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Short Research Paper

Crowdfunding for the Environmentally Sustainable Products: An Exploratory Case Study Approach

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Abstract: To transit towards an environmentally sustainable society, sustainable entrepreneurs need funding from external parties. Crowdfunding can provide a good alternative for financing sustainable initiatives. To further understand this emerging phenomenon, a case study approach is adopted to analyze sustainable crowdfunding by exploring the motivation, the platform, the return on investment, and the relationship between creator and backers. Four successfully crowdfunded sustainable projects from the reward-based platform Kickstarter were chosen to represent different industries and crowdfunding models.

Keywords: Crowdfunding, Environmentally sustainability, product design, ROI

1. INTRODUCTION

The UN COP26 (the 26th annual summit of the United Nations Climate Change Conference) in Glasgow has just ended in November 2021. The conference brought together 120 world leaders, 22,274 party delegates, 14,124 observers, and 3,886 media representatives. The issues such as global warming ^[1], depletion of natural resources ^[2], and environmental sustainability have again attracted extensive attention worldwide. In general terms, the concept of sustainable development was defined as “Our Common Future”, which is also known as the Brundtland Report published by the World Commission on Environment and Development: “meeting the needs of the current generation without compromising the ability of future generations to meet their needs” ^[3]. Specifically, environmental sustainability is “a condition of balance, resilience, and interconnectedness that allows human society to satisfy its needs while neither exceeding the capacity of its supporting ecosystems to continue to regenerate the services necessary to meet those needs, nor by our actions diminishing biological diversity” ^[4].

To transit towards a more environmentally sustainable society, a new breed of sustainable entrepreneurs has emerged as an important force in driving the transformation. Sustainable entrepreneurs “contribute to sustainable development by doing business in a sustainable way” ^[13]. They have to balance economic, social and environmental goals, the so-called triple bottom line ^[14], or to address the three Ps (“People”, “Planet”, and “Profit”). Different from conventional entrepreneurs, sustainable entrepreneurs extend their interests beyond economic returns towards higher social and environmental goals. The multiplicity of goals makes sustainable business more ambiguous and therefore less attractive for traditional investors compared to purely profit-

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oriented firms ^[9]. Furthermore, sustainable entrepreneurs have an intrinsic difficulty to provide tangible and measurable outputs in the short term, which consequently lead to higher market uncertainty and extended time necessary for the project to become profitable ^{[12][15]}. Therefore, it is recognized that the lack of funding from professional investors determines a central obstacle to the development of this type of project ^[16].

To overcome this challenge, crowdfunding can provide a good alternative for financing sustainable initiatives ^[17]. Compared with traditional financing agents such as venture capitalists (VCs), business angels (BAs), and banks, crowdfunding is characterized by the successful interaction between platform, a variety of entrepreneurs who seek financial support for their ideas and ventures, and large number of dispersed backers who are enticed to invest, pledge, lend or donate to these ideas and ventures ^[18]. As Lehner ^[19] states: “crowd investors typically do not look much at collaterals or business plans, but at the ideas and core values of the firm”. They are mainly motivated by altruistic or normative reasons, i.e., reasons with environmental causes, or social ideas they deem worthy and needed, or by the variety of attractive rewards they can receive ^{[19][20][21][22][23]}. This character echoes the ideology of sustainable entrepreneurs.

The potential of sustainable crowdfunding is rapidly gaining academic interest at present time. Previous research has specified four potential areas for sustainable crowdfunding, respectively motivation, platform, return on investment (ROI), and relationships between creator and backers. Sustainable entrepreneurs have more complex motivations for seeking crowdfunding, for example, crowdfunding is also used as a marketing instrument to attract attention in the media and new customer, or to increase public awareness, or it can be used to test and validate the market potential of commercial ideas ^{[20][26]}. Secondly, sustainable entrepreneurs need to consider additional dimensions when they choose crowdfunding platform ^[23], for example, platforms with the support of local associations and supervising institutional bodies may increase the trust of potential creators and backers. Thirdly, some sustainability project might have already failed to receive funding from conventional sources, and thus do not meet the criteria which are important for long-term entrepreneurial success. It is important to have a mechanism to guarantee backer’s ROI. Lastly, many sustainable entrepreneurs lack a business education and related experience ^[29] they very often neglect the financial aspects, namely expected yields, security of the investment and accounting liquidity, which were regarded as the most important investment criteria ^[30] by conventional financiers. Consequently, they need to pay closer attention to build more efficient relationships with backers.

To further explore this growing field especially the issues mentioned above, a case study approach is adopted to demonstrate how crowdfunding has been applied to sustainable projects. Four successfully crowdfunded sustainable projects from the reward-based platform Kickstarter were chosen to represent different industries and crowdfunding models. The objectives of this research are to:

- understand the characteristics of sustainable crowdfunding in terms of crowdfunding motivations, platform choice, project outcomes and relationship with backers;
- explore the success factors of these projects.

This article is structured as follows. In section 2, we will first review existing literature regarding environmentally sustainable products; then we will review literature about crowdfunding and how the crowdfunding might support the development of environmentally sustainable products. In section 3, we will

employ four cases to illustrate how crowdfunding is used in sustainable product projects. In section 4, we will analyze the research findings and draw conclusions.

2. LITERATURE REVIEW

2.1 Environmentally sustainable product

There is an increasing urgency for the manufacturers to think how to transform the traditional modes of productions and the consumption of products. Sustainable product design might give an answer to solve these tough questions by assisting the traditional ‘linear’ model of industry (where raw materials enter and products and waste exit the system) transformed into an integrated industrial ecosystem ^[5]. This is a closed loop model proposing the optimization of energy and material consumption, and waste minimization, where the outputs of one process serve as inputs for other processes ^[6]. Sustainable product design derived from life cycle design, which emerged in the 1990s. Life cycle design includes eight strategies for product development:

- selection of low impact materials
- reduction of materials usage
- optimization of production techniques
- optimization of distribution systems
- reduction of impact during use
- optimization of initial lifetime
- optimization of end-of-life system
- new concept development.

In 1997, Brezet and Van Heel (1997) put forward the Eco-design Strategy Wheel as a useful guide to promote product design improvements at key stages in the life-cycle of products. In 2000s, life cycle assessment tools in product design were developed to get involved in all life cycle phases of a product, and to improve use of materials and energy, and minimizing waste emissions. In 2015, Cooper advocated sustainable product design that adopts the principles of:

- Durability
- Reparability
- Upgradability
- Optimized energy and material consumption
- recyclability

Previous literature has identified a few key aspects of sustainable product. 1) sustainable product should be made from low-impact materials, such as renewable or recycled materials, or non-toxic materials. 2) sustainable product should have the longest possible lifespan. This means the product are designed to be durable, modular, upgradeable, easily disassembled, repairable, and reusable. 3) sustainable product allows the materials to be continuously recycle into new ones ^[25], which is subjected to an upcycling process, or a downcycling process, or a biodegradation process. 4) sustainable product should be efficient in the usage phase, such as the reduction of energy consumption, or product fueled by renewable energy sources such as solar or wind power ^[26].

2.2 Crowdfunding definitions and models

First used for funding small-scale projects in the music and movie industry ^[20], crowdfunding is now a growing source of alternative finance for a variety of both for- and non-profit ventures ^[29]. Crowdfunding is defined as “a collective effort by individuals who network and pool their money together, usually via the internet, to invest in or support the effort of others” ^[27]. Specifically, by involving platform, backers and entrepreneurs, a particular project can seek funding from other individuals in exchange for future rewards, equities or other forms of returns ^{[20][28]}. The platform regulates the rules concerning campaign design, funding rules, and legal issues. Entrepreneurs create the project; set the targeted amount of money they aim to collect; and present their project in regard to the project, output, organization, and risks. Furthermore, these details are usually presented in the form of video, images and text. Backers provide funding for projects. They are also play an increasing role in the entire sustainable innovation process ^[30] as user-citizens and user-legitimizers.

The role of backers also depends of the type of crowdfunding model. Literature has identified five forms of crowdfunding, namely donation-based, reward-based, lending-based, royalty-based, and equity-based ^[20]. In donation-based crowdfunding, backers donate money to support project without expecting anything in return. In the reward-based model, contributors are offered non-monetary rewards of products or service in exchange for their participation. The lending type of crowdfunding, backers lend their money to the project creator at a certain interest rate. In equity-based crowdfunding, backers receive share of equity securities. Finally, in the royalty-based model, backers receive a portion of future revenue in the form of royalties.

Besides the primary financial function for entrepreneurs, crowdfunding can serve for multiple other purposes. Firstly, crowdfunding can support marketing activities to attract attention, increase awareness, and stimulate sales. Secondly, crowdfunding can be used to test and validate the market potential of new product ideas, thus to diminish the market uncertainty. Finally, crowdfunding can allow the backers to participate in the process of new product development, and consequently bridge the gap between product features and customers' needs.

2.3 Sustainable crowdfunding

There are increasing researches conducted on the connections of sustainability and crowdfunding. For example, there is an on-going discussion about whether environmentally sustainable projects are more likely to succeed in crowdfunding. Some studies revealed that such projects even have higher chance to receive funds in excess of the original goal ^[15]. Furthermore, crowdfunding platform specialized in sustainability projects perform better than platforms with a diversified orientation. However, other studies suggested that sustainability projects are not positively related to the success of the crowdfunding, but rather a disadvantage ^[12].

There is also a discussion on the distinctive features of sustainable crowdfunding. It can be summarized as:

- sustainable entrepreneurs need to make greater efforts to communicate with backers to clarify the investment uncertainty and information asymmetry;
- backers play more active role in promoting sustainability projects than in the conventional projects;
- the way that creators design and manage the sustainability campaigns should be different from the conventional ones;
- sustainability projects launched in the platforms, which are more active in promoting sustainability, are more likely to be successful.

3. METHODOLOGY

This research adopts the case study method. The case study method is suitable for studying the relationship between specific phenomena and the deep underlying connections between them. Through case studies, people can build intuitive feelings that help uncover potential connections. Due to the different focus of crowdfunding schemes, multiple case studies were conducted to explore the characteristics of motivation, choice of platform, cost and ROI, and relationship with investors. Case studies are retrieved through online research and cases are selected on the basis that they are sustainable projects. For the above reasons, four cases using different crowdfunding models were studied to help understand the context of crowdfunding sustainable projects.

3.1 Case A

COLATREE is a design company that aims to produce equipment and apparel from sustainable sources. The goal of the crowdfunding project making hoodies from recycled coffee grounds is to raise \$50,000 through Kickstarter. This project collects coffee grounds and plastic bottles from local shops, processes them through a series of technical means, mixes them into yarn and finally spun into cloth. Step-up sponsorships will receive a range of associated memorabilia including hoodies, trousers and socks in three colors. Because of the sophisticated product design, detailed product description and excellent ROI, the crowdfunding program ended with \$558,796 through the platform's 5,921 backers.

3.2 Case B

The LastObject team's plan is to raise DKK 89,000 to produce the reusable cotton swab. The reason why this product was designed is that about 1.5 billion cotton swabs are currently produced every day and are thrown away after only one use. Cotton swabs have become one of the important sources of marine pollutants, which greatly affects the diversity of marine life. The project provides multiple colors of reusable cotton swabs for investors to choose from. Sponsorships of different sizes will receive a corresponding number of swab sets. The avant-garde environmental concept, good ROI, and innovative product design led to 19,909 sponsors raising DKK 4,789,213.

3.3 Case C

AVALON has released a crowdfunding project titled "The World's Best Eco-Friendly Sunglasses" to raise €20,000 in production funds. Sunglasses are all made of recycled materials, in addition, the sunglass frame is made of ultra-lightweight high-strength recycled polycarbonate, which is tough and flexible at the same time, and has the ability to resist impact and high temperature. At the same time Factories are audited, and have ISO9000, ISO14000 and SEDEX certifications. Investors can get a pair of high-quality sunglasses at prices well below market value. A very high ROI, high-quality products design, and frequently updated product information resulted in a total of €516,593 invested in this project by 8,831 sponsors.

3.4 Case D

Pluvi is an Italian startup. Crowdfunding for the revolutionary umbrella with a target of 20,000 euros. In this crowdfunding project, the materials and production methods of umbrellas have been revolutionized. The use of specially developed polymers makes it easy to recycle and reuse the umbrella, and it improves the overall reliability of the umbrella by replacing traditional screws and hinges with durable snaps. Reduced from more than 130 for traditional umbrellas to just 24, there are few components to minimize the chance of failure, and all

are produced by the same injection molding technology. Novel product design, high product return allowed 3281 backers to fund €101,960 to bring the product into production.

4. CROSS-CASE ANALYSIS

The summary case finds that the total amount of funds raised by sustainability-related crowdfunding projects increases with ROI. The ROI of Case B and Case C was much higher than the rest of the sustainable projects on the platform, so they received far more total funding than expected. The ROI of Case A and Case D is also very impressive, so they also get more money than expected, but not as much as Case B and Case C.

Investor participation, in other words, the update frequency of project information is also considered to be an important indicator of crowdfunding projects. Investor participation in Case B is much higher than Case A, Case C, and Case D, making Case B one of the most successful projects on Kickstarter on sustainability.

Product design is also relevant to crowdfunding projects. Innovative designs tend to attract more sponsors. Case D is one piece of evidence that innovative technology has made it useful to a considerable number of sponsors. Case B and Case C are rare product designs on the market. Case A also revolutionized the design of clothing, including a hoodie that could be folded into a pillow.

5. CONCLUSION

This case study research explores the features of reward-based crowdfunding platform (Kickstarter) as financial instruments to support environmentally sustainable product. The four cases were studied from four dimensions: motivation, platform, return on investment (ROI), and relationships between creator and backers. The results of the case study show that the total amount of funds raised by sustainability-related crowdfunding projects has a positive relationship with ROI; the update frequency of project information is an important success factor of crowdfunding projects; and innovative campaign designs tend to attract more backers.

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