (POW)' is the earliest and most widespread protocol. POW was used by two leading blockchain platforms, Bitcoin and Ethereum. Ethereum has recently switched its POW algorithm to a more energy-efficient protocol called 'Proof of Stake' (POS), but Bitcoin has remained to use POW.

As Interviewee 1 (Crypto, Analyst) explained: "The immediate negative side in the crypto area would be the POW protocol. It has a very bad carbon footprint as it is so energy intensive. Most of the other blockchains are not using the POW model anymore and they switched to POS which still has some footprint, but it's much less. But since Bitcoin it's still the largest by market cap, it's still the biggest cryptocurrency, so there's a negative environmental aspect which you could invoke".

Another indirect environmental impact of Fintechs is their role in **supporting green project development**. Green finance and the carbon credits market have been discussed under the 'Product and service development' core category. The growing area of green finance and carbon credits markets resulted in a growing number of green projects. As

Interviewee 14 (Green and ESG, Assistant Director) described: “The convergence between technology and the environment, both from a measurement point of view, using technology to measure the impact that we humans have on the planet, the ability to create environmental related data that provides an opportunity for wealth creation through our products and services”.

Interviewee 13 (Green and ESG, Business Development Lead), who worked for another green Fintech mentioned: “We partnered with another company and we have some projects in Mongolia to measure the impact of grassland recalibration projects. As you know many grasslands have become deserts in the past years, and we would like to recultivate them and measure their impact with our technology”.

Lastly, as Fintechs strive to bring more efficiency to the market by applying the 10x rule of product development, Fintechs can make the economic cycle faster. Optimizing the cash flow of companies or providing payment, loans, BNPL, and other services allow the clients of Fintech companies to increase their revenues and market share. Making the economy faster and consumption larger can have a rebound effect. As Interviewee 7 (Lending, Co-founder) highlighted: “During the same period, our customers can purchase and sell three times the goods they could have originally done, and we can support them in achieving even more”. Another respondent said: “Just think about how Fintechs can foster trade and commerce. Shipping companies could continue transport without any need to part their ships, and lose revenue by unused capacity or waiting for payment for the shipped goods”.

The **‘Social impact’ sub-category** emerged as a collection of responses where respondents provided their views about how the products and services of Fintechs impact society. Based on the respondent's answers, the following areas emerged: financial inclusion, democratization, financial education, labour market, environmental and ESG awareness, cashless society, fraud and speculation, and indebtedness.

Financial inclusion became the most referenced code, with eighty-two references across eleven respondents. Increasing access to financial services, investments, loans, and payments to the various levels of society is a key driver of Fintechs. The respondents represented Fintechs who targeted the wealthy, high-net-worth individuals, the middle

class, and the bottom of the pyramid. Reducing inequality and demonstrating access were recurring topics during the interviews.

As Interviewee 4 (Capital markets, Co-founder, CTO) from the alternative investment Fintech startup explained: “The idea is to make alternative investments accessible for every retail investor. It's about financial inclusion and equality when it comes to opportunities to increase wealth and protect wealth. Typically, you and I don't have access, we only have access to let's say ETFs, maybe crypto, maybe some gold or whatever but we didn't have access to more diverse, more stable investment opportunities”.

Some of the interviewed Fintechs are using user profile analysis to target their services to the different user personas. Interviewee 4 (Capital markets, Co-founder, CTO) described: “We have two main profiles. One is male, one is female, and both of them are educated and already experienced with investments themselves, looking to diversify their portfolio. We think alternative investments are a good investment case for everybody but it's not a good starting point to involve all potential customer segments”.

Interviewee 8 (Web 3.0, DeFi Partnerships Lead) highlighted that “I think Fintechs have their biggest impact through facilitating financing and to provide access to finances. I think this is where Fintechs have their biggest social impact”.

Enabling users to use the product or service from the comfort of their homes or mobile phones increases financial inclusion. As Interviewee 9 (Claims, Co-founder, COO) described: “We have a lot of retail customers. In a traditional service, these people would need to visit a notary service in person to manage their cases. They would need to travel and be there physically. This holds back many people from making an effort to manage their claims. With an online, digital service, it is much easier for them and increases the adoption by customers”.

Many interviewed Fintechs target first-time users previously excluded from a certain financial service. Interviewee 7 (Lending, Co-founder) from the BNPL and factoring service provider highlighted: “Fintech makes access easier to financial service. In our

industry, factoring was 98% provided by banks. 90% of our customers are factoring for the first time. We are democratizing access to factoring".

Having access to financial services and managing a person's finances is important. As the decentralized crypto exchange co-founder, Interviewee 11 (Crypto, Co-founder, CPO) explained: "We want to be able to allow our clients to trade in a sovereign way. Our users are a bit more technically savvy than complete entry-level investors. Our ethos is, nobody should be able to block you from trading. Nobody should be able to affect what you choose to do with your store of value, right? Which is like a very libertarian anarchist original crypto mentality".

Financial inclusion and access to financial services might be even more important in developing countries. In India, micro-merchants, who often are part of the bottom of the pyramid, are excluded from getting a loan from a traditional bank, as they have no previous baking history. Previously, these micro-merchants turned to their families to get funding when needed. However, the family model is changing, as explained by Interviewee 15 (Payment and lending, Co-founder): "What has happened is that families are becoming more nuclear. Parents have one or a maximum of two kids. I'm talking about averages. People are becoming more conscious of how they're perceived in the real world. People don't want to go out and ask their friends and family for money anymore, they would much rather borrow it from someone and pay a certain amount of interest. If they have to borrow it from the informal market, it comes at an extremely high interest rate. It is extremely onerous on them, and is extremely inefficient".

Another quote from the same respondent highlighted the importance of accessing financial services: "If you look at the bottom of the pyramid, it's not that they never wanted loans. It's just that they never got loans. They wanted microloans for their business because their business is subject to fluctuations in cash flow. They wanted loans to expand their business. Somebody who let's say was only selling women's shoes wanted to add men's shoes as well to expand the line, but never really had anybody who was willing to provide him that block of capital to increase the business to support him".

The increasing importance of managing one's finances and having free access to financial services opens opportunities for Fintech to promote financial inclusion. As Interviewee 2

(Advisory, Co-founder) explained: “The first thing that comes to my mind is how Fintechs can support democratizing access to finance. The freedom to access and the ability to self-govern your finances. If I want I can access my finances from anywhere in the world now. This was unimaginable ten years ago. Fintechs also provide means to their customers to participate in the Fintechs life, many of the time including their customer in a certain part of the decision-making to influence what new inclusion functionality the Fintech should develop”.

Interviewee 5 (Crypto, Co-founder, CTO) called out that with new Fintech services built on top of decentralized technologies, such as blockchain, people can access financial services and invest in the new assets: “With crypto, you could argue it is democratizing finance and anyone with a digital wallet is able to invest”.

Access to decentralized financial services can become necessary in countries where the traditional financial system is not functioning properly. As Interviewee 1 (Crypto, Analyst) explained: “People in countries like Venezuela can be included and get access to financial services, which they don't get from the traditional banking system. This is one aspect that generates interest because this is a good use case of crypto. It is not necessarily that crypto provides better services in developed countries with strong financial systems and with strong institutions, but there is definitely a case for crypto in countries with weak institutions. If you look at Turkey or Argentina, where the central bank may be captured, where people don't want to hold the local currency, but rather want to hold stablecoins because this preserves the value and optimally this is permissionless. So, they cannot be censored or excluded by the government which may not have an interest in people getting access to or being able to control their finances. This financial inclusion aspect generates interest from our customers and has an impact on society and financial inclusion”.

Democratization of access and the ability to participate in the governance of Fintechs is a growing experimental area. The crypto market, underlying smart contracts, and distributed ledger technologies create a new way of governing organizations. Some Fintechs today have chosen to adapt to a new, decentralized governance model called the Digital Autonomous Organization (DAO). DAOs issue tokens that can be reserved for the DAO or distributed and sold on the market for investors interested in the Fintech that created the DAO. Tokens can have their associated rights and ownership defined, and

some tokens can have voting rights. Tokens allow the token holder to act as a shareholder in the company. The more tokens someone has, the more influence they can have on the DAO. DAOs define their governance by allowing the community of token holders to decide on all DAO decisions.

As Interviewee 1 (Crypto, Analyst) explained: “Another aspect that comes to my mind is the new governance structure, the idea of democratization in crypto. It’s a little bit of anarchy, where you don't have a strong hierarchy in a company with one CEO.The idea is that token holders can vote. We have this new path-breaking ecosystem, which is promising, but which still has relatively few use cases. I think our customers are interested in learning about this, how does it work, what are the problems, and what are the advantages? There's definitely interest if this is just some old wine in a new bottle, or something totally new”.

One of the interviewed Fintech in the research was on its way to moving to a DAO governance model and has made the first steps already. As Interviewee 8 (Web 3.0, DeFi Partnerships Lead) described: “We are progressively moving towards being a decentralized organization. What does that mean? We have the traditional legal entities set up that people work for today, which is executing the protocol objectives. We do have a community of token holders, and we have a token. The DAO is actively being formed. The treasury isn't fully funded yet. It's really under development. The DAO is actively building up processes to help hold people accountable when a new entity comes in”.

The new DAO governance model is an experimental area, with a curiosity about the outcomes. Interviewee 1 (Crypto, Analyst) added: “It turns out that it can be very difficult to reach decisions in a DAO. You can follow the discussions, you have fractions that are forming, then people have to vote on some of the decisions. Sometimes you have very little participation because you have to do this voting, you have to make a transaction on a chain which costs money as you have the gas costs which are really high on Ethereum. For example, there was a big initiative from the founder of one of the DAOs, and the founder of the DAO just got bogged down and his initiative was not voted for”.

Interviewee 8 (Web 3.0, DeFi Partnerships Lead), whose company was on its way to moving to a DAO structure was less worried about losing control: “Theoretically, what

would happen is only people who really care about what the protocol is doing and really care about our mission and our vision, like our cultural values or ethos, will get involved at the governance level. They'll be able to dictate the protocol its objectives, its missions, and how it works. It's kind of like shareholder voting on steroids. I think what is interesting is that it opens up an opportunity for the protocol to be resilient, and at the same time to meet its objective. That's the theory at least".

Financial education has emerged as another large sub-category. As Fintechs provide services to previously excluded users, they found that financial education is required to increase customer adoption.

According to Interviewee 9 (Claims, Co-founder, COO): "Most Fintechs have a large educational impact on society. People are generally unaware of their rights, and how they can manage their finances more efficiently. They are not familiar with the available tools. If we take ourselves as an example, it is our main goal, which is a long and continuous effort to educate the society, from the grandparents to the professional CEOs of what financial options they have".

The BNPL and factoring provider, Interviewee 7 (Lending, Co-founder) supports the view by saying: "We precisely know who our customers are. Normally these are financially undereducated people, even if they are company executives. Our entire product is built up in such a way that it explains step by step the entire process, why a certain document is needed or where can the users read more about the background information behind a certain step".

Interviewee 15 (Payment and lending, Co-founder) explained: "The way every geography, every segment understands money is different. The annual percentage rate (APR) is a very standard common term across developed markets, but in the context of the Indian market, it is just beginning to get popularized by the regulator. A lot of small businesses only understand a very basic fundamental question. I'm borrowing x amount from you, over the tenure of the loan, how much do I have to pay back to you? Can you tell me that, because those are the hard numbers. So, if I borrow a hundred from you and I have to pay a hundred and twenty back, I know that my outflow is twenty rupees. In their minds, they're doing the mental math to figure out that if I have to pay twenty rupees,

is there a way in which I can make thirty or fifty or a hundred such that I pay back twenty?".

The alternative investment Fintech, which targets educated and already experienced investors, explained that financial education is critical for them if they want to expand their target customers to the wider population. Interviewee 4 (Capital markets, Co-founder, CTO) described: "My mom doesn't understand what diversification means and why it's important. The only concept she understands is putting money somewhere and getting 2% interest. We need to explain better how markets work, how correlations work and why investment is important, and why diversification is important. That's just something we need to explain to people".

Interviewee 2 (Advisory, Co-founder) advisor reinforced: "Demystifying finance through education is a key aspect of Fintechs".

Many times Fintechs need not only to explain finance to their customers but also the underlying technology and how the given technology supports their value proposition. Interviewee 13 (Green and ESG, Business Development Lead) from the green Fintechs who relied on real-time green data received from IoT devices explained: "We are encouraging everyone to trust the blockchain, to trust the technology because we understand how it will shape and standardize the entire carbon industry around the world. We are educating people about the benefits of the technology and how it can make a more transparent and immutable way of registering carbon credits".

Fintechs also have an impact on the **labour market**. Importantly Fintech is changing the perception of building financial services among potential employees. By focusing on value-added design, improving people's lives, and focusing on state-of-the-art technology, Fintech can attract talent who otherwise would not join a traditional bank or financial institution. As the Fintech advisor highlighted: "One of the key impacts of Fintechs is that they can attract a professional employee group and teach them how this new technology-driven financial area works, who otherwise would not be interested in working for a traditional bank. A significant group of employees is willing to work for a Fintech company, but they would never work for a bank. These people find professional fulfillment and career paths in Fintech, which positively impacts societal value creation".

Fintechs can also increase the mobility of employees. Fintechs put a big effort into enabling remote work of their employees to respond to changing workforce expectations. As Interviewee 2 (Advisory, Co-founder) described: “There is a growing pressure from employees to have a more fluid work experience. Employees are becoming more mobile and want fewer strings attached to their workplace. Fintechs are definitely playing a large part in changing people's attitude towards remote work”.

Fintechs can have a disintermediation and disruption impact on the existing market players and jobs. Fintechs increase pressure on traditional financial service providers. Interviewee 12 (Money markets, System integrator, Manager), as a former employee of a Cash in Transit company, whose business had shrunk by 30% in two years, explained: “From the company perspective, as a business entity, the impact of new Fintech entrants was negative because we lost a significant market share, we could not afford more jobs, and ultimately we needed to lay off people”.

Raising environmental and ESG awareness emerged as another indirect social impact of Fintech products and services. Environmental and ESG awareness is a natural course for many Fintechs, as internal stakeholders are often more sustainability conscious than previous generations. Interviewee 5 (Crypto, Co-founder, CTO) from the crypto investment Fintech explained: “What is tolerable to a generation of me, and my parents are not tolerable to a workforce that Fintech would support. From that point of view, anyone working in the Fintech industry as a whole has, without even thinking about it, to some extent, naturally, should bring out some best practices with respect to environmental and social positive impacts. You have a younger workforce working within the industry, and what they consider acceptable and the ideas that they generate, are more in tune with those subjects than people who are, you know, a little bit more grey-haired, and who've been brought up in a slightly different environment, and maybe aren't as acutely aware of it, or give a damn about it. As a generational DNA/blueprint, awareness of the environment, when I was a kid was not a consideration. To our younger employees, it is second nature to them”.

Some of the interviewed Fintechs are partnering with traditional, non-Fintech companies to raise awareness about environmental and ESG issues. Interviewee 3 (Green and ESG,

Co-founder) the co-founder of the carbon credits green Fintech explained: “We're fundamentally trying to convince more companies and individuals to take a proactive stance on their existing environmental footprint. We believe in the idea that at some point, most people, and most companies will have to act, it's just a matter of when and who's influencing them to act. We're looking to design and implement programs that have additional rewards for being carbon-neutral, beyond just spending money. We are changing the paradigm from being something where you only spend money in a direction where you are getting social benefits and economic benefits for being carbon neutral. We are partnering with airline companies, where customers can directly purchase the carbon offset of their flight emissions, and it is directly integrated into the checkout experience. We are also partnering with the WWF and launching a carbon-neutral social club together”.

By creating a wide spectrum of digital services that cover most finance-related needs of people and companies, Fintechs can be a driving force toward a **digital society**. New digital payment services are paving the way for a cashless society. The way Fintechs and COVID impacted the Hong Kong CIT market is part of a growing global phenomenon. Interviewee 12(Money markets, System integrator, Manager) a former employee of the CIT company, explained: “During 2018, our CEO did spot a trend where one-day Fintechs will give us serious damage to the CIT company. Originally we were transferring around 4 billion Hong Kong Dollars daily. By 2020 as the impact of digital payment, this value went down to about 2 billion Hong Kong Dollars. Only 2 billion Hong Kong Dollars. Within two years, the cash-handling business has been reduced by 50%. Fintechs and the government want to transform the city into a cashless city, as Mainland China is largely cashless already”.

Respondents also introduced some indirect negative impacts of Fintech's products and services. The most apparent concept emerging was **fraud and speculation**. Fintechs play a part in enabling - although not necessarily intentionally - fraud and speculation as Fintech platform operators facilitate between sellers and buyers. Interviewee 8 (Web 3.0, DeFi Partnerships Lead) described it as: “The way it works is there are asset originators who are supporting projects to receive financing through the DeFi protocol. The originators are ultimately responsible for making sure to do the compliance checks and to make sure that the asset owners actually own the house or asset they claim they own.

Asset originators are on the hook if any loans go bad. The platform is not responsible and is designed to help facilitate transactions".

Interviewee 9 (Claims, Co-founder, COO) reinforced the role Fintech platforms can play: "We always communicate to the borrowers that we are only a platform operator who is providing a digital means to manage the claim and debt collection. We as a platform operator cannot decide if the claim management case started by the lender has merits or not. We check the available documentation, but we cannot decide if those documents are valid if they meet certain formal criteria. Technically it is possible to start a claim management procedure even if there is no actual legal claim. This is allowed by the law today".

The crypto sector went through rapid growth, with some cryptocurrencies growing by thousands of percent during the crypto boom period. For example, Bitcoin has grown more than 5,000% in the past ten years, starting a speculative trend from investors (CoinMarketCap, 2022). As Interviewee 2 (Advisory, Co-founder) explained: "I see crypto as a very sharp, double-edged sword. It brainwashed many people's notions about how to make money. More and more people believe that the source of wealth is speculation and not hard work. The speculative aspect of crypto is really scary to me. It impacts how people look at themselves and what value they bring to society. Buying and selling into asset price increases or decreases and watching the monitors the entire day have a potential negative social impact".

The speculative aspect of the crypto sector was highlighted by other respondents as well. Interviewee 6 (Capital markets, Director) from the FICC Fintech software provider said: "I think in crypto specifically, a lot of people were obviously treating it as an investment. Many Fintechs started pushing these investments to the retail sector in the past years, and then this year, the retail investors would have lost all the money they put into it. I think it wasn't really responsibly marketed to the end investors, right?".

In 2022 there were multiple major crypto frauds where investors believed their money was safe on Fintech platforms. Many of these people have lost all their investments. As Interviewee 1 (Crypto, Analyst) explained: "These Fintech companies they borrowed short term from customers, and they said, you can withdraw your funds anytime and you

get a yield of 10% to 20%. In the meantime, it was a black box what they did with that money. They are not regulated as a bank and there was some shadow banking activity that was going on there. So, when the crypto crash happened and all the values went down, then people wanted to withdraw their money from services, such as Celsius, and Celsius just stopped the withdrawals and said the money was not there. This had a very negative social impact".

The latest crypto fraud was the mismanagement of funds by the second-largest centralized crypto exchange, FTX. At its peak, FTX was worth more than 30 billion USD and lost almost all its market value in a week due to mismanagement of funds and fraud. Interviewee 11 (Crypto, Co-founder, CPO) from the decentralized exchange provider explained: "In the last six months, I've repeatedly been asked about oligopolies and whether FTX is good or bad in the industry and I was saying it was good because Sam[1] is a crypto person who came in and generated wealth within crypto and is able to save other failing crypto companies. And it turns out, he was the villain the entire time, who had a scheme for propping up the value of his exchange and trading companies, right? Sam was the good guy of crypto. I'm still wrapping my head around what is the damage that he did".

Another indirect social impact of Fintechs is their potential role in increasing **indebtedness**. Facilitating risky investments, such as crypto investments, or taking out loans irresponsibly can increase indebtedness among Fintech users. As Interviewee 7 (Lending, Co-founder) said: "Retail BNPL providers provide loans to the public to increase consumption. The major criticism with such providers is that they allow you to buy for example a pair of Gucci shoes which otherwise you couldn't afford and then you need to pay for it over twelve months. Overspending is a large criticism towards retail BNPL solutions".

IV.3. Motivations and barriers in the Fintech sector

This section provides answers for Research Question 2.

[1] Sam Bankman-Fried, the founder of FTX

IV.3.1. Core categories and sub-categories of Research Question 2

The following table shows the core and sub-categories that emerged during the research regarding the motivations for and barriers to incorporating triple-bottom-line aspects into the operations and product and service development of Fintech companies (Research Question 2).

Core category	Sub-category	Transcript	References
RQ2 - Motivational factors		16	480
External stakeholders		16	291
	Customers	15	117
	External auditors	5	9
	Regulators	15	97
	Society	5	11
	Standards organizations	7	32
	Suppliers	7	17
	United Nations	3	8
Global events		7	12
	Economic recession 2022-23	1	2
	Global Financial Crisis 2008	2	3
	Global pandemic (COVID-19)	5	7
	Ukraine War	1	2
Internal stakeholders		15	124
	Company investors	10	29
	Employees	6	27
	Founders, Managers	13	68
Technology		14	53
	Application Programming Interfaces (APIs)	2	2
	Artificial Intelligence (AI)	1	2
	Distributed Ledger Technology, Blockchain	8	31
	Cloud technology	6	12
	Internet of Things (IOT)	2	4
	Mobile phone adoption	1	2
	Smart contracts	2	2

Table 12: Core and sub-categories of Research Question 2

Research Question 2 consists of four core categories: external stakeholders, internal stakeholders, technology and global events. These four core categories contain the key motivational factors that impact Fintechs based on the respondents.

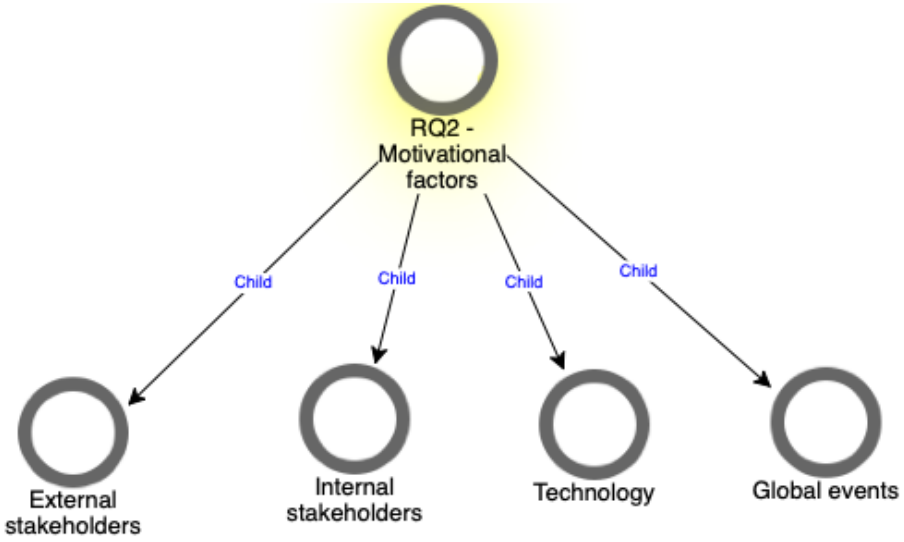

Figure 6: Core categories of Research Question 2

IV.3.2. External Stakeholders

External stakeholders emerged as a complex core category, with eight sub-categories: customers, regulators, standards organizations, suppliers, society, external auditors, and the United Nations.

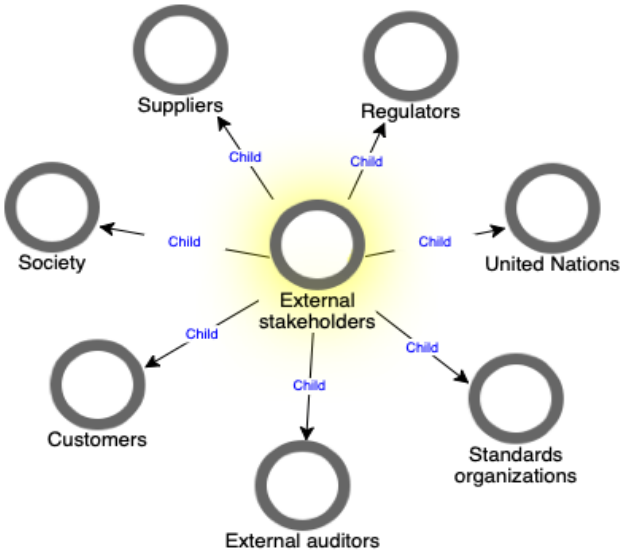

Figure 7: Sub-categories of External stakeholders

Customers emerged as the largest sub-category under external stakeholders. Customers strongly influence Fintechs as they are the end users of Fintech products and services. Fintechs react to customer demands via their product and service development efforts. Fintechs continuously analyze their target customers' needs and adapt their services and products. Interviewee 4 (Capital markets, Co-founder, CTO) said: “We derive new features from starting from a user experience perspective. How the user engages, why and what information he needs to see, and where would you expect to find it in the platform. This gives us a rough design of the user experience and then we can start designing the architecture, engineering the architecture, to the point where we have a design document ready to start the implementation and go live”.

The interviewed Fintechs serve many customers, each with a unique set of demands and requirements. Fintechs provide services to the entire spectrum of companies and the public. During the interview, the Fintechs who participated in the research focused on corporate or retail customers. Within the corporate segment, traditional financial institutions, micro, small and medium enterprises, and green project owners were the key target segment of the interviewed Fintechs.

Most interviewed Fintechs are serving **corporate customers**. The Fintechs that provide services to traditional financial institutions focus on banks, asset managers, mutual funds, pension funds, and sell-side companies, such as broker-dealers. Fintechs enable traditional financial institutions to access the growing asset class of crypto investments or to facilitate more efficient investments into green projects.

Traditional financial institutions are vital customers to enable growth in the Fintech sector. Interviewee 8 (Web 3.0, DeFi Partnerships Lead) described it as: “We require KYC and Anti-Money-Laundering (AML) from our customers, but many of the crypto Fintechs are not. That hurts us a lot. The challenge is that institutional investors will not get involved without regulations, and without their involvement, the main source of liquidity is just not present”.

Interviewee 5 (Crypto, Co-founder, CTO) from the crypto investment firm highlighted: ”Our clients are the more conservative types who go to great lengths to have a traditional

hedge fund structure type of manager to help them manage the emerging crypto market as an alternative asset product".

Traditional banks have a growing demand for transparent ESG and green investment related services. Traditional financial institutions want to understand and measure the ESG impact of an investment project. Project owners need to comply with the growing force from traditional financial institutions and often look for the help of Fintechs to provide them with the required products and services to demonstrate their ESG impact. Interviewee 3 (Green and ESG, Co-founder), the carbon credits exchange co-founder said: "The pressure is going to come on several fronts. Investor pressure is going to be one of the most significant drivers in the Western world. You know, BlackRock[2], has basically said that, in the future, if companies don't have the ability to demonstrate that they are indeed ESG positive, they're not going to receive investments from BlackRock. BlackRock is not going to be able to buy their shares anymore, using his large, you know, trillions of dollars in funds. This has scared a lot of CEOs, and now the CEOs are trying to figure out how to actually make their company eligible to continue receiving BlackRock's shareholder support".

The pressure to prove an investment's ESG elements or to provide ESG-related products and services is growing. Interviewee 6 (Capital markets, Director), from the global FICC technology provider, confirmed the rising pressure from the customers to demonstrate the ESG impact of their investments: "When I talk to customers or other market participants, especially on the derivatives side, there's a lot of talk about ESG products. Previously in a month I received 1-2 inquiries about ESG-based products, be it an index or other products, and I was thinking, that's interesting. A few months later the inquiries started to snowball, and almost all the major exchanges started offering ESG products. I think at the moment these products might have a maximum of 5%-10% market share, but it is only going to increase as investors are demanding it".

The employee of the stock exchange operator, Interviewee 10 (Capital markets, Head of Sales) forecasted significant growth as traditional financial institutions will demand more

[2] The largest asset management company, with 10 trillion USD assets under management (www.blackrock.com)

ESG-related investment products: “My view is that over the next five to ten years the green bond market will increase to several trillion dollars. At the moment, the biggest demand is data. Hedge funds, fund managers, and asset managers like BlackRock will take data from all the various major data providers”.

Financial institutions' demand for accurate, real-time green and ESG data is increasing. Interviewee 13 (Green and ESG, Business Development Lead) reinforced the observations other Fintech companies made regarding the growing need for ESG data: “Banking is definitely our target customer group. Banks, asset developers, and other corporates who need to go for net zero emissions and claim their grains. These are our typical customers. We try to build the technology at a very low cost, and provide real-time data integrity to empower our clients to have more confidence to invest money into the green space”.

Retail customers also play an important role in the development of the Fintech sector. Offering services to retail customers is one of the key target segments of the interviewed Fintechs. Demand and expectations from retail customers shape the services and process Fintechs implement to achieve customer satisfaction. The interviewed Fintechs with a retail focus provides claim management, investments, and carbon offsetting. Fintechs focus on creating cheaper and faster services and making it easier for their users to utilize their products and services.

Regulators emerged as the second most referenced sub-category under external stakeholders. During the interviews, Fintech companies highlighted three areas of regulation that impacts them: fintech regulation, carbon credits regulation, and crypto regulation.

The DeFi protocol operator is trying to distinguish itself from its non-regulated competitors. Interviewee 8 (Web 3.0, DeFi Partnerships Lead) explained: “Every investment is appropriately KYC’d and checked if any anti-money laundering violence was done. We outsource the KYC and AML work to professional third-party service providers. When you go to the platform for your investment pool, you'll have to register to it throughout the KYC process, and only once your KYC verification is complete you can start investing. I think our biggest difference is this kind of adherence to using a legal

framework, like KYC and AML. It's not as permissionless as other DeFi protocols". Interviewee 8 (Web 3.0, DeFi Partnerships Lead) emphasized that they were meeting regulatory requirements or highlighting the regulation's importance.

Interviewee 11 (Crypto, Co-founder, CPO) added: "We are a software company that does compliance and privacy within the crypto space. So, we also have an entire KYC workflow tool because we do believe it's important to make sure that we're doing the required amount of KYC. Also on the AML side, we are making sure that we're not dealing with sanctioned countries or individuals. We do a lot of checks on who's connecting from where, e.g. from Iran. I believe this is necessary that we comply with regulations".

Fintechs also raised criticism of existing regulations. One respondent was concerned about the outdated regulatory expectations imposed on them by the Central Bank and the Ministry of Economy in their country: "There is a lot of compliance, reporting, and due diligence requirements to obtain a license. Furthermore, we needed to meet a very high financial deposit threshold, which in the first two years of our operation was not possible to meet. Moreover, there are certain IT and cloud restrictions as well. All our applications run in a Google Cloud environment in Frankfurt, which is very safe. The regulator also mandates us to have a local server in the country. We need to operate our own server in a small, dusty server room, with sub-par security, and we need to run two infrastructures to meet regulatory requirements. This is very outdated".

Regulatory compliance is hard to achieve in the crypto sector, as the legal framework, including investor protection, KYC, and AML regulations, is not comprehensively defined. One of the interviewed crypto companies avoided strict local regulations by choosing an international crypto haven, the Cayman Islands, to set up its business. The Cayman Islands has its crypto regulation, with less strict expectations than the United States. As Interviewee 5 (Crypto, Co-founder, CTO) explained: "We have two entities in the Cayman Islands. Our company is a registered person under civil law, which means that we are recognized by the Cayman authorities as an asset manager. The fund itself is regulated by the Cayman Island monetary authority. We have to declare accounts and report our audits. The fund itself is audited as part of those regulatory requirements. Under

the regulation we can provide our services to professional investors only, retail is excluded".

Crypto regulation is a controversial subject. While the lack of regulation can support the growth of a new industry, in the beginning, the lack of unified regulation can harm future market growth and the adoption of the mainstream market. The FICC Fintech respondent, Interviewee 6 (Capital markets, Director) explained: "I believe crypto needs regulation. Regulators need to drive this area to manage the risks involved".

Interviewee 12 (Money markets, System integrator, Manager) highlighted the importance of regulation and how Hong Kong is trying to take advantage of the lack of global retail crypto regulation: "The government sort of unofficially announced during the Hong Kong Fintech Week in November 2022, that they probably would make Hong Kong as the only city in Greater China that would allow crypto trading at a retail level. This initiative could create a very popular industry in Hong Kong".

Carbon credits emerged as another not fully efficient regulatory area. Interviewee 3 (Green and ESG, Co-founder) explained: "From a regional regulation perspective, for example in Asia we see much more attention and policy formation around the idea of forcing companies to be acutely aware of their environmental profile. In China, they launched the National Carbon compliance markets, governing all of the utility companies of China and these utility companies need to account for how much carbon they produce, and whether or not they are within the baseline set by the government. From the international regulation perspective, it is different by continent. The carbon border adjustment tax is being implemented in Europe. If you import new products into Europe, for example, you're selling a green car, you have to prove whether the production of your car itself was carbon neutralized or not. They're going to charge you the carbon border adjustment tax at the borders if they hadn't been neutralized. They're going to charge you the European carbon prices and that's very expensive compared to Asian carbon prices".

Standards organizations also play an important stakeholder role. The increasing role of sustainable development, ESG, and the growing need from investors for companies to prove their environmental and social footprint highlighted some of the current issues with measuring ESG impact. A recurring theme among respondents regarding ESG standards

is the lack of standardized measurement and the non-unified methods used by rating agencies. The Greenhouse Gas Protocol is a positive example of approaching some generally accepted calculation principles, but only for carbon credits calculation. Interviewee 14 (Green and ESG, Assistant Director) explained: “The methodology for calculating the carbon footprint, we are following the given country schemes where the company operates. Whatever the scheme prescribes, we need to stick to it. The standard for carbon audits to ratify carbon emission reduction - there are many versions of those standards. Some of those standards are revised, but sometimes we still need to follow very old standards, like ones from ten years ago, simply because of the restriction of the subsidy schemes. I won't say the benefits calculated from old schemes are completely invalid but they are very different from new schemes”.

Another green Fintech respondent, Interviewee 3 (Green and ESG, Co-founder) said: “The process we follow is the Greenhouse Gas Protocol. It is similar to the Generally Accepted Accounting Principles (GAAP) for carbon credits. There's another measurement standard by the International Standards Organization (ISO). ISO has a standard for calculating carbon as well. We use these methodologies to calculate carbon footprint”.

The lack of a standardized way of measuring ESG impact was called out by Interviewee 10 (Capital markets, Head of Sales): “In our exchange, we have our main ESG conscious index. How is that different from the main index? It's adjusted by removing companies that engage in tobacco, oil, or gas. It is a slightly different version of the main index. There are other, thematic ESG types of indices offered by other exchanges, but there is no standardization of which companies can be added to those indexes”.

Suppliers are also experiencing a growing impact by the Fintech sector and Fintechs products and services. One of the impacts suppliers and supply chains are increasingly seeing is the push from Fintech to them into the ESG direction. As Interviewee 4 (Capital markets, Co-founder, CTO) mentioned: “We try to ensure that the investment products we offer to our customers are created with compliance of environmental and social standards. For example, they are not produced by using child labor. I think as we grow, we also earn a better negotiation position with the suppliers on what they're doing and make them make the right choice as well, as otherwise, we don’t buy from them. Today

they will just say okay, then don't buy. But I think in the long term we can have an impact indirectly as well".

As a supplier to Fintechs and large companies, the cloud system integrator said they are also under increasing pressure to demonstrate the environmental impact of the cloud products they are proposing to their clients. Interviewee 12 (Money markets, System integrator, Manager) explained: "Those gigantic cloud vendors, AWS, Azure, GCP or Alibaba are enjoying huge economies of scale, and built up their data centers at scale. A public cloud vendor such as AWS is not the best company to choose if you see their carbon footprint, because AWS has a pretty low rate of using renewable energy. The highest proportion of using renewable energy is the GCP, the Google Cloud. In their annual report, they claim for above than 30% of the energy to be used to power their data centers comes from renewable energy sources".

Fintechs can have a cascading impact on the entire supply chain. Clients of Fintech companies started to use the outcome of Fintech ESG services to influence their supply chains. As Interviewee 3 (Green and ESG, Co-founder) explained: "We're working on a few larger transactions right now. We help shipping companies, real estate companies, and manufacturing companies to understand what their carbon footprint is so that they can understand how much they need to offset. We are measuring scope one, scope two, and scope three emissions. We break down the three scopes. One very concrete thing that we find our clients are asking from us is to help communicate the scope three emissions of our client's clients back to them, as they want them to start taking action to reduce their own emissions as well".

Fintechs, when acting as suppliers to other companies, are also increasingly under pressure to create, maintain and present their ESG impact. Interviewee 6 (Capital markets, Director), from the FICC software provider Fintech explained: "Nearly all Requests for Proposals (RFP) from our clients include the requirement to add our ESG reports to the RFP response. It comes up 9 times out of 10 in an RFP these days. We have standard responses, and standard documentation for that".

To ensure the validity of reported carbon credits, greenhouse gas emissions, and ESG impact, the role of **external auditors** is growing. Interviewee 6 (Capital markets,

Director) added: “We have to be audited for the validity of our reports every year. We have to make sure those reports are up to date”.

Interviewee 3 (Green and ESG, Co-founder) from the carbon credits Fintech added: “Companies that use our services sometimes have an external auditor, who audits them after the fact. Some of these companies already separate out the advisory role, use one company to help them set up their carbon reduction schemes, and have another firm that actually does the carbon auditing, report preparation, and producing statements. Usually, the companies we work with, don't do the audit service, because they are under scrutiny of themselves. But the public companies need to have an audit service”.

The respondents also mentioned increasing awareness from society for ESG and sustainability performance. Society pushes Fintechs with their changing expectations. Having a good public image for the company is important for Fintechs to gain market share and increase the adoption of their products. Respondents raised some key aspects regarding Fintechs and society. According to Interviewee 11 (Crypto, Co-founder, CPO): “ESG is like a selling point. If that is your mission statement, then you're gonna go after the clientele that I identify with your value system, right? And it comes down to what are the values of the clients that you're going after”.

Or as Interviewee 2 (Advisory, Co-founder) explained the pressure from society is increasing to meet their changing demands: “Society could put pressure on Fintechs to meet their changing needs, which resulted in a discussion between Fintechs and traditional banks to provide more holistic, combined services. Innovation happens at the border of such co-operations”.

Companies use their brand image to influence the reaction of people. Some of these brand images are on the verge of using ESG-related activities for greenwashing. Interviewee 3 (Green and ESG, Co-founder) described: “In terms of motivation, companies have the desire to look good. They need to have good-looking reports, and being carbon neutral is a fantastic thing to put front and center on your report. It makes you look like you've done something useful”. Another respondent simply said: “Nowadays everyone thinks ESG is a topic. It's a fad. It's something we need to do because it's visible. Greenwashing is a predominant thing”.

The United Nations (UN) also emerged as a stakeholder in Fintechs' impact on SDG, and ESG. By setting the 17 Sustainable Development Goals and organizing the UN Climate Change Conference series (COP), the UN is a key stakeholder in sustainable development. As Interviewee 3 (Green and ESG, Co-founder) described: "We started the company shortly after coming back from one of the COP conferences. I was kind of horrified to learn that we have only a couple of years left until we blow past their carbon budget for 1.5 degrees".

Interviewee 10 (Capital markets, Head of Sales) was more concerned about the effectiveness in reaching the target the UN has set: "Everyone has a 2050 goal, and our company is also a part of this consideration. I mean, honestly, 2050 as a goal is, personally speaking, it's like, what, 28 years from now? It seems too long for me. Firstly, it's a big game. It's like, you won't do your homework if you have 28 years to do your homework, you will start doing it in the last minute. I think what some countries are trying to do is they need to spend money on some bad investments first before they can actually focus on greening the economy. They need to produce more coal and gas plants to build up the infrastructure. It's a bit of a vicious cycle, a catch-22 situation".

IV.3.3. Internal Stakeholders

The core category of **internal stakeholders** has three sub-categories: founders-managers, employees, and company investors. During the interviews, eight founders were involved, all still actively managing certain parts of their organization. The other interviewees were with employees. Two of the interviewed Fintechs have received investments from company investors.

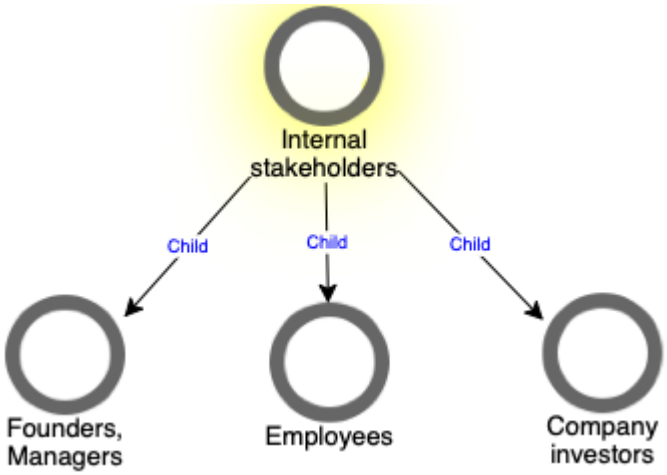

Figure 8: Sub-categories of Internal stakeholders

Founders-managers are leading their organizations through their vision and actions. The Fintechs where founders were still managers were mostly startup companies, either in an early stage or at the beginning of significant scaling and growth. Focusing on the **company's growth** was one of the core concerns of these founder-managers, as were raised as the highest priority for all founder-managers. As Interviewee 4 (Capital markets, Co-founder, CTO) explained: “Right now we're looking into funding so that we can grow, we can actually bring the impact that we wanted, that's the biggest contribution we can make. Our current focus is growth, growth, and growth”.

Funding was also a concern for other Fintech as well. Interviewee 8 (Web 3.0, DeFi Partnerships Lead) said: “Now, we are looking at growing and scaling, and we have tons of opportunities, there's tons of interest”.

Interviewee 3 (Green and ESG, Co-founder) explained that the carbon exchange Fintech also had a growth mindset: “As a startup, I think a lot of our focus is actually external to the company, like how we work with our clients. When we will have a hundred or two hundred people, then we'll start thinking more about some of the ESG reporting of our own company”.

Another important founder-manager duty is setting up the company based on the **actions of the founder-manager**. Setting up expectations towards employees, promoting environmental or social awareness, and leadership ethics were all part of the responses regarding the practical aspect of managing the company on a day-to-day basis.

Interviewee 8 (Web 3.0, DeFi Partnerships Lead) explained that some key management actions by them were: “We're trying to build an organization that can kind of manage itself through multiple different hierarchy models”.

Interviewee 7 (Lending, Co-founder) said: What is critical to us, is that whoever starts working for us, needs to love what they do. We expect excellence from everyone. We need people who are extremely talented, and are only looking for the best solutions”.

Interviewee 9 (Claims, Co-founder, COO) claimed: “I don’t want to show an overly good picture of us, but we received great feedback from your employees. We put a lot of emphasis on creating a good workplace”.

The Fintech advisor, who worked in the financial sector for more than 20 years, highlighted that management plays a crucial role in setting the standard and expectations. Interviewee 2 (Advisory, Co-founder) said: “In my experience, most sticking initiatives are started by the headquarter and senior executives. These can be donation programs, corporate social responsibility, or planting tree programs”.

Founders can be passionate about certain **goals**, and ESG can be one of them. As Interviewee 3 (Green and ESG, Co-founder) explained why he founded the company: “We started the company shortly after coming back from one of the COP conferences. I was kind of horrified to learn that we have only a couple of years left until we blow past their carbon budget for 1.5 degrees. This was a catalytic boom for me, and I decided to reorient my entire life and life savings actually, on this project”.

Employees became the other main sub-category of internal stakeholders. Employees profoundly impact companies by enriching, altering, and executing the vision and action plan set by management according to their capabilities, values, and actions. The seven employee-related interviews gave insight about how Fintechs can create a symbiosis and share value with their employees. As Interviewee 8 (Web 3.0, DeFi Partnerships Lead) said: “We have a mindset of people developing their own roles, and they have to work with their colleagues that are impacted by their roles to like, get feedback on the roles. For moving forward everyone is collectively responsible. Being emotionally vulnerable, hyper communicating, and managing our own roles or responsibilities, is quite unique”.

Interviewee 13 (Green and ESG, Business Development Lead) said: “Culture-wise, we have the passion, everyone, because we think what we do and the technology is really kind of a career trend for next decades”.

Employee motivation is fundamental, and the interviewed employees were each motivated to support their company’s vision and to actively contribute to its culture and future. As Interviewee 8 (Web 3.0, DeFi Partnerships Lead) highlighted: “We're really trying to build a good culture and we're really trying to do it intentionally. It's quite hard and we spent a lot of time talking about what cultural values and principles we believe in”.

Interviewee 1 (Crypto, Analyst) called out that they are empowered and invited to take part in the overall direction the company takes: “We are involved in the direction setting, by for example receiving a request to please provide at least three things that can be improved within the company. I'm getting involved in product decisions as well”.

Company investors are key stakeholders in Fintech companies. Investors obtain equity in Fintechs by providing capital. Company investors who invest in Fintechs are typically venture capitalists and early-stage or growth investors. Company investors play a key part in Fintechs as their investment enables Fintechs to focus on growth until they are not generating enough revenue to sustain their operation or to finance their rapid growth. Two of the interviewed Fintechs have received funding from company investors.

Interviewee 15 (Payment and lending, Co-founder) said: “We raised some capital. There's the private equity capital that we have, but in addition to that, we also raised debt and we partnered with financial companies, and with banks as well. The existing investors that we have are all impact investors. So, from their perspective, I think, well, obviously, growth is extremely important. One can say that any amount of growth is good, why not push the boundary further, and let's say grow 3x. Or if you are growing 3x, then 5x, or 10x. But I think the key focus for our investors is if we are meeting the need that we started the business for. The vision with the underlying micro-merchant in focus, and making sure that we remain true to that. In fact, next month we're undergoing a voluntary exercise on client protection principles by a third-party auditor based out of France, trying

to assess where we are in our journey of ensuring complete transparency, complete accountability to the underlying consumer, and to make sure that they understand what they are getting into when they're borrowing from us. This was also a request of our investors".

The IoT and green data Fintech has also received investor funding. Interviewee 13 (Green and ESG, Business Development Lead) explained it as: "We just finished a Series A funding in the value of more than 5 million USD. Our investor is committed to our goals and is a large investment bank that itself is very interested in the use of our technology".

IV.3.4. Technology

Technology evolved to become a core category in the interviews to understand the enabling factors of Fintechs better. Interview respondents were all working in the Fintech ecosystem and were highly familiar with technologies and their influence on Fintechs. Some of the main technologies mentioned were: blockchain, smart contracts, cloud technology, the Internet of Things (IoT), Application Programming Interfaces (APIs), and Artificial Intelligence (AI). Technologies, such as the internet or mobile phones were only mentioned in the historical context, and respondents were taking these technologies as already given.

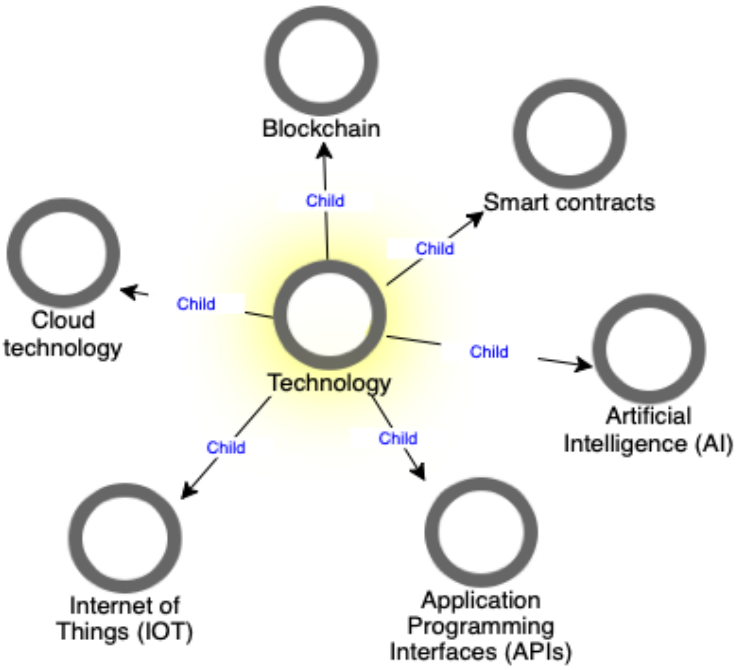

Figure 9: Sub-categories of Technology

Blockchain and smart contracts emerged as the most mentioned technology during the interviews. Blockchains can be regarded as an infrastructure layer where a single or more individual computers, called nodes, create a network to run applications written in programming language technologies, such as smart contracts. Blockchains became the technology backbone for the new crypto and Web 3.0 product developments. Respondents had various views on the impact of blockchain and smart contracts.

As Interviewee 4 (Capital markets, Co-founder, CTO) said: “One thing that comes to my mind is when we talk about Fintech, is we need to talk about blockchain. I think we need to do something about Proof of Work chains that consume so much energy”.

Meanwhile, the first and today's largest blockchain platforms, Bitcoin and Ethereum, all started out in their first days as using highly energy-intensive POW communication protocols, by pressure from the public through the negative media modern blockchain platforms are using different, much less energy intense protocols.

Interviewee 8 (Web 3.0, DeFi Partnerships Lead) said: “We did switch away from Ethereum, because it was so energy inefficient, and we are now building on a Polkadot, which is a POS chain”.

The energy consumption impact of blockchain has been brought up by other respondents as well. Interviewee 6 (Capital markets, Director) said: “The obvious when it comes to crypto is its power consumption. How coins are mined or created. The amount of energy it consumes to create coins is concerning”.

Ethereum changed to a POS algorithm in 2022, reducing the original energy needed to run the Ethereum blockchain by 99.9%, from 11,016,000 to 870 tonnes of CO2 a year (ethereum.org, 2022).

Respondents mentioned some key blockchain and smart contract technology benefits. Fintechs use blockchain not to make their energy consumption larger but because blockchain and smart contracts offer significant benefits in product features and competitiveness. As Interviewee 2 (Advisory, Co-founder) explained: “Blockchain and

smart contracts, the ability to automate processes and track processes and items real-time open up a whole new world of opportunities". The privacy, immutability, and real-time visibility aspects of blockchains and smart contracts were highlighted by Fintechs.

Interviewee 13 (Green and ESG, Business Development Lead) said: "We are a blockchain-based company. We use the hybrid blockchain infrastructure. We put the IoT device data into a private chain but we register the IoT devices with non-confidential client data to a public chain, so we can further empower clients to get access to a wider dataset. There is no global universal gold standard for ESG reporting, but we help clients to put their data on the blockchain to make sure it's immutable".

The carbon credits exchange Fintech is also using blockchain to leverage some of its benefits. Interviewee 3 (Green and ESG, Co-founder) described the benefits as: "When you purchase carbon credits, it is recorded as a permanent entry on the blockchain. You, your partners, and other people will be able to find it to verify your claims. We are using Polygon, a low-energy layer two solution that is compatible with Ethereum. It is very energy and cost efficient".

Cloud technology is the second most mentioned area where Fintechs and technology intersect. As Interviewee 7 (Lending, Co-founder) explained: "All our services are running in the cloud. We don't have on-premise servers, only that is needed by regulation".

Interviewee 12 (Money markets, System integrator, Manager), the respondent from the system integrator specialized in setting up cloud environments for Fintechs called out: "I'm now in the cloud business. If you have to have the IT infrastructure that could power up a payment or Fintech system, it requires a certain amount of computing power storage, networking, and IT infrastructure and that infrastructure. In the cloud, everything is available on demand. You pay only after the actual use of the cloud. If you need more computing power, and storage or you would like to set up another cloud environment in a different county, it can be done in seconds. No on-premise infrastructure is needed".

Cloud technology is where large BigTech companies, such as Amazon, Google, Microsoft, and Alibaba have the most significant market share. Not only Fintechs but

almost all companies with a modern IT infrastructure are running part or all of their services in BigTech cloud environments.

Application Programming Interfaces (APIs) are replacing inefficient, complicated, and error-prone message or file-based connectivity between computer systems. APIs allow programmers to create a network of interconnected systems performing certain key functions. From the end-user perspective, there can be a single unified interface to access all services without knowing that another company might provide the given service from the background. APIs allow Fintechs to save costs, comply with regulations and focus on their core service and product offering by outsourcing non-core capabilities to third-party providers. Interviewee 11 (Crypto, Co-founder, CPO) explained how Fintech leverages KYC and AML third-party service providers: "We are a software company that does compliance and privacy within the crypto space. We have an entire KYC and AML workflow tool because we do believe it's important to make sure that we're doing the requisite amount of verifications. We do a lot of checks about our customers. We are using third-party service providers to do the document checking via their global databases and we connect to them by using APIs".

Or, as Interviewee 9 (Claims, Co-founder, COO) highlighted: "Our vision is to support companies in achieving financial fitness. This is an overarching goal. We want to build a platform, where our customers can manage all their company operational issues. We work together with other Fintechs to achieve our goal".

Fintechs also mentioned the importance of leveraging other technologies in their product and service offerings. IoT devices and artificial intelligence (AI) software are becoming increasingly important. As Interviewee 2 (Advisory, Co-founder) called out: "What is really exciting in my opinion is that everything will be digitized. AI-powered Fintechs will enable more fluid economic activity with much less capital required. It is a very interesting new area".

IV.3.5. Global Events

Global events is the last core category that emerged as a factor impacting the Fintech sector. Global events in the past fifteen years impacted Fintechs and acted as a catalyst.

Unforeseeable, black swan events such as the global pandemic caused by the COVID-19 virus, the global financial crisis in 2008, and the Russian war in Ukraine have all made their impact on Fintechs.

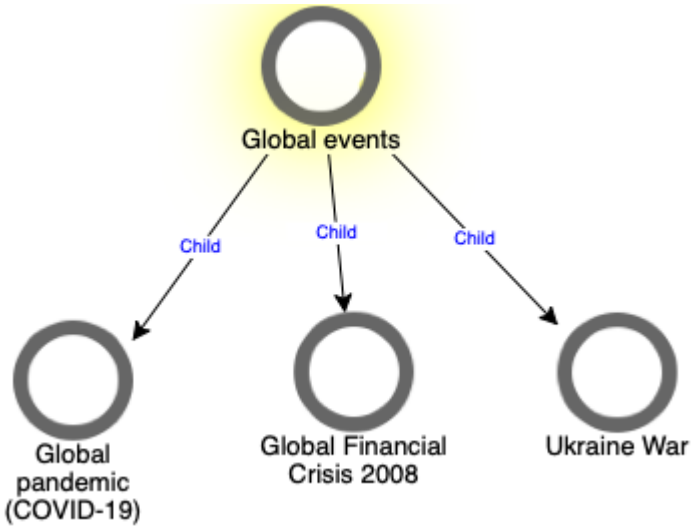

Figure 10: Sub-categories of Global events

The global pandemic has caused distress and resulted in the loss of lives, a downturn in economic activity, and fear of leaving people's homes. Companies tried to adapt to the new conditions. Activities that were business as usual before have changed from one day to another. Digital services and remote access have become more important. As Interviewee 10 (Capital markets, Head of Sales) explained: “COVID has affected a lot of people around the world and it has affected mentally as well. Going to work is a way of life, and people were forced into working from home, which they got used to and started to enjoy, and now they are mandated to go back to their offices. Some people became unhappy. The management has understood this need”.

Interviewee 9 (Claims, Co-founder, COO) said: “COVID increased the attention towards our services. People needed to manage all their usual activities from home, and they realized there are these new companies who can provide them with such services fully digitalized”.

The global financial crisis in 2008 was mentioned as a catalyst for the development of Fintechs. As Interviewee 11 (Crypto, Co-founder, CPO) highlighted: “How the heck did all these rating agencies gave good ratings when they say that they did not have enough

data? In 2008, we had computers, we had mainframes, and we had big data already as well. The indirect effect of the crisis was, getting a market share for Fintechs, which can bring more transparency to the market. Fintechs moved the ball forward a little bit, to try to make sure that there wouldn't be another financial meltdown on the basis of there is bad data in the underlying assets".

The war in Ukraine has also made an impact on Fintechs. Some global initiatives were halted and negatively impacted as countries needed to revert to some of their old energy production technologies. The global sanctions on Russia resulted in a change in the energy mix. As Interviewee 1 (Crypto, Analyst) explained: "The invasion of Ukraine by Russia, the energy crisis, now basically all the European countries say, we don't have gas, we don't have oil. They need to switch back to coal, and for example, Germany is getting dirtier in the energy mix. They are faced with the choice of having no energy or probably having people with pitchforks in the streets. This has impacted Fintech as well who were promoting green and ESG as these topics are less of a concern in light of the energy crisis".

V. DISCUSSION OF RESEARCH RESULTS

Grounded theory was proven effective in discovering answers to the research questions. On the one hand, the interviews supported the notion that Fintechs have similarities with traditional banks as both Fintechs and traditional banks are impacted by their stakeholders. Fintechs also want to be successful in the business domain they have chosen to operate in and have a growth mindset.

On the other hand, Fintechs are unique and different from traditional banks in several respects. Most previous studies failed to draw a clear line between Fintechs and traditional banks, which resulted in ambiguous results about the social and environmental impact of Fintechs. Fintechs aim to change the traditional brick-and-mortar banking business and provide financial services more efficiently through digital channels. Fintechs are also exploring and innovating state-of-the-art technologies and new business models. As the interviews revealed, Fintechs can have a significant direct and indirect social and environmental impact.

The Fintech sector and its pioneering initiatives inherently carry risks. Respondents were all aware that while Fintechs bring new services to the market with an overall aim to benefit people, there are inadvertently some drawbacks in the process, which may result in increased risks and fraud.

V.1. Discussion of Research Question 1

Research question 1 was formed to elicit feedback from respondents to understand:
How does the triple-bottom-line concept appear in the operations (direct impact) and the products and services (indirect impact) of Fintech companies?

Fintechs have a significant direct economic, social, and environmental impact based on the interviews. The **direct economic impact of Fintechs** is most apparent in their pursuit of increasing company revenues. Fintechs are for-profit organizations. None of the respondents claimed that their company operates as a social business, and respondents prioritized growth as a key company goal. To maximize the value created by utilizing internal resources, Fintech respondents highlighted the importance of continuous

prioritization of work and avoiding spending resources on non-critical, low-value-added items.

Fintechs take pride in creating a fair distribution and motivation model within their organizations. It became clear that founders-managers use employee ownership models to attract talent to their companies by sharing a part of the potential upside if the company becomes a success and eventually gets acquired by a larger bank or other Fintech. Employees receive shares during employment or obtain rights to purchase company shares at a discounted price. The distribution of wealth across the company shareholders has a direct economic impact on employees. A successful company's stock can be worth a large monetary value, sometimes millions of dollars. This direct economic impact on employees can grow a network of founders, where the previous employee becomes a Fintech entrepreneur and founder. Each Fintech founder was an employee before at another Fintech, and some of them have achieved successful exits and used their earnings to fund their new venture.

Fintechs have **indirect economic impacts** through their products and services. Fintechs are leveraging their innovative and agile product and service development practices to create new products with improved business models and enhanced user experience in payment, lending, green and ESG finance, and many others. Most of Fintechs' indirect economic impacts are positive: improving market efficiency, democratizing access to financial markets, supporting ecosystem development and partnerships, and improving the financial fitness of corporations and the economy. Fintechs also create new markets by leveraging new technologies: blockchains and smart contracts enabled Fintechs to create a more than trillion-dollar crypto and Web 3.0 economy in a matter of years. Fintechs also have a visible impact in supporting the green economy by providing tools and services to project owners and investors to increase trust in green and ESG reporting and thus support the flow of capital into green projects with high positive externalities.

The new economic models also introduced negative indirect impacts, such as illegal activity and fraud. External stakeholders, such as regulators, will need to play an increased role in some of the new markets created by Fintechs to ensure rules are set and followed; therefore, the market is ready for wider adoption.

The operational activities of Fintechs are responsible for their **direct environmental impacts**. Some of the key direct environmental impacts of Fintechs can be grouped into the following areas: IT infrastructure, office space, employee traveling, digital processes, and environmental awareness.

Fintechs leverage state-of-the-art cloud-based IT infrastructure, allowing them to pay dynamically only for the computing power their services require at a given time. Cloud environments provided by BigTech companies became the key technology backbone for Fintechs. Cloud-based environments do not require any upfront investment to buy physical IT hardware and eliminate the need to maintain or repurchase it once it becomes obsolete. Cloud environments help to increase the efficiency of Fintech products and company operations.

Fintechs try to reduce their office environments and shift towards a hybrid working model. Employees who wish to work in the office need to leverage hot-desking systems, meaning there are no fixed tables for employees. Virtualization of the office reduces the direct environmental footprint of Fintech operations. By leveraging fully digitized internal processes and creating paperless products, Fintechs have reduced their paper usage and waste creation. Digital internal operations championed by Fintechs are becoming a standard, with many large traditional banks following Fintechs in eliminating paper-based processes.

To eliminate their direct environmental footprint, including the carbon emissions of global travel by employees, some of the interviewed Fintechs highlighted several environmentally conscious activities. Decarbonizing the impact of renting and operating office space, the energy consumption of laptops and appliances, or the environmental impact of travel makes a step forward to an overall carbon-neutral Fintech sector.

The **indirect environmental impact** of Fintechs can be attributed to their products and services. Digitalization and supporting green project development have a largely positive environmental impact. Digitalization brings significant efficiency to Fintech's products and services. Digital payments are reducing cash usage and the costs and environmental impact of maintaining cash. Digital products eliminate the need to mail and transport

documents and reduce the time, energy, and money required to travel to a physical bank branch to manage finances.

Indirectly, by increasing the flow of funds into green project developments and by standardizing and automating green impact reporting, Fintechs increase the confidence of investors to channel their funds into well-evaluated and trustworthy green projects. Channeling of funds is facilitated directly by Fintechs, with an increase in exchange-based green investment products intending to provide investors with opportunities for green project financing.

Fintech products and services can also have a negative environmental impact by making the economy faster by increasing the economic turnover for businesses with more effective payment and cash management solutions. These businesses can be more efficient in selling, producing, and shipping more goods, potentially negatively impacting SD.

Another frequently mentioned negative impact was the intense energy usage by some of the initial blockchain platforms, such as Bitcoin and Ethereum. Meanwhile, Ethereum has already switched to the much more energy-friendly POS synchronization protocol, Bitcoin is still using POW synchronization, which is estimated to be using approximately 100 Terawatt Hours of energy per year, which is 0.5% of the global electricity production, or similar to the energy usage of Sweden (Cambridge Center for Alternative Finance, 2022).

From a social impact perspective, respondents emphasized that Fintechs have a positive social impact. Fintechs have a **direct social impact** on their internal stakeholders: founder-managers and employees. Respondents discussed the company culture and structure as key resources to achieve their business objectives. The culture of Fintechs includes a large number of positive elements: anti-harassment, equal treatment, ethical leadership, lead by example, no blame culture, transparency, dare to be vulnerable were some of the terms respondents used to illustrate the work culture, where employees are treated as the biggest asset of the company. Fintech's company structure aims to support rapid feedback cycles and is relatively flat compared to more bureaucratic organizations. Fintechs also try to build efficiency by creating a remote-first, decentralized decision

making which allows employees to have more time with their families by saving time, eliminating commuting, and achieving a better work-life balance.

The interviews confirmed previous studies that Fintechs have a significant **indirect social impact**. Some of the key indirect social impacts of Fintechs are financial inclusion, financial education, impact on the labour market, raising environmental awareness, transitioning towards a digital society, and democratization of finance. From the negative side, increased fraud and speculation and a potential negative impact of deepening indebtedness can be mentioned.

Previous studies have already highlighted the financial inclusion impact of Fintechs. Leveraging the research responses, it became even more striking how much Fintechs do in terms of financial inclusion. By providing simple, easy-to-use solutions and leveraging fully digital processes, Fintechs allow access to previously underserved demographic groups and users in developing countries who were unaware of how to manage certain parts of their financial lives. Many respondents claimed that their users are 90% first-time users of a given service, as they were unaware they could access certain financial services, such as digital claim management or factoring. By providing financial education and their services, Fintechs achieve a dual goal: they funnel their user growth and educate the population about the financial possibilities previously only available to the financially savvy or high-net-worth individuals. Transitioning towards a digital society enables the democratization of access to financial services and also supports the labour market by attracting different types of talents to finance.

With the freedom to access increased financial services and products, there is an increased responsibility toward the users. The ability to invest in new types of alternative investments, cryptocurrencies, or tokens, resulted in the creation of large wealth and increased speculation. Many people who have speculated lost their life savings. The new crypto, token, and Web 3.0 economy created by Fintechs has increased the ability to bypass the law or to exploit the information asymmetry between tech-savvy project owners and people who wanted to get in early to the new digital gold rush. Grey and black market activities started to leverage crypto to facilitate outside-of-the-banking system payments, and fraudulent project owners left many trusting investors losing all their money and life savings.

V.2. Discussion of Research Question 2

Research question 2 was formed to elicit feedback from respondents to understand: **What are the motivations for and barriers to incorporating triple-bottom-line aspects into the operations and product and service development of Fintech companies?**

The interviews made it apparent that Research Question 2 can be structured as the interactions between Fintechs and their stakeholders. Identifying the right stakeholders and their relative impact compared to others is essential to stakeholder theory. The importance of identifying the correct stakeholders was highlighted in the article of Phillips et al., 'What stakeholder theory is not'. The authors argued that meritocracy is the strongest interpretation of the balance among organizational stakeholders. Stakeholders need to be understood from their relative importance perspective in light of their contributions, costs, and risks (Phillips et al., 2003).

The current research helped to identify the key stakeholders the interviewed Fintechs regarded as impactful. Based on the interviews, the following stakeholders emerged as important for Fintechs: external stakeholders, including customers, regulators, standards organizations, suppliers, society, external auditors, and the United Nations. Regarding the internal stakeholders, founders-managers, employees, and company investors became the three large sub-categories.

Stakeholder theory was used to understand the internal and external motivation factors that impact Fintechs from a TBL perspective. External stakeholders play a critical part in the life of Fintechs. External stakeholders, such as customers, can push Fintech in a specific development direction. Regulators are external stakeholders who also have a strong influence on Fintechs.

Customers are the largest stakeholder group impacting the environmental and social approach Fintechs take. Fintechs serve all major customer groups, including retail customers and corporations. Retail customers are motivated by the ease of access to services, good user experience, and the ability to access new financial investment products, such as crypto or DeFi. Retail customers are also more interested in understanding their environmental footprint and, if not overly expensive, offsetting it with

verified carbon credits. The interviewed Fintech companies did not indicate a strong push from their retail customers to have mandatory ESG or sustainability compliance.

Corporate customers have more formalized ESG expectations toward Fintechs to provide proof of the company's ESG compliance and what activities the company accomplishes from an environmental and social performance perspective. Fintechs, especially the ones serving large corporate clients, need to do their sustainability reporting, use external auditors to verify their ESG report's content, and maintain the reports continuously. In order to receive funds from investors or to participate successfully in RFP tenders, corporate customers growingly require Fintechs to have their ESG and TBL practices in place.

Upstream customer demand increases the push from Fintechs on their downstream supply chain. Fintechs are not only providers of services but consumers of other companies' services. Fintechs impact their supply chain by performing environmental and social impact due diligence before engaging with a particular company. Some interview respondents highlighted their company's practice in performing various screening activities on their supply chain.

As more layers of society start to understand and get involved in sustainability, the pressure on Fintechs to increase their direct and indirect positive environmental and social impact is growing. Customers, suppliers, and society create a virtuous cycle of positive reinforcement, where Fintechs can gain more business by meeting social and environmental expectations.

Regulators, standard organizations, external auditors, and the United Nations emerged from the interviews as critical stakeholders. Regulators, including national and international regulators, play a vital role in the development of the Fintech sector. Based on the respondents, there are three critical areas for regulation: fintech regulation, crypto regulation, and carbon credits regulation. Respondents said that in terms of fintech regulation, including traditional services such as payment, lending, or investment products, Fintechs already need to comply with many local regulations. Local regulators include the government, central banks, and various ministries. In order to be able to provide financial services to customers, certain licensees need to be acquired by Fintechs.

The conflict was mentioned when Fintechs, who usually strive to provide services in more than one jurisdiction, must comply with each country's local laws, and there is no global 'pass' that meets all criteria. Outdated technology expectations, such as operating a minimum physical hardware environment in the local jurisdiction, were also mentioned as a barrier.

Stakeholders clearly agreed that more regulation is required related to the rapidly growing crypto markets. Respondents claimed that the current regulatory frameworks are insufficient and allow for leveraging offshore loopholes and other not regulated areas of crypto. Respondents agreed that until there is no precise crypto regulation in place, fraud, grey, and black market activities will continue with a significant risk of halting the development of the otherwise increasingly apparent crypto, decentralized finance, NFT, and metaverse sector.

Related to regulation is the lack of unified definition and measurement criteria regarding ESG and carbon credits. Respondents raised that creating a service that meets global expectations is hard, as no unified ESG or carbon credits standard exists. Meanwhile, public companies are required to use third-party auditors to verify the validity of their ESG reports; there are no unilaterally approved global verification and auditing criteria. The carbon credits market is globally fragmented, with opaque carbon credits classification criteria and the lack of an efficient global carbon credits exchange. Although specific industries are already mandated to offset their carbon emissions via carbon taxes, there is no single global venue where companies could go to do so. A global carbon credits registry is missing, acting as a single, unified data source. Today almost all large carbon offsetting deals are facilitated directly between the buyers and sellers with the support of a third party in over-the-counter deals (OTC). The terms of OTC deals are not visible outside of the parties, and respondents raised this as a potential area for carbon fraud.

The United Nations (UN) emerged as an important and unique stakeholder. The UN acts on a global scale. Among its valuable initiatives, it is the creator of the SDGs and the organizer of the most impactful global climate conference, the COP. The COP was described as a life-changing experience for those who participated in it. The participation

and general awareness of COP motivated some Fintechs to start their work in the green and ESG areas.

Internal stakeholders have continuous interaction with external stakeholders. Meeting the business, sufficiency, and ecological equity expectations of external stakeholders are the key concerns of the founder-managers of Fintechs. Founder-managers had various perceptions towards ESG and sustainability. Some regarded SDG and ESG initiatives as greenwashing or something their company is too small to engage in, while others were putting green and ESG as their core value propositions. The actions and ethics of founder-manages emerged as a driver behind how the given Fintech will ultimately support sustainability. Meanwhile, not all founders-managers emphasized the importance of ESG, green, or sustainability, every respondent highlighted the importance of treating employees fairly and creating a desirable workplace. Creating a desirable workplace included setting up and maintaining the expectation of the company culture and creating an organizational structure that supports the company's goals. Equal salaries based on seniority level, anti-harassment, gender equality, employee inclusion in decision making, transparency, ethics, environmental awareness, supportive, open culture, and leading by example were some aspects of how founders-managers created a desirable workplace.

Employees help to achieve the company’s vision by providing their time, capabilities, and values, which manifests in their daily activities. Fintechs look for passionate employees who love what they do. Employees receive multiple benefits from Fintechs, including career development support, training, and company ownership. However, they also need to do their part: strong work ethics, independence, and coping with a rapidly changing remote organization. Employees are also key for Fintechs as they bring their professional talents to develop the products and services. Through the development of products and services, employees have an immense opportunity to shape and influence the key aspects of the products: value proposition, functionality, design, marketing, and other product development activities.

Company investors who provide finances to Fintechs and green projects have an increasing need to see the social and environmental impact of their investments. Company investors can be of various sizes, from small angel investors to family funds to global

asset managers. Respondents explained that they receive an increasing demand from investors to have a verifiable positive social and environmental impact.

Alongside external and internal stakeholders, two other factors have influenced the interviewed Fintechs: technology and global events. Technology and Fintechs live in a close symbiosis. Technology is the foundational layer enabling the development of the Fintech sector. Meanwhile, back in 2017, the key discussion point regarding technology was the focus on cheap mobile phones, internet access, cheap IT hardware and software, and global telecommunication infrastructure (Varga, 2017), in 2022 respondents did not even mention these technology elements as they were taken them as unquestionably available. Respondents highlighted more state-of-the-art technologies as technology enablers. Current technologies focus on virtualization, removing physical hardware needs, and creating seamless connectivity across different applications leveraging APIs. Applications also leverage decentralized networks, and the immutability, real-time visibility, and automation benefits blockchain and smart contracts offer. Interconnected devices and point-of-source measurement via IoT devices became standard and widely adopted practices, where automated AI algorithms process raw data to enhance the business case. Fintechs adopt, combine and improve upon technology as they create new services and business models via technology.

Global events can act as catalysts or blockers for companies. Respondents highlighted three global events that impacted the environmental and social approach of Fintechs. First, the global financial crisis in 2008 decreased trust in banks and acted as a catalyst for developing a new decentralized financial system. Blockchain and smart contract technology have been leveraged to create the first fully decentralized value exchange system using its native crypto token, Bitcoin. Since the creation of Bitcoin, the size of the crypto, token, and Web 3.0 market has grown to a more than a trillion USD sector. Fintechs continue to build decentralized financial applications and DeFi protocols, some with significant environmental and social impact. The global financial crisis was a key event facilitating the growth of the Fintech sector.

The global pandemic of COVID-19 also had an impact on Fintechs. During COVID, people needed to stay at home, but their need to manage finances and other activities increased the demand for digital services. Many interviewed Fintechs reported increased

growth during the global pandemic, as their digital services were readily available. Financial inclusion in digital services and financial education has increased. After two years of COVID, the world has gone back to normal, however, the increased confidence and adoption of Fintech services have remained.

Lastly, the war in Ukraine has also been mentioned. The war harms green and sustainable energy-related investments. As Europe is facing an energy, oil, and gas crisis, green investments and green energy projects took a setback. In the interviews, green Fintechs said they expect a temporary decrease in their services until the energy crisis is resolved.

V.3. Discussion of the sub-questions of the research

Meanwhile the research focused on the two main research questions, exploring the direct and indirect economic, environmental and social impact of Fintechs and the motivation factors behind them, the research could also successfully answer all of the sub-questions of the research.

The knowledge Fintech companies have about the TBL, their best practices from a social and environmental perspective, their internal motivations, and barriers that help or hinder the appearance of the TBL in product and service development have been discussed in the previous sections.

The author would like to highlight one area that became the research's by-product: how can the current grounded theory research results be interpreted through the framework of the author’s previous, non-empirical, desk research from 2017? As the article from 2017 has received several references from international authors, reviewing the current research results through the past desk research framework can provide additional value.

The current grounded theory research made it apparent that the evaluation of Fintechs from a resource-based theory and key value drivers perspective alone provides a narrowed view of Fintechs. The current research allowed for more holistic learning about Fintechs. From a product and service development point of view only - which was the focus of the author’s 2017 research - the current research respondents were calling out the following areas about how Fintechs develop their products and services: value proposition, product

development principles, new business models, innovation, product marketing, ecosystem and partnerships, and the development of the actual product: payment, lending, capital markets, green and ESG, crypto and web 3.0 product development.

The 'Research Results' section has already summarized the interview responses. This section focuses on revisiting the findings from 2017 and seeing if additional insights could be added.

The following table contains the key value drivers identified in 2017 regarding the product and service development efforts of Fintechs and the relevant findings from the current grounded theory research.

Layer	Key value drivers - 2017	GT research findings - 2022
1st Layer (Top layer) - Human-centered design	● State-of-the-art customer and data analytics ● Superior user experience ● Experimenting, design-thinking approach	● Value proposition ● Product development principles ● Product marketing
2nd Layer (Middle layer) - Pioneering services	● Rapidly scalable services ● Open innovation approach ● Disruptive business models	● Innovation ● New business models ● Ecosystem and partnerships ● Lending product development ● Payment products development ● Green and ESG product development ● Capital markets products development ● Crypto product development ● Web 3.0 product development
3rd Layer (Bottom layer) - Ecosystem developments	● Cheap mobile phones and internet access ● Cheap IT hardware and software ● Global telecommunication infrastructure	● Blockchain ● Smart contracts ● Cloud technology ● Application Programming Interfaces (APIs) ● Internet of Things (IoT) ● Artificial Intelligence (AI)

Table 13: Assessing key value drivers behind Fintechs in 2017 and 2022

As discussed under Research Question 2, the key technologies have significantly shifted since 2017 towards new, state of the art technologies, cloud environments, and the ability to create a fluid, real time connection across applications leveraging APIs. Under the resource-based view's 'Pioneering Services' layer the importance of experimenting with

new business models, engaging in innovation, and creating scalable services were mentioned almost verbatim by the current research's respondents. This finding confirms the previous years' results and reinforces the assumption that Fintechs regard these capabilities as their core resources.

The research adds hands-on insights into the practical aspects of new products and service developments. The interviewed Fintechs were developing services in payment, lending, capital markets, green and ESG, crypto, and the web 3.0 domains. Each product and service aimed to be pioneering by significantly improving the currently available services offered by traditional financial institutions. Some of the services create entirely new product categories on their own. The interviews have revealed some of the key focus areas the respondents were considering under the product and service development core category. Such insights were not available from the desk research, and the current research results give a better understanding of what some global Fintechs consider a product and service development priority today.

Sub-categories of product and service development core category	Key concepts
Innovation	● Barriers of innovation ● Open innovation and co-creation
New business models	● Tokenization ● Platform creation
Ecosystem and partnerships	● Third-party data providers ● Fintech - traditional finance partnerships ● NGO partnerships
Crypto product development	● Crypto investments ● Crypto exchange development ● Crypto news and analysis
Green and ESG product development	● Carbon credits products ● Green data and analytics products ● Green investments
Lending product development	● Claim management ● Loans ● Buy Now Pay Later (BNPL) ● Digital factoring ● Repurchase agreements
Payment products development	● Digital payments ● Clearing and settlement
Web 3.0 product development	● DeFi protocols ● Non-Fungible Token (NFT)

	● Metaverse

Table 14: Research findings related to ‘Pioneering services’

Reviewing the responses from the grounded theory research using the framework of the previous desk research shows that the highest value added category - human centered design - shows similar responses found in 2017.

Sub-categories of product and service development core category	Key concepts
Product development principles	● Compliance with security and legal framework ● Product development ethics ● Agile product development ● 10x rule of product development ● Scalability of the product
Value proposition	● Real-time processing and visibility ● Superior user experience ● Cheaper services
Product marketing	● Green and ESG marketing ● Educational materials ● Tailored communication channels ● Trustworthiness of the brand

Table 15: Research findings related to ‘Human-centered design’

The current grounded theory research helped to broaden the understanding of Fintechs and the fundamental concepts of their product and service development process.

V.4. Triple-bottom-line concept map of Fintechs

During the interview period the interviews were transcribed and the transcripts were continuously analyzed according to the grounded theory methodology. The initial sampling period resulted in a generic concept map that included the core internal and external categories and some of the sub-categories which impact the economic, social, and environmental impact of Fintechs, but with no sufficient detail of each core category.

The initial sampling period demonstrated the focus of Fintechs on creating new products and services via their product and service development activities, influenced by their internal stakeholders. Company operations appeared as a vital core category to support Fintech's vision and its product development activities. External to Fintechs but having a

significant impact on them were external stakeholders and global events. Technology appeared as a critical enabler for Fintech innovation. Based on the interviews, a generic concept map could be created. The generic concept map was amended with the economic, social, and environmental dimensions to capture the respondent's feedback regarding the impact of Fintechs in the three areas.

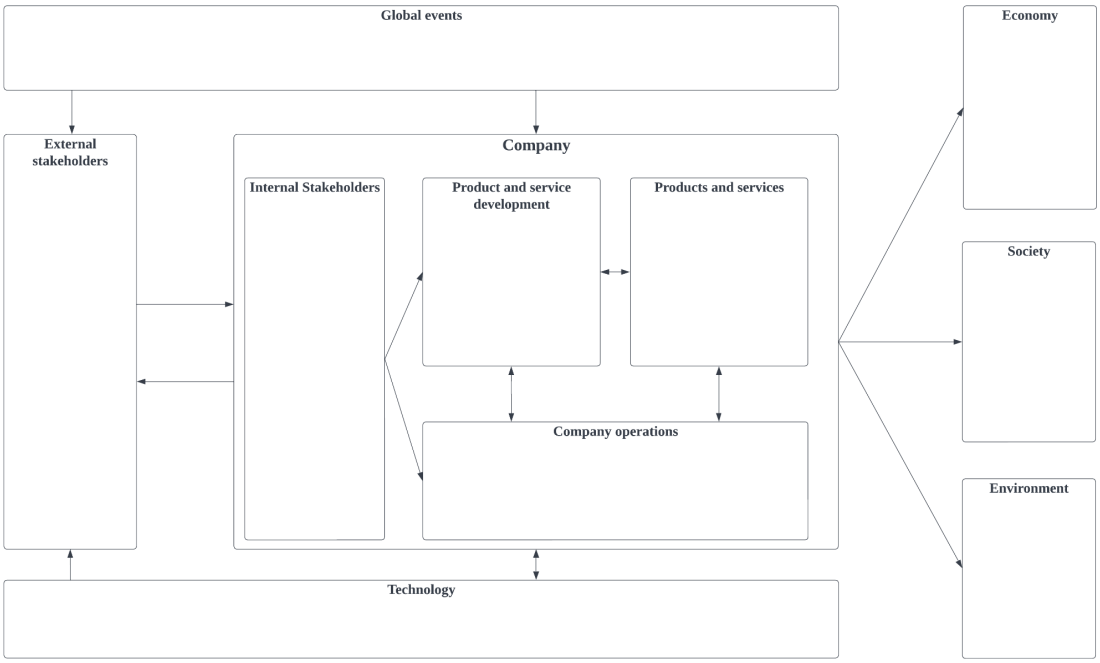

Figure 11: Generic concept map of Fintechs

According to the grounded theory methodology, the initial sampling period was followed by a focused theoretical sampling period to gain more knowledge about the details of the emerging concept map. The theoretical sampling period helped to attain further details on the emerging core and sub-categories and their relationships. The theoretical sampling period's interviews helped to clarify the generic concept map that emerged through the initial sampling period. The interviews were continued until theoretical saturation was reached.

By combining the research results and applying stakeholder theory, a detailed 'Triple-bottom-line concept map of Fintechs' could be created. The 'Triple-bottom-line concept map of Fintechs' gives a comprehensive framework on the TBL impact of Fintech companies from their operations, products, and services perspective.

The building blocks of the 'Triple-bottom-line concept map of Fintechs' can be categorized into three main groups: 1) internal factors, 2) external factors 3) triple-bottom-line impacts. Internal factors are the ones that Fintechs have the sole power to manage. It includes the internal stakeholders, company operations, product and service development, and the products and services.

External factors are motivating and enabling elements that influence the direction of Fintechs. Fintechs cannot survive long without finding the right balance between their internal and external influences. External factors include external stakeholders, global events, and enabling technology.

Triple-bottom-line impacts include the impact of Fintechs from their direct and indirect economic, social and environmental perspective.

The previous sections describe in detail the results of each of the core and sub-categories of the Triple-bottom-line concept map of Fintechs.

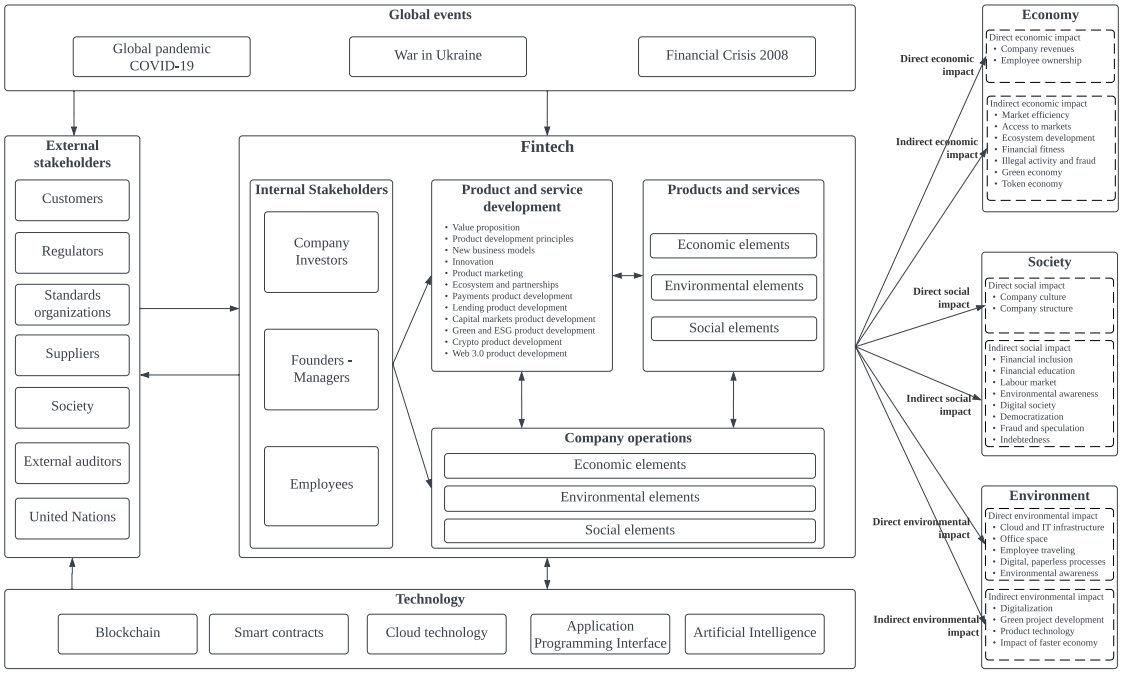

Figure 12: Triple-bottom-line concept map of Fintechs

Each of the building blocks of the 'Triple-bottom-line concept map of Fintechs' have been described in detail in the previous sections. The concept map helps to highlight the

synergy and interdependence of the various building blocks. The concept map provides a holistic summary and highlights that Fintechs operate in a complex environment. The concept map can support the creation of a generalized framework to support Fintechs in increasing their positive direct and indirect social and environmental impacts. By leveraging the learnings of the research about the details of the internal and external factors that impact Fintechs it is possible to consciously create an environment for Fintechs where their positive triple-bottom-line impacts can be maximized.

The ‘Triple-bottom-line concept map of Fintechs’ can provide the basis for both theoretical and practical approaches toward the TBL impact of Fintechs. From a theoretical perspective, researchers have a first-time access to a comprehensive map created based on the responses of a large assortment of global Fintechs with a dispersed geographical distribution. The ‘Triple-bottom-line concept map of Fintechs’ allows future studies to be strategically focused in specific directions of the research about Fintechs and their TBL impact.

The ‘Triple-bottom-line concept map of Fintechs’ can also be a valuable practical tool for Fintechs and traditional banks. Companies can use the concept map to analyze their TBL impact based on the building blocks. In such a sense, the concept map can also be regarded as a canvas representing the primary building blocks of Fintechs from a sustainability performance perspective.

Fintechs can also use the concept map to assess and improve their internal operation and product and service development; meanwhile, external stakeholders, such as regulators, can use the concept map to create a pro-innovation and pro-TBL regulation of Fintechs.

VI. CONCLUSIONS

VI.1. Overview of the research

The financial sector will need to overcome considerable challenges in the coming years to support sustainable development. Achieving the goals of the Paris Agreement alone requires an estimated three trillion USD annually in green investment globally, which is four times the current level (Puschmann et al., 2020; Schmidt-Traub, 2015; Schmidt-Traub and Sachs, 2015). The financial sector will also need to increase its social inclusion impact to reach the 1.4 billion adults who are currently unbanked (World Bank, Global Findex Database 2021).

Such goals can only be achieved with the strategic involvement of the entire financial sector. Traditional banks have been unable to achieve such goals. Fintech companies have grown significantly in past years. There are almost 19,000 Fintechs globally (CB Insights database, 2022), with almost 300 achieving a billion-dollar company valuation (FintechLabs.com, 2022). Fintechs will need to play their part in supporting sustainable development. There is already clear evidence of Fintechs' positive social and environmental performance, including their ability to better financially serve the non-or underbanked population than traditional banks (Tate and Bals, 2016).

The literature review has highlighted that while there is a large body of knowledge on the role of corporations and banks in supporting sustainable development, this level of knowledge is not yet available concerning Fintechs. In an attempt to address the shortcomings of current definitions of Fintech, the present research uses the author's own definition to distinguish Fintechs from traditional banks – a necessary distinction for examining exactly how Fintechs are different from traditional banks in their ability to support sustainable development. Clearly distinguishing Fintechs from banks will support researchers to examine the topic using clear definitions: Fintech refers to ventures without a banking license whose goal is to develop and provide novel, technology-enabled financial services with a value-added design that will transform current financial practices.

The literature review revealed that while numerous sustainability frameworks exist to support traditional banks, there is no detailed understanding of how Fintechs can support sustainable development. Prior studies focus on either explaining how Fintechs have emerged (such as the actor-based evolutionary approach of Fintechs by Arner et al., or the resource-based approach of Fintechs by the present author) or provide siloed examples of selected Fintechs and explain their achievements from a social or environmental impact perspective. Siloed explanations are insufficient for providing a detailed understanding of how Fintechs can increase their sustainability performance and what their direct and indirect social and environmental impact is.

There is a gap in the literature in terms of a comprehensive understanding of the direct and indirect social and environmental impacts of Fintechs. Accordingly, it is apparent that Fintech companies should be examined from a TBL impact perspective.

Two main research questions were created based on the literature review:

- Research question 1: How does the triple-bottom-line concept appear in the operations (direct impact) and the products and services (indirect impact) of Fintech companies?
- Research question 2: What are the motivations for and barriers to incorporating triple-bottom-line aspects into the operations and product and service development of Fintech companies?

VI.2. Methodological significance

Due to the novelty of the research topic and the gap in the literature that was identified, the author chose to use a qualitative research method. The exploratory nature of qualitative research helps to understand the patterns of thinking and opinions related to the topic (Sajtos and Mitev, 2007).

In order to ensure the theoretical and technical validity of the research and thus the credibility of the model that was derived, the author used grounded theory methodology for the research, as specified by Glaser and Strauss (Glaser and Strauss, 1967). Guidance on the reliable execution of grounded theory as defined by leading practitioners was employed.

Grounded theory is particularly applicable in areas related to management research, such as decision-making or the process of fostering financial innovation (Glaser and Strauss, 1967; Horváth and Mitev, 2015), and is suitable for exploring topics (Charmaz, 2006; Horváth and Mitev, 2015). The agility of grounded-theory-based research complicates the work of researchers: it is impossible to foresee when research will achieve the required point of information saturation and thus support substantive theory. Because of this, grounded theory is a time-consuming method, which is why researchers often turn to other options (Horváth and Mitev, 2015).

The research followed the steps of grounded theory methodology described in the 'Research Design' section: interview preparation, pilot period, initial sampling, theoretical sampling, and ongoing execution of the required coding process. The research reached theoretical saturation after 15 interviews. Approximately 230 pages of transcripts were created from the interviews and analyzed together with the notes made by the author during the research. The results were encapsulated in the emerging core categories and sub-categories and resulted in the creation of a unique 'Triple-bottom-line concept map of Fintechs'.

The research contributes to the research on Fintechs from both a theoretical and methodological perspective. While grounded theory has been used for studies published in leading academic journals, no similar research on Fintechs and sustainable development could be identified. The current research is thus the first to involve extensive analysis of Fintechs and their social and environmental impact based on grounded theory.

VI.3. Theoretical significance

The research is unique as it was carried out to respond to some of the critiques of current Fintech studies: namely, that they do not typically use international samples and tend to narrowly focus on a single company or a single domain. The author conducted 15 interviews with representatives of Fintechs from around the world, active in various domains and of different sizes. The Fintechs included in the research were from Europe, Asia, and North America and included both private, small Fintechs and large, public Fintech companies with thousands of employees. The research included Fintechs from

various domains, such as payment and lending, capital markets, green and ESG, crypto, and Web 3.0. The research also involved company representatives from the Fintech advisory, cloud system integration, and money markets domains.

The research successfully generated answers to both research questions and the sub-questions. The 'Research Results' section contains some key excerpts from the interviews and a detailed description of the core and sub-categories that emerged. The 'Discussion of Research Results' section provides genericized insights created by interpreting the research results in line with emerging theory.

Addressing Research Question 1 – How does the triple-bottom-line concept appear in the operations (direct impact) and the products and services (indirect impact) of Fintech companies? – resulted in three core categories: the impact of company operation, product and service development, and the impact of Fintech products and services. The research results show that Fintechs have significant direct and indirect TBL impacts, and give a unique, detailed overview of these.

From an economic impact perspective, company revenues and employee ownership emerged as the direct impacts, and market efficiency, access to markets, ecosystem development, financial fitness, illegal activity and fraud, the green economy, and the token economy were identified as the areas where Fintechs have the largest indirect economic impact.

From a direct social impact perspective, company culture and structure play a significant role in Fintechs. From an indirect social impact perspective, Fintechs significantly impact financial inclusion, financial education, the labour market, environmental awareness, digital society, the democratization of access, fraud, speculation, and indebtedness.

The direct environmental impact of Fintechs was greatest in the areas of cloud and IT infrastructure, office space, employee traveling, digital, paperless processes, and environmental awareness. Fintechs also have an indirect environmental impact via their digitalization, green project development, product technology, and speeding up economic transactions.

Responding to Research Question 2 – 'What are the motivations for and barriers to incorporating triple-bottom-line aspects into the operations and product and service development of Fintech companies?'– also resulted in meaningful answers. Stakeholder theory helped to understand and identify external and internal stakeholders, their relative importance, and their motivations. From the external stakeholder perspective, customers, regulators, standard organizations, suppliers, society, external auditors, and the United Nations emerged as key stakeholders. Founder-managers, employees, and company investors were the important internal stakeholders with strong motivational involvement in Fintechs.

Global events, such as COVID-19, the war in Ukraine, and the financial crisis in 2008, were mentioned as important motivational factors. The research also revealed the rapid evolution of technology as an important enabler. New technologies such as blockchain, smart contracts, cloud technology, APIs, and artificial intelligence enable the development of new innovative Fintech products and services.

The grounded theory research clarified that the evaluation of Fintechs from a resource-based theory and key value-drivers perspective alone provides a narrow view of the sector. The research allowed for more holistic learning about Fintechs. The current research also provided an opportunity to assess the author's previous desk research findings regarding the product and service development of Fintechs. Respondents explained in detail how Fintechs develop their products and services. The interviews highlighted the importance of the value proposition, product development principles, new business models, innovation, product marketing, ecosystem and partnerships, and the development of the actual products: payment, lending, capital markets, green and ESG, crypto, and Web 3.0.

The research results were combined into a holistic 'Triple-bottom-line concept map of Fintechs'. The concept map visualizes the key building blocks of the TBL impact of Fintechs, including the direct and indirect economic, social and environmental impact, the operations, the products and services, and their development, and the key motivational factors, including stakeholders, global events and technology. The 'Triple-bottom-line concept map of Fintechs' is a holistic illustration of the research results that can support researchers to create formal theory about the TBL impact of Fintechs.

VI.4. Recommendations for future research

The focus of the research was to conceptualize sustainability in the Fintech sector. The research only covered Fintechs and not the entire financial system. The research did not aim to generate a formal theory that is applicable to the whole sector, rather to develop a substantive theory that – together with further research – could contribute to a more comprehensive understanding of Fintechs and their social and environmental impact. The research is the first to utilize grounded theory methodology to increase understanding of Fintechs and their impact on sustainable development.

The 'Triple-bottom-line concept map of Fintechs' summarizes the research results using a holistic approach. Based on these findings, the following steps are suggested for future research:

1. Create a formal theory by extending the detailed research design used in the current research to a sample representative of the global Fintech sector;
2. Leverage the learnings of the current research and future formal theory to create a Fintech-specific TBL value-creation framework that provides guidance and benchmarks for Fintech to ensure they can maximize their positive TBL impact while minimizing negative ones;
3. Undertake focused research in the areas that emerged during the current research where Fintechs have a potential negative TBL impact, and use the findings to create executable action plans to ensure that Fintechs positively contribute to economy, society, and the environment. Some potential risk areas that have been identified are i) a lack of regulation and a common taxonomy for Fintechs with a particular focus on the emerging crypto market, ii) a lack of understanding of the potential impact of Fintechs and BigTech on the stability of the wider financial market;
4. Create a permanent forum wherein the stakeholders identified in the current research can evaluate and discuss the directions of research regarding Fintechs and their involvement in SD on a regular and recurring basis. Discussions between the key stakeholders need to be captured in the form of an executable global roadmap in which progress meeting goals is continuously measured.

The research aims to contribute to the growing literature about Fintech companies in an area that is not well researched yet: the social and environmental impact of Fintechs. As the Fintech sector is rapidly growing, it is important to understand how these innovative financial companies impact sustainable development. Understanding the social and environmental impacts of Fintechs can enable a more focused utilization of Fintechs in supporting overall global sustainability efforts. By conceptualizing sustainability in the Fintech sector, the author hopes that the current research makes a small but meaningful contribution to support the efforts of transforming the global economy into a more sustainable pathway.

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VIII. APPENDICES

Appendix 1: Interview Guide (Theoretical Sampling)

Examining Fintech Companies from a Triple-Bottom-Line Impact Perspective with a Focus on Financial Product And Service Development

Introduction (in neutral tone)

- Introduction of the interviewer
- This research is part of the Ph.D. research of David Varga, a doctoral candidate at the Corvinus University of Budapest.
- The interview will be recorded and the collected information will be transcribed and used for a qualitative analysis method, called Grounded Theory.
- Confidentiality: Names of the interviewed participants and companies will remain anonymous in the research, and any personal details that may come up during the interview are handled with confidentiality. The research will include the sector of the company and the role of the interviewed person but not the name of the person or the company.
- Purpose of the research: The goal of the research is to have a better understanding of the impact of Fintech companies on sustainable development, and their social and environmental impact. Currently, there is limited information available on the sustainability impact of Fintech companies in terms of their operations or product and service development.
- Sustainability-related concepts: When speaking about sustainability aspects of Fintechs we consider the following concepts as synonymous: Environmental, Social, and Governance (ESG), Sustainable Development (SD), Sustainable Development Goals (SDG), and the Triple-Bottom-Line (TBL).
- Fintech definition used in the research: Fintech refers to ventures without a banking license, whose goal is to develop and provide novel, technology-enabled financial services with a value-added design that will transform current financial practices (Varga, 2017, 2022).
- It is important to mention that there are no good or wrong answers. I would like to learn about your perspective.

- Duration of the interview: about 60 minutes

Respondent Introduction

Goal: To learn about the background of the respondent and his/her role

- What is your position in the company?
- When did you join the company?
- For how long have you been working/involved in the Fintech sector?
- What is your educational background?

Company Introduction

Goal: To learn about the background of the company the respondent works for

- Please tell me about the company you work for in a couple of sentences.
- Where was your company incorporated?
- How many employees do you have?
- Who are your main customers?
    - Prompt: retail, enterprise, please describe
- How many customers does the company have?

Sustainability in Fintech Statements

Goal: Participants were asked to think about Fintech organizations they would classify as having exemplary sustainable development-related business practices. Then, participants were asked to generate a list of statements descriptive of these organizations' social and environmental practices and behaviors.

- Please describe to me what statements come to your mind when you think about an exemplary Fintech company in relation to sustainable development.
    - Prompt: What statements come to your mind about these organizations' social practices and behaviors?
    - Prompt: What statements come to your mind about these organizations' environmental practices and behaviors?

TBL related questions

Goal: To learn about the knowledge of the respondent about the social and environmental aspects of the company's operations and product and service development.

1. Can you please describe in your own words what you think the core values of your company are?
    - Probe: If social or environmental values are mentioned: can you please tell me more about how these values appear in the company?
2. Please describe to me if in your opinion your company has a social and environmental impact.
    - Probe: Can you please tell me how your company has a social (people) impact?
    - Probe: Can you please tell me how your company has an environmental (people) impact?
3. Can you please explain to me how environmental considerations appear in your company's daily operational activities?
    - Probe: If they don't appear, why do you think they don't appear?
4. Can you please explain to me how social considerations appear in your company's daily operational activities?
    - Probe: If they don't appear, why do you think they don't appear?

5. Can you please explain to me what are the most important factors in your company's product and service development? Think of the process of creating new products or services.
    - Probe: can you please explain to me how environmental considerations appear?
    - Probe: can you please explain to me how social (people) considerations appear?
6. Can you please explain to me how the social or environmental aspect appears in the actual service or product you offer to your Clients?
7. Can you please explain to me what are the most important factors for your customer to decide to use and choose your service or product?

    - Probe: Can you please tell me how important in your opinion it is for your customers to have your company be conscious of social and environmental aspects?
8. Can you please tell me what are your thoughts about your company and its approach toward social issues?
9. Can you please tell me what are your thoughts about your company and its approach toward environmental issues?
10. Can you please tell me how you measure the impact of your company's social and environmental impact?
11. Can you please tell me what more your company could do in your opinion to become more conscious about sustainable development?
12. Can you please tell me what obstacles, and problems your company might face in becoming more conscious about sustainable development?
13. Can you please tell me what you think are the biggest motivators of your company to become more environmentally and socially conscious?
14. Can you please explain to me what training programs your company has in place?
    - Probe: Is there any training about sustainability aspects?
    - Probe: Is there any training about social aspects?

EXPERIENCE RELATED QUESTIONS

- Can you please name a Fintech company that you think takes into account social and environmental considerations?
    - Probe: Why do you think so?
- Do you have any information on any available organizations or frameworks which could be helpful in helping to consider social and environmental aspects for your role?

Closing Remarks

I don't have any more questions. Is there anything I forgot to ask and you would like to mention?

Thank you for your participation!

Appendix 2: The author's publications in the subject

Varga, Dávid (2017). Fintech, The New Era of Financial Services. Vezetéstudomány - Budapest Management Review, 48 (11). pp. 22-32. DOI https://doi.org/10.14267/VEZTUD.2017.11.03

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In: Keresztes, Gábor (editor) Tavaszi Szél 2018 Konferencia, Spring Wind 2018: Konferenciakötet II. Budapest, Magyarország: Doktoranduszok Országos Szövetsége (DOSZ) (2018) 563 p. pp. 231-249. , 19 p.

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