Engaging without greenwashing: a holistic gamified approach to foster eco-friendly behavior in a renewable energy crowdfunding platform

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December 2021

Abstract
To achieve the necessary transformation towards a low carbon society, it is obvious that all the coming technological innovations should also be accompanied by gargantuan shifts in lifestyle patterns. This study aims at identifying a possible gamified engagement strategy that fosters pro-environmental behavior for a renewable-energy projects crowdfunding app. Besides the growing interest of industry in gamification, there is few research on how to implement such approaches in a way it fosters pro-environmental behavior.

The research provides an integrative literature review of subjects such as environmental psychology, gamification and human computer interaction, to finally outline a comprehensive framework to guide practitioners in fostering sustainable behavior within the business world, in the context of a renewable energy crowdfunding platform, and also the analysis of a business case, Seeds.

While many game elements and marketing techniques can be positive for increased customer engagement and business development, they can be severely counterproductive as a strategy for climate change public engagement, and contrast sharply with the long-term sustainable practices that are required to transform to a climate neutral society. This work suggests that the corporate ethos might do more harm than good when it comes to fight climate change. Some widely spread corporate strategies to drive customer engagement, such as the usage of pervasive technology to build habits on users, are based on unmoral principles that invite critique, and perhaps, rejection. Finally, the limitations of the research suggest than additional validation is required, leaving several unresolved questions that could drive further scientific research.

Keywords: pro-environmental behavior, gamification, marketing, climate change public engagement, renewable energy crowdfunding platform.

1. Introduction

To date, the energy transition has been underfunded. According to the International Renewable Energy Agency "In the power sector, the global energy transformation would require investment of nearly USD 22.5 trillion in new renewable installed capacity through 2050. This would imply at least a doubling of annual investments compared to the current levels, from almost USD 310 billion to over USD 660 billion." [1]. In 2018, humanity was below 50% of the investment required to avert the worst consequences of climate change. This staggering statistic clearly shows that financial investment needs to either be redirected to the energy transition, or new financing channels need to be opened. Crowdfunding can play a pivotal role in changing the course of the energy transition. And that is what Seeds Renewables intends to do, believing that every regular citizen could play a big role in financing this transition.

Seeds Renewables S.L. (hereby "Seeds") is an environmental Financial Technology (FinTech) mobile application that sits uniquely at the crossroads of Cleantech and the digitization of financial services by using crowdfunding to finance renewable energy projects. Seeds' goal is to create the digital platform which can harness the collective financial power of the environmental movement by lowering the financial barrier for investment to just spare change, by giving investors full control of which projects their investments build and by providing a competitive return on investment. By using crowdfunding to finance the construction of renewables, Seeds creates a virtuous cycle of financial growth for the public which helps incentivize, democratize and decentralize the energy transition. From the scratch, sounds like a tool that many environmentally concerned citizens would be interested in. And perhaps the biggest challenge that Seeds faces is to create a community of users big enough to finance the projects in time. Considering that users investments are conceived to be very low, in order to collect the amount of money required to finance a loan for a renewable energy project a high number of micro investments are required. To have a better idea, according to the latest financial models, the critical mass to finance projects at a steady pace, also the break-even point, is 63.000 users. Therefore, finding a marketing strategy that scales the userbase is a critical aspect for the success of the company. Additionally, the marketing strategy should procure not only to acquire users, but also to retain and engage them.

According to Localytics, the average mobile app loses 80% of its users within just three days of download. Making the company's value clear from the beginning is also essential.

Therefore, this study aims to investigate whether or not there is a possible gamified approach for a renewable energy project crowdfunding platform that fosters eco-friendly behavior. Combining insights from mainly environmental psychology, gamification, human computer interaction, and behavioral economics, it will be hypothesized how gamification can be used as a way to engage people in pro-environmental behavior. The analysis of the literature will be synthetized in a theoretical framework, to later analyze the business case of Seeds. After doing a critical review of the first engagement strategy in the context of subjects mentioned before, a new approach for gamification will be presented, inspired by the previous theoretical framework and the 6D method, or six Steps to Gamification from Werbach and Hunter.

1.1. Description of the research area

The dissertation entails different research areas, as we can see below in figure 1. The research process, despite being perhaps too fragmented and interdisciplinary, it is evidently conceived this way to have a practical application to the business case of Seeds, but is considered to be relevant for any other crowdfunding or investing platform within the renewable energy industry, or any platform that would like to foster pro-environmental behavior with a gamified implementation.

Figure 1: Research areas covered in the dissertation

1.2. Problem Statement

The question that this study evaluates is: Is it possible to foster pro-environmental behavior through a gamified app to invest in renewable energy projects? If it is, which are the critical success factors to implement this green gamification approach?

1.3. Goal and relevance of the research

The goal of this dissertation is to present critical success factors for gamification and marketing approaches as a method to increased pro-environmental behavior and customer engagement and retention. Doing an analysis on the existing literature in behavioral science, environmental psychology, and other domains (represented in figure 1), the insights extracted will be summarized in a theoretical framework that will be used as a base to design a gamification strategy to foster pro-environmental behavior while building a strong relationship with customers.

Furthermore, the business case of Seeds will be analyzed, to apply all the findings of the theoretical part by analyzing their current gamification strategy, and proposing a new model. This model or design concept can be used for Seeds, but also any other similar platform. In this sense, besides the highly contextual green gamification implementation proposal, the conclusions of the analysis can be interesting to any emerging platform willing to drive sustainable behavior to their users. Whether or not gamification approaches are used as a business strategy for customer engagement, several trade-offs might occur when using marketing-based approaches for behavioral interventions. The role and limitations that marketing and gamification plays in engaging the public in climate change is analyzed. Also, the role that visualization methodologies can play by providing ecological feedback to users is discussed, highlighting the limitations and opportunities than this area of research (eco-feedback technologies) can bring to companies that try to foster pro-environmental behavior.

This dissertation is relevant for the scientific and business world, for many reasons. Searching for tools and technology for growth and increased pro-environmental behavior is not only of significance to businesses but also to the environment. This study mainly concerns 4 of the United Nations Sustainable Development Goals (SDGs); Which are goal number 9: Industry, Innovation, and Infrastructure, goal number 11: Sustainable cities and communities and goal number, 12: Responsible Consumption and Production 13: Climate Action [2]. The ambition of this study is to compile joint knowledge around different areas to try to find an effective method to make individuals act in a way that aligns with these goals.

1.4. Interest of the client

All the businesses interacting with consumers through technology can surely benefit from understanding the effect that gamification has on consumer acquisition and retention. But it is also of fundamental importance to understand the critical factors and limitations of gamification and marketing approaches, as well as understanding the different game mechanics features and how to evaluate them given a specific business context. Also, there are many reasons why sustainable user behavior should be of interest of marketers. In Ripple et al. [3] words: marketers should be cognizant that the consumption mindset that conventional marketing encourages is a key driver of negative environmental impacts [4] [5].

Additionally, businesses able to adapt to the demands of our changing times, including the urgent demand for sustainability, will probably be more likely to succeed in a longer perspective while enjoying the strategic benefits [6]. Moreover, research suggests that socially and environmentally responsible business practices have the potential to harvest more positive consumer perceptions of the organization, and also increases in profitability [7] [8] [9] [10].

Ideally, the outcome presented in the last part of the dissertation can be used as a foundation for designers and programmers at Seeds.

1.5. Thesis Structure

The structure of the text chronologically follows the methodological steps taken when conducting the research. A summary of the most important content of each chapter is given here.

All the theory will be explained in the chapter hereafter, chapter two. First, it provides a definition of all the important concepts that will be extended during the rest of the dissertation. Then, an integrative literature review is conducted going through the following topics: behavioral interventions, psychological barriers to adopt sustainable practices, carbon offsets limitations, marketing-based approaches for climate change public engagement limitations, gamification and finally visualization of the ecological footprint. More details on the logics of the research process will be found in the next chapter. The details with regards to the used research methods, theories and frameworks will be explained in chapter 3, Methodology. Then, a broad synthesis of the literature review is conducted and developed in chapter 4. This integrated theoretical framework is a way of summarizing all the findings from chapter 2 in a way they can be applied in a more straight-forward manner in the next chapter. In chapter 5, a business case study is conducted, analyzing the first gamification strategy of Seeds, and later proposing a promising and innovative gamification approach, aligned with all the previous research conducted. The most important conclusions and contributions of work are summarized in the chapter 6. The final chapter describes the limitations and suggestions for future work.

2. Literature review

The aim in the beginning of the literature review is to share first, the logic that has been followed to extract insights from the literature. Once the research process has been clarified, the research areas will be mapped out. Then some basic definitions on the different topics will be provided, to be followed up with more in-depth discussions.

2.1. Research rationale

Here, the research question “Is it possible to foster pro-environmental behavior through a gamified app to invest in renewable energy projects? If it is, which are the critical success factors to implement this green gamification approach?” is broken down into sub questions. This can be seen in the figure 2, which shows the logic process of the research.

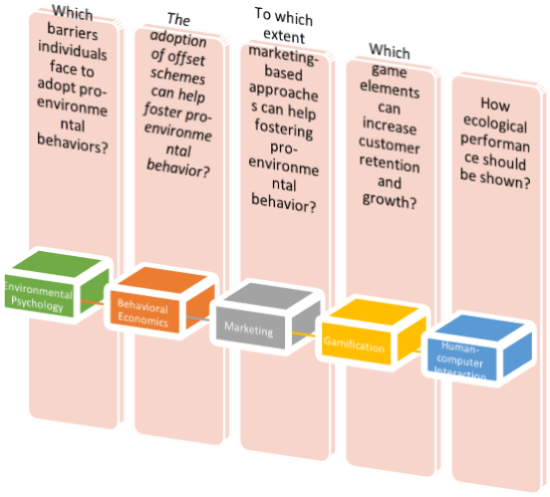

Figure 2: Research Rationale

To understand how to sustainable practices could be promoted, the first area that was addressed was environmental psychology. Starting with the question “Which barriers individuals face to adopt pro-environmental behaviors?”

This leads to the analysis of behavior interventions in an ecological context, with a broad analysis of the barriers that hinder pro-environmental behavior. This will conclude with an analysis of the ones that are relevant in the current research, which is to say, in the context of a gamified app to invest in renewable energy projects. The conclusion will particularly stress the importance of analyzing a well-known psychological phenomenon, paying to alleviate guilt. This issue is far from new, and is now being put in practice in the voluntary carbon market, driving a profound debate among the scientific community.

To approach the question “The adoption of offset schemes can help foster pro-environmental behavior?” it was deemed necessary to understand first the limitations that such approaches face, by carefully examining them through the lens of behavioral economics.

Following this, an analysis on marketing-based approaches for climate change public engagement is conducted. To know to which extent these approaches can help foster pro-environmental behavior, a broad revision on marketing interventions in this context was conducted. This part specifically tries to address the question “To which extent marketing-based approaches can help fostering pro-environmental behavior?”

The discussion follows with an analysis on gamification practices, trying to answer the question “Which game elements can increase customer retention and growth?”

Lastly, having into account that the design and investigation of technologies that provide ecological feedback received considerable scientific attention in the last few decades as a way of helping individuals reduce their environmental impact [10] [11] [12] [13] [14] [15] [16] [17] it was considered relevant

to pass through this area to enrich the research, by addressing the question “How ecological performance should be shown?”

3. Methodology

The process of this research, outlined below in figure 3, was divided into two phases; Theoretical phase, which contains an integrative literature review that concluded in the elaboration of a framework, and the practical phase, that addresses the business case of Seeds.

Figure 3: Methodology of the dissertation

3.1. Theoretical phase:

The purpose of this phase was to complete the research formulation. This included background research of all the relevant research areas and also an analysis of Seeds business case, to assertively propose a scientific question that was aligned with Seeds overall strategy and vision. Once this scientific question was clear, an integrative literature review was conducted, to later summarize all the findings into an integrative theoretical framework.

The integrative literature review was done by following the guidelines of Torraco et. al [18].

This method allowed to do an analysis of the literature that moved beyond the mere description of a body of evidence, but also help deriving new insights through integration and critique’ [19]. Having into account that this area of research area is quite new (or perhaps too unexplored), this research method was thought to be the most suitable. In words by Post et al. [20] ‘In novel or emergent research areas, integrative literature review articles can connect research findings from various disparate sources in original ways so that a new perspective or phenomenon emerges. Also, following this methodology made possible elaborating an Integrative Theoretical Framework that summarized all the findings. This framework was conducted by following the method “understanding, selecting, and integrating a theoretical framework in dissertation research” [21].

3.2. Practical phase:

This phase’s purpose was to apply in a real business case, some of the concepts that were assessed in the theoretical phase by proposing a new gamification proposal. This approach considered the findings from the integrative theoretical framework and was designed following the six Steps to Gamification, commonly known as 6D method [22].

4. Theoretical framework for a sustainable gamification implementation

The framework in figure 4 is based on the analysis done in the literature review, and it has been conceived by following the method “understanding, selecting, and integrating a theoretical framework in dissertation research”. The proposed framework can serve as a "route map" in designing sustainable gamified engagement strategies. Each key insight will be further discussed hereafter.

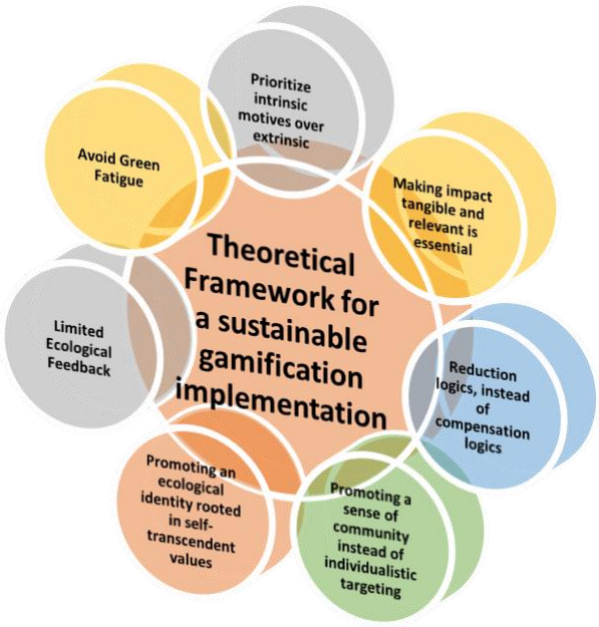

Figure 4: Theoretical framework

- **Intrinsic vs extrinsic tradeoff**

As the current research has remarked in several occasions, intrinsic motivations have been proved to be very stable over time, and to be more robust to any extrinsic financial incentive [23] [24] [25] [26] [27] [28] [29] [30] and moreover extrinsic motives are not compatible with intrinsic motives [31] [32].

Therefore, in case there is a tradeoff, it is recommended to communicate the intrinsic value of a given pro-environmental behavior alone.

- **Promoting a sense of community instead of individualistic targeting**

Going in line with the recent individualized discourse of climate change; individual citizens (users) are targeted for their individual role in causing emissions, and urged to change the situation. This individualistic framing of climate change might be problematic for people, for two reasons. First, it does not show society as it is actually experienced, which is to say, as an interconnected network of social relations. And second, there is an evident tension with the representation of climate change as a collective problem and the strong focus on individuals' behavior, which might be a bit paradoxal [33]. One key finding of current research on environmental psychology is that fostering a sense of community is paramount to sustain long-term behavior change.

The challenge than collective action poses is relevant to show how social influence operates with regards to sustainable actions. When individuals observe others engaging in a given action, this can increase their perception of collective efficacy or "a group's shared belief in its conjoint capabilities to organize and execute the courses of action required to produce given levels of attainments" [34]. Surprisingly, collective efficacy has been understudied in the sustainability domain, but seems to be a promising approach. In other contexts, such as the organizational leadership [35] and political action [36] it's influence is clear and validated. Drawing on these studies, we suggest that collective efficacy can be a good motivator of pro-environmental behavior.

C*ommunicating actions in a group context will increase the tendency to engage in sustainable actions, as a result of increased collective efficacy. Additionally, creating a sense of community can be key to sustain long-term behavior change.*

- **Promoting an ecological identity rooted in self-transcendent values (environmental citizenship):**

There is significant evidence demonstrating that self-transcendent values are correlated with pro-environmental behavior [37], so the identity that should be promoted ideally has its values. According to Crompton [37], for what he calls "bigger-than-self" issues like environmental protection (or any other issue that may not be in an individual's immediate self-interest to invest energy and resources in helping to solve), campaigns that promote self-enhancing values may actually weaken the common purpose that links them. Crompton is based on empirical findings from social psychologists who demonstrated that particular personal values, such as materialism or self-interest, can end up inhibiting behavioral expressions related to the antagonistic cultural values, namely co-operation or pro-environmental behaviour [38] [39].

As it has been remarked previously, promoting a sense of environmental "citizenship" can be a good way to link any pro-environmental behavior in the values underlying it, rather than to any financial incentive or other types of external stimuli. In words of [40], it is not necessarily "the environment" which motivates environmental citizenship, but a sense of justice and fairness. Some studies have demonstrated that a perceived ability to restore justice can lead to actions such as selecting fair-trade products [41], it might be the case that conveying collective notions of justice (e.g., communicating information about collective impacts and consequences of unjust, unsustainable actions) can be useful in fostering a environmental citizenship notion. In particular, communication about negative environmental threats and how these are felt by communities that are the most vulnerable might be a compelling message [42]. Additionally, motivating individuals to participate in local environmental decision-making can also be positive to foster environmental citizenship.

Promote environmental identity by promoting self-transcendental values, or a notion of "environmental citizenship" can be a very effective method of fostering pro-environmental behavior. A way to motivate that citizenship notion is by giving information about climate justice and also by motivating individuals to participate in local decision making.

- **Reduction instead of compensation logics**

When it comes to talk about ways to improve the ecological performance of users, the compensation or offsetting logics is highly disadvised. The growing trend of market-based compensation mechanisms for nature conservation is very likely to crowd-out intrinsic motivations [23] [24] [25] [26] [27] [28] [29] [30] and has been proved to be very ineffective, as there is no evidence of reduction or avoidance of emissions due to markets so far [43] [44] [45] [46]. Instead, what this research suggests is to promote a philosophy of reduction, rather than persuading individuals to outsource greenhouse gases reductions.

The easiest way of decreasing the greenhouse gases at individual level is by reducing the consumption levels. Perhaps promoting a philosophy of reduced consumption can help.

- **Limited ecological feedback**

Ecological feedback should only be provided whenever there is no risk on reducing subsequent pro-environmental behavior. There is strong evidence showing that ecological footprint feedback may not help in promoting pro-environmental behavior, when it reduces feelings of self-efficacy.

In the other hand, other recent studies specifically observed that social recognition of prosocial acts reduces prosocial striving, while without social recognition prosocial striving is encouraged [47]. This suggests that negative spillover is likely to occur when there is social acknowledgment of a given pro-environmental act.

It is suggested that ecological feedback is only shown when there is no danger of reducing feelings of self-efficacy. Also, when the feedback is positive, the possibility of social acknowledgment should be limited, or it might end up with negative spillover.

- **Making impact tangible and relevant is essential**

The long-time horizon associated with pro-environmental behavior might make it costly to the present self. Sometimes, the positive sustainable outcome in the future is often to prioritize over oneself own affective benefits. However, acting in a manner that can help other individuals has been shown to provide positive affect, sometimes termed as "warm glow" effect [48]. Focusing on how sustainable behaviors can create positive affect in the present might increase the likelihood of subsequent ecological behaviors. We propose that:

Making sustainable impacts seem local and relevant to the self, by framing them with an immediate (vs. long-term) positive affect, can increase the likelihood of its performance.

- **Avoid green fatigue**

Climate change is a serious, nebulous, and can have large-scale consequences. This can make that individuals perceive their acts as small and inconsequential, leading to green fatigue. This form of demotivation is the result of information overload and lack of hope with regards to meaningful change [49] and such hopelessness can be demotivating to individuals [50]. One suggestion might be to celebrate small and concrete wins that can reinforce positively more sustainable actions and keep individuals engaged with the climate action.

Rewarding small milestones can encourage people to continue engaging in pro-environmental behaviors by helping avoid green fatigue.

5. Proposing a framework for sustainable gamification: the *Seeds* Case Study

Based on the findings in the previous phase, a new gamification proposal will be drafted. The framework is based on the methodology proposed by Professor Kevin Werbach, called Gamification Design Framework, which is well-reviewed by many researchers. It includes 7 game elements, and it successfully managed to have into account some of the points extracted from the theoretical framework. It also includes carefully selected information from previous studies on gamification for sustainable behavior, by extracting the most frequently appearing factors associated with successful gamification interventions for sustainable platforms.

Following the Gamification Design Framework by Kevin Werbach, the first step is to align the framework with the business ultimate objective.

5.1. Defining business goals:

It is critical to think about the business goals to make sure that the gamified system benefits the organization. According to Seeds CEO William Wiseman, their fundamental business goals is:

- Incentivize users to invest in renewable energy projects and engage frequently with the app

5.2. Defining target group:

The method that has been considered to do this segmentation process in a game context is the Bartle Taxonomy of Player Types. According to Richard Bartle, we can distinguish four types of players; Achievers, explorers, socializers, and killers, each one with different motivations and propensities. Achievers prefer raising points, badges, and rising in levels or other concrete measurements of success which the game might have. Explorers like to immerse themselves in the game world and love discovering new content. Socializers enjoy engaging with other players rather than the game itself. Lastly, the Killers thrive on competition and like to fight with others. As researchers suggest, the most successful gamified systems have something to offer to each player type [51].

5.3. Delineate target behaviors:

A third important aspect of the 6D approach to implement gamification is to define target behaviors. Target behaviors should be concrete and specific, and therefore the overall target has to be broken down. Conceivable target behaviors are as follows:

- Download the app
- Connect the credit card to the app
- Incentivize users investments in renewable energy projects.

5.4. Results:

The framework proposed is based on critical factors found from theory and previous studies on gamification. These are; the three dimensions of Werbach and Hunter's DMC Pyramid (Dynamics, Mechanics, Components), the player types, motivation type (Intrinsic or Extrinsic) and finally the alignment with Seeds business goals and any successful pro-environmental key insight.

For each game element presented, these factors were used to evaluate the specific design proposal, resulting in a 8x8 matrix to evaluate a given prototype based on these factors. A few of the came elements proposed can be seen in the next page (table 1).

Table 1: Proposed gamification approach

Game element	Implementation guidelines	Supporting business goals	Dynamics / Mechanics / Components	Type of Motivation	Player type
Levels	• Levels can help reduce green fatigue by rewarding small milestones • It is advised that levels are based exclusively on the ecological impact the investments generated. This is a way to promote intrinsic over extrinsic motivations, and promoting an ecological identity rooted in self-trascendent values. • Also, it is highly recommended to include levels for teams, as this could create a sense of community and increase collective efficacy.	Yes	**Dynamics:** Progression *(the player's growth and development)* **Mechanics:** Feedback *(information about how the player is doing)* Rewards *(benefit from some action or achievement)* **Components:** Levels *(defined steps in player progression)*	Extrinsic	Achiever Socializer
Leaderboard	• It is a simple feature, but it can be demotivating if implemented wrong. It should not be static, therefore it is suggested to have multiple leaderboards, one for individuals and another one for teams. That would be a simple way to make it dynamic while fostering a sense of community at the same time. It is suggested to create another leaderboard based in the geographical locations of the users, as is it believed to be an effective way to make impact local and relevant to the self. • It is unknown how a good positioning on the leaderboard might result in negative spillover	Yes	**Dynamics:** Emotions *(curiosity, competitiveness, frustration, happiness)* Progression *(the player's growth and development)* **Mechanics:** Competition *(one player or group wins, and the other loses)* **Components:** Leaderboard *(visual display of players progression and achievement)*	it may either promote intrinsic motivation or reduce intrinsic motivation.	Achiever Socializer Killer (weak)
Teams	• The player can choose to build a team with his/her friends (which would increase collective efficacy) and compete with other teams, or join a team in their hometown (which would be a way to increase a sense of community and frame the impact with an immediate positive effect).	Yes	**Dynamics:** Relationship *(social interactions generating feelings of camaraderie, status, altruism)* **Mechanics:** Cooperation *(players must work together to achieve a shared goal)* **Components:** Teams *(defined groups of players working together for a common goal)*	Extrinsic	Achiever Socializer Killer (weak)
Gifting	• If a marketplace is available within the platform. If a project was funded too quickly, other investors might be gifting selling his/her position.	Yes	**Dynamics:** Emotions *(curiosity, competitiveness, frustration, happiness)* Relationship *(social interactions generating feelings of camaraderie, status, altruism)* **Mechanics:** Transaction *(trading between players, directly or through intermediaries)* **Components:** Gifting *(opportunities to share resources with other)*	Intrinsic	Explorer (weak) Socializer (strong)
Feedback	• Progression/feedback and setting your own goal can trigger intrinsic motivation. However, is it suggested to separate the impact goals of the financial ones,	Yes	**Dynamics:** Progression *(the player's growth and development)* **Mechanics:** Feedback *(information about how the player is doing)* **Components:** Collection *(sets of items or badges to accumulate)*	Intrinsic	Explorer Achiever

6. Conclusions

The question that this study was evaluating: *Is it possible to foster pro-environmental behavior through a gamified app to invest in renewable energy projects?*

The conclusion is that it will be changeling to create a stronger incentive for consumers to engage in pro-environmental behaviors by using a gamified app to invest in renewable energy projects. There are many barriers to overcome; while some are implicit in the inherent logics of gamification and marketing techniques itself, the others are found in the human psyche. What this analysis has underlined is that no marketing approach can be 'value-free', being clear that marketing logics have the principles of the current economic rationality firmly embedded within it. Some key features might end up undermining pro-environmental behavior (segmentation based on individuals' differences, an individual-focused approach, extrinsic rewards). It is suggested that any conventional marketing implementation would have overlooked any of these aspects, at the expenses of the utmost objective of maximizing profit.

The previous arguments can lead to the question: can climate change and the broader problems of sustainable resource use and environmental degradation be successfully tackled with the current deregulated, globalised, growth-based economy [52]. Perhaps, to the extent that this is not really a sustainable economic model, all marketing approaches that operate within it are highly unlikely to be either.

The conceptual tools that corporations use to engage the public are inherently biased towards making profit. On that basis, it is considered crucial to equip ourselves with tools for change which are not constrained by this perspective. That being said, it is unclear to which extent the proposed framework can help individuals adopt pro-environmental behaviors, as further validation would be required.

Despite of this being uncertain, the second question will be addressed: *"If it is, which are the critical success factors to implement this green gamification approach?"* the basis of the answer is found in the theoretical framework. Also, the key points with regards to its implementation is that all of the game-components are motivating for all different player types (Achievers, explorers, socializers, and killers), touching different dynamics and mechanics, and trigger both intrinsic and extrinsic motivation

It is uncertain if the new gamification strategy can be more successful than the previous methodology proposed, but surely it is a more ethical approach. Ethics traditionally always ranked the social benefits above the individual benefit. As Kant defined, an action is especially moral when it benefits others at expense to one's own benefit. It's been a while since corporations separated from morality to pursue a purely material goal, which is the maximization of profit. Sometimes this utmost objective can be quite immoral, as how the money is made does not matter. A similar thing can be observed in other fields such as the natural sciences; researching without morally evaluating or even regulating research. For example, the discovery of atomic energy enabled both the use of this energy form and the development of the atomic bomb. Ultimately, however, it is suggested that a society should prevent this kind of science from being used against it. The essential question of the benefit or harm to human beings should be stated as early as possible, to avoid implementing things that can represent a societal damage.

7. Limitations and future research

This research has been multidisciplinary and, therefore, benefited from multiple methodologies. While such diversity could be seen as a strength, it has also resulted in a set of disconnected literatures. The results proposed in this work are an attempt to organize the existing literatures and try to explain and integrate its contradictions, while providing a unifying theoretical model and gamification implementation approach that can – and perhaps should – be further tested and explored.

The main limitation of the research is fairly obvious; it is missing validation of the hypothesis stated. Gamification has never been applied in practice to evaluate if it can be compatible with fostering sustainable behavior in an investing platform.

In order to make a more impactful integrative literature review, the boundaries conditions should have been narrowed down more, and stated more clearly. Also, the presented theoretical framework should have been validated by experts in relevant areas.

Another point is that the method for this research was quality-based rather than quantity. In future research, it could be of interest to conduct a quantity-based evaluation. A suggestion for the future research is to use A/B-testing as a quantitative evaluation method. This methodology consists of a randomized experiment with two variants, A and B. In this case, one variant could have game elements, and the other could not include any game element. In the case this further evaluation is conducted, it is essential to secure enough time for the testing period and a good way to measure the pro-environmental performance, to properly evaluate the effect.
Another possible limitation is that no inclusion of end customers has been included in the development of the framework. In future studies, it may be of interest to also include interviews, surveys, or other types of data collection from end customers. This could lead to a better understanding of the target group and their motivations.

One of the interesting point raised in this research is that it is still not clear what effect most extrinsic game mechanics have on intrinsic motivation and how exactly they affect motivation, both positively and negatively [27]. Further research is needed, but what is suggested from the available body of research is that extrinsic rewards may have a negative effect on motivation.

To conclude, it is clear that analyzing the impact of the game elements on behavior would be very interesting to expand our knowledge on rebound effects, moral balancing, and other environmental psychology domains which need empirical data to support their theories. In order to justify moral licensing as a

driver of indirect rebound effects, future research could perhaps benefit partnering with Seeds to verify if investing in renewable energy can later translate into moral licensing in product and consumption decisions.

References

[1] M. Fagan and C. Huang, “Many globally are as concerned about climate change as about the spread of infectious diseases,” Pew Research Center, 2020.

[2] The United Nations. Sustainable Development Goals. https://sustainabledevelopment.un.org/?menu=1300. (accessed: 07.02.2020)

[3] William J. Ripple, Christopher Wolf, Thomas M. Newsome, Mauro Galetti, Mohammed Alamgir, Eileen Crist, Mahmoud I. Mahmoud, William F. Laurance, 15,364 scientist signatories from 184 countries, World Scientists’ Warning to Humanity: A Second Notice, BioScience, Volume 67, Issue 12, December 2017, Pages 1026-1028, https://doi.org/10.1093/biosci/bix125

[4] Csikszentmihalyi, M. (2000). Beyond boredom and anxiety. Jossey-Bass.

[5] Peattie, S., Peattie, K., 2009. Social marketing: a pathway to consumption reduction? Journal of Business Research 62 (2), 260–268

[6] Banerjee, Bobby & Iyer, Easwar & Kashyap, Rajiv. (2003). Corporate Environmentalism: Antecedents and Influence of Industry Type. Journal of Marketing - J MARKETING. 67. 106-122. 10.1509/jmkg.67.2.106.18604.

[7] Brown, T. J., & Dacin, P. A. (1997). The Company and the Product: Corporate Associations and Consumer Product Responses. Journal of Marketing, 61(1), 68–84. https://doi.org/10.2307/1252190

[8] Luo, Xueming & Bhattacharya, Chinmoy. (2006). Corporate Social Responsibility, Customer Satisfaction, and Market Value. Journal of Marketing - J MARKETING. 70. 1-18. 10.1509/jmkg.70.4.1.

[9] Olsen, Mitchell & Slotegraaf, Rebecca & Chandukala, Sandeep. (2014). Green Claims and Message Frames: How Green New Products Change Brand Attitude. Journal of Marketing. 78. 119-137. 10.1509/jm.13.0387.

[10] Sen, Sankar and C.B. Bhattacharya (2001), "Does Doing Good Always Lead to Doing Better? Consumer Reactions to Corporate Social Responsibility," Journal of Marketing Research, 38 (May), 225-44).

[11] Van Houwelingen, J. H., & Van Raaij, W. F. (1989). The effect of goal-setting and daily electronic feedback on in-home energy use. Journal of Consumer Research, 16(1), 98–105. https://doi.org/10.1086/209197

[12] Hutton, R. B., Mauser, G. A., Filiatrault, P., & Ahtola, O. T. (1986). Effects of cost-related feedback on consumer knowledge and consumption behavior: A field experimental approach. Journal of Consumer Research, 13(3), 327–336. https://doi.org/10.1086/209072

[13] Kappel, Karin & Grechenig, Thomas. (2009). "Show-me": Water consumption at a glance to promote water conservation in the shower. 350. 26. 10.1145/1541948.1541984.

[14] Kuznetsov, Stacey & Paulos, Eric. (2010). Rise of the Expert Amateur: DIY Projects, Communities, and Cultures. NordiCHI 2010: Extending Boundaries - Proceedings of the 6th Nordic Conference on Human-Computer Interaction. 295-304. 10.1145/1868914.1868950.

[15] Matsukawa, Isamu. (2004). The Effects of Information on Residential Demand for Electricity. The Energy Journal. 25. 10.5547/ISSN0195-6574-EJ-VOL25-NO1-2.NADEL.

[16] Seligman, C., & Darley, J. M. (1977). Feedback as a means of decreasing residential energy consumption. Journal of Applied Psychology, 62(4), 363–368. https://doi.org/10.1037/0021-9010.62.4.363

[17] Winett, Richard A & Kagel, John H, 1984. "Effects of Information Presentation Format on Resource Use in Field Studies," Journal of Consumer Research, Oxford University Press, vol. 11(2), pages 655-667, September

[18] Richard J. Torraco, Writing Integrative Literature Reviews: Guidelines and Examples First Published September 1, 2005 Research Article https://doi.org/10.1177/1534484305278283]

[19] Elsbach, Kimberly & Knippenberg, Daan. (2020). Creating High-Impact Literature Reviews: An Argument for ‘Integrative Reviews’. Journal of Management Studies. 57. 10.1111/joms.12581.

[20] Post, C., Sarala, R., Gatrell, C. and Prescott, J.E. (2020), Advancing Theory with Review Articles. J. Manage. Stud., 57: 351-376. https://doi.org/10.1111/joms.12549

[21] Grant, Cynthia & Osanloo, Azadeh. (2015). Understanding, selecting, and integrating a theoretical framework in dissertation research: Developing a 'blueprint' for your "house". Administrative Issues Journal. 4. 10.5929/2014.4.2.9.

[22] Werbach, K., & Hunter, D. (2012). For the win: How game thinking can revolutionize your business. Philadelphia: Wharton Digital Press

[23] Rode, J., Gomez-Baggethun, E., Krause, M., 2015, Motivation crowding by economic payments in conservation policy: a review of the empirical evidence, Ecological. Economics. 117, 270–282,

[24] Spash, C.L. & Theine, Hendrik. (2018). Voluntary individual carbon trading: Friend or foe?. 10.1017/9781316676349.021.

[25] Gneezy, Uri and Rustichini, Aldo, A Fine is a Price. Journal of Legal Studies, Vol. 29, No. 1, January 2000, Available at SSRN: https://ssrn.com/abstract=180117

[26] Falk, Armin, and Michael Kosfeld. 2006. "The Hidden Costs of Control." *American Economic Review*, 96 (5): 1611-1630.

[27] Bielik, P. (2012). Integration and adaptation of motivational factors into software systems. In M. Barla, M. Šimko, J. Tvarozek (Ed.), Personalized Web - Science, Technologies and Engineering: 11th Spring 2012 PeWe Workshop Modra - Piesok, Slovakia April 1, 2012 Proceedings (pp. 31–32). Bratislava: Nakladateľstvo.

[28] Deci, E. L. (1972). Intrinsic motivation, extrinsic reinforcement, and inequity. Journal of Personality and Social Psychology, 22(1), 113–120.

[29] Kosoy, N., and Corbera, E., 2010, Payments for ecosystem services as commodity fetishism. Ecological Economics, 69(6), 1228–1236.

[30] Gordon, A., Bull, J.W., Wilcox, C. and Maron, M., 2015, Perverse incentives risk undermining biodiversity offset policies, Journal of Applied Ecology, 52, 532–537.

[31] Bolderdijk, J. W., Lehman, P. K., & Geller, E. S. (2012). Promoting Pro-environmental Behavior with Rewards and Penalties. In L. Steg, A. E. van den Berg, & J. I. M. de Groot (Eds.), Environmental Psychology: An Introduction (pp. 233-242). Wiley.

[32] Schons, Laura & Sipilä, Jenni & Sen, Sankar & Mende, Gina & Wieseke, Jan. (2018). Are Two Reasons Better Than One?The Role of Appeal Type in Consumer Responses to Sustainable Products. Journal of Consumer Psychology. 28. 10.1002/jcpy.1032.

[33] Butler, C., 2010. Morality and climate change: is leaving your T.V. on standby a risky behaviour? Environmental Values 19 (2), 169–192.

[34] Bandura, A. (1997). Self-efficacy: The exercise of control.

[35] Chen, G., & Bliese, P. D. (2002). The role of different levels of leadership in predicting self- and collective efficacy: Evidence for discontinuity. Journal of Applied Psychology, 87(3), 549–556. https://doi.org/10.1037/0021-9010.87.3.549

[36] Velasquez, A., & LaRose, R. (2015). Youth collective activism through social media: The role of collective efficacy. New Media & Society, 17(6), 899–918. https://doi.org/10.1177/1461444813518391

[37] Crompton, Tom & Kasser, Tim. (2010). Human Identity: A Missing Link in Environmental Campaigning. Environment. 52. 23-33. 10.1080/00139157.2010.493114.

[38] Kasser, T., Cohn, S., Kanner, A.D., Ryan, R.M., 2007. Some costs of American corporate capitalism: a psychological exploration of value and goal conflicts. Psychologi- cal Inquiry 18, 1–22.

[39] Maio, G.R., Pakizeh, A., Cheung, W.Y., Rees, K.J., 2009. Changing, priming, and acting on values: effects via motivational relations in a circular model. Journal of Personality and Social Psychology 97 (4), 699–715.

[40] Dobson, A., 2010. Environmental Citizenship and Pro-environmental Behaviour. Rapid Research and Evidence Review. Sustainable Development Research Review, London.
[41] White, K., MacDonnell, R., & Ellard, J. H. (2012). Belief in a Just World: Consumer Intentions and Behaviors toward Ethical Products. Journal of Marketing, 76(1), 103–118. https://doi.org/10.1509/jm.09.0581
[42] Lazarus, R., & Lazarus, B. (1994). Passion and Reason. Making Sense of Our Emotions. New York: Oxford University Press.
[43] Chomitz, K. (2006). At Loggerheads: Agricultural Expansion, Poverty Reduction, and Environment, A World Bank Policy Research Report
[44] Lohmann, L. (2005). Marketing and Making Carbon Dumps: Commodification, Calculation and Counterfactuals in Climate Change Mitigation, Science as Culture, 14(3), pp.203–235.
[45] Böhm, S. and Dabhi, S., eds., (2009). Upsetting the Offset: The Political Economy of Carbon Markets. Mayfly.
[46] Spash, C. (2010). The Brave New World of Carbon Trading. New Political Economy, (15)2, pp.169-195.
[47] Susewind, M., & Walkowitz, G. (2020). Symbolic Moral Self-Completion - Social Recognition of Prosocial Behavior Reduces Subsequent Moral Striving. Frontiers in psychology, 11, 560188. https://doi.org/10.3389/fpsyg.2020.560188
[48] Giebelhausen, Michael & Chun, Helen & Cronin. Jr, J. & Hult, G. Tomas M.. (2016). Adjusting the Warm Glow Thermostat: How Incentivizing Participation in Voluntary Green Programs Moderates Their Impact on Service Satisfaction. Journal of Marketing. 80. 10.1509/jm.14.0497.
[49] J. B. Strother and Z. Fazal, "Can green fatigue hamper sustainability communication efforts?," 2011 IEEE International Professional Communication Conference, 2011, pp. 1-6, doi: 10.1109/IPCC.2011.6087206.
[50] Guyader, Hugo & Ottosson, Mikael & Witell, Lars. (2017). You can't buy what you can't see: Retailer practices to increase the green premium. Journal of Retailing and Consumer Services. 34. 319-325. 10.1016/j.jretconser.2016.07.008.
[51] R. Bartle. Hearts, clubs, diamonds, spades: players who suit muds. 1999.
[52] Jackson, T., 2010. Prosperity without Growth: Economics for a Finite Planet. Earth- scan, London.