

# SCHOOL OF ECONOMICS AND MANAGEMENT

## **A Comparative Study of Crowdfunding in the UK and Germany:**

Exploring Cultural and National Influences on Investor Behavior in Green  
Technology Crowdfunding Campaigns

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## **Abstract**

This thesis investigates the dynamics of crowdfunding especially in the green technology sector, by examining how the differences in national and cultural contexts influence investor contribution. A comparison is made between the UK and Germany under cultural, economic, and regulatory factors using crowdfunding campaigns of 60 green tech companies, split equally between the two countries. Findings reveal that the UK investors contributed higher average amounts than their German counterparts showing significant differences between the two countries. These insights underscore the need to design green or sustainability-oriented crowdfunding campaigns according to the national and cultural factors of the different countries to make them successful. The study's implications can be extended to born global companies, innovative, sustainable startups, and SMEs who expect to use alternative finance in completing their campaigns, and to the policymakers and entrepreneurs who are looking forward to optimising crowdfunding strategies in diversified economic and cultural environments.

**Keywords:** green crowdfunding, green technology crowdfunding, national regulations in crowdfunding, cultural context in investment, investor contribution in green funding, crowdfunding dynamics

# Chapter 1: Introduction

## 1.1. Background

In the dynamic business world, finance is the lifeblood that feeds company growth, sustains productivity, and fuels innovation. Companies seek financing to turn ideas into useful products, expand their operations, and meet market challenges in doing so. Whether it is a startup looking to launch a new app or a seasoned entrepreneur looking to expand their product line, companies at all stages of the life cycle need financial strength to achieve their goals of being competitive.

The funding requirements for new projects which can be considered as an important factor for financing a business or a project, especially those with an emphasis on sustainability, have changed significantly in recent years (Tang et al, 2024). The traditional way of financing was usually through banks, equity raising, or government grants, which, while effective, can be rigid and exclude many people without many traditions or unproven ideas (Obiora & Csordás, 2017). According to Obiora & Csordás (2017), these traditional financing methods have played an important role in financial support for considerably a long time. However, these traditional financial institutions were mentioned to be generally operated under strict standards and exhibited a cautious approach to risk.

This risk aversion means that businesses or companies with established track records are often preferred, missing out on innovative start-ups, and individuals with innovative, sustainable ideas, and consequently those businesses that can have been this impressive could struggle to raise the funding needed to make it happen (Obiora & Csordás, 2017; Agrawal, Catalini, & Goldfarb, 2014). In response, the business finance environment has diversified drastically, and alternative finance emerged to fill the gaps created by traditional financing (Obiora & Csordás, 2017).

Alternative finance, defined as non-traditional methods of financing that skip conventional bank loans, has become gradually popular as traditional lending techniques were tightened (Obiora & Csordás, 2017). This type of finance generally involves online platforms that join lenders (alternatively termed as backers, investors, funders, or sponsors throughout this paper) with debtors (alternatively termed as borrowers, fundraisers, entrepreneurs, or project initiators throughout this paper), facilitating the right of entry to funding through mechanisms such as peer-to-peer lending and crowdfunding (Obiora & Csordás, 2017).

As the economic environment has evolved, the new funding mechanisms have become more prominent and these mechanisms connect them to a global audience willing to support businesses that are small and risky based on their intellectual strength rather than their financial history (Obiora & Csordás, 2017; Agrawal, Catalini, & Goldfarb, 2014). These variables represent a democratic approach to funding, where the potential for positive impact and public interest can create the capital needed to bring sustainable innovation to life (Agrawal, Catalini, & Goldfarb, 2014; Tang et al, 2024). In this tough traditional financing scenario, for those who have proven

flexible in this evolving environment, the challenges are tough but suggested to be overcome using crowdfunding as an alternative financing method which is discussed throughout this paper with an emphasis on ‘green technology crowdfunding’.

Crowdfunding is defined as a groundbreaking alternative by Mollick (2014) which is a method that allows individual founders of for-profit, cultural, or social projects to request funding from many individuals, often in return for future products or equity. This form of capital raising uses the collective efforts of individuals, primarily online through social media and crowdfunding platforms (CFPs), leveraging their connections for greater exposure and allows them to raise capital going around traditional financing routes, enabling the public to support projects that are not viable otherwise (Mollick, 2014).

An important characteristic of crowdfunding is that funders can enjoy extra private benefits in participating in crowdfunding and it varies depending on the form of crowdfunding ranging from a *donation-based*, *reward-based*, *equity-based*, and *debt-based* model (Belleflamme, Lambert, and Schwienbacher, 2014). In donation-based crowdfunding, sponsors give money without the expectation of return, often motivated by charitable motives. Reward-based crowdfunding gives backers a tangible reward or savings in exchange for their contributions. Equity-based crowdfunding (also called crowd-investing) gives investors ownership stakes in a company, aligning their financial returns with the success of the business. Lastly, debt-based crowdfunding, or peer-to-peer lending, allows donors to repay, usually with interest, making it more like traditional lending but visually more flexible under normal conditions (Belleflamme, Lambert, and Schwienbacher, 2014).

Mollick (2014) claims that crowdfunding has many advantages that may draw the attention of potential funders. It enables access to a wide range of entrepreneurs and industries with the use of digital innovation while avoiding geographical and traditional barriers to investment. Crowdfunding allows for rapid market conviction, support, and mobilisation of ideas before full implementation (Belleflamme, Lambert, and Schwienbacher, 2014). Additionally, it connects supporting people to campaigns who are emotionally and financially involved in the success of the businesses.

However, Mollick (2014) states that crowdfunding is not without its challenges. The risk of project failure and failure to deliver promised results can lead to dissatisfied sponsors and possible legal issues. The success of a crowdfunding campaign depends largely on its ability to attract attention and attract money, which can be highly volatile. Furthermore, the public disclosures required in crowdfunding campaigns may pose a risk to intellectual property protections (Agrawal, Catalini, and Goldfarb, 2014).

Crowdfunding shines as a beacon of hope for green technology innovation where traditional financiers retreat, crowdfunding is stepping in, eager to support projects that promise to be sustainable and environmentally friendly. This financial support not only drives these projects

from concept to reality but also builds a community of supporters who are invested in their success (Rossolini, Pedrazzoli, and Ronconi, 2021). Crowdfunding's central role in promoting green technology underscores its importance in removing financial barriers and fostering a green future (Rossolini, Pedrazzoli, and Ronconi, 2021).

Green tech, commonly referred to as green technology, is defined as any product, service, or process that provides value using fewer resources and produces less pollution compared to current standards (Marra et al., 2017). Some broad categories such as wind and solar power, green transport, green buildings, and efficient power plants are renewable energy sources (Marra et al., 2017). These technologies aim to produce smaller environmental impacts and are widespread across sectors, although they vary in nature, but share a common goal of enhancing environmental performance (Marra et al., 2017). The green tech market is expanding globally, heavily influenced by consumer demand and changes in market trends, towards innovation and success of small and medium enterprises (SMEs) (Marra et al., 2017).

Green crowdfunding has emerged in the crowdfunding landscape to finance projects in green technology, which focuses on sustainability and environmental responsibility. This approach allows for projects aimed at making a positive impact on the environment, allowing the public to contribute directly to renewable energy, conservation efforts, and other environmentally friendly initiatives (Tang et al. 2024). A more detailed discussion in this regard is conducted in the Literature Review.

## **1.2. Research Purpose**

In this study, we aim to explore the dynamics of green crowdfunding and cultural, regulatory, and economic factors that could affect investor contribution for which there is a gap in current literature which is available. In analysing the effectiveness of green crowdfunding, the UK and Germany provide relentlessly complementary contrasting scenarios. Being a pioneer in crowdfunding, the UK has exited the European Union (EU) while Germany is with a significantly growing market adapting to the EU regulatory framework being a part of the EU. This unique initiative highlights the different ways in which crowdfunding can support sustainable development in these two different economic contexts.

By comparing these two distinct areas, our study aims to provide deeper insights into the factors affecting the success and adoption of crowdfunding for sustainability purposes permanently and meantime provides valuable lessons for other countries with similar aspirations or challenges.

That especially could be directed at born global companies and the usage of green crowdfunding as a strategic financial tool, with a focus of ones introducing innovative green technologies. Born-globals, as per Knight and Tamer Cavusgil (2004), are characterised by having knowledge and capabilities but lacking financing. The authors identify how the born-globals are typically

innovative companies with forward-thinking that internationalise during their first years in order to achieve superior performance and meet financial goals.

The research examines whether crowdfunding might serve as a transnational, viable capital generation method but also a strategy to mitigate the financial struggles of these new-to-market companies. By exploring how different regulatory and economic landscapes influence investor contributions to green tech companies' crowdfunding campaigns, insights into strategic internalisation processes can be gained. Specifically, it focuses on whether internalisation is necessary to successfully raise capital through crowdfunding and whether the success of campaigns depends on the country in which they are undertaken or if investor enthusiasm transcends national boundaries.

Furthermore, the concept of dialectical tensions described by Kriz and Welch (2018) treats how new-to-the-world tech companies not only struggle with market uncertainties but also with technological uncertainties, complicating their financing strategies. This research aims to illuminate how direct engagement with global investors through crowdfunding can alleviate these challenges and guide strategic market entry decisions when investment risks are heightened.

The empirical focus is on the influence of geographical locations with a relatively low psychic distance on the average contributions from investors in green technology crowdfunding campaigns. The internalisation between those two countries appears to be feasible while they present two distinct cases with different policies and investment climates, offering a robust context for the investigation. By analysing these differences, the study aims to recognize patterns that could help in making informed strategic decisions regarding where and how to initiate crowdfunding efforts. That is especially useful as green technologies usually face long research and development timelines while being cost-heavy.

The outcomes of this study are expected to contribute to the broader research regarding the financing options for born globals. Those insights could provide a practical recommendation for not only entrepreneurs but also policymakers, in order to attract more business and incomes to the business landscape of the nation. By integrating theoretical frameworks with empirical data, the research aims to present a comprehensive analysis of the strategic usefulness of crowdfunding for overcoming the natural financial challenges faced by innovative green technology firms in a global context.

### **Research Question**

Given the identified gaps and the need for deeper empirical insights, this research proposes the following question: *How do national and cultural differences influence the level of contribution per investor in green technology crowdfunding campaigns between the UK and Germany?*



## **Chapter 2: Literature Review**

Since the beginning of the financial crisis (2007-2008), the credit cycle has contracted in many developed and developing countries worldwide (Krěpřta, 2015). The global financial crisis highlighted the weaknesses in the traditional lending market where 70% of corporate sector funding is provided by the banking sector for Europe and 20% for the US which has directly influenced sluggish economic growth, especially in Europe due to this fact (Krěpřta, 2015). 50-60% of total bank lendings in developed European countries were directed to the real estate sector (Krěpřta, 2015).

At the same time, stumbling credit providers joined with the IT sector to generate alternative ways to connect lenders with savers to improve access to funding for SMEs and new startup companies by widening the existing financial ecosystem in the European Union (EU). According to Krěpřta (2015), alternative finance emerged to fill the gaps in traditional financing and as an alternative, equity financing such as venture capital, private equity, crowdfunding, and peer-to-peer lending has become the most optimal choices aiming to restore viable business funding, putting more leverage on young companies in Europe, which is a vital part of long term vibrant economic growth.

Crowdfunding as an alternative financing method has emerged during the last two decades due to three reasons stated by Cuesta et al. (2015) namely: the mobilisation of supply and demand due to the financial crisis, advancements in telecommunication and other technologies in the digital era, and absence of a properly defined regulatory framework. Crowdfunding's success depends on a stranger's willingness to support other strangers for causes, products, or services that have not yet been realised and they have less oversight and control over it (Testa et al., 2019). Despite this, the potential of crowdfunding in innovation and sustainable entrepreneurship projects is getting noticed by media and academic groups (Testa et al., 2019).

Some empirical evidence suggests that there is a positive relationship between environmental or sustainability orientation and the likelihood of the success of a crowdfunding project (Testa et al., 2019). Changing our current consumptive and productive patterns for the planet's sake has attracted potential investors for these types of projects (Testa et al., 2019). Crowdfunding and sustainability are gaining ground in the academic literature due to the lack of papers discussing this field in depth as sustainable or green crowdfunding is becoming increasingly apparent (Böckel, Hörisch, and Tenner, 2020).

### **2.1 The Genesis and Conceptual Framework of Crowdfunding**

As discussed in previous sections, alternative finance has emerged because of problems SMEs face with traditional financing. Even though traditional financing was still predominant at the rate of being 72 times larger in 2017 during the research of Obiora (2017), alternative financing methods are becoming gradually prominent. Among those, peer-to-peer lending, crowdfunding, and venture

capital play an important role (Obiora, 2017). Crowdfunding is becoming a popular alternative due to some of the key benefits (as shown in Figure 1 below) and advantages such as having to worry less about losing any portions of future equities from the initial stage, using crowd ‘wisdom’ in unravelling successful projects, coming up with better ideas and modifications, lack of geographical barriers due to online nature of product promotion (Obiora, 2017).

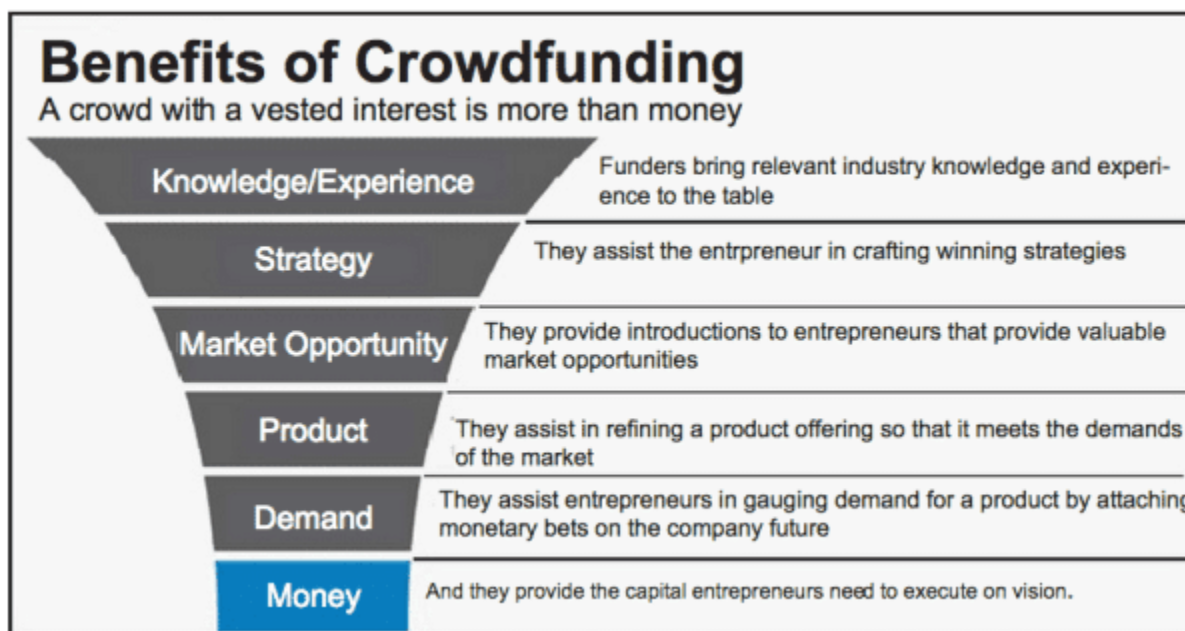


Figure 1.1 (Source: Vijayalakshmi & Priyadarshani, 2021)

Researchers argue that crowdfunding is a part of ‘crowdsourcing’ especially because crowdsourcing is simply defined as “the act of a company or institution taking a function once performed by employees and outsourcing it to an undefined (and generally large) network of people in the form of an open call” (Rouzé, 2019, p. 16). However other researchers counter-argue that crowdfunding is a distinct phenomenon even though it would have descended from crowdsourcing (Rouzé, 2019). For others, the difference between crowdsourcing and crowdfunding depends on ‘collaboration’, in crowdsourcing the participants influence the content, while in crowdfunding they do not do so (Rouzé, 2019).

The American researchers David Freedman and Matthew Nutting (2015) claim that the birth of crowdfunding officially came into being in the US in 2004, thanks to the musical sector and platform Artistshare and the jazz musician Maria Schneider (Rouzé, 2019). Schneider could raise \$130,000 following a call for backers to produce a new album that won a Grammy Award in 2005 (Rouzé, 2019). As an initiative, this fundraising was categorised into two models namely ‘the betting model’ and ‘the investing model’, and Sellaband.com (United Kingdom) and Bandstock.com (the Netherlands) which were founded in 2006 became the forerunners of today’s CFPs based on ‘investment’ approach (Rouzé, 2019).

However, the history of the birth of crowdfunding goes back to 1997 when British prog-rock band Marillion successfully raised \$60,000 through their website to finance a US tour (Rouzé, 2019). Nonetheless, since the start of the 21st century, crowdfunding has become an interesting topic for researchers who have educated funders around the world who are interested in it. One of the first CFPs in the US is Kickstarter and in Europe, it is Ulule (Liakopoulou, 2020). The significant growth of supporters in these two platforms shows a ‘globalisation’ effect has led to the participation of people from all around the world in the initiatives (Liakopoulou, 2020).

Belleflamme, Omrani & Peitz (2015) state in their paper that crowdfunding is a niche phenomenon even though it is gradually becoming popular, and learning more about CFPs would be an interesting and important topic in this regard. CFPs have appeared around the world creating approximately 60% in Europe and 20% in North America (Belleflamme, Omrani & Peitz, 2015). In Europe, the UK was leading with collecting 2.3 billion euros in 2014 which represented 79% of the total amount collected in Europe followed by France, Germany, and Sweden having collected 154, 140, and 107 million euros respectively (Belleflamme, Omrani & Peitz, 2015). As mentioned before, crowdfunding takes place mostly on internet-based platforms connecting fundraisers with many of the funders to fund a particular campaign.

When discussing varieties of CFPs, it is important to understand the different types of participants who are attracted and their motivations towards participation (Belleflamme, Omrani, and Peitz, 2015). Motivations can differ and can even be non-monetary to support a particular idea depending on individual campaigns. Based on those conditions, CFPs are mainly divided into investment-based, reward-based, and donation-based models. Investment-based CFPs are known to act as alternative finance instruments to finance start-ups and SMEs and those can be distinguished between equity-based, royalty-based, and lending-based CFPs (Belleflamme, Omrani, and Peitz, 2015). Fundraisers need to understand the motivations of reward-based funders whether they are partly driven by individual motivations or personalised benefits offered by joining the campaign (Belleflamme, Omrani, and Peitz, 2015). Donation-based CFPs do not offer personal benefits but authors say that sometimes it is hard to draw a line between reward-based and donation-based CFPs, for example mentioning of the funder can already be seen as a reward.

As the crowd financing landscape transforms, the emergence of green crowdfunding marks a pivotal shift toward democratising funding for sustainable projects. This literature review seeks to investigate the depth and breadth of existing academic and industry research on green crowdfunding, particularly in the fields of renewable energy and environmentally sensitive projects between two selected countries in Europe. With increasing global emphasis on sustainability, crowdfunding not only fills the huge financial gap left by traditional financial institutions but also reflects the movement of broader societal change from an environmental perspective as well.

## 2.2. Motivation for Crowdfunding

Even though crowdfunding is a new phenomenon, it is important to understand the motives of individuals who invest in this type of financing method, considering both the advantages and disadvantages such projects carry. Motivation is the level of stimulated motives that regulate individuals' behaviour not only affects individuals' selection, decision, and intention to perform a certain behaviour but also generates energy, effort, and perseverance in fulfilling such behaviour (Bagheri, Chitsazan, and Ebrahimi, 2019). It could be interesting to understand what drives the backers who are interested in investing in crowdfunding which may not be funded otherwise considering the risks associated compared with traditional financing. To understand the motivations behind their actions, it would benefit from discussing: (1) *the characteristics of the crowd* and (2) *how they perceive certain benefits and risks associated with increasing their willingness* (Nikolaos and Wei, 2017).

### 2.2.1. Characteristics of the crowd (Sustainability-oriented projects)

When discussing crowdfunding, the characteristics of investors play an important role. However, much of the past research regarding crowdfunder's characteristics has focused mainly on crowdfunders in general so far (Tenner and Hörisch, 2021). Tenner and Hörisch (2021) state that understanding investors' characteristics and values who support sustainability-oriented projects may help project managers to better target their crowdfunding campaigns. There is an open question of what makes sustainability-oriented crowdfunders different from ordinary crowdfunders which the researchers tried to answer in their research. According to Vismara (2019), equity crowdfunding projects attract small and professional investors alike but their investment preferences and attitudes towards sustainability are different.

Professional investors invest in crowdfunding as usual to receive a monetary return and their involvement in sustainability-oriented crowdfunding is less and follows a market logic (Vismara, 2019). Vismara (2019) explains the market logic by the decisions professional investors make based on expected rates of returns. Small investors follow a community logic having interests in non-market values which include goals beyond the financial returns a commitment to community values, and a belief in trust and reciprocity which makes them more involved in sustainability-oriented crowdfunding compared to professional investors (Vismara, 2019).

As past research already addressed success factors for crowdfunding projects and sustainability-oriented crowdfunding projects in general, there is not much information available on supporters' socio-demographic characteristics or individual values (Tenner and Hörisch, 2021). Their research has found that investors who support sustainability-oriented or green crowdfunding are younger than 50 and hold at least a university entrance degree. Investors who have an above-average education tend to invest more in this field and they further state that gender and income have not played a significant role in the investment in green technology. Apart from socio-demographic

factors, it is shown that investors who are highly familiar with crowdfunding projects are more likely to invest in green crowdfunding projects (Tenner and Hörisch, 2021).

Based on cluster analysis, Za, Winter and Lazazzara (2023) discuss the characteristics of three clusters in green-oriented crowdfunding campaigns such as *social enthusiast*, *green fan*, and *tech-oriented*. *Social enthusiasts* are highly engaged in social media platforms such as Facebook, and motivated by the social impacts of a campaign while *green fans* who are interested in environmentally friendly products and are willing to support renewable energy projects and other eco-friendly technologies and *tech-oriented* are those who focus on innovation and new technologies (Za, Winter and Lazazzara, 2023). The authors state that the tech-oriented cluster obtains the highest value and has a positive relationship with the amount raised and crowdfunding's success.

When it comes to personal values involved, individuals with self-enhancement and conservative values are less likely to invest in green crowdfunding projects because they seem to appreciate status, prestige, conformity, security, and tradition which make them make bigger investments via traditional financing mechanisms (Tenner and Hörisch, 2021). Those types of values conflict with the idea behind crowdfunding as crowdfunding focuses on the collection of funds from online mechanisms by an unfamiliar project initiator (Tenner and Hörisch, 2021). According to Tenner and Hörisch (2021), risk-taking mechanisms involved in the crowdfunding area discourage these types of investors and encourage more investors who are self-growth and open to change values.

Shneor et al. (2024) state socio-demographic data about the crowdfunding scenario in Europe through 'The European Crowdfunding Market Report 2023'. It is interesting to find out that young investors (below 46) dominate equity and lending crowdfunding markets in Europe while a significant proportion of young investors dive into the non-investment crowdfunding market which is dominated by older investors above 46 and a higher percentage of them are women (Shneor et al., 2024).

Therefore, green crowdfunding project initiators should target potential investors who are young, educated, and familiar with crowdfunding mechanisms and platforms when designing their projects as concluded in Tenner and Hörisch's research (Tenner and Hörisch, 2021). However, according to country or region, these factors may have noticeable changes and it would benefit from looking at previous statistics from those countries or regions to design the campaigns adapting to local preferences.

### **2.2.2. Perception of benefits (motives) and risk associated**

The innovation diffusion theory developed by Rogers (2003) would be helpful in understanding to which population of consumers the crowdfunders belong. Crowdfunders can be categorised as early adopters considering the risk they are taking and their awareness of the uncertainties they face to fulfil their motivation in doing so (Bagheri, Chitsazan, and Ebrahimi, 2019). According to Bagheri, Chitsazan, and Ebrahimi (2019), both intrinsic and extrinsic motivations drive funding

behaviour in crowdfunding. And the researchers further mention that these investors' perception of risk seems to be different.

According to Nikolaos and Wei (2017), investors in equity-based crowdfunding projects are familiar with these types of methods and are motivated by the higher returns that follow in such investments building interest and excitement in them. It is the information asymmetry that makes crowdfunding investments risk-associated (Nikolaos and Wei, 2017). The project initiators need to keep that in mind when designing their projects that awareness about information reduces the perception of risk levels of the backers to attract higher levels of investments (Nikolaos and Wei, 2017).

Motivation and acceptance of risks and uncertainties are interrelated because highly motivated individuals tend to invest more in projects with more risks and uncertainties (Bagheri, Chitsazan, and Ebrahimi, 2019). In charity-based crowdfunding projects, the funders do not receive any returns or tangible rewards for their investments which makes understanding the motivations behind such investments crucial (Bagheri, Chitsazan, and Ebrahimi, 2019). However, some charity-based crowdfunders are expecting a nonmonetary return such as recognition or tokens (Bagheri, Chitsazan, and Ebrahimi, 2019).

Bagheri, Chitsazan, and Ebrahimi (2019), state that intrinsic and extrinsic motives are cumulative, and extrinsic motives enable and strengthen the intrinsic motives of direct backers by supporting crowdfunding projects that function in highly connected and interactive social environments and increase their need for competence and relatedness. Intrinsic motives make backers fund crowdfunding projects because they gain satisfaction and fulfilment by doing so (Bagheri, Chitsazan, and Ebrahimi, 2019). On the other hand, extrinsically driven backers are involved in crowdfunding to gain external consequences and outcomes (e.g. monetary rewards) (Bagheri, Chitsazan and Ebrahimi, 2019).

Some studies show that sustainability-oriented crowdfunding projects tend to be more successful compared with others that do not exhibit such features (Petruzzelli et al., 2019). Even though sustainability-oriented crowdfunding projects are associated with higher risks, backers are motivated by altruistic or environmental motives that are beyond financial motives (Wehnert and Beckmann, 2023). When project initiators advertise the social and environmental effects of their sustainability-oriented crowdfunding projects, it is more likely to increase the interested potential backers especially those within communities that benefit from a social innovation (Wehnert and Beckmann, 2023).

### **2.3 Introduction to Green Crowdfunding**

Delving into the role of green crowdfunding, its crucial role in giving a needed push forward to sustainable technological innovations and influencing societal perceptions towards eco-friendly investments is examined. While currently available literature does not provide a clear academic definition for green crowdfunding, it can be generally defined as collecting funds from a network

of interested and potential individuals online for innovative, sustainable projects that are concerned about the environment. It is becoming a heavily discussed topic pertaining to ongoing environmental issues that affect the planet.

Companies started to realise the fact that resources were over-consumed over time, becoming scarcer and they need to develop sustainable product development initiatives to align with the environmental footprint of a product throughout its life cycle (Corsini et al, 2024). In this context, green crowdfunding represents a major continuity between economic and environmental sustainability. This type of financing allows private individuals to invest directly in renewable energy and other pro-environmental projects. Tang et al. (2024) argue that green crowdfunding mobilises the financial capacity and collective environmental consciousness of citizens, channelling these resources into projects that might otherwise struggle to obtain support through traditional funding mechanisms.

Tang et al, (2024) further argue that the appeal of green crowdfunding lies in its ability to differentiate between investment structures, and the success rates of green crowdfunding started to exceed the non-green crowdfunding projects significantly from 2018 onwards (38.6% and 24.5%, respectively). This showcases lowering the barrier to entry enables individuals at all social levels to invest in environmental causes of interest which could make crowdfunding a popular and successful means of green technology (Mollick, 2013; Tang et al. 2024). This initiative not only broadens the financial base for green projects but also increases public participation in sustainable development issues and fosters deeper relationships with investors and between supported services (Tang et al. 2024).

Corsini et al, (2024) support this statement by highlighting the important role of the "green" label in crowdfunding campaigns, which significantly affects the financial success of projects. Projects with a strong environmental focus tend to attract more attention and financial support, indicating that investors want incremental growth in the sense of sustainability. This trend highlights a shift towards financing that emphasises' smart planning, where the potential impact of a project on the environment is as important as its economic benefits (Corsini et al. 2024).

Furthermore, green crowdfunding can be an early indicator of market potential for new green technologies. By leveraging public interest and financial commitment through CFPs, entrepreneurs can assess the market acceptability of their innovations before they are even fully commercialised. This aspect is particularly useful in the green technology sector, where high upfront development costs and market uncertainty may discourage conventional investments (Corsini et al. 2024).

It would be beneficial to discuss green companies or businesses and examples for them in further understanding green crowdfunding. The concept of 'green businesses' first emerged at the end of the 20th century (Čekanavičius, Bazytė and Dičmonaitė, 2014). Čekanavičius, Bazytė, and Dičmonaitė, (2014) define "green business is an organisation that is committed to the principles of environmental sustainability in its operations, strives to use renewable resources, and tries to

minimise the negative environmental impact of its activities”. Businesses going green is a multifaceted process in which a company should participate in various practices at least in one of the “4Rs” namely, reduction, reuse, recycling, and recovery (Čekanavičius, Bazytė and Dičmonaitė, 2014). According to these researchers, “R” as reduction has twofold meanings such as reduction of resource consumption and reduction of waste.

However, a noticeable gap between ‘green businesses’ and ‘sustainable businesses’ was discussed by the authors “The latter term (sustainable businesses) refers to business being sustainable economically, socially and environmentally” (Čekanavičius, Bazytė and Dičmonaitė, 2014, p. 76). Green businesses are part of the broader concept of sustainable businesses (Čekanavičius, Bazytė and Dičmonaitė, 2014). Green tech, as defined in the 1.1 section, shares a common feature in creating products and services with the use of new and innovative technology with minimal impact on the environment (Marra, Antonelli, and Pozzi, 2017). It is estimated that there are 1,400 green tech companies around the world and most of them are innovative start-ups and SMEs, more than 90% of them are located in the UK (Marra, Antonelli, and Pozzi, 2017).

These are mainly from sectors such as information and communication technology (ICT), and biotechnology but differentiate from industries such as mining where large companies dominate it (Marra, Antonelli, and Pozzi, 2017). The researchers point out that there can be green clusters which are defined as “a strategy which tends to be seen as supporting innovative production and R&D activities, promoting economic spillovers and stimulating sustainable energy production” (Marra, Antonelli, and Pozzi, 2017, p.1038) that can emerge in large urban areas and examples were given from Sweden and Austria. In 1999, the Austrian government decided to create a sustainable energy cluster with 140 companies (from solar energy [solar thermal energy, photovoltaic], wind energy, biomass and biogas, geothermal energy and heat pumps, small hydropower, energy efficiency technology, and low energy buildings) and 3,500 employees which have a total turnover of more than €1.6 billion so far (Marra, Antonelli and Pozzi, 2017).

#### **2.4. Technological Innovation and Crowdfunding**

Zhang and Chen (2019) define innovation as "the development of a new or significantly improved product or process". Crowdfunding can be an enticing source of finance for such product development, but it is critical to obtain feedback, ideas, and word-of-mouth from crowdfunding backers early in the project's life cycle (Stanko & Henard, 2016). The benefits of such crowdfunding campaigns for technical advances extend beyond financial gain to spreading word of mouth about new products, hence increasing product awareness among early adopters who are interested in investing in them (Stanko and Henard, 2016).

Prior research has revealed that technological innovations are made up of two key components: technology and customer benefits (Zhang and Chen, 2019). According to Zhang and Chen (2019),



it is difficult to recruit backers for technological innovation projects, and their first impression has a significant impact on funding success, which must be addressed by developing a strong project title. Most technical advancements are crowdfunded through reward-based platforms like Kickstarter and Indiegogo, where backers receive monetary rewards for their support (Zhang and Chen, 2019). Rewards, usually the items or innovations under development, are tied to customer benefits, affecting the number of backers. Previous study reveals that the variety and number of rewards supplied might considerably influence this relationship (Zhang and Chen, 2019).

According to recent research (Stanko and Henard, 2016), crowdfunding campaign creators find it time-consuming and exhausting because publicity and backer relations take a significant amount of time and effort, and many initiators bring their own family and friends to the platforms to get support when there are fewer backers than expected. However, an innovation organization must open and receive ideas from internal and external sources, increase the number of backers, who are mostly interested early adopters, and properly structure the project to attract backers (Stanko and Henard, 2016; Zhang and Chen, 2019).

## 2.5. Cultural Framework on Crowdfunding

National culture shapes an individual's motivations to act in a certain way since it could be seen as a value system that is characteristic of a group or a society (Bernardino, De and Santos, 2022). This makes each culture carry different values, beliefs, behaviours, habits, and attitudes toward the outside world that tends to influence different management practices in every aspect including those related to fundraising (Bernardino, De and Santos, 2022). The work of Hofstede has provided a broader framework for national cultural differences (Bernardino, De and Santos, 2022). Table 1 below defines the six dimensions in Hofstede's framework and refers to past research on the link between crowdfunding and national culture.

<b>Hofstede's cultural dimension</b>	<b>Definition</b>	<b>Past Research on Crowdfunding and Entrepreneurship</b>
Power Distance	The extent to which the less powerful members of institutions and organisations within a country expect and accept that power is distributed unequally (Hofstede, 1991).	Hofstede (2001) Hayton et al. (2002) Celikkol, Kitapci, & Doven (2019) Cho & Kim (2017)
Individualism vs. Collectivism	Individualism describes the relationship between the	Mueller & Thomas (2001) Celikkol, Kitapci, & Doven

	individual and the collectivity which prevails in a given society. It is reflected in the way people live together – for example, in nuclear families, or tribes (Hofstede, 1991).	(2019) Cho & Kim (2017) Pietro & Buttice (2020) Shneor, Munim, Zhu & Alon (2021)
Masculinity vs. Femininity	Masculinity, with its inverse femininity, looks at how distinctly roles in society are defined. It is focused on material success as opposed to concern with the quality of life (Hofstede, 1991).	Hayton et al. (2002) Celikkol, Kitapci, & Doven (2019)
Uncertainty Avoidance	Uncertainty avoidance is defined as the extent to which members of a society feel threatened by uncertainty or unknown situations (Hofstede, 1991).	Cho & Kim (2017) Pietro & Buttice (2020)
Long Term Orientation	Long term orientation stands for the fostering of virtues oriented towards future rewards, in particular, perseverance and thrift. Its opposite pole, short-term orientation, stands for the fostering of virtues related to the past and the present, in particular, respect for tradition, preservation of face and fulfilling social obligations Hofstede (2001).	Celikkol, Kitapci, & Doven (2019) Pietro and Buttice (2020)
Indulgence	Indulgence stands for a society that allows relatively free gratification of basic and natural human desires related to enjoying life and having fun. On the opposite pole, restraint stands for a society that controls gratification of needs and regulates it by means of strict social norms	Celikkol, Kitapci, & Doven (2019)

	(Hofstede, Hofstede & Minkov, 2010).	
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Table 2.1: Source: Bernardino, De and Santos, 2022

According to the previous research papers, crowdfunding does not motivate less powerful individuals in countries with high power distance, as they think it is for the higher class and are not aware of the opportunities and may not have the necessary skills and access to resources (Bernardino, De and Santos, 2022). Bernardino, De and Santos, 2022 state in their paper that since investors are achievement-oriented individuals, independent power distance may be negatively associated with the desire for autonomy. This leads to a state that the knowledge and the tendency to use crowdfunding at an individual level are negatively related with the power distance (Bernardino, De and Santos, 2022).

Individualistic cultures facilitate a favourable environment for crowdfunding as entrepreneurs have characteristics such as high levels of self-confidence, initiative, and courage (Bernardino, De, and Santos, 2022). They further state that investors in individualistic countries tend to invest in different types of crowdfunding compared to collectivistic societies. This leads to state that the knowledge and the tendency to use crowdfunding at an individual level are positively related with individualism.

When it comes to the direction of the association, some literature supports the idea that successful entrepreneurs score high on masculinity while others argue that masculinity has a negative impact on entrepreneurship attitudes, abilities and success (Bernardino, De and Santos, 2022). Based on available information the researcher stated that the nations with masculine orientation tend to have values such as assertiveness, domination, independence, high performance, making money, and the pursuit of visible achievements while nations with feminine orientation tend to have their focus mainly on people (Bernardino, De and Santos, 2022). This led them to state that the knowledge and the tendency to use crowdfunding at an individual level are positively associated with masculinity.

Countries with higher uncertainty avoidance tend to have shared beliefs while the ones with lower uncertainty avoidance tend to have less shared beliefs and more logical information (Bernardino, De and Santos, 2022). They further state that crowdfunding models with a lower risk level are popular among the countries with higher uncertainty avoidance. This led them to state that the knowledge and the tendency to use crowdfunding at an individual level are negatively associated with uncertainty avoidance (Bernardino, De and Santos, 2022).

Concerning long-term orientation, it is said to impact positively on entrepreneurship abilities, aspirations, and success whereas countries with long-term oriented societies tend to invest more in equity-based crowdfunding compared to short-term oriented societies due to the investors in long-term oriented societies tend to have aspirations, vision, optimism, foresight, and imagination towards challenging and risky processes (Bernardino, De and Santos, 2022). This led them to state

that the knowledge and the tendency to use crowdfunding at an individual level are positively associated with long-term orientation (Bernardino, De and Santos, 2022).

Finally, when it comes to indulgence it tends to have a positive impact on entrepreneurial attitudes, abilities, and success due to personal value systems, the desire to be economically independent, the capacity for enjoyment and a pleasant personality are important factors of an indulgent society (Bernardino, De and Santos, 2022). This led them to state that the knowledge and the tendency to use crowdfunding at an individual level are positively associated with indulgence (Bernardino, De and Santos, 2022).

In summary, the research conducted using Hofstede's framework suggests that countries with low power distance, high individualism, masculinity oriented, low uncertainty avoidance, long-term oriented, and high indulgence tend to have more knowledge in crowdfunding which makes them more in such riskier alternatives finance methods while the countries with high power distance, collectivism, famine oriented, high uncertainty avoidance, short-term oriented and low indulgence tend to go for low riskier methods having lower levels of knowledge in crowdfunding (Bernardino, De and Santos, 2022).

## **2.6. Policy and Government Influence on Green Crowdfunding**

Alhammad, AlOthman and Tan (2021) state that the quality and quantity of entrepreneurship are affected by the regulatory business environment. Therefore, regulators who formulate the regulatory framework should consider all actors (entrepreneurs, investors, and intermediaries) involved in the crowdfunding process into account (Alhammad, AlOthman and Tan, 2021). When the actors of crowdfunding comply with the rules, innovation, and economic development are enhanced (Alhammad, AlOthman and Tan, 2021). Due to harmonised international regulations in this regard still at an early stage, national or regional crowdfunding regulations across countries is applied (Alhammad, AlOthman and Tan, 2021).

The crowdfunding regulatory requirements include key regulation themes such as authorization, fundraising and investment limits, disclosure obligations, crowdfunding advertising law, capital requirements policies, protection of client funds, and platform-specific regulation (Alhammad, AlOthman and Tan, 2021). The study suggests that the main focus of crowdfunding regulatory requirements should be investor protection while managing the risk of the platform's insolvency (Alhammad, AlOthman and Tan, 2021). Concerning the EU, regulatory harmonization can be defined as "the process aimed at eliminating, or at least reducing, regulatory diversity in economic policy areas where the Member States have autonomous regulatory jurisdiction" (Cicchello, 2019, p. 588).

An institutional setting is said to influence the behaviour of individuals, especially entrepreneurs (Butticè et al., 2019). The environmental sustainability orientation can be defined as "the presence of formal (i.e., policy and regulation) and informal (i.e., norms, values, beliefs and practices)

institutions, that are concerned not only with the current level of economic and non-economic wellbeing but also with its sustainability over time i.e. the ability to pass natural, physical, human, and social resources to future generations” (Butticè et al., 2019). According to Butticè et al. (2019), it influences both the entrepreneur’s willingness to launch a sustainability-oriented project and use crowdfunding to fund it.

In countries that encourage green crowdfunding with a strong institutional setting, more entrepreneurs seek to fund their sustainability-oriented projects through crowdfunding because they anticipate a greater likelihood of success of their campaigns (Butticè et al., 2019). However, in such countries, those projects can also be facilitated through traditional financing methods which may negatively affect the use of CFPs (Butticè et al., 2019). Adverse selection (a mechanism which may lead to benefit either the buyer or the seller due to information asymmetry) may discourage entrepreneurs from using crowdfunding to finance their projects as the potential backers may perceive such campaigns are lacking in quality if crowdfunding was used (Butticè et al., 2019).

Butticè et al. suggest that crowdfunding is more likely to be considered as a potential source of financing for green initiatives in countries with less institutional settings towards environmental sustainability because it would be hard for them to access funding through traditional financing sources. They further suggest that policymakers in such countries should use crowdfunding as a method of financing green entrepreneurs to overcome the funding gap that they suffer from (Butticè et al., 2019). Governments and policymakers in such countries may focus on providing support to such entrepreneurs such as advertising and sharing green-oriented campaigns among the general public to build awareness and confirm their legitimacy doing so (Butticè et al., 2019).

In summary, in the evolving crowdfunding landscape, it is important to have a proper regulatory framework for all actors in crowdfunding worldwide. According to Cicchiello (2019), there is a need for a harmonised EU regulatory framework for the countries that belong to the EU or a harmonised international framework for crowdfunding because, at the moment, each country places a high emphasis on national directives in regulating crowdfunding regardless it is general or sustainable-oriented.

## **2.7. Summary**

Finance serves as the lifeblood in the dynamic business world from the start to the maturity stage of a company. Traditional financing dominated funding for a long time and alternative finance has emerged to fill the gaps created by traditional financing. Crowdfunding shines as the beacon of alternative financing methods due to its characteristics of being lesser geographical barriers in supporting innovative and sustainable startups and SMEs through online-based funding mechanisms. There are four types of crowdfunding platforms such as donation-based, reward-based, equity-based, and debt-based crowdfunding according to the motivations of the investors funding them. The public and entrepreneurs pay more attention to the environment as the resources

are getting scarcer and environmental problems start to rise which leads to design and investment in more crowdfunding campaigns related to green technology. An introduction to the history and origins of crowdfunding and green crowdfunding, the motivations for crowdfunding, technological innovations, cultural framework, and government policies related to crowdfunding were discussed in depth in this chapter with a focus on a sustainability-oriented manner.

## Chapter 3: Methodology

The study aims to explore or understand the dynamics underlying green crowdfunding, with a specific focus on the green technology sector. The study aims to establish whether the national location and cultural background characteristics of the relevant stakeholders influence participation in alternative fundraising.

### 3.1 Research Approach

To understand the undertaken research, it is essential to explain the research approach which shows how the theory connects with the data. So far, most of the literature has focused on deductive or inductive studies (Timmermans and Tavory, 2012). A deductive study is defined because of hypothesis testing that has been established based on a grounded theory (Bryman & Bell, 2011). The goal of the study is to test the sustainability of the theory and how it measures up with presented empirical data. On the other side of the spectrum, there is inductive study which serves a different purpose. The inductive method starts with observations and its end goal is to create a new theory or framework based on the analysis of the presented evidence (Bryman & Bell, 2011). However, those two methods shouldn't be treated as dichotomous, and their interchanging nature can be attributed to the inductive dilemma of grounded theory – that is that the well-established theories could lead to hypothesis reaching further than the typically expected ideas leading to abductive approaches (Timmermans and Tavory, 2012). This approach could be particularly useful in social science studies as theories are further reaching than in natural sciences. Abductive approaches could be most simply explained by “generating creative and novel theoretical insights through a dialectic of cultivated theoretical sensitivity and methodological heuristics” (Timmermans and Tavory, 2012, p.180).

This research aims to give a new insight into renowned theories of firm internalisation, especially in the aspect of choosing locations. While the theories already take up aspects like institutional support, cultural distance, and risk-taking, at the time of their creation, methods of alternative financing were unheard of. Those methods present a more complex aspect of the interference between institutions, shareholders, and uncertainty avoidance as the response to a highly growing market (Dacin, Goodstein and Scott, 2002; Mollick, 2014). Innovative approaches, especially the rise of start-ups which are considered disruptors (Christensen, 1997), pose a bigger challenge to the implications of the internalisation theories. Therefore, a deductive study on the influence of crowdfunding is more revealing than the narrower implications of existing theories suggest. Additionally, the inductive study is not a sustainable solution as the hypothesis should be tested to see if there are implications of the national difference when it comes to quantifiable measures. That is why the abductive approach is chosen to explain the outcomes of the alternative approach to financing companies and their further strategies.

To define the direction the study is taking, the research strategy must be decided. Typically, a dichotomous approach to that is preferred – either qualitative or quantitative research is chosen. In

qualitative research, an in-depth analysis explores how companies or investors engage with CFPs. This approach aims to understand investor behaviours within campaigns and to develop a new framework, similar to the methodology used by Civardi (2023), who investigated the motivation and satisfaction of investors in crowdfunding. On the other side of the spectrum there lies quantitative research which uses deductive logic through data analysis to test existing theories (Bryman & Bell, 2011). For this study, a quantitative approach has been picked due to the nature of the question, seeking the answer to understand whether the policies and uncertainty avoidance influence the outcomes of crowdfunding campaigns. Quantifiable measures were taken to understand if the success of the campaigns of technological companies could provide insight into how firms ought to pick their investors and if their national differences matter. The considered variables included the amount raised in the crowdfunding round, the number of investors, the type of company from the green technology sector, and a description of what exactly firms do. Additionally, if the information was provided, the success of the crowdfunding campaign was noted as the raised amount met the required capital (Mollick, 2012).

### **3.2 Research Design**

To understand how to interpret the data collected, a research design must be established which involves putting the variables, sampling, and results into greater context (Bryman & Bell, 2011). The study has been designed to be comparative. By definition, that is a design that takes at least two contracting cases to collect data and is typically used in cross-national studies that consider the culture (Ember and Ember, 2009). This approach tests or finds insight into established theories in the broader context, allowing one to test how the business differs across borders. In the case of this specific study, the cross-cultural approach is considered as the economic, social, technological, legal, and environmental interactions with the businesses are considered. This allowed us to compare distinct cases of countries with different risk avoidance characteristics as well as policies and regulations surrounding start-ups, alternative finance, green technologies, and especially commercial crowdfunding.

Usually, within the comparative design, a second design is embodied that puts a regime of data collection for all the distinct cases. In the study, separate companies are considered that originate from the studied countries. They are taken as a snapshot of time as the result of the crowdfunding campaign and do not change over time. Additionally, the collected data is a mix of continuous and discrete variables showing that it is quantitative or quantifiable (Bernard, 2013). All those aspects fulfil the requirements for cross-sectional design set by Bryman and Bell (2011). What it implies is that the only feasible data analysis includes association analysis rather than one that looks for causality.



### **3.3 Data Collection and Sampling Method**

The following section provides the outline of the process of manually obtaining the necessary data further filtering the data and selecting the relevant cases. The section provides the chronological order of collecting the data and therefore is structured first as criteria for selecting data, followed by sources of information, and then the method of sampling itself and how data was structured.

#### **3.3.1. Case selection**

As the first step, the case selection criteria were set to understand what companies should be considered for the analysis, as no source provided a comprehensive database with ready-to-analyse data. Therefore, the companies were set to be considered via several aspects such as the country of headquarters and whether they meet the definition of being a company producing green technology.

The country of headquarters was picked to provide the information about what could be the main nationality of the shareholders and stakeholders as they were the main consideration. This allowed for a simplification regarding the company's tax residence and under what laws they must obey. To consider two countries were picked – Germany and the United Kingdom. As mentioned previously the countries have similarities that could allow for more controlled statistical analysis as well as the variables of interest could differ. Both countries score similarly on Hofstede's (2001) dimensions of power distance, individualism-collectivism, masculinity-femininity, and short vs. long-term orientation. The significance differs on the uncertainty avoidance scale with Germany scoring higher, implying that nationally they tend to avoid risks, differentiating with the United Kingdom whose score implies a higher willingness to take risks (Hofstede, 2001). This implication of the negative relationship between risk-taking in business situations and cultural risk avoidance has been shown by Bate (2022).

The second step considered has been the definition of green technology in application to the companies. To ensure the definition is universal and does not differ from country to country, the definition was applied manually to the description of the companies' modus operandi, rather than based on how the company was positioning itself. The benchmark definition was taken from a United Nations report in which the authors defined green technologies as ones that "protect the environment, are less polluting, use all resources more sustainably, recycle more of their wastes and products, and handle residual waste more acceptably than the technologies for which they were substitutes" (United Nations Conference on Trade and Development, 2023). Every company was evaluated through those lenses which allowed to obtain a ruinously structured sample.

### 3.3.2. Information sources

Due to the absence of a comprehensive official record of all crowdfunding campaigns, a manual review was conducted. The primary tool for this exploration was CrowdSpace.com, which is a database that allows one to filter through crowdfunding websites based on the country of operation, industry, or other filters. The initial filtering focused on campaigns labelled as “green”, indicative of their commitment to addressing environmental changes. The websites selected were assumed to represent the investor nationalities based on the locations of the companies' headquarters and the CFPs themselves. This assumption was necessary due to the unavailability of direct investor demographic data. The website rockets. investments were selected to investigate Germany-based companies. ROCKET provides a platform for mainly SMEs, start-ups and scale-ups focused on sustainable and impact-oriented investments. It connects the companies with private investors and provides other services regarding managing the campaign or investment. The campaign profile comprehensively details the company, the interest rate, the date of return, the number of investors, the amount raised, and the funding goal. For the United Kingdom-based companies two websites were chosen. The first one was seedrs.com. Seedrs provides an online platform that facilitates equity investment in start-ups and growth-focused companies by connecting investors and companies during crowdfunding campaigns. The platform provides information about companies gathered in their secondary marketplace. On the company's profiles, information is provided about its history the website is the company's indicative valuation, the total amount raised via the platform in different financing rounds, and the total number of investors. The second platform was Crowdcube which is also a UK-based CFP. They also facilitate connections between private investors and the companies by providing services surrounding the campaigns for the investors and the risers. The campaign page provides information regarding the raised amount, number of investors, interest rate, and the goal of the campaign. All the websites were licensed CFPs providing information in a transparent and accessible manner and deemed relevant to the research objective (Keegan, 2009).

### 3.3.3. Sampling

Given the tight limitations of the industry, the manual sample collection had to be conducted. According to the European Crowdfunding Report, approximately 200,000 fundraising campaigns are conducted annually across Europe, and companies that fall under the broad definition of technology companies make up about 15% of this market. However, each platform typically records fewer than 51 campaigns annually (Shneor et al., 2024). Additionally, most of the platforms do not provide specific information regarding the previous campaigns or if they do, it is available for investors specifically. Consequently, it was anticipated that restricting the data collection to publicly available information about green technology companies involved in crowdfunding would naturally result in a smaller sample size that is restricted in its nature. This approach was necessary to ensure the specificity, replicability, and relevance of the data to the research objectives.

In the data collection phase, similar methods were used for each of the platforms. Firstly, a filter might have been applied with categories of companies that fell under the previously stated definition of “green technology”. Then, each of the companies was evaluated based on the provided description. Then it was decided whether the company should focus on producing technologies that fell under the definition of ‘green technologies. If that was the case, then information about the market the company fell under was extracted and a short description was provided. Following, all campaign-specific information was extracted such as the amount pledged by investors, the number of investors, and if provided, whether the campaign’s goal was met. Additionally, a universal currency was chosen to buy the euro as it is a universal currency for the European Union. If financial data from the campaigns were provided in currencies other than the euro, the mean annual average exchange rate from the European Central Bank was used for conversion purposes. For 2023, the applicable conversion rate was set at £1 = €1.16 (European Central Bank, 2024).

This manual extraction allowed us to collect a sample of 30 companies from Germany and 30 companies from the United Kingdom. All of them were double referenced to confirm they went through crowdfunding rounds as provided on their Crunchbase profiles, in the publicly available information. The collected companies represent a significant cross-section of green technology companies based in both Germany and the UK. They vary in the size and success of their campaigns, the complexity of the technologies they develop, and the maturity of their projects. The companies’ sizes include both start-ups as well as more established companies, with some located in the business hubs and others in smaller regions and typically addressing the environmental needs there. The technological focus included areas such as renewable energy solutions, eco-friendly product innovations, and sustainable manufacturing processes. Companies also had different duration times of crowdfunding campaigns, with some achieving the goal within days or weeks, while others had several months, reflecting the investors' responses and market dynamics. Altogether, the sample represents all types of companies present on the market and can be considered representative.

### **3.4 Data Analysis**

With a comprehensive data sample, it was important to decide upon a data analysis procedure. The following section's main objective is to present the variables and the methods that allow us to understand the wider implications of the sample for the population.

#### **3.4.1. Variables**

The sample consists of a variety of companies that differ in size and needs. Some companies require more funding due to the complexity of the technology they are developing, while others need less funding due to simpler technology or lower levels of maturity. Additionally, the composition of the amount pledged in the sample companies varies. In some companies, particularly those from Seedrs, the funds represent the cumulative total of all previous

crowdfunding campaigns conducted on the website. Conversely, companies from ROCKETS and Crowdcube typically provide data for the specific campaign conducted on the platform. Therefore, the companies differ in the volume of the gathered funds, and comparing the mean amount pledged nationally would not yield any meaningful information, as the companies vary in their sizes and needs.

That is why a new variable is introduced – mean contribution per investor. This diffuses the size of the campaign more evenly and allows us to compare the mean investment across platforms regardless of the total amount raised or success rate. Shifting the focus to the average contribution per investor, the analysis normalised the differences in campaign scales and investor engagement. This allows the study to reflect investor behaviour and commitment more accurately. Additionally, the study keeps the industry as a constant that reduces the variation that comes from specific interactions with the industry. Furthermore, the variations in funding requirements and campaign goals among the companies can be acknowledged while keeping the comparison standardised. Calculating the mean contribution per investor helps to level the playing field, enabling a clearer examination of the investment attractiveness and investors' willingness to invest in riskier financing. Thus, this metric is an indicator of underlying values perceived by the investors, independent of the company's size or the campaign's total funding goal.

Calculating the mean is done using the following formula:

$$\text{mean contribution per investor} = \frac{\text{total amount pledged} \cdot \text{currency exchange rate to } \text{€}}{\text{total number of investors}}$$

The variable not only standardised the data from different sampled campaigns but also mitigated the impact of outliers caused by either typically large or small campaigns. Per Newbold, Carlson and Thorne (2013), standardisation allows comparison across different scales, and in the case of crowdfunding campaigns that is a crucial factor to consider.

### 3.4.2. Statistical tests

The statistical tool meant to evaluate the means of one or two populations is the independent samples *t*-test. Among its many applications, the test can evaluate whether there is a statistical significance between groups while they are independent of each other (Newbold, Carlson and Thorne, 2013). The first step in conducting the *t*-test is defining the null and alternative hypotheses. For this study, they are as follows:

**H<sub>0</sub>:** *There is no significant difference between mean contribution per investor in green technology companies' crowdfunding campaigns in Germany and the United Kingdom.*

**H<sub>1</sub>:** *There is a significant difference between mean contribution per investor in green technology companies' crowdfunding campaigns in Germany and the United Kingdom.*

Before conducting the test, the model's assumptions need to be checked. While the  $t$ -test tends to be durable to deviations from the assumptions, they have to be at least plausible and fulfilled (Newbold, Carlson and Thorne, 2013; Montgomery, 2020). The first assumption is that the data is quantitative and follows a normal distribution on a continuous scale which is especially important for small samples. The second assumption is the homogeneity of variance, meaning that the standard deviation of samples should not vary drastically. In case that cannot be ensured, then the test is adjusted to account for unequal variances by not using a pooled variance but rather a separate one. Third, and the most important one, is the independence of data points – i.e. they all refer to separate cases and are not connected with one another.

Upon confirming the assumption that it is possible to find the  $t$ -statistics using the formula:

$$t = \frac{\bar{x}_1 - \bar{x}_2}{s_p \sqrt{1/n_1 + 1/n_2}}$$

where  $s_p$  is the pooled variance,  $\bar{x}$  is the average of each ground and  $n$  is the sample size (Montgomery, 2020). The calculated  $t$  value can be compared against the critical value from the  $t$ -distribution table, in accordance with the chosen alpha value (significance level) and degrees of freedom derived from the sample sizes. In case the test statistics are lower than the tabularized  $t$  value, the null hypothesis fails to be rejected. In that case, it is decided that the two groups have the same means. In case test statistics are higher than the  $t$  value, the null hypothesis is rejected. That means alternative hypotheses are accepted and the two groups have different means.

### 3.5 Validity and Reliability

Concepts of validity and reliability are concerned with how accurately and consistently a method assesses a variable. By evaluating the conducted research through those lenses, it can be ensured that the findings are both replicable and reflective of true underlying phenomena.

Reliability is related to replicability and stability of the study (Bryman & Bell, 2011). That is, it must be verified whether it is possible to revise the study after some time. The challenge in this context arises from the manual collection of data, which may introduce variations during the replication process. The sample was obtained thanks to campaign information publicly available on CFPs but there is an integral risk associated with the potential alteration or loss of data, either through archival, deletion, or restricted access. Nevertheless, as the documentation of the method is described step by step it is possible to repeat the cumbersome process of data collection. The slight alteration in new samples, in case of new companies from future campaigns or the additional campaigns for already listed companies, can provide valuable testing for the robustness and reliability of the original findings. When it comes to stability, data regarding specific crowdfunding campaigns ought to not change, once the campaign is concluded which makes the sample stable.

An additional challenge arises in the form of inter-observer consistency; therefore, the standardisation of the data process was introduced in defining what to adhere to. Since the study heavily relies on data collectors' judgement of company description fitting within the tightly defined green technologies, the potential for subjective interpretation by different observers can significantly impact the study's reliability due to differences in the types of sampled companies.

Validity is an assessment of how well the variable measures up the concept that is being investigated (Bryman & Bell, 2011). In this study, investors' willingness to commit and eagerness to invest in crowdfunding campaigns is being examined via financial information. The financial measure that has been introduced – that is the mean contribution of investors in campaigns – tries to find the average response of investors to the national crowdfunding landscape, while keeping the industry constant. That is, gauging whether the economic, political and cultural landscape influences how the investors interact with the crowdfunding campaign. The robustness of consideration points of differences between nations can also contribute to strengthening the internal validity of the study. All the investors considered interact with the same industry which acts as a control variable in this case. That allows us to strengthen the casualty relationship between the considered factors of national differences and then the mean contribution. However, the reverse causal relationship cannot be negated as no experimental procedure has been set up to verify that such a dynamic such as analysing the effects of investor behaviour on subsequent changes in economic, political, and cultural conditions. Additionally, a measure of mean contribution per investor was reviewed to ensure it encapsulates the dimensions influencing the investors' willingness, highlighting the content validity of the study. Nevertheless, it is recognized that while this measure has been employed in various financial studies, it is acknowledged that it does not fully encapsulate all of the complexities behind investment decisions (Baker and Wurgler, 2006). Yet, provides a benchmark on comparable, visible differences between the countries.

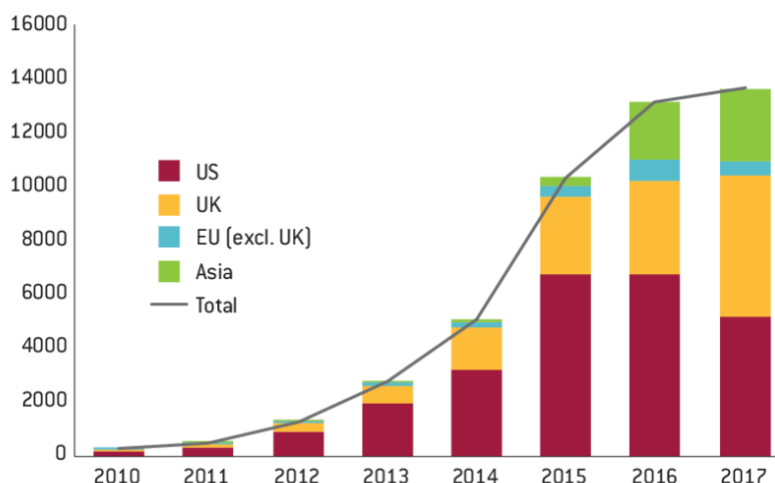
### **3.6 Summary**

This chapter provides an understanding of the methodology of this paper with a focus on addressing green initiatives in crowdfunding with a research approach of combined deductive and inductive methods. The research aims to understand how geographical location and cultural differences influence participation in fundraising. A comparative cross-section design is used to collect data from crowdfunding platforms in the UK and Germany. The sample includes 30 companies from each country, evaluated based on their alignment with the universal definition of green technology. The data analysis was focused on mean contribution per investor which was standardized to account for campaign size variations. An independent samples *t*-test was conducted to assess the statistical significance of the difference between the two countries. The study ensures validity and reliability through meticulous data collection and standardised evaluation criteria at the meantime acknowledging the potential limitations in capturing the full complexity of investment decisions.

## Chapter 4: Country-wise differences

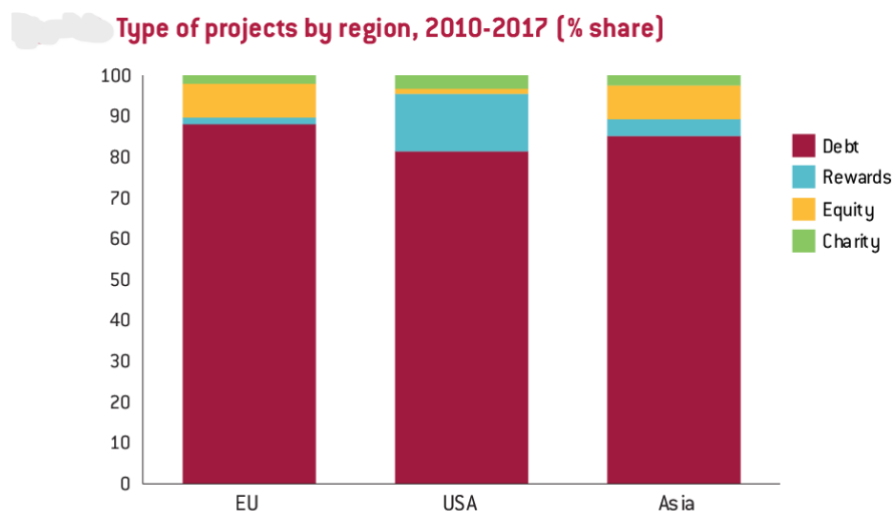
### 4.1. Overview of the Crowdfunding Scene in Europe

It is interesting to have a glimpse at the current trends of crowdfunding in Europe. According to Chervyakov and Rocholl (2019), Europe became a major player in crowdfunding between 2010-2017 accounting for €16.9 billion out of €48.5 billion which was raised globally (see Figure 2 for the total amount raised globally). Despite this Europe still has relatively a low global share (excluding the UK) with minimum cross-border transactions meanwhile, the UK has become dominant accounting for 88% of the funds raised during this period (Chervyakov and Rocholl, 2019). Among the different crowdfunding types adopted across Europe such as debt, rewards, equity, and charity debt-based (see Figure 3 below for the type of projects by region) have become the most popular, and the UK and Germany lead in equity-based projects (Chervyakov and Rocholl, 2019).



Source: Bruegel based on TAB, formerly Crowdsurfer. Note: only funded campaigns included.

Figure 4.1: Total amount raised (€ millions)



Source: Bruegel based on TAB, formerly Crowdsurfer. Note: Only funded campaigns included.

Figure 4.2: Type of projects by region, 2010-2017 (% share)

The report of Chervyakov and Rocholl (2019) discusses a slowdown in crowdfunding growth rates between 2016 and 2017, especially in the US and Europe (Chervyakov and Rocholl, 2019). This could be because crowdfunding in these countries already reached its peak during this time. Strategic shifts need to be implemented to sustain the crowdfunding ecosystem (Chervyakov and Rocholl, 2019).

## 4.2. Theoretical Framework

This paper mainly focuses on crowdfunding in the UK and Germany because they are among the largest crowdfunding markets in the world. Even though both countries are engaged in green crowdfunding, some differences are discussed using factors in the PESTEL framework. PESTEL stands for political, economic, socio-cultural, technological, environmental, and legal frameworks. Some of the factors were already mentioned in previous sections of this paper when country comparison was discussed. The PESTEL framework is a framework used to analyse the micro-environment of a business and to study challenges and opportunities in the international business environment (Aithal, 2017).

### 4.2.1. The UK

The UK is one of the pioneers in crowdfunding in Europe and many crowdfunded projects in Europe are based in the UK but in 2020, the UK exited the European Union (EU) which is named 'Brexit'. This effect seemed to reduce crowdfunding success in the UK as a lot of changes occurred simultaneously with Brexit including the changes in the regulatory framework (Vu and Christian, 2023). The regulation in the UK is investor-friendly and unrestrictive, encouraging multiple investments by allowing crowdfunding to operate with relatively flexible rules (Cicchiello et al., 2021). This approach has made the UK a place where crowdfunding activities are carried out,



facilitating an environment in which start-ups and SMEs can also grow on the capital raised through these platforms (Cicchello et al., 2021).

#### **4.2.1.1. Political**

The authority responsible for regulating equity CFPs and activities in the UK is the Financial Conduct Authority (FCA). Frameworks that regulate the activities of CFPs have been implemented by the FCA such as the Financial Services and Markets Act 2000 (FSMA) and the Financial Services Act 2012, which aims to protect and ensure the integrity of financial markets for investors. Crowdfunding has been relatively supported by the UK government as a means of fostering innovation and entrepreneurship. Relevant policies Seed Enterprise Investment Scheme (SEIS) and Enterprise Investment Scheme (EIS) provide tax incentives to investors in startups, including those funded through equity CFPs. These incentives aim to encourage investments in early-stage ventures.

The presence of more CFPs and startups can be because of the UK's comparatively abundant regulatory environment which also is nurturing innovation and entrepreneurship.

#### **4.2.1.2. Economical**

In the UK, crowdfunding is characterised by a robust framework that supports various models such as equity and debt, crucial for funding renewable energy initiatives. Platforms like Abundance Generation play an important role in mobilising public investments toward sustainable projects, exemplifying the integration of environmental sustainability with financial innovation (Iskandarova et al., 2021). This success is supported by a regulatory environment that ensures investor protection while fostering a culture that values innovation and trusts online transactions, making the UK a leader in European crowdfunding.

Political stability, strong economic indicators, and strong environmental policies in the UK are driving the growth of a green crowdfunding economy. The legal framework is well-defined, providing clear rules that protect investors while encouraging financial innovation (Iskandarova et al., 2021).

### 4.2.1.3. Socio-cultural

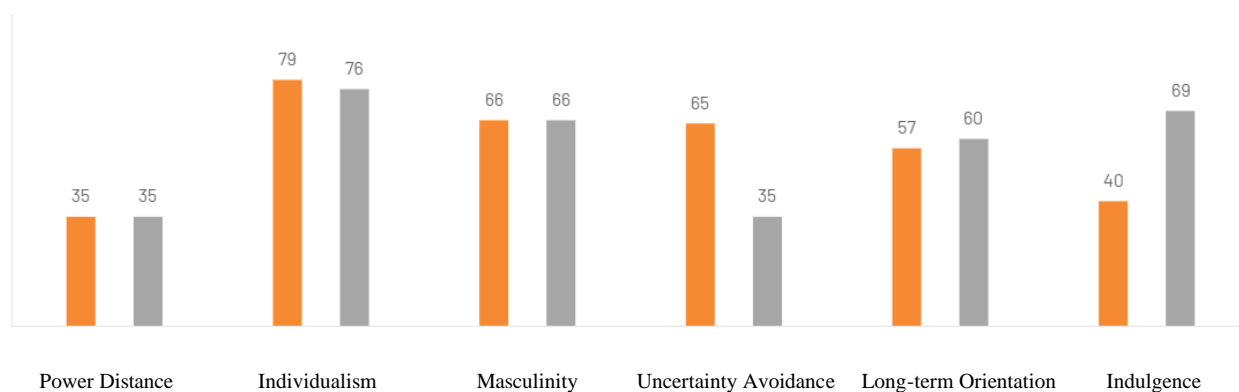


Figure 2.3: Source: Hofstede Insights, 2023 (orange: Germany and grey: The UK)

As shown in Figure 4 above, there is a clear gap in uncertainty avoidance and indulgence between the UK and Germany while other factors remain approximately the same. The lower value in uncertainty avoidance of the UK shows that they are willing to take risks comparably and invest in risk-associated financing methods such as crowdfunding as uncertainty avoidance is negatively associated with individual crowdfunding capability levels as mentioned before in section 2.5 (Bernardino, De and Santos, 2022). The UK scores high on indulgence comparably which could suggest that the level of self-dependency and enjoyment is higher which tends for investors in the UK to invest more in crowdfunding with higher capabilities because it is positively related to indulgence as tested by Bernardino, De and Santos (2022).

### 4.2.1.4. Technological, Environmental and Legal

In the UK, known for its robust financial services and forward-thinking innovation policies, crowdfunding for green technologies has been rapidly adopted (Iskandarova et al., 2021). This quick uptake is supported by government initiatives that encourage renewable energy investments, positioning these crowdfunders at the forefront of sustainable finance.

The institutional framework in the UK is geared to facilitate entrepreneurship through crowdfunding, supported by a legal environment that encourages innovation and economic growth (Iskandarova et al., 2021). It might provide a more conducive environment for the rapid adoption of crowdfunding due to its less restrictive regulatory approach and strong support for financial innovations (Iskandarova et al., 2021).

### 4.2.2. Germany

Crowdfunding in Germany still displays a niche market and adopts a similarly unrestrictive regulatory framework but includes specific measures to ensure investor protection, such as requiring forums to provide them with detailed financial information on potential investors (Cicchello et al., 2021). Nonetheless, the overall situation in Germany is also conducive to

crowdfunding subtle differences in regulation between points effects of government policies on the growth and development of crowdfunding as they are offered as a means of accessing entrepreneurial finance (Cicchello et al., 2021).

#### **4.2.2.1. Political**

The German Federal Financial Supervisory Authority (BaFin) is the supervisory body accountable for the regulation of equity crowdfunding in Germany. BaFin was given the authority to manage CFPs under the act German Securities Trading Act (Wertpapierhandelsgesetz) and German Banking Act (Kreditwesengesetz). The reflection of the careful approach to investor protection and financial steadiness regulations in Germany can contribute to the tendency in which German regulations are more inclined to be rigorous compared to the UK. The involvement of higher discovery requirements for CFPs and stricter entitlement criteria for startups seeking funding. The regulatory framework may be seen as more restrictive compared to the UK still, Germany also supports innovation and entrepreneurship. Nevertheless, Germany's goal to balance investor safety with smoothing access to alternative forms of financing, including crowdfunding is achieved through initiatives such as the Small Investor Protection Act (Kleinanlegerschutzgesetz).

On the other hand, Germany's stricter regulatory framework may provide investors with greater confidence but could also pose barriers to entry for startups and CFPs, potentially stifling innovation. Investors' greater confidence can be explained by Germany's stricter regulatory framework, but this could also pose barriers to entry for startups and CFPs, potentially stifling innovation.

Hornuf, Schmitt, and Stenzhorn, (2018) state that German startups engaged in 'equity crowdfunding' are more likely to get follow-up funding through business angels or venture capitalists than their UK counterparts. However, these German firms show a tendency towards failure which may suggest a complex interplay between the initial funding success and long-term sustainability possibly influenced by factors such as different investor behaviours or economic environments in the two countries (Hornuf, Schmitt, and Stenzhorn, 2018).

#### **4.2.2.2. Economical**

Germany's approach to crowdfunding, particularly within the sustainability sector, illustrates a keen alignment with the EU's Green Deal, where regulatory adjustments support the growth of financial-return crowdfunding. This has become a significant avenue for funding energy transition projects. The evolution of crowdfunding in Germany not only caters to the SME sector but also reflects a meticulous balance between offering attractive returns and maintaining strategic communication to ensure campaign success (Siebeneicher et al., 2022).

The economic environment in Germany is strengthened by its technological base, making it a fertile ground for crowdfunding especially in the sustainability sectors. However, although

technological progress is important, the legal environment continues to make progress to better integrate new economic policies under EU guidance (Siebeneicher et al., 2022).

#### **4.2.2.3. Socio-cultural**

As shown in Figure 4 in section 3.3.3, Germans would prefer to invest in low-riskier crowdfunding models compared to the UK as they have scored high on uncertainty avoidance. And since Germany has scored low on indulgence comparably, it could suggest that the level of self-dependency and enjoyment is lower compared to the UK which could discourage investing in riskier and unfamiliar financing methods.

#### **4.2.2.4. Technological, Environmental and Legal**

Germany's methodical approach to innovation diffusion reflects its integration of new technologies with existing industrial strengths. This systematic integration is gradually influencing the crowdfunding sector, particularly as the country aligns its regulations and market structures with broader EU standards aimed at promoting sustainable development. Here, government policies play a dual role; they act both as facilitators, by aligning with EU green initiatives, and as potential barriers, when regulatory changes lag behind innovation needs (Siebeneicher et al., 2022).

In Germany, institutions are adapting to a new financial landscape where crowdfunding is becoming increasingly significant, supported by governmental policies that aim to foster sustainability and innovation within the financial sector (Siebeneicher et al., 2022).

Germany's more cautious regulatory stance might slow the adoption process but ensure thorough integration with existing systems, potentially leading to more sustainable long-term growth (Siebeneicher et al., 2022).

Major country-wise differences in crowdfunding are described in the following table (Table 2). Germany is a member state of the European Union and therefore is affected by EU directives in addition to their national laws in their regulatory environment. The United Kingdom is no longer a member state and now is regulated by the Financial Conduct Authority (FCA) which adheres to specific requirements for transparency and investor protection. Being an early adopter of crowdfunding in Europe, the UK is a highly developed market with a wide range of platforms and a sophisticated investor base while Germany has fewer platforms and projects with a growing but less matured market compared to the UK. As mentioned in the previous paragraph investor behaviour in Germany is with the likelihood of obtaining follow-up funds but failures compared to the UK where it is with more cautious investors. The long-term success of post-crowdfunding is challenging in Germany while it is vice-versa in the UK.

Differences in institutional frameworks in both countries have led the UK to follow a liberal market economy (LME) which encourages firms to develop effective innovative competencies dominated

by rapidly emerging technologies while Germany follows more organised or coordinated market economies (CME) which develop institutions with long-term and incremental innovation strategies but restrain more radical innovative paths (Casper and Whitley, 2004).

Aspect	Germany	United Kingdom
Regulatory Environment (political and legal)	Subject to national laws and EU directives.	Regulated by the Financial Conduct Authority (FCA) with specific requirements for transparency and investor protection.
Market Maturity (economic)	Growing but less mature compared to the UK. Fewer platforms and projects.	Highly developed with a wide range of platforms and a sophisticated investor base. Early adopter in Europe.
Investor Behavior (socio-cultural)	Higher likelihood of obtaining follow-up funding but also higher rates of failure.	Follow-up funding is less likely, possibly indicating more cautious or selective subsequent investment.
Investment Outcomes (economic)	Challenges in sustaining long-term success post-crowdfunding.	Generally, more sustained success and stability post-crowdfunding.
Innovation Strategy (Technological)	Emphasises long-term and incremental innovation strategies, developing stable institutions but restraining radical paths.	Encourages rapid and radical innovation with effective competencies in emerging technologies.

Table 4.1: Based on Hornuf, Schmitt and Stenzhorn, (2018)

### 4.3. Summary

This chapter compares the differences in crowdfunding dynamics in the UK and Germany in accordance with the PESTEL framework. As a pioneer in crowdfunding, the UK benefits from

having an investor-friendly regulatory environment, supportive government policies, and a culture that embraces risk-taking and innovation by scoring low on uncertainty avoidance and high on indulgence. In contrast, Germany has a supportive but more cautious and rigorous regulatory framework by scoring high on uncertainty avoidance and low on indulgence compared to the UK. The UK left the EU recently while Germany is still regulated under the EU regulatory framework. These differences impact market maturity, investor behaviour, and long-term success, with the UK leading in market development and sustained crowdfunding success having more projects based there, while Germany aligns more with long-term incremental innovation strategies within a coordinated market economy.

## Chapter 5: Results

The following chapter presents the characteristics of the two samples manually collected from German and British CFPs. Firstly, the descriptive statistics of two samples are presented which is followed by the statistical testing.

### 5.1 Descriptive Statistics

Two samples were collected for the study – one consisting of UK-based companies and one consisting of Germany-based companies, both with the assumption that the investors are nationals of those countries due to home bias.

#### 5.1.1. German companies

The companies were collected from mainly ROCKET.INVESTMENTS platform as well as Crowdcube. The total number of companies sampled was equal to 30. Seven major categories were recognised among types of green technologies in the sample. Eleven companies focused on solar energy, five developed technologies aimed at increasing energy efficiency, six specialised in innovative materials, and the remaining companies were involved in bioenergy, wind energy, energy storage, and other sustainable solutions. The majority of them were successful campaigns, reaching or exceeding the set goal of money raised in the campaign. Thirteen of them were unsuccessful in reaching the goal of the campaign and for one of them, the goal of the campaign was not provided.

Considering the financial measures, the collected information painted the following picture. The mean number of investors per campaign was 414.7 with a standard deviation of 292.8. Number of investors is also distributed quite exponentially (see Appendix A). The median of the set was 316.5. This suggests that a campaign on average had 415 investors, but the standard deviation is relatively high compared to the mean, suggesting great variation in the data set. This is further supported by the exponential distribution and median of 317 investors. That suggests a right-skewed distribution with a significant number of campaigns with a lower number of investors and some campaigns with a large number of investors that stretch the distribution to the right. For the total amount raised in the campaign, the mean amounted to 503 504 Euro with a standard deviation of 388 094 Euro. The median was 353 325 Euro, and the distribution was once again right-skewed (Appendix A). This suggests that while the mean amount raised was 503 504 Euro, half of the companies have not exceeded 353 325 Euro which explains the relatively high standard deviation. This suggests the existence of a few companies that have raised a relatively larger amount of capital than the majority which resulted in higher variation and skewness of the dataset. Additionally, it was found that the total amount raised is highly positively correlated with the number of investors. The mean contribution per German investor was 1 168 Euro with a standard deviation of 215 Euro and a median of 1 120 Euro. This suggests the variation in the variable was lower which achieves the objective of normalising it.

### **5.1.2 British companies**

Companies from the United Kingdom were collected in their majority from Seedrs with the rest coming from Crowdcube. The sample size was equal to 31. In this sample nine categories of green technologies were recognised. Five companies were working with waste and recycling management, another five were developing marine and tidal energy, four were developing energy storage and hydrogen with the remaining ones working with solar energy, bioenergy, energy efficiency, innovative energy solutions, circular economy, and sustainable material and hybrid and renewable energy technologies. Due to the nature of market information on Seedrs, for the majority of the companies, it was impossible to determine whether they reached their goal or not. However, for companies from Crowdcube, 85% of them have reached or exceeded their set campaign goal.

All financial measures were originally posted in British pounds, so the conversion rate to Euro has been used as mentioned in section 4.3.3. The mean number of investors in the British campaign was calculated as 1 291.6 investors with a standard deviation of 1 450.6. The standard deviation is higher than the mean which suggests that the variability is high as well as the fact that there are potential outliers in the set. This is further supported by a significantly lower median of 658 investors and the fact that the data is highly exponentially distributed (Appendix A). This suggests that there are few companies with a high number of investors but most of them have a relatively lower number of investors and it can be said that not more than half of them have not more than 658 investors. The mean amount raised in the campaigns was 2 100 082 Euro with a standard deviation of 2 699 265 Euro which means that there is a high variability in the sample. The median was equal to 906 255 Euro and the distribution is again steeply exponential. It can be interpreted as the fact that there were a few campaigns high in the volume of invested money which increased the mean. In this sample, the number of investors was strongly correlated with the amount raised but the relationship has not been as strong as in the case of Germany. The mean number of contributions from British investors amounted to 1 761.8 Euro with a standard deviation of 1 171.2 Euro, still suggesting higher variability in the data than in the German sample. However, the median was 1424.2 Euro which suggests the skewness is not that prominent and the normalisation was successful.

### **5.1.3. Summary**

Most important information regarding the samples can be found in Table 3 below, summarising the previous findings.



	Germany	UK
Sample Size	30 companies	31 companies
Mean Number of Investors	415	1292
Median Number of Investors	317	658
Mean Amount Raised (€)	503 504	2 100 082
Median Amount Raised (€)	353 325	906 255
Mean Contribution per Investor (€)	1 168	1 762

Table 5.1: Descriptive analysis main findings

## 5.2 Model Assumptions

Before performing the statistical test, it is imperative to test the assumption of the model. In this case, there was: (1) independence of the observations, (2) data is fairly normally distributed and (3) the variances of two groups should be tested if they are equal or not.

The first assumption is fulfilled due to the fact that each data point is related to a separate company with a unique name. For that reason, there is no risk of duplication of data points. Therefore, the observations are independent of each other and there is no risk of them influencing one another. The values for investors' contributions are also continuous meaning that they can take any value and are not restricted which allows for better statistical analysis.

Next, the normal distribution was examined. Firstly, the histograms were created to visually examine the normal distribution (Appendix A). The sample with German investors has a clearly visible normal distribution. However, the British sample has a more non-symmetric distribution. Therefore, additionally, a QQ plot has been created which compares the data points with how the shape they ought to take up if they were normally distributed (Newbold, Carlson and Thorne, 2013). In this case, for both data sets, it is more visible that data points follow the normal distribution. In British investors' QQ plot, it is more visible that there are some outliers that hinder the typical normal distribution, but the majority of the points follow the normal distribution. That is why, it is concluded that samples follow the acceptable normal distribution.

The last assumption is verifying the difference in variances and if there exists one, adjusting the formula for the  $t$ -test to account for that. The best test for that is the Levene's Test. The test tests the null hypothesis that the variations are equal and if the obtained p-value is lower than 0.05 then there is significant statistical evidence that the variances are not equal (Montgomery, 2020). The

variance between mean investor contributions is compared for two samples. The p-value of the test was less than 0.05 which means rejection of the null hypothesis. Therefore, there is significant statistical evidence for the fact that the variances are unequal. In this case, the *t*-test still can be applied because the standard deviation for the population is unknown and assumed unequal, the samples have normal distribution and samples have at least 30 data points (Montgomery, 2020).

After verification of assumptions, it is possible to move on further into the statistical testing.

### **5.3 Statistical Testing**

To gain insights into how investor contribution differs between British and German investors in green technology crowdfunding campaigns, statistical analysis using a two-sample *t*-test is performed. Having adjusted for the unequal variance, the test performed is also called Welch's *t*-test where the denominator of the formula is adjusted for the variance of each of the samples, instead of the pooled variance.

The performed Welch's *t*-test yielded a *t*-statistic equal to -2.7733 with degrees of freedom equal to 32. The associated value of p-value was equal to 0.009168 which is lesser than the standard significance level of 0.05. This means that the null hypothesis is rejected and that there is statistically significant evidence that there is a difference between contributions from British and German investors. Additionally, the 95% confidence interval for the difference in means ranges from -1029.26 to -157.61, which is calculated as the difference between mean contribution in Germany and the UK. Since the confidence interval does not include zero, it is further evidence of the difference between the two groups.

Therefore, the test shows that the mean investor contribution in green technology crowdfunding campaigns for the UK (1761.79 Euro) is higher than in Germany (1168.36 Euro). This suggests that, on average, investors contribute more to crowdfunding campaigns in the UK than in Germany.

## Chapter 6: Discussion

The study's goal was to find if there is a difference in investor contribution to green crowdfunding between the UK and Germany due to the change in national and cultural factors. During the testing, the null hypothesis was rejected, indicating support for the alternative hypothesis which stated that there is a difference in mean contribution between the countries in crowdfunding campaigns. It has also been found that the mean contribution for the UK campaigns is higher than for German ones. A few reasons for that should be considered.

The main underlying assumption in the study is the existing home bias in investments (Oehler, Rummer and Wendt, 2008; Lin and Viswanathan, 2016). Lin and Viswanathan (2016) specifically identified the presence of home bias within the crowdfunding market. Moreover, a study by Coval and Moskowitz (1999) demonstrated that home bias is prevalent in small and highly leveraged firms, which typically would include companies engaging in debt crowdfunding. That is why, during sampling, it was simplified that the home bias exists, and the investors were of the same nationality as the company's location. The study results align with this assumption, reflecting cultural differences in the expected manner.

The study by Bernardino, De, and Santos (2022) highlights two key insights for this research: the first is that cultural uncertainty avoidance is negatively associated with the willingness to participate in crowdfunding, and the second is that indulgence positively influences such willingness. In the previous analysis, it has been found that those are the main key differences in Hofstede's cultural dimensions between those two countries. While both nations score similarly on power distance, idealism, masculinity, and long-term orientations, meaning that those variables are kept constant, they are different on indulgence and uncertainty avoidance spectra. Germans are more uncertainty-avoidant and strict whereas British people are more indulgent and uncertainty-accepting (Hofstede, 2001). What that means for the study is that the population of investors for each of the countries consists generally of these characteristics, citing the home bias in their investments.

The results of the study support this notion – German investors had a lower mean contribution compared to British ones. This suggests that on one plane the difference can be explained through the cultural differences the populations are characterised by. However, a newer study from the European Central Bank suggests that home bias is smaller than previous research has shown and investors from smaller countries with much more saturated markets, tend to invest in financial centres (Molestina Vivar et al., 2020). While that finding regards the investment fund sector, the study shows that the trend is changing and the home bias is slowly decreasing in the European context (Molestina Vivar et al., 2020). That important insight could translate into the study as the fact that the population of investors might not be so homogeneous nationally, especially considering Germany and the UK are financial hubs, and the differences in the cultural dimension should not be considered the main factor reflected by the differences found.

Another plane to consider in seeking an explanation for the differences in investor contribution for green technology companies can be the maturity of the crowdfunding market and investor sentiment. The standard classical framework assumes that investors act rationally and are not influenced by sentiment (Fama, 1965). However, newer research shows that sentiment actually has influence, and it is driven by emotions and perceptions rather than fundamental analysis (Baker and Wurgler, 2006). Recent research shows that in emerging markets investor sentiment has more impact and can sway investment decisions and market outcomes (Wang, Su and Duxbury, 2021). In contrast, the developed markets have more stable measures to control the immediate impact and the sentiment is more long-term enduring (Wang, Su and Duxbury, 2021).

In that context, it ought to be expected that investors are more willing to contribute to the more developed markets rather than in emerging ones. Studies have shown that the United Kingdom has been an early adopter in Europe of crowdfunding and is much more established (Hornuf, Schmitt and Stenzhorn, 2018). Hornuf, Schmitt and Stenzhorn (2018) also found that companies have more long-sustained success and stability in the UK market. This allows it to consider the UK as the developed market in which investors have more trust, simply due to its maturity. Higher trust in the market increases investors' willingness to invest (Che Hassan et al., 2023) and therefore leads to sustained investment over time as sentiment impact has an enduring impact.

The UK crowdfunding market might be seen as less risky due to its developed nature. Germany's crowdfunding scene, however, can be considered as a still emerging market in crowdfunding (Hornuf, Schmitt and Stenzhorn, 2018). Not only has it lower volume than the UK but the companies also struggle for long-term success after crowdfunding (Hornuf, Schmitt and Stenzhorn, 2018). This novelty could make investors more cautious resulting in their sentiment causing a more volatile market outcome and lower willingness to risk taking. This is reflected in the outcomes of the statistical testing - for investors in German companies the contributions are lower, suggesting a more cautious approach. Additionally, a higher percentage of German companies have not reached their campaign goals which also displays the higher caution taken and aligns with the expectation of investors sentiment.

Efficient Market Hypothesis (EMH) offers an additional explanation for the efficiency of the mature market – it is due to their better regulatory framework and higher information availability (Fama, 1970). This is further supported by the institutional theory which shows that more mature markets have better-developed insinuations (North, 1990) which can provide better protection for investors, reduce transaction costs, and improve market liquidity. Translating it into the study results, the population of investors that invest in crowdfunding markets with the more robust regulatory framework should encourage the investors and make them feel more protected, and therefore invest more.

The first aspect is the authorization and licensing of the CFPs. Germany, as part of the EU, is bound by law to implement the regulations introduced by the European Parliament and Council. The European Union has introduced "Regulation (EU) 2020/1503 on European crowdfunding

service providers for business" which requires platforms to request clear information from companies fundraising to inform potential investors and provide guidance on risk management (European Parliament, Council of the European Union, 2020). The regulation also mandates that all operating platforms are required to apply for the license and ensure the safety of both sides in investment and are to be regulated by corresponding national bodies.

In the United Kingdom, the matter looks a bit different. CFPs are regulated under the Financial Services and Markets Act 2000, but there are no additional specific regulations regarding the licensing of platform providers (Financial Conduct Authority, 2019). The main regulation imposed is the probation of media promotion of this type of investment as both equity-based and loan-based crowdfunding are marked as high-risk investments by the FCA (Financial Conduct Authority, 2019). However, there lacks a specific regulation for the licensing of CFPs. In contrast, in addition to EU regulation, Germany has introduced "Kleinanlegerschutzgesetz" (Small Investor Protection Act) in 2015. This proceeded the EU with similar requirements of transparency of information and comprehensive risk disclosure, as well as limits that can be raised with a prospectus (Hainz and Hornuf, 2019). These differences should constitute the higher mean contribution from the German investors but also contradict the notion of emerging markets – as a still-growing crowdfunding market the regulatory framework should reflect that and be underdeveloped.

However, there is additional insight into this provided by the literature. In their 2017 study, Hornuf and Schwienbacher proposed a notion that strong investor protection is counterproductive to the growth of equity crowdfunding markets, challenging traditional views within the finance literature. The authors conclude that the tight regulatory framework applied in Germany in order to protect investors poses high compliance costs for SMEs and might prevent them from participating in crowdfunding due to high administrative costs (Hornuf and Schwienbacher, 2017). Thus, this could lead to a fallacy that crowdfunding portals may begin to resemble traditional angel networks, offering little differentiation and failing to attract a broader base of investors (Hornuf and Schwienbacher, 2017). The UK's more mature market appears to be better adjusted to this need as the space is regulated by the FCA but creates a more attractive and distinct space for crowdfunding, despite the high-risk label.

This context helps to frame the results of the testing. Traditional financial and institutional theories would explain the results due to the connection of maturity of the market, the regulatory framework, and risk-taking. The analysis suggests that Germany offers more robust investor protection and tighter regulations – encouraging investors to contribute with higher protection and lower information asymmetry. Then the results of testing should show that German companies receive higher contributions. However, that is not the case and there exists a significant statistical difference between mean contribution between Germany and the UK, with the UK having a higher mean. This reflects the other side shown in the literature – the tight regulations hinder the growth of crowdfunding.

British regulatory approach, while less stringent, might create a more attractive environment for investors. The higher contribution from investors could reflect the ability to balance the protection with operational flexibility. This is further supported by the literature which suggested that the UK has a more conducive environment for crowdfunding due to the existing regulations (Cicchello et al. 2021). The results also align with Siebeneicher et al. (2022), which described Germany's systematic integration of crowdfunding within its existing industrial and regulatory frameworks, thereby slowing its growth pace. That can be reflected by lower contribution levels in German campaigns.

The regulation influence can further tie back to the cultural willingness to take risks. Unprotected investors tend to take higher risks while investing due to the lack of institutional support. And yet, the less strict regulations in the UK market attracted higher contributions from investors to green technology campaigns. Considering the decreasing home bias, a further reaching conclusion can be proposed – the regulatory framework in the UK attracts more risk-taking investors who are also more willing to risk higher investments in hopes of premium returns. The connection between risk-taking behaviour and financial markets has been shown by Wang (2023) and Zain UI Abideen et al. (2023).

Additional support for the results could come from examining public and national support in both countries for green technology initiatives. A UK government survey has shown that over three-fourths of the UK population supports the construction and implementation of green energies (Department for Energy Security and Net Zero, 2024). Additionally, the UK government has reported that their Contracts for Difference scheme has helped to pique the interest of investors and the public in green technologies (Hands, Kwarteng and Department for Business, Energy & Industrial Strategy, 2022). In Germany, the European Central Bank has played a crucial role in financing green projects (European Investment Bank, 2024) showing that the public and institutions have a high commitment to the matter. In the consolidated fact sheet, German society paints a picture of highly supporting green energy and technology initiatives, citing a plethora of surveys and studies (Wehrmann, 2022). Therefore, the difference in mean contributions cannot be explained by the difference in public knowledge and support for sustainability matters. Both countries display a high level of investment and awareness, with Germany showing slightly stronger public and institutional support.

The higher mean contributions from investors in the United Kingdom can be attributed to the country's relatively looser regulatory regime. While providing institutional support, the burden of investment risk is not fully shifted to the companies and therefore is proportionally dispensed among investors and raisers. The looser regulatory framework appears to leave more breathing room for the companies and investors, attracting more investors who are not risk-averse and expect premium returns. This is reflected in the higher mean for the investor contribution for UK companies. Germany offers more protection, and the compliance costs are higher. This attracts

more risk-averse investors who during investments feel protected and their investment might not result in loss of money. The lower mean for German investors aligns with that.

The results then can be mostly explained via risk taking or uncertainty avoidance and they agree with the initial analysis of the cultural differences between countries. However, literature suggests that the difference is that strict policies towards crowdfunding have a higher influence which results in attracting investors whose behaviour agrees with the national cultural differences. This indicates that regulatory frameworks not only impact the financial aspects but also shape the investor profiles and behaviours, further reinforcing the observed differences in mean contributions between the UK and Germany.

In a broader concept for international companies, it suggests that the most important aspect to consider while choosing crowdfunding is the regulatory framework of the country in which the campaign should take place. Study results suggest that there exists a difference between how much each investor is willing to contribute to a campaign. Smaller contributions mean a longer time to achieve a goal due to having to convince more investors. This could suggest that as the nationality of investors is not so significant but rather their personal risk-taking tendencies in response to the regulatory framework, the place to undertake the crowdfunding campaign should be considered more thoroughly. In that context, internalisation of a company can help achieve the financial performance the needs by taking up crowdfunding in foreign countries.

## Chapter 7: Conclusions

### 7.1 Research Aim and Objectives

The research aim of this paper was primarily to explore the influence of national and cultural contexts on the level of contribution per investor in green technology crowdfunding campaigns between the UK and Germany. As analysed in Chapter 4, there exist clear differences between the cultural and regulatory landscapes of these two countries despite their small psychic distance. The UK's relatively looser regulatory regime and its implications for risk-taking investors were compared with Germany's stricter regulations, which provide higher investor protection but possibly lead to lower investments. As Chapter 5 has shown, there are distinct differences in the level of contributions between these two countries.

By providing a comparative analysis, the intention was to offer deeper insights into how national regulatory and cultural differences affect the success and adoption of crowdfunding for green technology. These insights aim to identify best practices and potential outcomes of actions taken within the national context of crowdfunding, highlighting how these factors influence the effectiveness of such initiatives. These findings have presented an unexpected picture. Germany, an emerging market when it comes to crowdfunding, subjects the participants to a higher regulatory regime. That possibly encourages the more risk-avoidant investors to participate and lowers the mean contribution. On the other hand, the UK is considered a developed market with less restrictive policies regarding the crowdfunding market. The investor despite that responded to it by contributing on average more than in Germany, most likely in hopes of premium returns. Such eagerness agrees with national differences in uncertainty avoidance. However, uncertainty avoidance should be reflected in the stringency of the regulations rather than the direct behaviour of the national investors. Given the decreasing home bias in investment, the investor population is not purely national but includes international participants as well. Therefore, it should be considered that investors respond by how restrictive the market is and the risk-taking presence.

Secondly, the study aimed to explore the implications for born global green technology companies and their expansion strategies. According to Knight and Cavusgil (2004), born globals internationalise rapidly to achieve superior performance and meet financial goals. The research sought to provide insights into selecting countries for internalisation through the lens of potential crowdfunding campaigns. Furthermore, the study aimed to understand whether direct investment from global investors through crowdfunding can guide market entry decisions for new-to-market companies. This was done by examining how the cultural and regulatory landscapes of the UK and Germany influence mean investor contributions in green technology campaigns. The study has shown that there are differences in how much investors are willing to contribute which is influenced by who is willing to participate due to the different regulatory framework. For born global green tech companies this is a significant piece of the puzzle. As mentioned, born globals tend to internalise seeking better financial performance. Additionally, companies with new-to-the-world technologies have even more burden due to technological uncertainty so they seek



successful internalisation strategies. The results provide an insight into how to create such strategies – by analysing the regulatory framework, the investor's eagerness can be assessed. This translates into different marketing strategies – in the freer regulatory regimes the burden is shifted from the companies and the investors are more willing to contribute. That decreased compliance costs as well as potential marketing costs to reach investors as fewer of them are needed to meet the costs. That is why, the study recommends green tech companies who are willing to internationalise and crowdfunding, considering basing those campaigns in countries with those characteristics.

## **7.2 Limitations and Future Research**

The study has several limitations. First, it is its scope. The study is concerned with green technology companies, and extending the findings to other industries would not be sustainable as the investors' feelings towards the industry could have a potential influence. Additionally, the sample sizes were still relatively small which could hinder the results. The manual collection of data could also introduce bias or errors, affecting the reliability of the findings.

Another limitation comes from the reliance on publicly available data from crowdfunding platforms, which may not capture all relevant investor behaviour or market dynamics. That is an additional recommendation for future research or studies – creating a robust database with information regarding crowdfunding campaigns or campaigning for the national regulatory bodies to collect those data and make them publicly available.

The cultural and regulatory contexts were primarily analysed based on existing literature. Such research might not fully capture the complexities or nuances of all the interplays happening. Moreover, some aspects of the framework the context was analysed through, might be under-researched and therefore there are some missing dimensions in the analysis.

Further research for the investor contribution should be considered. New studies should increase the scope and ideally the samples, thanks to more robust databases available or more information being publicly available. However, that also requires additional time. Also, new research should include a wider range of industries to see if the pattern holds in the other industries or not. More insights about how patterns change could be gained through longitudinal studies, especially if between the periods of interest there has been the introduction of the new or revised policy. Potentially, more studies could be done regarding what causes campaigns to fail from a financial perspective.

The main focus of the studies from moving forward could be also how crowdfunding can be used as a measure to internationalise. While this study tries to explain it, the method does not capture more nuances and complexities and provides just a recommendation. Possibly case studies could

be considered in order to see how companies fare and if the liability of the foreigners' transverse in crowdfunding.

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## Appendix A

### A.1. Results of descriptive statistics

Figure A.1.1: Number of Investors by Country:

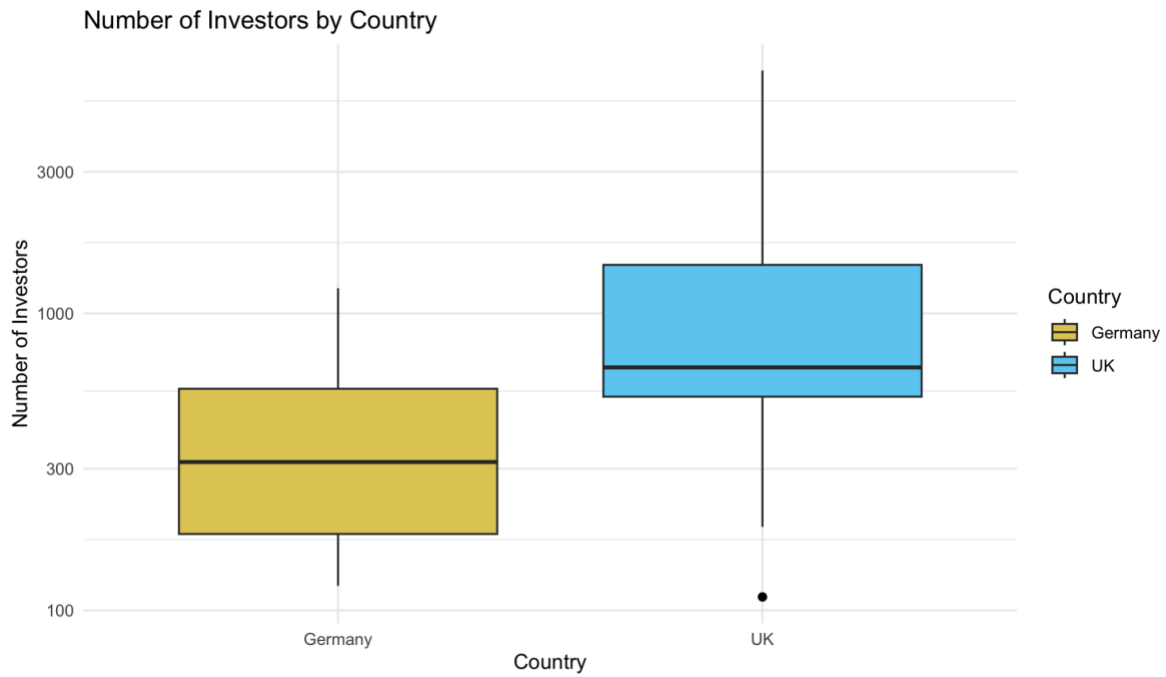


Figure A.1.2: Amount Pledged by Country:

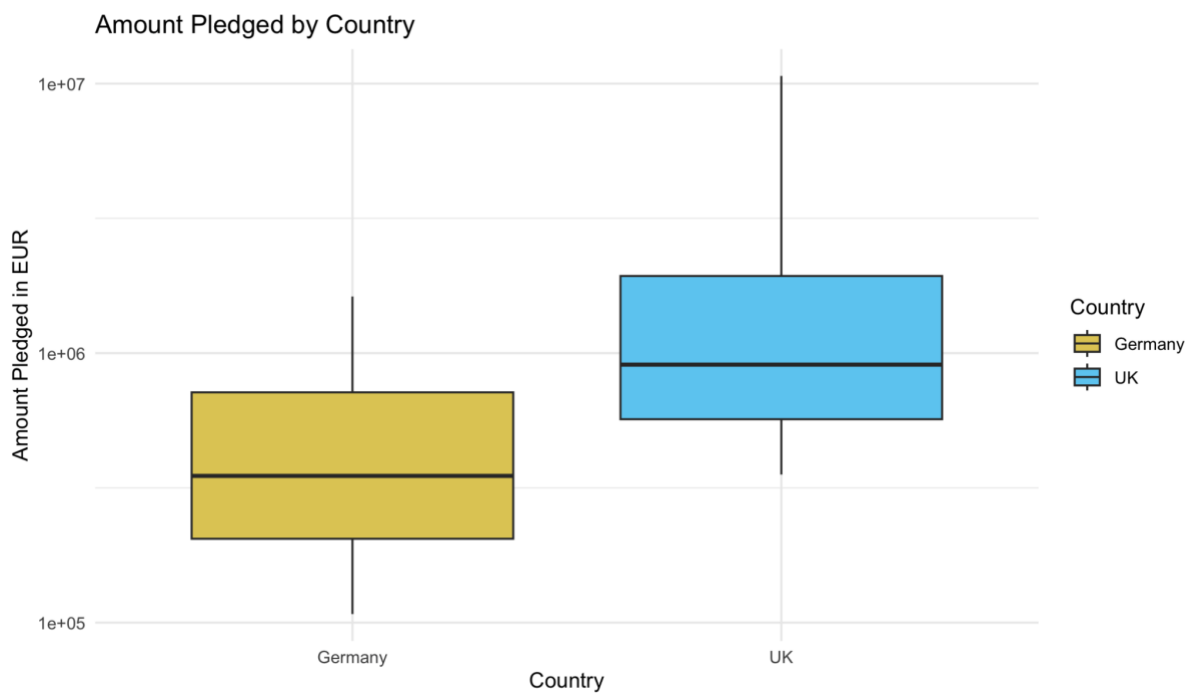


Figure A.1.3: Histogram of Amount Pledged in UK:

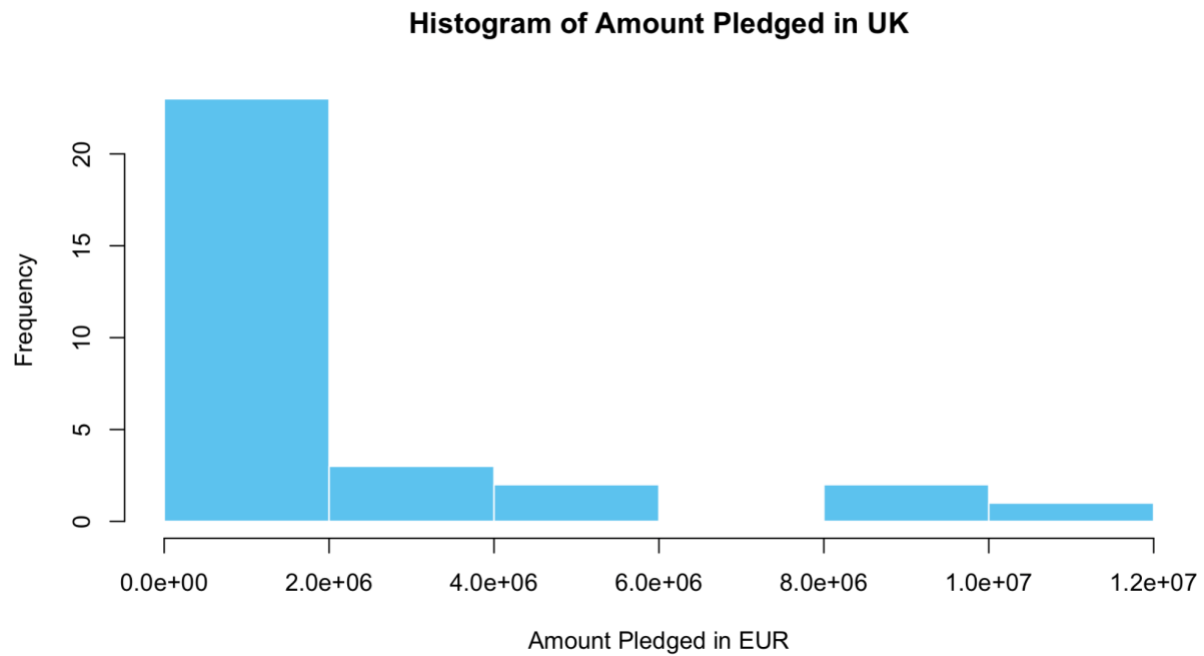


Figure A.1.5: Histogram of Amount Pledged in Germany:

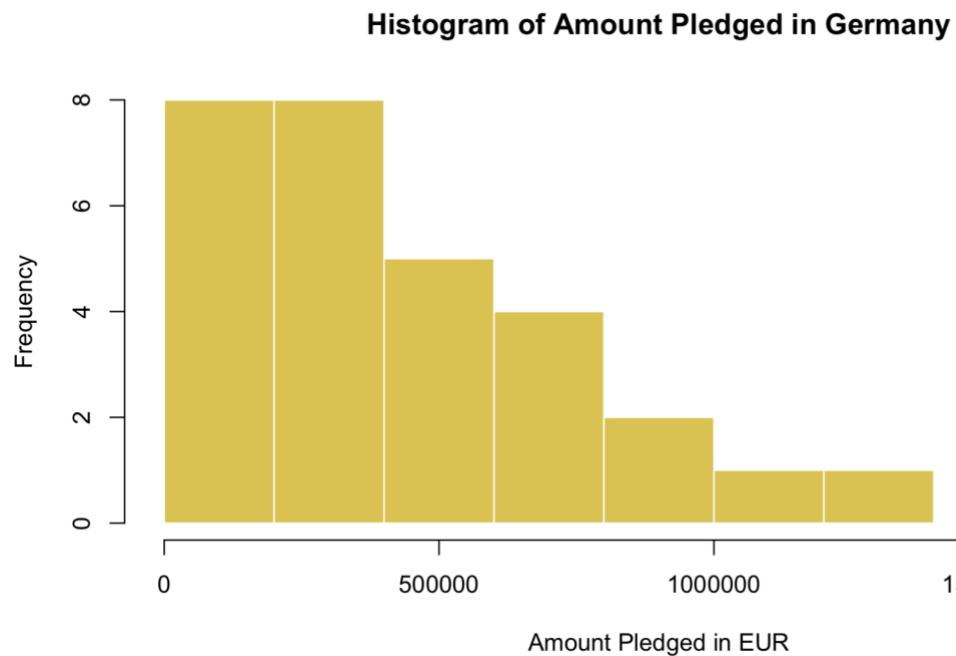


Figure A.1.6: Histogram of Number of Investors in UK:

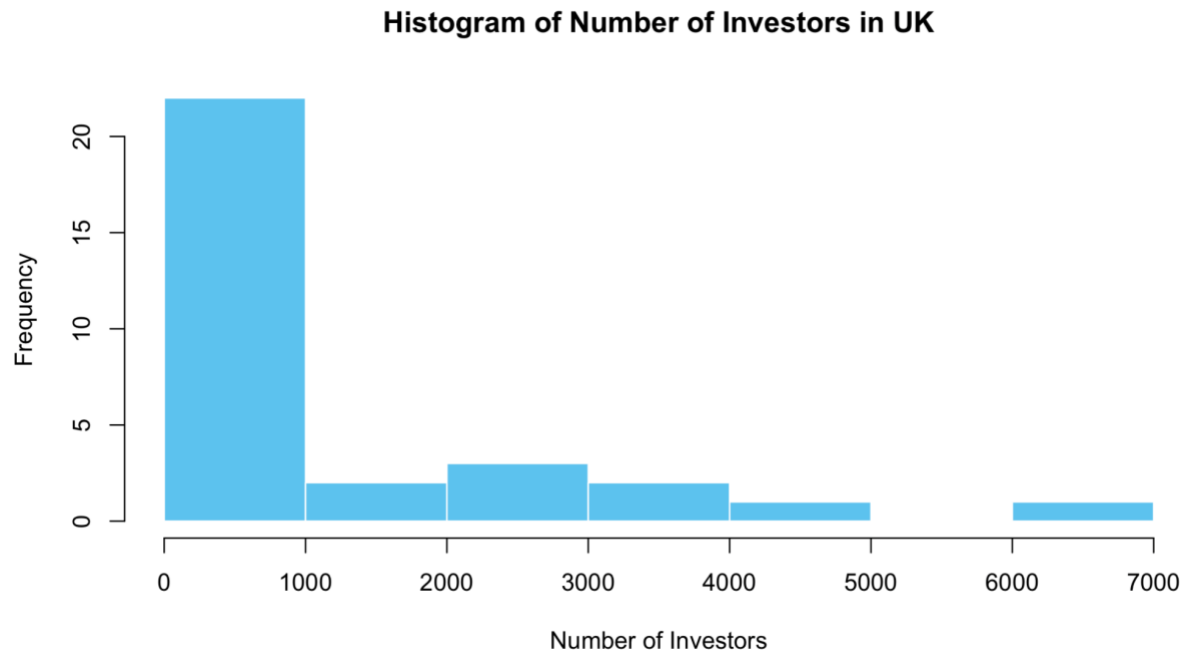
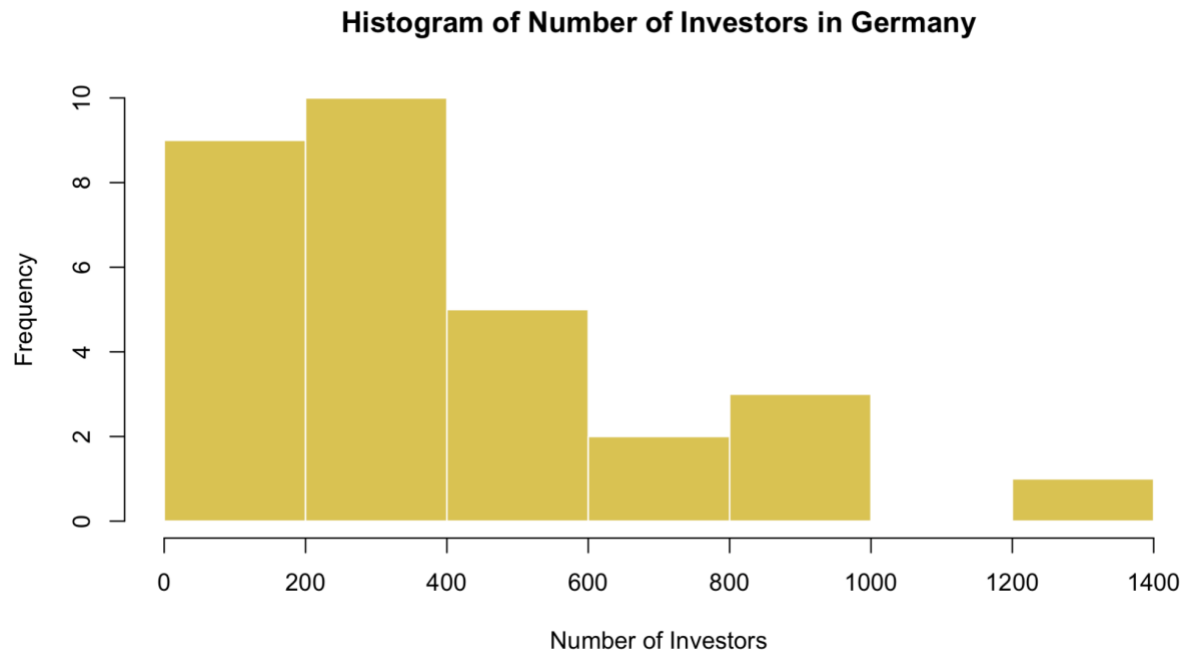


Figure A.1.7: Histogram of Number of Investors in Germany:



## A.2. Model assumption testing

Figure A.2. 8: Histogram of Mean Investor Contribution in Germany:

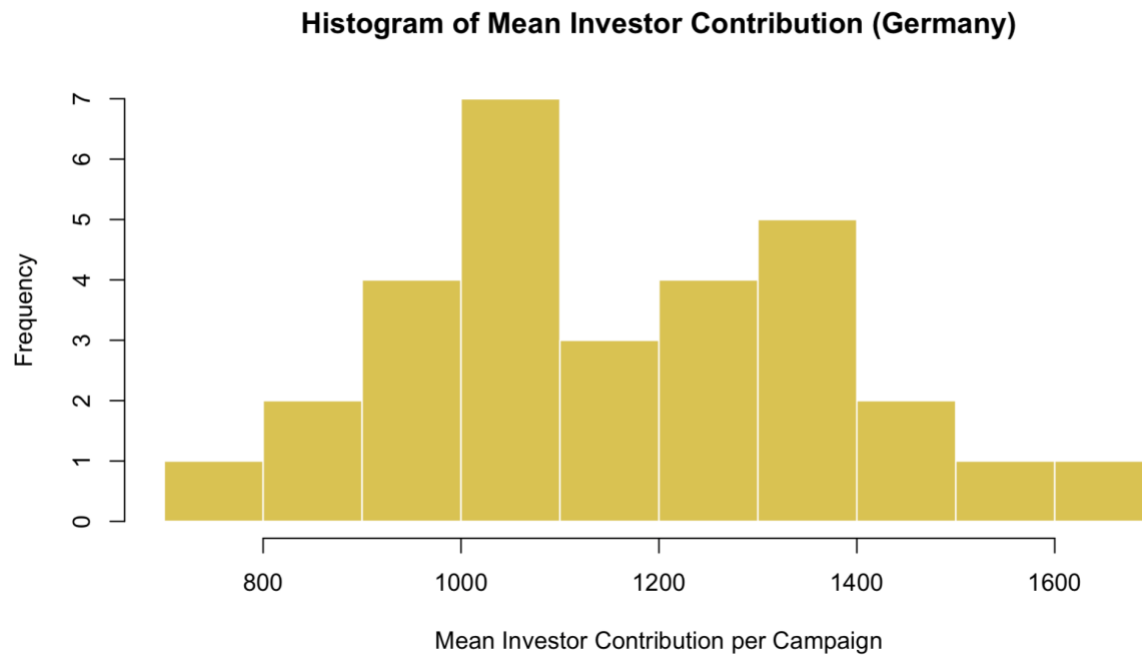


Figure A.2.9: Histogram of Mean Investor Contribution in UK:

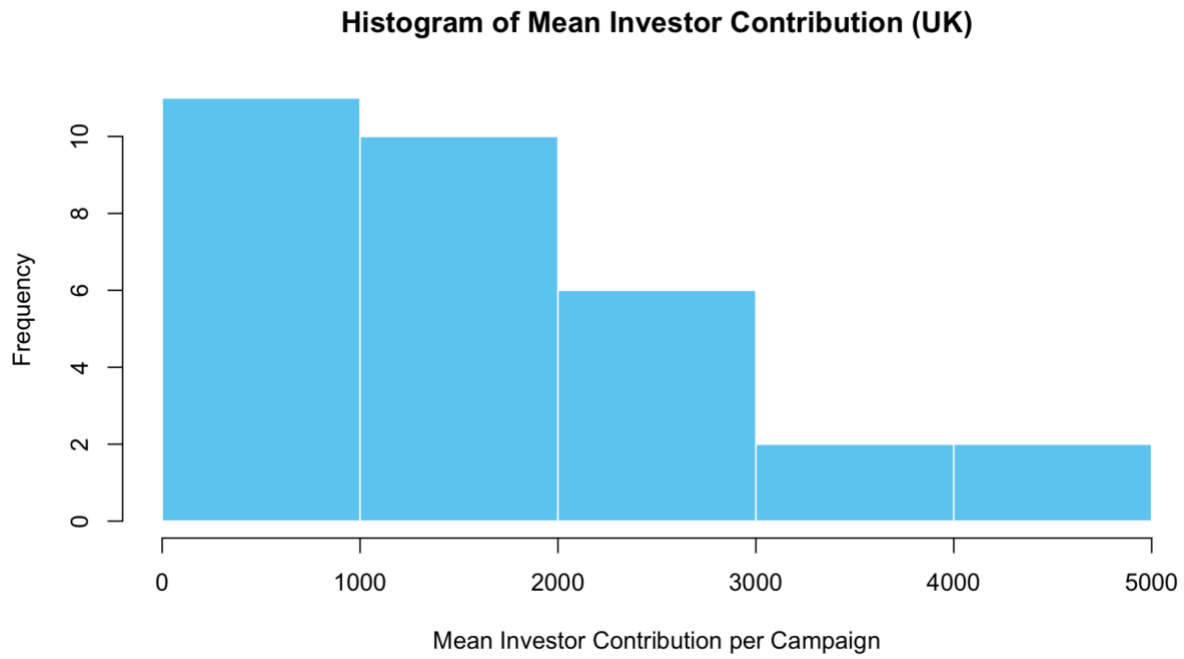
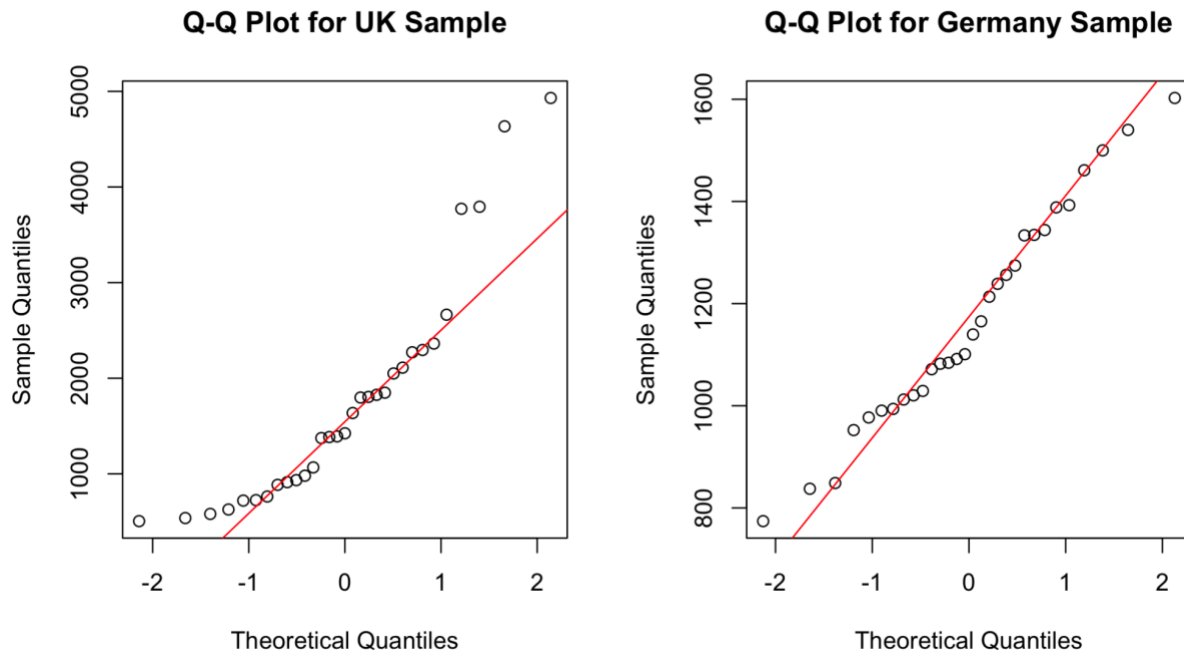


Figure A.2.10: Q-Q Plots for Both Samples:



## Appendix B

### Statement of Ownership

We, the undersigned, confirm that we are the authors of this thesis titled "A Comparative Study of Crowdfunding in the UK and Germany: Exploring Cultural and National Influences on Investor Behavior in Green Technology Crowdfunding Campaigns."

The authorship of the thesis is as follows:

Paulina Szofer has written the following sections:

- Section 1.2, Chapter 3, Chapter 5, Chapter 6 (with the help of notes provided by Charu Hasini Thanthulage), Chapter 7

Charu Hasini Thanthulage has written the following sections:

- Chapters 1, 2 and 4 (except for the sections mentioned by Paulina and Moaiad)

Moaiad Tareg Abuzakhar has written the following sections:

- Section 4.2.1.1 and 4.2.2.1

We confirm that we have conducted the research, analysis, and writing independently in our respective sections. In sections where ideas, information, or text from other sources have been used, proper academic references were provided within school guidelines.

Signed,

Paulina Szofer

Charu Hasini Thanthulage

Moaiad Tareg Abuzakhar

May 21st, 2024



## AI Usage Statement

In the writing process of this thesis, the following AI tools were used: Grammarly, ChatGPT 4

They were employed to assist with the following tasks:

- Translation of German crowdfunding campaign postings (in order to be able to analyse if company qualified as green technology)
- Generating sectors names used in section 5.1 (providing specific description of what company does and asking what type of sector/industry they operate in could be called)
- Correcting the sentences in things like word order or better wording
- Correction of grammatical, punctuation and typing mistakes (Grammarly)

Explanatory prompts were used with the AI tool:

- “Translate the following campaign posting to English”
- “The sentence is hard to read, propose several revisions how to improve the message it conveys”
- “Company does/produces xxx, what are the possible names for that industry sector”
- “Summarising and giving notes on some of the literature used in the literature review”
- “Criticising and giving pointers to improve the writing”

Signed,

Paulina Szofer

Charu Hasini Thanthulage

Moaiad Tareg Abuzakhar

May 21st, 2024