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DIGITAL BUSINESS PLATFORMS AND SUSTAINABILITY: A STUDY ABOUT SUSTAINABLE BEHAVIOUR

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Thesis presented to Escola de Administração de Empresas de São Paulo of Fundação Getulio Vargas, as a requirement to obtain the title of Master in International Management (MPGI).

Knowledge Field: Management and Competitiveness in Global Companies

Advisor: Prof. Dr. Renato J. Orsato

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ABSTRACT

As current environmental problems suggest that present consumption and production patterns are not sustainable, technology has received attention as the mediator between scarce resources and continued economic growth. New and ground-breaking sustainable business models are emerging with the potential to realign technological development with sustainable consumption and habit. One of them is the digital platform which has disrupted several industries. As platform-based businesses are rapidly acquiring market share, one could question their role in sustainability.

This thesis project focuses on digital platforms for sustainability, and it aims to investigate the features that a digital platform for sustainability should have to develop and support users' sustainable behaviour. Drawing from the current literature and to answer such a question, a qualitative interview-based research was performed. The study subject chosen was greenApes, a digital-based certified B corporation that promotes sustainable behaviour via social network. The thematic analysis performed on the 15 interviews' resulted in five main features, which may play a key role in the context of a digital platform for sustainability: Gamification, Social Network, Community, Clarity and Target. A framework was developed based on these features. Digital platforms for sustainability may use the framework to verify its adequacy in incentivizing sustainable behaviour.

KEYWORDS: Digital Business Platform, Social Network, Sustainability, Sustainable Behaviour

RESUMO

Os problemas ambientais sugerem que os atuais padrões de consumo e produção não são sustentáveis. A tecnologia tem recebido atenção como mediadora entre os recursos escassos e o crescimento econômico contínuo. Novos modelos de negócios sustentáveis e inovadores estão surgindo com o potencial de realinhar o desenvolvimento tecnológico com consumo e hábitos sustentáveis. Um deles são as plataformas digitais que tem desorganizado diversos setores. Como as empresas baseadas em plataformas estão adquirindo rapidamente participação no mercado, pode-se validar seu papel na sustentabilidade.

Este projeto de tese se concentra em plataformas digitais para a sustentabilidade, e tem como objetivo investigar os recursos que uma plataforma digital para a sustentabilidade deve ter para desenvolver e apoiar o comportamento sustentável dos usuários. Com base na literatura atual e para responder a essa questão, foi realizada uma pesquisa qualitativa com base em entrevistas. O assunto de caso escolhido foi a greenApes, uma empresa B certificada com base digital que promove o comportamento sustentável por meio das redes sociais. A análise temática realizada nas 15 entrevistas resultou em cinco recursos principais, que podem desempenhar um papel fundamental no contexto de uma plataforma digital de sustentabilidade: Gamificação, Rede Social, Comunidade, Clareza e Target. Uma estrutura foi desenvolvida com basenessos recursos. As plataformas digitais para sustentabilidade podem usar a estrutura para verificar sua adequação no incentivo ao comportamento sustentável.

PALAVRAS CHAVE: Plataforma de negócios digitais, rede social, sustentabilidade, comportamento sustentável

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1. Introduction

Current environmental problems suggest that present consumption and production patterns are not sustainable (Pouri et al., 2018), with global warming being a prominent example of such problems. Technology has received attention as the mediator between scarce resources and continued economic growth (Söderholm et al., 2019). The ICT-enabled economy has altered and, in some situations, disrupted dominant patterns of consumption and production, suggesting the existence of opportunities and threats for sustainability arousing from digitalization (Pouri et al., 2018). Nevertheless, technology has two contradictory effects: on the one hand, by increasing individual consumption, it intensifies ecological impacts. On the other hand, technological innovations can be an essential means of improving sustainable lifestyles, such as energy-efficient products and ICT services that incentivize sustainable behaviours by amplifying awareness of global ecological problems (Backhaus et al., 2012). The conversion to more sustainable production and consumption trends compels changes in conventional business models (Edbring et al., 2016; Bockenet al., 2019). New and ground-breaking sustainable business models are emerging with the potential to realign technological development with sustainable consumption and habit (Mont, 2004).

One of the most disruptive business models that emerged in the past decade or so is the digital platform (Teece, 2017). Digital platforms can be defined as an "extensible, digital medium of exchange for products,

information, and services" (Glaser et al., 2019, p. 121) that creates value by enabling exchanges and interactions between two or more interdependent groups of players in scalable networks of resources and users (Glaser et al., 2019; Parker et al., 2016). Platforms have radically transformed how goods and services are exchanged between providers and users. In particular, they have been changing the way that people share and conduct transactions (Pouri et al., 2018). As platform-based businesses are rapidly acquiring market share in all kinds of industries, one could question their role in sustainability (Downes et al, 2013). Many of the world's most valuable and powerful businesses are platform-based. Alibaba, Google, Facebook, and Amazon have reached a global presence and towering market capitalizations. Nonetheless, reaching success in the platform-based arena is extremely difficult. The vast majority of digital platforms fail. According to the Harvard Business Review, they fail quickly – in less than five years. A similar fate waits for start-ups; about 90% of them fail within their first year (Start up Genome, 2011). The primary causes of failure relate to misreading market demands and not being able to develop trust with users and partners, essential for long-run survival (Giardino, 2014).

In light of the above, this study addresses the research areas of sustainable behaviour and digital platforms. Indeed, platform-based businesses for sustainability have remained an under-investigated research area and empirical studies on digital platforms remain scarce because the issue is new, complex and yet to be fully understood (Schor et al., 2017).

Therefore, these research contexts were chosen to address a gap in the intersection of sustainable behaviour and digital platforms for sustainability literature. More precisely, the analysis seeks to answer the following research question:

"Which platform's features may encourage users' sustainable behaviours?"

To answer such a question, a qualitative approach was adopted based mostly on semi-structured interviews. In greater depth, the former concerns a thematic analysis, which allowed to explore the features involved in the complexity of digital platforms for sustainability by systematically analysing the answers provided by the respondents. Specifically, *greenApes*, a digital-based certified B corporation that promotes sustainable behaviour via social network, was chosen as the object of the study. The findings and results of the analysis are then arranged to provide a framework for digital platforms for sustainability that might help them test the adequacy of their digital platforms in incentivizing users' sustainable behaviour.

The proposed research project is relevant for the practice of management as it tackles a new trend, digital business platforms for sustainability, that influences both the practice and theorization of business administration and as it offers insights into the development of a digital-based business for sustainability.

As for the organization of the thesis, it will be structure as follows: the second section reviews the existing literature of the abovementioned

two main areas: (i) Sustainable Behaviours and (ii) Digital Business Platforms. Section 3 explains the research design and methodology. Section 4 presents the performed data analysis and results. Section 5 presents the discussion about the findings and the developed framework. Section 6 presents the conclusion of the study. Section 7 reports the references used throughout the work.

2. Literature Review

The section provides the conceptual groundwork for the study. It presents a review of the existing literature clustered in three areas: sustainable behaviours and digital platforms. Each area is then further disentangled in its subsections.

2.1 Sustainable Behaviour

Several authors in the sustainability literature suggest that there is a strong necessity for changing consumption patterns and the prevailing economic system grounded on limitless growth in a resource-finite world (Cavanagh et al., 2004) Besides, the global consumerist class keeps increasing as people in developing countries spend their rising purchasing power to imitate the consumption levels of economically developed countries (WEF, 2011). Being the last player in the value chain, through their behaviour, consumers can establish tendencies and determine preferences while encouraging or refusing products, brands, or other characteristics such as ethical, social, and environmental considerations (Backhaus et al., 2012). Indeed, as the DEFRA (Department of Environment Food and Rural Affairs) has stated in 2002, sustainable development will not take root unless people modify their behaviour to become actively engaged across countries. Sustainable development has been defined as the development that satisfies the needs of the present without compromising the ability of future generations to do the same (Brundtland et al, 1987). Building on the

definition of Webster (1975) a socially conscious consumer behaviour "*takes into account the public consequences of his or her private consumption or who attempts to use his or her purchasing power to bring about social change*" (Webster, 1975, p.188). Other scholars advanced several ways of determining responsible consumer behaviour (Belch, 1982, Mayer, 1976), combining the environmental and social scopes into the same concept. It was Roberts (1995) who divided these two features and suggested a scale with two separate dimensions (i.e., social and environmental) to measure responsible consumer behaviour. From that study, Webb et al. (2008) concluded that no measure provided an up-to-date way of measuring responsible consumer behaviour because of the extent of the array of social problems that exist.

This section is divided into three subsections: Sustainable Lifestyle, Sustainable Consumption, and Eco-citizenship. Eco-citizenship will be the concluding subsection as it involves integrating sustainable lifestyle and consumption principles into everyday patterns of behaviour. Specifically, *sustainable consumption* is connected to the process of purchasing, consuming, and disposing of products, while *sustainable lifestyles* encompass a broader set of activities and values, such as interactions and education, which include, but are not limited to material consumption (Thidell, 2010).

2.1.1 Sustainable Lifestyle

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Consumerism is the general lifestyle approach in developed countries, an attitude that is not sustainable in the long term (Lorek et al., 2015). As solutions are being investigated, Agenda 21 recognizes that "fundamental changes in the way societies produce and consume are indispensable for achieving global sustainable development" (UN, 2004). For Mont (2007), *sustainable lifestyles* represent patterns of action and consumption, assumed by individuals to associate and distinguish themselves from others, which consist of meeting essential needs, offering a better quality of life, limiting the use of natural resources and emissions over the lifecycle, not jeopardizing the needs of the future generation. Indeed, *sustainable lifestyles* provide a broad concept encapsulating more complex interactions about consumer choices and behaviours, while *sustainable consumption* is a subsequent effect of what we consume (Picha et al., 2019). A *sustainable lifestyle* relates to a pattern of behaviours of an individual who maintains balance with the society, economy, and environment, which is reflected by several environmental practices to be "living well within earth's limits" (Lubowiecki-Vikuk et al., 2020). Devuyst and Van Volsem (2001) describe sustainable lifestyle as "the sum of all habits that together can be identified as a distinct "way of living" of a human being, which guarantees a basic quality of life that can be maintained indefinitely by a certain population and therefore remains within the carrying capacity of the ecoregion considered". According to Aydın and Ünal (2016), consumer lifestyle has an impact not only on data about the environment or attitudes towards the environment but also on responsible consumption. When analysing sustainable

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behaviours, Onel et al. (2018) differentiated three consumer archetypes with distinct sustainable consumption strategies: holistic sustainable consumers, transitional sustainable consumers, and restricted sustainable consumers. Moreover, the evidence indicates that it is unlikely to decrease the effect of society's lifestyles only by increases in production efficiencies, collective shifts towards goods and services with lower climate change impacts is needed (Lubowiecki-Vikuk et al., 2020). As demonstrated, a change towards sustainable lifestyles is not achievable by a single actor or by "top-down" processes (Uyterlinde et al., 2012). The active participation, effort, and involvement of every significant stakeholder is required for a shift towards a more sustainable society, in which a high quality of life is attained through low-impact lifestyles (Uyterlinde et al., 2012).

2.1.2   Sustainable Consumption

Sustainable consumption may be defined as the use of services and products to satisfy basic needs and bring a better quality of life while minimising the use of natural resources as well as the emission of waste and pollutants over the life cycle of the service or product to not jeopardise the needs of future generations (Glavič & Lukman, 2007). In the last few years more sustainable products, services, and social innovation plans have emerged making sustainable consumption achievable for a larger number of people (Uyterlinde et al, 2012). However, there is no indication that even the pace of damage to the ecological world base is diminishing, but quite the opposite (MEA, 2005; Worldwatch Institute, 2012). To feed and fuel

21st-century lifestyles, Earth's biocapacity is overused by at least 56% (WWF, 2020). The necessity to tackle unsustainable lifestyles and their collateral effects has been emphasized in 1992 by the international program for a sustainable society, known as Agenda 21 (UNCED, 1992). A few years later, the UN Johannesburg Plan of Implementation recognized shifting unsustainable levels of production and consumption as one of the main features of sustainable development. In 2015, the Sustainable Development Goals (SDGs) were proposed as part of "The 2030 Agenda" UN Resolution (SDG, 2015). Those *Goals* are a set of 17 global goals meant to be a "blueprint to achieve a better and more sustainable future for all" and they are planned to be achieved by the year 2030. According to the SDGs, in particular SDG 12, consumption is sustainable if it satisfies the necessities of the present without compromising the ability of future generations to meet their own needs (SDG, 2015). Sustainable consumption is linked to the course of purchasing products and services, consuming, and disposing of (Mont, 2007). Both the direct and indirect impacts from consumption behaviours need to be allocated to the consumer, such as fuel combustion in a household, and the indirect impacts created during the production and delivery of products and services (Uyterlinde et al., 2012). Bilharz et al. (2011) have defined three key features of sustainable consumption: relevance, endurance, and externalities. Relevance targets at a significant sustainable consumption level in terms of resource usage and emissions. Endurance is based on the intergenerational nature of sustainable development as well as from the

vision that consumption is not a singular act but a sequence. Furthermore, sustainable consumption choices should implicate positive externalities, that affect third parties such as other consumers as well as suppliers (Bilharz et al., 2011).

2.1.3   Eco-citizenship

Several policies and strategies for sustainable daily life have been introduced by governments and businesses, mostly based on technological innovations for decreasing ecological impacts of manufacturing, designing higher quality products, and offering a structure for collective services. Furthermore, sustainable lifestyles can be shaped not only through technological innovation but also through social innovation (Mont et al., 2014). As stated before, goals as diminishing greenhouse gas emissions, waste, and increasing energy and water efficiency can be achieved only with high levels of public participation. Moreover, since consumption is significantly entwined with social relations and norms, the individual behavioural shift is more related to inducing a change in social habits and trends (Seyfang, 2006). The action of consuming allows citizens to identify, through selections and preferences, environmental, political, cultural, social, and economic macro-practices. Therefore, through responsible consumption, people can become "eco-citizens" (Marchand et al., 2008). The concept of "ecological citizenship" is still an under-researched area (Asilsoy et al., 2018). Dobson (2003) present ecological citizenship as a radically new kind of citizenship, which tackles environmental issues in

depth. It is presented as a virtue-based version of citizenship that is non-reciprocal, noncontractual, and non-territorial. In that sense, according to Dobson, the term comprehends the world as a whole and it focuses on shared value via collective duty and responsibility (Asilsoy et al., 2018).

Overall, "ecological citizenship" can be viewed as a shared personal commitment to sustainability; in other words, as it has been stated before, it integrates sustainable lifestyles and consumption principles into everyday patterns of behaviour. Specifically, *sustainable consumption* is connected to the process of purchasing, consuming and disposing of products, while *sustainable lifestyles* encompass a broader set of activities and values, such as interactions and education, which include, but are not limited to material consumption (Thidell, 2010).

2.2 Digital Platforms

The birth and propagation of mobile computing, cloud computing, in-memory technologies, and social media, are collectively referred to as digital platforms (Nambisan, 2013). A platform is a constructing block that provides an essential function to a technological system and serves as a foundation upon which products, technologies, or services can be created (Gawer, 2009). The European Commission (2015) has defined platforms as an institution running in two (or multi)-sided markets, which utilizes the Internet to enable interactions between two or more distinct but interdependent groups of users to generate value for at least one of the

groups. Besides, certain platforms also qualify as intermediary service providers as general internet search engines (e.g. Google, Bing).

As Digital Business Platforms are a new phenomenon, their impact on innovation and competition still needs to be defined (Cusumano and Gawer, 2012). The need for better understanding of platforms is crucial as Parker (2016) suggest that companies must include platform thinking in order to compete in the future. Indeed, any industry in which information plays a key role is a candidate for platform revolution (Parker et al.,2016).

This section is divided into eight subsections: Digital Platform Architecture, Digital Platform Characteristics, Digital Platform Governance, Digital Business Platform model, Traditional Businesses versus Digital Businesses platforms, Platform business model innovation, Digital Platforms as Sustainable Innovation for Business Models and at last Digital Platforms: Social Network and Gamification

2.2.1   Digital Platform Architecture

Architecture is defined for any platform as the explicit design for product services set up to enable users' interactions. The very first step entails defining the core interaction, that is to say, the interaction that constitutes the nub of the value creation mission of the platform. It consists of three main parts, namely: the participants i.e. the producer and the consumer of value, the value unit i.e. the original exchange of information valued by the users and the filter i.e. the algorithmic device employed to ensure that appropriate value units are exchanged amongst the participants. Then, to

optimize the core interaction, three main functions shall be implemented by the platform: (i) pull i.e. the platform should attract participants and then keep them engaged over time, (ii) facilitate i.e. the platform should incentivise the interactions of the network's users by supplying them with appropriate communications and rules, and last but not least, (iii) match i.e. the platform should use the information available about the users in order to pair them as effectively as possible (Parker et al., 2016).

2.2.2   Digital Platforms Characteristics

Kim (2015) proposes three important characteristics of digital platforms:

First, platforms enable *two-sided markets, which consists in* a platforms' capability to act between different types of consumers and its capacity to match value between them. This approach is broadly implemented, i.e., as Google offers data for customers and the possibility to target them through advertising for companies, Amazon offers products for end-users and producers may use Amazon platform to sell them.

Second, the platform should enable *network effects,* which are described by Katz and Shapiro (1985) as the direct relationship between the utility of a single consumer and the total number of users using the same product in the ecosystem. Network effects or externalities are categorized into direct and indirect network externalities. Direct effects happen when an "nth" customer enters into the network while indirect effects are generated by an increase in the demand for complementary products or services. Van Parker et al. (2016) define network effects as

demand-side economies of scale such that the value to existing consumers rises in the number of subsequent consumers, differing from supply-side scale economies that arise from low marginal costs. They affect user willingness, user adoption, and therefore the value of the platform. For Suarez (2004) stronger network effects are linked with higher customer retention and loyalty by increasing the switching costs for the user. Four important sources of network effects can be found in the literature: (1) through a direct impact of the number of purchasers on the product's quality; (2) through indirect effects. An example is the "hardware-software paradigm": a consumer purchasing a personal computer is interested in the number of other customers buying related hardware since the quantity and diversity of software being developed for a particular computer is a rising function of the total pieces of hardware being bought; (3) When product information is more easily available for more popular brands; (4) the role of market share as a signal of product quality (Katz & Shapiro, 1985). Parker et al. (2016) identified four types of network effects in two-sided markets, namely same-side or direct effects (i.e. the effect that the users from one side have on the users from the same side) and cross-side or indirect effects (i.e. the impact that users from one side have on users from the opposite side), both of which can be either positive or negative.

Third, digital platforms allow the creation of an *Ecosystem.* The concept was defined by Moore (1996) as a community sustained by a groundwork of interacting organizations and individuals. Within these circumstances, platforms may build economic communities of consumers

and/or companies and sustain them through coordination of value provision (Gatautis, 2017).

Furthermore, platforms can be categorized depending on the nature of the fees charged (membership or utilization), on their market dominance (monopoly, duopoly, or N-platforms), or on whether they play on one or both sides of the market (single homing vs multihoming) (Caillaud and Jullien, 2003). Gawer (2014), for instance, proposed that platforms should be seen as developing (meta-) organizations that join and coordinate actors, create value by utilizing economies of scope in supply and/or in demand, and include a core-periphery structure. In this respect, Gawer (2014) located and distinguished platforms within three broader settings: within firms (internal platforms involving one company, closed interfaces), across supply chains (supply chain platforms involving an assembler and suppliers, selectively open interfaces), and across industry ecosystems (industry platforms involving a platform leader and complementary open interfaces).

Digital platforms have given societies and organizations an unparalleled potential for innovation through their affordability, ease of adoption, and ease of connection with users, customers, and suppliers (Yoo et al., 2012). Such platforms have disrupted the conventional linear equation: IT complexity is no longer proportional to resource availability (financial and human capital), giving the possibility to companies with low capital to innovate as their resourceful counterparts. Moreover, digital

platforms play an essential role in enabling and sustaining online communities (Spagnoletti, 2015).

2.2.3 Digital Platform Governance

Tiwana et al. (2010) definition of governance defined as who takes what decisions about the platform. According to the authors, the design of a platform's governance structure can be analysed from three distinct viewpoints, namely: *decisions rights portioning* i.e. evaluating the way decision making power is shared among the owner(s) and the module developers, *control* i.e. studying the type of tools, formal and/or informal, that the owner employs to encourage developers to follow desirable conducts and *proprietary vs shared ownership* i.e. considering whether the platform's property belongs to a single firm or is divided between different owners. Yet, they define three kinds of openness decisions faced, that is to say: choices about manager/sponsor participation, secondly about developer participation, and thirdly about users' participation. As concerns the last set of decisions, of particular importance is producer openness, meaning how free producers are to add content to the platform. Nevertheless, the authors state that one shouldn't suppose that open/closed decisions are a dichotomy, thus similar platforms may decide to use different openness choices and that platforms modify their degree of openness over time (Tiwan et al., 2010).

2.2.4 Digital Platforms Business model

The business model definition has seen a lot of variations and transformations linking it to the different operational and strategic components (Goyal et al., 2017). For Amit and Zott (2001), the business model can be viewed as a blend of transaction content, structure, and governance in a way that it generates value through the exploitation of business opportunities.

Regarding the "platform business model", this concept is used to describe companies which develop platforms for their activities. Indeed, the business model of the platform was analysed by several researchers aiming to identify business model innovative aspects. Kim (2015) basing on Kim (2014) and Eisenmann *et al.* (2008) has suggested three main aspects to describe a platform business model.

First, the platform's *components and rules* which are followed by platform users.

Second, platform providers deal with *demand, supply and external parties*. External parties mainly refer to advertisers, who are interested in demand and supply sides. Different suppliers, content providers, producers and developers might act as supply-side parties and demanders, consumers, and end-users might act as demand-side parties. Third, the *transactions* between these parties are facilitated through the platform. As more transactions happen, more direct and indirect network effects are created, and the value creation mechanism is auto alimented.

The business model concept addresses the vital aspect of customer segments as companies aim to satisfy the selected segment's needs with

their value offering proposition (Gatautis, 2017). Digital platforms make it possible to reach any customer segment in the international market, however, different kinds of user segments will use the platforms (Gatautis, 2017). According to EY (2016), four types of users can be found. The first one is *platform owners*, who are responsible for developing and ensuring platform functioning. Secondly, key partners, which consist of organizations involved in platforms activities and offering opportunities to platforms owners to extend value creation possibilities. The third type of users is peer producers, different organizations contributing to platform activities with value offerings while looking for chances to increase their value offerings and obtain additional revenues. The last group is Peer consumers, which are persons or organizations that act as end-users of the platform thus acquiring value from the use of the platform.

From the point of view of value creation, Parker (2016) has identified important aspects of the platform business model that enable value creation. Value creation may be enabled by *finding new sources of supply* and decreasing market barriers to entry.

Second, by *reconfiguring value consumption* through the enablement of new forms of consumer behaviour, value is not associated only with the product or service, but also with the experience obtained through the platform.

Third, by *reconfiguring quality control*. With community development, the platform users assume an active role in content creation and content sharing.

Fourth, with *re-intermediation*, by serving as the key destination site in accessing desired services and goods.

Last, by enabling *market aggregation*, with being a one-stop-shop and allowing customers to access different products on the same site. From the point of view of financial aspects of platforms, Oxera (2015) outlines the following three characteristics.

First, the variation of the platform impact on operating costs: some users of e-commerce platforms may prefer to sell directly to avoid the fees charged by the platform. However, platform distribution channels are cheaper than brick-and-mortar stores.

Second, the reduction of search and transaction cost: online platforms such as e-commerce or recruitment platforms may take advantage of economies of scale. By giving consumers different ways to find potential products/services more efficiently (e.g. by increasing the candidate pool of potential hires) and by reducing the time and cost of searching, the costs of sales transactions are lowered.

Third, the reduction of marketing costs: Online platforms make it easier for businesses to optimize and measure the effectiveness of their marketing.

2.2.5   Traditional Businesses versus Digital Businesses platforms

Traditional businesses are founded on a linear value chain with a value configuration model consisting of the transformation of raw materials into products. Unlike traditional businesses, Business platforms don't buy

inputs, create final products, and sell them. Instead, they search for participants and then sell each group of participants access to the other group of participants. The different users are the inputs that they use to produce the intermediation service they supply (Evans et al., 2016). For Parker (2016) Digital Business Platforms have the advantage of scaling more efficiently by eliminating gatekeepers which also allows customers to have more freedom in choosing the products that satisfy their needs.

Besides the characteristics of digital platforms explored in section 2.3. Accenture (2016) proposes another two.

The first one is the *Distribution Power law*: Platforms business models enable scaling, and supply-side platform participants can generate profits in the "long tail" of the distribution curve with a minimal scaling cost, thus avoiding diminishing returns typical of traditional (linear) models.

The second one is *Asymmetric Growth and Competition*: Platforms can be the arena where asymmetric competition takes place. It is grounded on driving the demand of a core market through complementary markets, which are often subsidized (or free) to users and which cross industry lines. This happens when two companies go after market opportunities with very different approaches and resources. These characteristics reveal the particular nature of the platform business model and its differences from the classical approach to value creation. From the traditional perspective, value is created linearly while in the business platform the approach to value creation is different. The platform acts as an orchestration mechanism that structure value creation to ensure its continuous creation (Gatautis, 2017).

The significant distinction between platforms and most traditional businesses is that platforms are multisided: they generate valuable ecosystems run by network effects. The more users there are on one side of the platform, the more valuable the platform becomes to other users' groups (Evans et al., 2016). This mechanism is connected to the *chicken-or-egg dilemma* that pipelines businesses do not suffer from: users won't use a platform unless it has value, and a platform won't have value unless users use it (Parket et al., 2016). Thus, the central asset of a platform is its network of creators and customers. In opposition to pipeline strategies, resource organization is more significant than resource control, and simplifying connections and handling interactions have the priority than internal efficiency maximization (Van Alstyne et al, 2017).

2.2.6 Platform business model innovation

Business model innovation can be defined as transformations in business reasoning that are new to the firm, yet not necessarily new to the world, and must result in visible changes in the practices and activities of a Business Model (Bouwman et al., 2008). The changes which are introduced might be caused by technologies development (such as social media, IoT, big data), the situation in the market (competitive pressure) or even by political decisions (legal regulation). As technologies develop rapidly and markets became very dynamic, business model innovation became a necessity for a company to operate in the market (Gatautis, 2017). Platforms are penetrating several industries by facilitating cooperation

between different companies and by affecting value creation mechanisms (Accenture, 2016). Consequently, companies need to understand how to transform their business models in order to successfully compete in platform-based digital ecosystems. However, it is not an easy task to innovate business models. By analysing the early attempts to apply platform business model innovation, Parker et al. (2016) have identified 6 key factors why it may fail.

First, the platform may fail to optimize openness: platforms behave as foundations for the ecosystem and openness ensures the involvement of different players. Low openness will result in low involvement and lack of generation of network effects.

Second, users might not be engaged sufficiently: platform development should be according to user needs through improved features and functionality. Platforms that fail in following "digital Darwinism" fail in the long term.

Third, when platforms do not share the surplus created within all the players: the value created should benefit all involved parties. If companies that are implementing the platform business model retain most of the value created without sharing it with the rest involved parties, the business model is not sustainable in the long term.

Fourth, when the focus of the platform is not on the right side: platforms business model is based on a certain balance between multiple and different sides. Sometimes it is important to focus on attracting

consumers over producers, while sometimes may be the reverse, and both sides might need equal attention from the outset.

Fifth, when the priority of the platform might be on making money instead of critical mass: building critical mass is an important factor in platform business model development in order to generate network effects. Facebook and Google attracted many users offering free value and then found ways to monetize the platform. Companies fail in platform business model implementation if monetization of platforms overtakes critical mass.

Six, for a lack of imagination: Platform business model needs cooperation with other ecosystems actors instead of simple sell-buy relations. Some companies, such as Sony, HP or Garmin committed the mistake of emphasizing the products over the platform ecosystem.

2.2.7 Digital Platforms as Sustainable Innovation for Business Models

In an extremely competitive and uncertain world, entrepreneurs and managers are looking beyond products and processes to attain revenue growth and to respect demanding environmental standards. Indeed, the concepts of business model and sustainability have been significantly addressed in the literature. With the intensification of global sustainability pressure, fundamental questions have been raised about the impacts of present corporate business models on the sustainability of the economy and society. From this perspective, business model innovation is considered an essential baseline to accomplish sustainable business models (Geissdoerfer,

2018). Over the years, business model innovation has acquired many definitions: as a change in the structure of either the whole business model or singular parts of it, either as a response to opportunities or challenges in the business's industry or as a medium for diversification and innovation (Lindgardt et al., 2009).

Business model innovation is increasingly acknowledged as a solution for conveying greater social and environmental sustainability in the industrial organism (Lüdeke-Freund, 2010). As part of the methods to involve different stakeholders in fostering ideas for a more sustainable society, the European Commission has been investing and supporting the work of technical platforms (Mont, 2012). These platforms' purpose is the creation of visions, the proposal of concrete research agendas, and the employment of research strategies. Socio-technical platforms have been set up in recent years to tackle the question of how more sustainable lifestyles can be encouraged and enabled in contemporary society (Meroni, 2007). Indeed, research demonstrates that technical, but also progressively social innovation, is vital to driving significant changes in the ways we currently live and in the ways we frame and define the quality of life and well-being (Manzini, 2006). The creativity and network of many platforms can play a critical role in achieving the radical changes that will shift current unsustainable lifestyle trends, provide innovative business models, and strong support systems to make complex changes easier. The socio-technical platform may help close the gap between techno-economic and social science research by using a challenge-based approach that will bring

together resources and knowledge across different fields, disciplines, and technologies and by engaging the power of social actors, stimulating interactions among them, and enabling dynamic social processes (Mont et al., 2009). Since food production and consumption are responsible for about one-third of the world's overall household environmental impact, consumers' choices have a main role in the change towards more sustainable development (Simeone et al., 2020). One factor that determines what, why, and how much individuals should consume is the social environment. The use of social networks has revealed to modify the way consumers search and select products and services. Social media, specifically social networks, are becoming prominent sources of information and means of communication, specifically in the consumption of goods (Zhang et al., 2019).

2.2.8   Digital Platforms: Social Network and Gamification

During the last few years, the acknowledgement that the networks endorsed by digital platforms are not mere forums in which individuals congregate has been rising. Social networks generate significant value for the participants: individuals, organizations, and the society at large by providing social support, creating new channels to boost sales and profits, enhancing knowledge and public awareness, and sustaining innovation (Kim et al., 2013). It has been claimed that social networks may play a critical role in the challenge to transform unsustainable social-ecological interactions into new trajectories that sustain the capacity of ecosystems to

provide wellbeing for present and future generations (Westley et al., 2013). They may do so by being a key actor in the challenge of converting governance systems into new adaptive models (Folke et al., 2005). Boyd et al. (2007) consider social networks as digital-based services that consent people to first create a profile within a limited system, then organize a list of other users with whom they have a relationship, and lastly view and cross their list of contacts and those made by others within the structure. For Aggarwal (2011), a social network is defined as a set of interactions or relations, where the nodes consist of users or entities, and the edges are the interactions between these actors. Social networks can be categorized either in the context of organisms such as Facebook which are planned for social interactions, or in terms of other sites such as Flickr which are intended for a diverse service such as content sharing, but which also allow an extensive level of social interaction (Aggarwal, 2011). Social networking sites (e.g., Facebook, Twitter) allow the development of online communities built upon shared interests and values, which generate and share enormous varieties of content that is by nature relevant and meaningful to the constituent groups (Lee et al., 2013). The main purpose of social networks is to engage people (Kujur et al., 2017). Engagement is the amount of involvement, interaction, intimacy, and influence that users develop over time with the platform (Safko et al, 2010). To achieve better user engagement on social networks platforms the concept of "*Gamification*" has emerged. Gamification is described as the use of game design elements in non-game contexts and is meant to create gameful and playful user

experiences, to incentivize desired user behaviours, and to increase of the user's joy of use (Deterding et al., 2011). Gamification dynamics may include gamified graphic design (e.g. Avatars), Reward, Status, Challenges, Achievement, Self-expression and Altruism (Bunchball, 2010). Huotari et al., (2016) have highlighted the experiential nature of gamification as a practice to support users' overall value creation acquisition. Moreover, as Zichermann et al. (2013) have explored in their research, gamification can revolutionize business thinking and practices and when integrated with business strategy, serves as an invaluable change agent to increase a business competitive position. Therefore, the process of gamification can take place in business models and be implemented according to the business objective you want to achieve. The benefits of gamification such as the increase in motivation, performance, and engagement of users can be boosted when applied together with social network features (Toda et al., 2019). Moreover, Lee et (2013) state that gamification dynamics are congruent with necessary changes to promote sustainable behaviour and social media technologies can enable peer-to-peer relations and motivate behaviour change effectively.

3. Methodology

This section outlines the context, and it presents the research question. Then, the explanation of the applied methodology to conduct the research

follows. Lastly, Section 3.3 provides the description of the data collection process and Section 3.4 the description of the interviewees' profiles.

3.1 Research Context

The study addresses the research areas of sustainable behaviour and Digital Business Platform for the promotion of sustainable behaviour. They were chosen as research contexts to address a gap in the intersection of platform-based businesses for sustainability. Indeed, whilst extensive literature exists on the concepts of sustainability and digital business platforms, the connection between them has remained an under-investigated research area and empirical studies on digital platforms remain scarce because the issue is new, complex and yet to be understood (Mattila et al., 2020; Schor et al., 2017). The research is interested in understanding the main features that a digital platform for sustainability should have to develop and support users' sustainable behaviour. Hence, as already presented in the Introduction, the research question to be investigated is: *"Which platform's features may encourage users' sustainable behaviours?"*

3.2 Research Approach

The approach employed is an interview-based qualitative research approach (Blaikie, 2000), resulting in the development of an original framework. In other words, this study is carried out through a three-step qualitative

methodology[1]. The first step corresponds to the identification of a suitable object of study.

GreenApes was the case chosen as it was one of the first digital platforms with gamification features aimed at increasing sustainable behaviour in its users, thus suiting well the subjects studied in this study and explored in the Literature Review. Therefore, it represents a proper case to investigate the digital platform features that may impact on sustainable behaviour. Moreover, it was given the possibility of having direct communication with greenApes CEO and the chance to participate in the fieldwork as one of greenApes representatives.

There are several digital platforms for sustainability, especially in the food-waste sector, but in the ambitious segment of platforms promoting sustainable behaviour, there are fewer cases. GreenApes was chosen not only because it is a case that encompasses the main themes of the project thesis, sustainable behaviour and digital platform, but for other several reasons. First of all, it is the first digital platform in Italy that was created to create and maintain sustainable behaviours in its users. Indeed, greenApes was founded in 2012 and has already overcome the Start-up phase, becoming one of the 10% of businesses that are able to survive the first years (Start up Genome, 2011).

There are two main competitors of greenApes on Apple App Store, JouleBug and EcoAttivi. JouleBug is an international app like greenApes,

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[1] Such a methodology has been chosen as it is often deemed the most appropriate to develop and frame concepts from the investigation of a complex matter (Sutherland & Jarrahi, 2018).

that promises to make every day users' habits more sustainable through tips, rewards, challenges and badges to be publicly recognized as a sustainable citizen (JouleBug, 2020). EcoAttivi is an app born in 2019 that aims to create a community where users can complete actions, quizzes and missions through gamification features in order to increase their sustainable behaviour and receive rewards. It is based in Italy and works with several municipalities e.g. Biella and Pescara (EcoAttivi, 2020).

Compared to JouleBug and EcoAttivi, GreenApes is the only platform that has received funding from the European Union (EU Horizon 2020 research and innovation programme).

By comparing the evaluations on Apple store of JouleBug and EcoAttivi, greenApes is the best performer. Indeed, greenApes has scored 4,5/5 with 67 reviews, while JouleBug has a score of 3.0/5 with 3 reviews and EcoAttivi 3,3/5 with 16 reviews. Furthermore, greenApes has shown better web and social media presence through a *hashtag tracer* calculator. In the last month (December 2020), greenApes has collected 72 mentions (29 on the web, 43 on social media) while JouleBug 33 (29 on the web and 4 on social media) and EcoAttivi 25 (6 on the web, 19 on social media). Also by looking at the number of followers, greenApes shows a greater reach and engagement by having 1862 followers on its Instagram page (data from the 28/12/20), while JouleBug has 321 followers and EcoAttivi founders' Instagram profile, Achab Group, has 284 followers.

Apart from having the privilege of direct contact with the CEO, greenApes was deemed as the best candidate for this project thesis based

on these criteria that testified superior user-friendliness of the app and greater presence and awareness on social media.

The second step encompasses conducting in-person semi-structured interviews and analysing the answers through thematic analysis. By using such an approach, this study aims to address the research question grounded in the activities, opinions and understandings of the interviewees (Corbin & Strauss, 1990). Specifically, thematic analysis is used to systematically recognize, classify, and suggest patterns of meaning across a data set (Clarke and Braun, 2015). To assess the validity of the thematic analysis Clarke et al. (2015) guidelines were followed. Several "themes" were derived by analysing the language and terms of the interviewed actors which were transcribed word-by-word. Such themes are derived through a coding process: that is the performance of multiple revisions of the data collected to let an interpretation of the subject emerge; then the concepts resulting from the codification were categorized in themes to better understand the phenomenon (Blaikie, 2000; Gioia et al., 2013). The quotes from which the main themes were derived, were chosen based on their significance and exemplariness to represent the codes. Additionally, the interviews were structured into two parts with two different purposes, as it will be expanded upon later: the first part aimed at collecting answers to be interpreted through the thematic analysis; the second part aimed at collecting users' feedback on potential additional features for the greenApes app, and it was conducted through forced-choice questions i.e. respondents must choose a response choice that delivers a specific answer to the

question (yes/no answer in this case) (Wivagg et al., 2008). The third step of our methodology focuses on the development of a framework for firms to test the adequacy of their digital platforms in incentivizing users' behaviour.

3.3 Data Collection

Secondary data about the greenApes Bcorp was extracted from greenApes website, Facebook page, as well as media articles. Primary data was collected via informal communications with the greenApes CEO, Gregory Eve. Other primary data about user preferences were collected through 15 semi-structured interviews during the "Junglathon" in the city of Prato (Italy), a workshop from the 25th to the 27th of September 2020, of co-design and co-creation dedicated to the development of innovative ideas connected to the concept of "Urban Jungle", a sustainable city community. It was deemed as an adequate occasion for the data collection as it allowed interviewing individuals who are concerned about sustainability and thus an appropriate potential user that can allow greenApes to properly target this segment based on the results of the analysis.

All interviews were conducted in Italian and in-person and were divided into three sessions: pre-usability, app testing, and post-usability. Post-usability sessions consisted of personal interviews that lasted from 5 to 12 minutes and are the object of the thematic analysis. The questions were established to keep some consistency between the various interviews but left the possibility for adjustment to the different interviewed

individuals' opinions and understanding. This allowed the interviewees to use their own words, and not those of the interviewer (Manning, 2017). However, a second part of the interviews consisted in forced-choice questions, i.e. yes/no answers, to receive positive/negative feedback on *potential* features that the greenApes app could develop in the future to increase individual's sustainable behaviour (Wivagg et al., 2008).

These potential features were collected through a questionnaire to the citizens of Prato. The interviews were recorded with the permission of the interviewees. The data collection process started during the "Junglathon" and ended in October 2020. Tab. 1 presents the type of collected data and their use in the analysis. Tab. 2 presents the questions asked during the interviews and their aim.

Tab. 1 – Data type and use

Data Type	Details	Use in the analysis
15 semi-structured interviews	Interviews with potential users of the platform conducted during the hackathon	Capture users' understanding of the greeApes app; collect information on potential features
Forced-choice questions	Forced-choice questions to the 15 potential users interviewed with semi-structured interviews.	Acquire feedback on potential features that greenApes could develop in the future to increase engagement

After the first part of the interview during which the respondents were able to freely express their opinions, the second and last part consisted in 7 binary (yes-no) questions regarding the desirability of potential features,

which were suggested by some citizens of Prato in a questionnaire launched by greenApes. Tab. 2 presents the question asked and their aim.

Tab. 2 – Question types and purposes

Number	Type	Question	Aim	Theme*
Q1	Semi-structured	How would you describe greenApes? What is its purpose?	Capture the first impression about the app	All five
Q2	Semi-structured	What do you think of the jungle setting and the apes?	Analyse the liking of the graphic design	Gamification
Q3	Semi-structured	What are your most and least preferred features of the app?	Analyse the liking of the current features	All five
Q4	Semi-structured	What do you think about the possibility of reading sustainability stories written by other citizens of Prato?	Analyse the liking of User Generated Contents and content sharing features	Social Network
Q5	Semi-structured	What do you think about the use of challenges and prizes to incentivize sustainable actions?	Analyse the liking of leveraging competition between users	Gamification
Q6	Semi-structured	What did you like most about the app and what did you like least?	Analyse the overall liking of the app	All five
Q7	Semi-structured	Do you have any other suggestions/ideas/concern about greenApes or about possible ways to involve citizens?	Gain insights about possible other features	All five
Q8	Semi-structured	Are there any shops/organizations/associations that you think could offer interesting prizes?	Gain insights about possible ways to involve partners	Community

Q9	Semi-structured	Would you use the app?	Understand the attractiveness of the current features	All five
Q10	Forced-choice	Would you like to have challenges shared with other users	Analyse the liking of leveraging competition between users	Gamification
Q11	Forced-choice	Would you like challenges shared with your neighbours?	Analyse the liking of leveraging competition between users	Gamification
Q12	Forced-choice	Would you like an app section for participating physically or in distance to sustainable initiatives?	Analyse the liking of collaboration between users	Community
Q13	Forced-choice	Would you like an app section to aggregate users for developing together local projects?	Analyse the liking of collaboration between users	Community
Q13	Forced-choice	Would you like to know the carbon footprint for your eco-action completed?	Analyse the liking of receiving quantitative and certificated feedback	Clarity
Q14	Forced-choice	Would you like to receive information about green initiatives in your neighbourhood?	Analyse the liking of receiving news updates	Social Network
Q15	Forced-choice	Would you like to receive information about the environmental quality of your neighbourhood	Analyse the liking of receiving news updates	Social Network

*Themes are expanded upon in Section 4

3.4 Profile of Interviewees

The majority of the interviewees had less of 45 years (87%) had a least one university degree (60%) and were located in Prato or the nearby cities (87%). The whole sample owned at least one digital device (e.g. computer, tablet) and were present on at least one social network (e.g. Facebook, LinkedIn). Tab. 3 reports the demographics and related information.

Tab. 3 – Interviewee's Profiles

Socio-demographic	Results (n=15)
Location	
Prato and nearby cities	87%
Rest of Italy	13%
Age	
18-24	20%
25-34	47%
35-44	20%
45-54	7%
55-65	7%
Education	
High School	20%
Bachelor	13.4%
Master of Science	40%
PhD	6.6%
Missing data	20%
Employment	
Unemployed	6.6%
Student	40%
Employed	40%
Freelance	6.6%
Missing data	6.6%
Digitalization	
Own a digital device	
Yes	100%
Have a social network	
Yes	100%
Number of downloaded apps	
<5	13%
5-11	47%
11-30	40%
Sustainability	
Importance of sustainability *(1-5, where 5 is maximum)*	

Average and Standard Deviation	4.43; 0.53
Own level of sustainable behaviour *(1-5, where 5 is maximum)*	
Average and Standard Deviation	3.87; 0.61

3.5 Data Analysis

Semi-structured interview data institutes the empirical pillar of the great majority of qualitative research in social sciences (Campbell et al, 2013). Since interviews are a fundamental source of evidence of the meanings that the participants hold of the issue, it is necessary to record responses in a way which is functional and accessible in the achievement of this purpose (Creswell, 2014). Reliable deductions can be originated from the interview transcripts by following an appropriate coding process and classification methodology (Campbell et al., 2013). As the analysis was concerned with addressing a specific research question and the data were analysed taking this into consideration, the thematic analysis was theoretical rather than an inductive one. Open coding was utilized, thus there were no pre-set codes, but they were developed and modified as the analysis kept going (Maguire et al., 2017). Furthermore, the development of codes and categories of the narrative texts was carried out to compare responses among each other, to bring out important themes. All 15 semi-structured interviews were recorded, transcribed word-by-word and later categorized into an analysis sheet using the server online Taguette which facilitated comparison and coding. The word-by-word transcripts of circa 120 minutes of audio recording resulted in 73 pages of transcription (Verdana character, dimension 12, line spacing 1,5).

3.6 Coding Process

After the first phase of familiarization with the data i.e. immersing oneself in the data by reading and re-reading the transcriptions and listening to audio-recordings, the coding process was begun (Braun et al., 2014). The data were analysed with an integrated coding approach. Starting with broad code types, and then developing sub-codes from data, the integrated coding process is a compromise between an inducted grounded method and a start-list method by combing the benefits of both (Bradaley et al., 2007). This combination results in attention to what emerges from the data, with an acknowledgement of the benefits a framework in the code structure can bring for accuracy and efficiency in the process (Bradley et al., 2007).

Codes are the building blocks of analysis because they identify and provide a label for a feature of the data that is potentially relevant to the research question (Braun et al., 2014). In this analysis, the coding was done at the semantic level of meaning. Concerning the interviews, this involved the execution of a read-through of the transcripts and the underlining of each relevant information fragment, labelling it with a certain colour according to its type. This first round of coding led to the creation of provisional phrases and terms (Locke, 2001). Once this was completed for all 15 interview transcripts, the provisional phrases and terms were gradually collapsed into several categories according to their essence resulting in 15 Codes. The final step of the process consisted of the grouping of the 15 Codes into five overreaching themes.

A theme is a pattern that seizes something significant or interesting about the data and/or research question (Maguire et al., 2017). As Clarke et al. (2015) state, there are no defined rules about what makes a theme. Therefore, a theme is characterised by its significance (Maguire et al.,2017). The final themes were found after various rounds of trial-and-error where the synergies and similarities between the various codes were evaluated. The code structure was developed through the iterative review of the interview transcripts.

3.7 Limitations

Since the research is based only on primary data collected during 15 semi-structured interviews which were developed by the team of greenApes in a very specific setting i.e. one city (Prato) and to a pool of potential users to one single platform for sustainability, the findings cannot be generalized to other realities and business models.

Therefore, several limitations concerning the qualitative research have emerged: only one business platform was analysed, the potential users interviewed were only of greenApes and in a specific geographical area, and the fact that the study is limited to the present. Therefore, it would be interesting to expand the study with further research on users of other digital platforms for sustainability and in other geographical locations to investigate changes in the preferences. Also, it would be interesting to use a control group i.e. monitor the behaviour of a group of individuals who is not a user of the digital platform for sustainability, in order to use it as a

benchmark to measure how the actual users perform in terms of sustainable behaviour. Another interesting avenue to follow would be to monitor how greenApes will perform over the years i.e. whether it will be able to generate a true impact on the economy, the environment and the society at large. Finally, an important path to be explored concerns the impacts of the features on the business models, specifically in the cost structure of the business platform.

4. Results

4.1 The greenApes case

Founded in 2012, greenApes is a certified benefit corporation that developed an award-winning digital platform rewarding sustainable behaviours of citizens, employees and customers. GreenApes was created to be the first social network rewarding sustainable actions and ideas. It is built to be integrated with third-party apps and services to automatically reward friendly behaviours and positive actions of end-users, such as sustainable mobility, reduced energy use, volunteering and participation, sustainable consumption. Moreover, it is a platform that can support the work of corporate managers and smart city decision-makers, while building an engaging experience (with real rewards) for end-users through *gamification* features.

The value creation mechanism is based on rewards with a pointing system. The core interaction is formed by participants (consumers and

producers) + value unit (posts) and filters (geography and interests). Therefore, greenApes may be considered as a platform that exchanges via posts informative stories of sustainable lifestyle by geography and interests. Moreover, the user receives points, called "BankoNuts", for sustainable actions, and then rewards by suppliers i.e. local venues (offline) and eCommerce (online). There are three players in the value creation mechanism: 1) *Individuals*, such as producers and consumers; 2) *Suppliers* of BankoNuts and rewards, and 3) *Organizations* as municipalities/NGO.

The Value proposition for B2B as stores, brands, retailers that have a product offering of green or ethical products and services, consists in finding in greenApes a digital partner to attract new customers by receiving visibility in the platform and by engaging the user base through greenApes campaigns and competitions. Moreover, being a platform on which users recommend each other eco-products and services, it can increase the level of relationship between businesses and end-consumers, incentivizing loyal consumers to become brand ambassadors.

The Value proposition for B2C involves users' utilization of a platform whose purpose is to increase and maintain sustainable behaviour. By participating in the community network where green ideas are shared, the user can earn points with his/her ecological action, get inspired by other users' actions, and claim real-life rewards.

There are three main activities that the user may do while utilizing the app: The first one is through the feature "*Act and share"* thus by doing and/or sharing a green action, challenge or idea (e.g creative recycling

method, a green recipe, sustainable mobility use, green events). Moreover, greenApes can be connected with other apps such as Google Fit & Apple Health (walking and biking), Car2Go (carsharing), Enengan (renewable energy) to certify the green action; The second activity is with the *"Earn BankoNuts"* feature thus by acting and sharing, the user gain points for inspiring other apes with their certified green actions; last, the user can exploit the feature "*Claim Rewards*" by using the BankoNuts collected, and claim a green reward of choice from greenApes partners (e.g. train tickets, food and beverages, supermarket discounts, sustainable clothing discount).

Regarding the value proposition for Municipalities/NGO, by being a customizable platform to measure and reward sustainable behaviours, greenApes may help municipalities to promote sustainable behaviours among citizens. The collaboration between municipalities and greenApes works as follows: First, the municipality chooses the sustainable behaviours to be rewarded (green mobility, waste sorting, energy savings, participation and volunteering, local consumption). Then, greenApes deploys a scheme for incentivizing the chosen sustainable behaviours by defining the prizes and challenges for the citizens, preparing engagement campaigns, and integrating greenApes with other apps and services to create synergies with local initiatives and businesses. GreenApes has successfully enabled projects and initiatives in several cities as Milan, Florence, and Prato. In Milan, greenApes is the platform powering *SharingM*i, an initiative launched by the city of Milan and C*onsorzio Poliedra*, under the European Project SharingCities.

4.2 "Themes" emerging from the fieldwork in Prato:

The "Junglathon" research and co-design event is a fundamental part of the Prato Urban Jungle (PUJ) project (Comune di Prato, 2020). The PUJ project is based on the idea that the extension of urban green e.g. plants growing along the walls of buildings and on the surrounding of edifices, can result in urban jungles through the implementation of co-research and co-design paths (Comune di Prato, 2020). These paths aim at establishing a new balance in the relationship between built space and living nature through processes of re-naturalization of the urban territory. Hence, the objective of the project is to make the "jungle" a green colonization of collective spaces, becoming an integral part of the citizens' everyday life. By inverting the paradigm in which the built element prevails, the objective is to create areas with high intensity of green through the introduction of trees and plants on the facades and roofs of existing buildings (Stefano Boeri Architetti, 2020).

The Junglathon goal is not to just collect participants' feedbacks and impressions on sustainable solutions but to make them more active and responsible citizens through collaborative design of future scenarios. Indeed, the Junglathon aimed at raising citizen awareness and participation, and at incentivizing civic imagination and co-planning of sustainable urban futures. No prerequisite for participation to the event was needed thus allowing a diversified pool of individuals (Comune di Prato, 2020).

The codification process of the word-by-word transcripts of the interviews collected during the Junglathon has revealed 5 main themes. These 5 themes may represent the features that a digital platform should have in order to potentially incentivize and support sustainable behaviour.

The names of the codes and themes were not pre-selected but have been chosen from common key words emerged in the answers of the interviewees. The complete data structure that emerged through this process may be seen in the table below.

Tab. 4 – The identification of themes

Codes	Themes
Challenges	**1. Gamification**
Rewards	
Status	
Gamified Graphic Design	
User-Generated Contents	**2. Social Network**
Content Sharing	
Social Interaction	
Collaboration	**3. Community**
Behavioural Emulation	
Shared Interest	
Reward System	**4. Clarity**
Contents Certification	
Procedures and Interface	
User Age and Interest	**5. Target**
Producers' Value Offering	

The codification process described in section 3.6 has revealed 5 main themes which can give the foundations to answer the research question as they may represent the five main features that a digital platform may have to incentivize and support sustainable behaviour.

4.3 Gamification

The first theme, Gamification, has emerged from the underlying codes: Challenges, Rewards, Status and Gamified Graphic Design. These codes generated the Gamification theme as they are gamification dynamics (Lee, 2013). The selective quotations chosen and their codification are shown in the table below:

Tab. 5 – Gamification selective quotations

Quotations	Interviewee Identification Number	Gamification			
		Challenges	Rewards	Status	Gamified Graphic Design
It is very useful from a point of view of competition, because challenges, when there are some, and it is specified that you gain points, incentivize one to read more"	N1	X			
"I completely agree with the fact that a challenge is launched that has a reward connected to the sustainable nature of the app (…) Maybe they (rewards) could be connected to some sustainable activities,	N1		X		

so I do not know maybe, an electric mobility means for example, or something simpler, I do not know, like shopping bags, maybe of compostable materials"					
"I strongly agree on the choice of an avatar instead of a profile pic"	N1				X
"I understand that by creating a pointing system a lot of people can say: well if I can earn something… so someone is more incentivized in utilizing it"	N2		X		
"I do not particularly love them (challenges)… but for personal temperament"	N3	X			
"Avatars are a good idea, and they are also something fun to use, in my opinion, they are a point of strength"	N3				X
"To me personally, for how I am, it is not the part that stimulates me the most, but it may be for my fault since I am not very competitive or sportive"	N4	X			
"It could be a useful thing if maybe the reward would become something that is publicly visible"	N4			X	
"There are for sure people who need them (challenges)"	N5	X			
"A reward that maybe could be a decrease in the TARI (waste tax) since it is connected to waste management"	N7		X		

Quote	Code				
"You tell yourself that you should do it on principle not only if I win something or if it makes me a respected person…but for sure it can do something, so it seems to me a good idea"	N9			X	
"When someone tells you that you can win something by acting this way, in my opinion, can be very attracting because it is part of a game and this app gives you something back in return, and maybe it can be a good "engine" to incentive people to be more sustainable"	N9		X		
"(challenges) are a nudge, a facilitator"	N9	X			
"I have found the graphic design very captivating"	N9				X
"I really like the apes as avatars, I like the jungle feeling"	N11				X
A reward helps especially who has less willpower to keep following a certain path, and a small reward is always needed. Is an effective format"	N13		X		

From the exploration, the desire to receive a prize that would be connected to sustainability and linked to the eco-action accomplished to achieve has emerged.

The analysis on the forced-choice questions about challenges i.e. (i) Would you like to have challenges shared with other users, (ii) Would you like to have challenges shared with residents of your neighbourhood, showed that at least half of the respondents like them (i) 73% yes (ii) 53%.

4.4 Social Network

The second theme that has stemmed from the analysis is Social Network. The underlying codes are User Generated Contents, Content Sharing and Social Interaction. These codes generated the Social Network as they are key components for the creation of a Social Network. The selective quotations chosen and their codification are presented in the table below:

Tab. 6 – Social Network selective quotations

Quotations	Interviewee Identification Number	Social Network		
		User-Generated Contents	Content Sharing	Social Interaction
"I would stop to more synthetic data rather than stories. Maybe shorter news would be more incentivizing for the user to read it"	N2	X		
"This is a good thing, to keep oneself updated on current events"	N2		X	
"One could put short stories, small examples of sustainable behaviour in an advice style, really short "pills", other than the sharing stories from the community"	N3	X		
"(I would like) something that is able to influence my circle of friends at the same time, not only me but also who is near me"	N4			X
"(What I like the most) is the fact that it can be a tool to share information"	N5		X	
"I would like to have two functionalities, one for the citizens to create stories, the other one for scientific stories about sustainability"	N5	X		
I would prefer a thing that says to involve others to do something (…) Or you	N5			X

do collective challenges and then you do achieve something together, if not it becomes very individual"				
"(I would like to have) an initiative that is collective"	N6			X
"I would totally try it (the greenApes app), I think it is truly nice, also when you travel to somewhere else and you can use it because it gives you inputs on what is important for you"	N9	X		
"It is interesting for divulgation"	N11		X	
"One could start for daily facts, about sports, and maybe using as research key sustainability"	N13	X		

From the analysis conducted on the forced-choice questions (i) Would you like to receive information on green initiatives in your area and (ii) Would you like to receive information on the environmental quality of your area e.g. air or water, it resulted that the great majority would like to be informed (i)100% yes (ii) 93% yes.

4.5 Community

The third theme that has arisen from the coding process is Community which lays upon the following codes: Collaboration, Behavioural Emulation i.e. an individual observes and replicates another's behaviour, and Shared Interests. These codes generated the Community themes as they are key characteristics of a community (Morell et al., 2019). The selective quotations chosen and their codification are shown in the table below:

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Tab. 7 – Community selective quotations

Quotations	Interviewee Identification Number	Community		
		Collaboration	Behavioural Emulation	Shared Interests
"[I would use the app] not mostly to get a reward, but to participate directly to the eco-sustainability of your neighbourhood, of a locality"	N1	X		
"[I would use it] to get inspiration from others' actions"	N3		X	
"Maybe the first step is more watching what others do and then we will see if I also start to post"	N4		X	
" I liked the fact that there is an app, an app dedicated purposefully to sustainability in the city"	N5			X
"You should convert the things to do in something about the community"	N7	X		
"(I would like) something that is able to influence my circle of friends at the same time, not only me but also who is near me (…) to do something together, to have team rewards through collaborative actions"	N11	X		
"What I liked the most is the fact that is possible to meet and interact through the pivot of sustainability, through engagement strategies on sustainability."	N12	X		
"(I would like to read) virtuous projects, of designs connected to the environment, new regulations, local government laws or national that promote biodiversity or care of the environment"	N13			X
"It is interesting because greenApes aggregates people who share certain ideas and certain choices	N15			X

Quotations	Interviewee Identification Number	Clarity		
		Reward System	Contents Certification	Procedures And Interface
"and then it can be expanded and maybe also some that are not one hundred per cent convinced can start being a part of it"				

The forced-choice questions (i) Would you like a section to aggregate people interested in developing local projects? (ii) Would you like a section for sustainable initiatives to take part physically or remotely? received a high rate of agreement and liking with (i) 93% yes and (ii) 100%.

4.6 Clarity

The fourth theme that was found through the coding process was Clarity. The underlying codes are Reward System, Contents Certification, Procedures and Interface. The selective quotations chosen and their codification are shown in the table below:

Tab. 8 – Clarity selective quotations

Quotations	Interviewee Identification Number	Clarity		
		Reward System	Contents Certification	Procedures And Interface
"Before (in the usability test) I have read "you got 100 Bankonuts" and I have asked myself: are they a lot or few? Also regarding how many points do you need to achieve a new level"	N1	X		
"I did not really understand what bankonuts are, but they would seem rewards"	N2	X		
"I did not understand if the logo will be a photo	N2			X

that you upload or if it will be a pre-set image"				
"I did not immediately get the reward system, in what reward consist of"	N3	X		
"I would prefer reading contents when they have already been moderated rather than from every single user"	N3		X	
"I would like a section in the app that would have more scientific information, related indeed to sustainability. What scares me is an app that is left completely to citizens and that everything can end inside, everything the opposite of everything, and this is not always correct, I mean, not everything is sustainable because I say so, but it is based on certain criteria"	N5		X	
"There was a plus icon that was a little bit ambiguous, was it to add news, to add photos that you would share on a social as Instagram, to add photo and posts. That plus could have been mistaken between the coin and the things to add"	N7			X
"It comes to a certain point in which a user believes in the things that are written without reason. It risks becoming a bubble, an informative site"	N13		X	

From the analysis of the answers to the forced-choice questions "Would you like to have the possibility to calculate of the carbon footprint for the eco-

action you have achieved?" it resulted that 80% of the interviewees would like to quantify their impact.

4.7 Target

The fifth and last main theme that has emerged from the coding is the platform target which is based on two underlying codes: User Age and Interest and Producers value offering. The selective quotations chosen and their codification are shown in the table below:

Tab. 9 – Target selective quotations

Quotations	Interviewee Identification Number	Target		
		Age	Interest	Producers Value Offering
"A coupon in a shop that has a less polluting product, that could be a nice idea"	N3			X
"(The target would be) Not a person who is not very digitalized and that maybe does not have, is not part of our generation, that maybe does not have a sensitiveness about being sustainable"	N4	X		
"By engaging commercial entities that have as well sustainable behaviours"	N4			X
"In my opinion, the target is, maybe, for the middle layer where there is still sensitiveness, but that maybe is not either a dogmatic, very converted individual, it (the app) could be useful for them"	N4		X	

"In my opinion, one could involve organizations that work for the environment as forestry vivarium. Realities that are about the conservation and protection of the biodiversity for example."	N9			X

5. Discussion

This section aims to answer the Research Question: *"Which platform features may encourage users' sustainable behaviours?".* To do so, it was adopted Parker et al. (2016) approach to optimize the core interaction of platforms' offers: pull, facilitate, and match. Therefore, the themes, the underlying codes, and the associations between them were defined and discussed as the features that improve the core interaction. Such features were organized following the above-mentioned logics, thus their intent is optimizing the aim of a digital platform for sustainability, the creation and support of sustainable behaviour.

5.1 Pull

In the logic of the "pull" function, the platform should attract participants and keep them engaged over time. A platform that fails to *pull* participants will not be effective in generating network effects that make a platform valuable. Indeed, Digital Business Platforms face challenges, such as the chicken-or-egg dilemma, that traditional companies do not (see Section 2.2.5). Thus, the method to marketing Digital Business Platforms may seem

counterintuitive (Parker et al., 2016). Three themes emerged from the thematic analysis that may be used to achieve the aim of the pull logic:

1. *Gamification* features to attract users

Gamification, as it has been described in the Literature Review (Section 2.2.8), is the employment of game design elements in non-game contexts with the intent to create *playful* user experiences (Deterding, 2011). Gamification has proven to be an effective marketing tool in incentivizing desired user behaviours and motivating people, as well as enhancing user perception and engagement (Lu et al., 2020). Moreover, marketing teams use it as a means to attract and retain customers (Palmer et al., 2012). A key point of gamification is the leveraging of competition between users to achieve the desired behaviours and outcomes (Conaway et al., 2014). In greenApes competition is stimulated through challenges and rewards which incentivize users to adopt sustainable practices and actions.

The Gamification theme has emerged from the codes Challenges, Rewards, Status and Gamified Graphic Design, which are gamification dynamics. The *Challenges* feature gives users goals to accomplish, and the feeling they are working toward something. The configuration of challenges on actions (or eco-action) connected to the main purpose of the platform (increase sustainable behaviour) increases the chances of seeing the purpose achieved. Healthy competition between social group has proved to be an effective way to elicit sustainable behaviour (White et al., 2019). Besides, the forced-choice questions answers reported positive feedback

regarding this theme. The *Rewards* feature are another drive for human motivation. A reward given after the occurrence of an action (i.e. behaviour) has the intent to cause that behaviour to occur again. Indeed, offering rewards can help shape good habits and thus support sustainable behaviours over time (White et al., 2019).

As interviewee N9 has stated:

"When someone tells you that you can win something by acting this way, in my opinion, can be very attractive because it is part of a game and this app gives you something back in return, and maybe it can be a good "engine" to incentive people to be more sustainable"

Status, recognition and esteem from others are factors that most humans need. To receive the desired level of esteem, users have to engage themselves in activities which aim is aligned with the Digital Business Platform purpose. Therefore, potential users may be attracted to use the platform to be publicly recognized as "sustainable citizens", thus increasing the chance to positively affect consumers actions by making behaviours public (White et al., 2019).

"You tell to yourself that you should do it on principle not only if I win something or if it makes me a respected person…but for sure it can do something so it seems to me a good idea" (Interviewee N9)

Gamified Graphic Interface, which consists in creating an identity for users virtual-self i.e. avatars, and in the platform general graphic setting (in greenApes case, a jungle is the setting, and the avatars are apes) should be captivating to "pull" potential users to try it (Palmer et al.,2012).

2. *Social Network* features to keep users engaged over time

Social Network value comes from creation and the sharing of digital content, from the enablement of social interaction within groups that share same values and beliefs and from the reduction of boundaries between producers of value and users (Ketonen et al., 2016). From enacting these value generation mechanisms Social Networks can increase user's engagement over time (Kujur et al., 2015).

The Social Network theme has emerged from the codes User-Generated-Contents, Content Sharing and Social Interaction which are enablers of user engagement. The *User-Generated Contents* (UGC) are any form of content, such as images, videos, text created by users that is accessible on the platform (Krumm et al., 2008). Moreover, if the contents shared are interesting enough, feedback loops are created i.e. "the user will be drawn to the platform repeatedly, generating a further flow of value units and facilitating interactions" (Parker et al., 2016, p.45). The *Content Sharing* feature is defined as the practice of giving a defined set of people access to news content via social media platforms, as by posting or recommending it (Kümpel et al., 2015). It is of vital importance to be able to share and access information on the platform as it may increase the

user's engagement and interest in the platform (Oeldorf-Hirsch & Sundar, 2015). The forced-choice questions results presented in section 4.3 show a high level of agreement on elements regarding this theme. *Social Interaction* allows the users to identify herself with a social unit by following a common goal and abiding to common rules established by group membership (Spagnoletti et al., 2015).

3. *Community* to keep users engaged over time

A community is seen as "a group of people that interact and support each other, and are bounded by shared experiences or characteristics, a sense of belonging, and often by their physical proximity" (Cobigo et al., 2016, p.192).

The theme community was derived from the following underlying codes: Collaboration, Behavioural Emulation, and Shared Interests. *Collaboration* can be defined as "a mutually beneficial relationship between two or more parties who work toward common goals by sharing responsibility, authority, and accountability for achieving results" Chrislip et al, 1994, p. 5). Communities are born from collaboration, through which users follow rules and engage in activities that demand significant group coordination (Spagnoletti et al., 2015). Also, positive reactions have emerged from the analysis of the results of the forced-choice questions regarding this code (see section 4.4). As Interviewee N3 has stated: "I would use the app to get inspiration from others' actions", and Interviewee N4 says: "Maybe the first step is more watching what others do and then we will see if I also start to post", therefore, *behavioural emulation* push

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participants to adapt their behaviour to others to assume a group identity. Moreover, as White and al. (2019) state, people's aspiration to emulate and conform to the behaviour of others, and thus to the habits developed over time, impact the likelihood that they will consume sustainable products and services. *Shared Interest* demonstrates that users follow a common goal by sharing the same interests and values. As interviewee N15 stated:

> "*It is interesting because greenApes aggregates people who share certain ideas and certain choices and then it can be expanded and maybe also some that are not one hundred per cent convinced can start being a part of it*".

Digital platforms may help to create a community, which may start with "people who share certain ideas and certain choices" and then it can *pull* inside even people who in the beginning are not completely aligned yet with the platform's purpose. To conclude, *community* is a fundamental driver for a continuous engagement of users as it is based on the intrinsic human need to create and maintain relationships in disperse social environment and to build and increase networks, generate network effects through aggregated interaction (Schneckenberg, 2009). The knowledge and experience acquired in an action-based and meaningful context, such as the ones that gamification and social network provide, have been proved to stimulate behavioural change by forming the individual and social basis of new behaviours (Cordero et al., 2008; McKenzie-Mohr, 2008; Nisbet,

2009). Also, normative and committing power to communities, rather than a focus on the individual, has proven to effectively change behaviour, thus it may incentivise behaviours to be more sustainable (McKenzie-Mohr, 2008).

5.2 Facilitate

The platform should *facilitate* the interactions of the network's users by supplying them with appropriate communications and rules (Parker et al., 2016). The importance of clear rules and communication channels between users and on the platform is vital to guarantee the proper functioning of a platform (Morell et al., 2019). By having the right information at the right time, users can make better decisions and show greater commitment to a cause, resulting in an increased sustainable behaviour (Mostashari et al., 2011).

One theme, *Clarity*, has emerged from the analysis that should represent a feature of the platform that would allow to properly "facilitate" the interactions within the platform. The need for *Clarity* has arisen from the finding of the following codes: Reward System, Contents Certifications and Procedures and Interface. The *Reward System* feature is also related to Gamification features. It was found in several interviews in which the individuals reported difficulties in understanding the value of the reward currency, see section 4.6 (in greeApes the reward currency is called Bankonuts). If a user does not understand the value of the reward associated with an action it cannot associate the proper value gained if it is

achieved. Consequently, the user might not feel appropriately motivated. The *Contents Certification* feature is required by some of the interviewees regarding the contents shared within the platform to avoid the diffusion of unscientific news. To ensure end-user satisfaction in such a dynamic system as a social network can be, the digital platform has to organize, manage, and control the veracity of the information that is shared on the network (Hänninen et al., 2019). Besides, the forced-choice questions' results regarding this theme reported positive feedback as it is possible to see in section 4.6. *Procedures and Interface* that are clear, user friendly and intuitive are necessary to facilitate user interactions within the platform.

5.3 Match

The platform should use the information available about the users (consumers and producers of value, see section 2.2.1) in order to match them with one another as effectively as possible (Parker et al., 2016). As any other business, the identification and the understanding of the target are essential to creating an effective value offering and thus to generate exchanges of values between the actors (Courage et al., 2005).

One theme has emerged from the thematic analysis that may be used to achieve the aim of the "*match"* logic: *Target*. The *Target* theme has two underlying criteria that emerged from the analysis of the interviewees' answers: User Age and Interest, and Producers' value offering. The *User Age and Interest* code: a clear preference in targeting young generations has been noticed for their greater level of digitalization and friendliness with

social networks, in addition to having a higher level of interest regarding sustainability (Gazzola et al., 2020). Moreover, White et al. (2019) state that millennials consumers particularly pay attention to the sustainability of brands and products. Indeed, it was reported from the statements of the interviewees reported in section 4.7 that a digital platform for sustainability will catch the interest of someone closer to the sustainability issues. The *Producers' Value Offering*: the partners that participate in the platform should have a value offering "*matching*" the interests of the individual users. In the case of greenApes, they are mainly shops that sell sustainable products, e.g NaturaSì (Italian wholesaler chain of organic and biodynamic products). This matching need might also be seen from that the statements in section 4.3, in which the desire to receive rewards (from producers) connected to sustainability is shown.

Moreover, to acquire more user data (e.g. socio-demographic information) and thus optimize the matching process, the digital platform can leverage on the gamification and social network features (Parker et al., 2016).

5.4 Framework

Platforms permit people and businesses, even located in different areas, to become actors of social growth and development. Indeed, digital platforms have the potential to promote social inclusion, generate income opportunities for businesses, thus increasing the sustainability of their business model, ensure access to cheaper goods and services, and

ultimately improve welfare (Falco et al., 2018). Therefore, for a successful digital platform, all three functions *pull, facilitate, match* are essential to creating the before-mentioned benefits (Parker et al., 2016). A framework was constructed on the discussion of the themes found in section 4 to try to provide a tool for businesses that may want to verify the adequacy of their digital platform for sustainability to encourage valuable core interactions and the resulting network effects, thus potentially increasing sustainable behaviour. The framework was named Game (to pull) Set (to facilitate) Match (to match). As the name comes from "*game-set-match*", the expression commonly used to conclude a tennis match, this framework may represent the last step for companies to evaluate whether their digital platform has considered the features that might potentially help to create and maintain sustainable behaviours in its users. The themes that emerged in the coding process and their interactions are illustrated in Fig. 1.

Figure 1 – The "Game-Set-Match" Framework
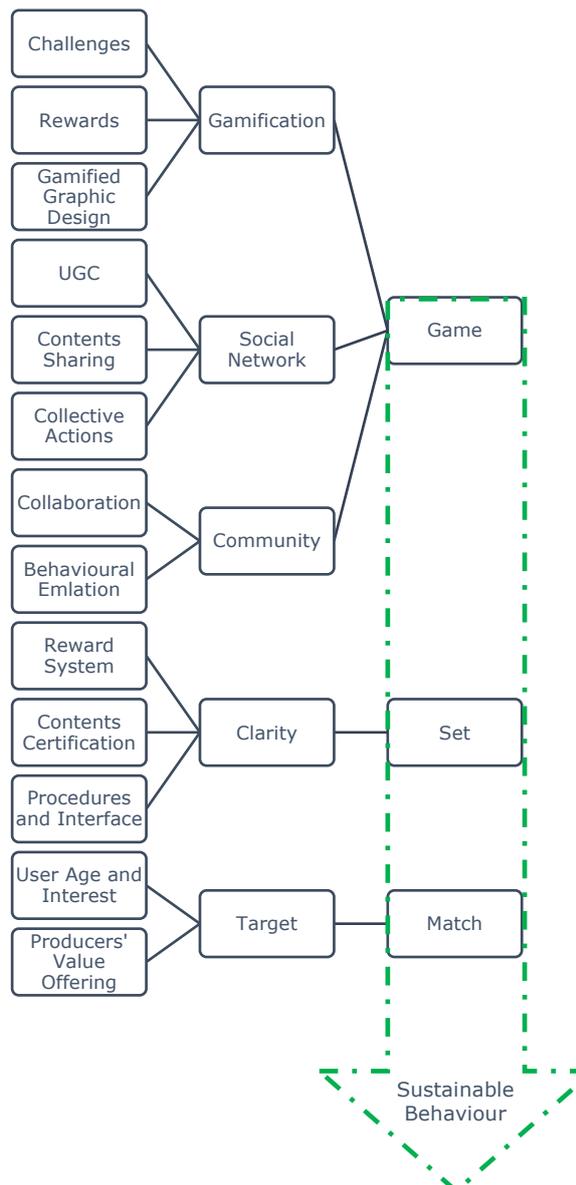
There are three pillars of the Game-Set-Match Framework:

1. Game: Game is related to the concept and theme of gamification, Social Network and Community. It covers the aims of the pull function seen in section 5.1 to attract users by having gamification, (the assumption is that the app would attract not only individuals who have already adopted a great sustainable behaviour but also individuals who have not such an eco-friendly footprint) and keep them engaged over time also thanks to the

Social Network and Community features. If well implemented, they can generate *feedback loops* (see section 5.1) and increase value creation by enhancing network effects. Therefore, after being attracted by the gamification aspects, the users are incentivized to share their contents through the social network features. By doing so a twofold purpose is achieved: on the one hand, the nourishment of the existing community and the fostering of virtuous behaviours in users by the increase in user engagement; on the other hand, free publicity and positive word-of-mouth are created for the app which may increase network effects by attracting potential users (Lu et al., 2020; Palmer et al., 2012; Conaway et al., 2014). Moreover, White et al. (2019) state that one of the most successful methods to stimulate sustainable behaviours is by leveraging social influences within the actors in the social ecosystem.

2. Set: The intent is to "set" clear rules in order to "facilitate" the interactions within the platforms (see section 5.2). By creating a clear setting, users are provided with the right tools and rules that smooth interactions and exchanges of value between them thus increasing the quality of connections (Parker et al., 2016). In the case of a gamified digital platform for sustainability, it is vital to have a clear rewarding system, certificate the contents that are shared within it in order to maintain users' trust and loyalty, and intuitive procedures and interface as the user is facilitated in accomplishing the desired interaction with the platform (Morell et al., 2019; Mostashari et al., 2011; Hänninen et al., 2019).

3. Match: The intent is to "match" producers and consumers effectively by using information about each to connect them in ways that can be mutually rewarding (see section 5.3). The data necessary to do so is collected through a coherent targeting of users and producers by matching their interests with the product offering. By knowing who the current users, it is easier to create a tailored platform with a focused value offering on their needs (Parker et al.,2016; Courage et al., 2005).

Indeed, the framework proposed aims to explain how the platform for sustainability may enable and maintain sustainable behaviour. Therefore, the platform for sustainability should "pull" the producers and the users to the platform with the *gamification* feature and enable interactions within them by the creation of a *social network* that keeps them engaged. Then, the platform should "facilitate" the interactions within the platform by providing *clarity* in its setting. Lastly, it needs to create a consistent and coherent user pool to enable smooth and spontaneous interactions among them; to do so (i.e. to match them effectively), *targeting* the appropriate user segment is crucial.

A platform that has implemented the above-mentioned features may also create revenue generation opportunities at the business model level through partners' involvement, visibility, marketing, public incentives; in other words, fuelling the community that the platform may exploit to establish a revenue business model inherently linked to sustainability. Indeed, the platform owner holds these services and monitors their

evolution to exploit the value of community interactions (Spagnoletti et al., 2015) and guard information security (Baskerville et al., 2014).

Since food production and consumption are responsible for a third of worldwide household environmental impact, consumers' behaviours have a pivotal role in the shift towards more sustainable trends (Simeone et al., 2020). As seen in section 2.2.7, one of the main factors that determines individuals' behaviours is the social ecosystem (Simeone et al., 2020).

The use of social networks has revealed to transform the way consumers search and select products and services (Zhang et al., 2019; Mont et al., 2009; Simeone et al., 2020; Kim et al., 2013; Lee et al., 2013). Therefore, platforms have been receiving attention as a way to tackle the question of how more sustainable lifestyles can be incentivised and enabled in contemporary society (Meroni, 2007). Indeed, the network of many platforms can help to achieve the profound changes that will shift current unsustainable lifestyle trends and strong support systems to make complex changes easier by engaging different social players, stimulating interactions among them, and enabling dynamic social processes (Mont et al., 2009).

6. Implications and Conclusions

6.1 Implications for practitioners

By highlighting the structural features of the platform, this study is particularly valuable for understanding in practical terms how the proposed features should help the encouragement of sustainable behaviour.

Therefore, the study aims to provide a tool for businesses that may want to verify the adequacy of their digital platform for sustainability to incentivise valuable core interactions and the resulting network effects, thus potentially increasing sustainable behaviour. For businesses, the research might facilitate digital platforms' interaction with current and potential users by proposing the features that can improve the relation mechanisms between the platform and the customers and on the support that they can provide to their business processes. In particular, in an effort to maximize sustainable behaviour, the framework can encourage local business and retailers to integrate the use of the app within their current practices to be closer to end-customers and strengthen their relationships. Moreover, the study can also help the policymakers, the organizations engaged in volunteering and all other stakeholders to find avenues for collaboration with these platforms in a way that can be of mutual benefit.

Finally, the research offers suggestions that can support incumbent platforms in their growth and also guidelines to assist new entrants in their strategic planning and in the structuring of their value offering mechanisms. However, it is important to highlight that the framework does not give the guarantee that these features will generate sustainable behaviour, however, these features may increase the chances to achieve so. Indeed, as seen in sections 2.2.7 and 2.2.8, social media technologies can enable peer-to-peer relations and motivate behaviour change effectively and gamification dynamics are congruent with necessary changes to promote sustainable behaviour (Lee et al., 2013).

6.2 Implications for scholars

The study responds to the increasing attention in digital business platforms on the part of scholars as it adds on the existing literature on digital business platforms for sustainability as studies on platform-based businesses for sustainability remain scarce because the issue is new, complex and yet to be fully understood (Schor et al., 2017). More specifically, by highlighting the features of Digital Platforms for sustainability, it is particularly valuable for understanding how they can have an impact on users' behaviours. This is achieved for the most part by shedding lights on the main features that a digital platform for sustainability may have to support sustainable behaviour through the adoption of a qualitative interview-based study approach that involved field analysis and resulted in framework development. Moreover, the study opens up further research on other features that could have a significant impact on users' behaviours.

6.3 Conclusions

In recent years increasing attention has been paid to sustainable behaviour, which can have a major environmental, social and economic impact for the climate change issue. As a new type of actor, the digital business platform has emerged in almost every industry, and this study aims to understand what features of a digital platform for sustainability could encourage the creation and improvement of sustainable behaviour. In that respect, digital platforms for sustainability constitutes also an opportunity for businesses

and municipalities to achieve simultaneous growth and promotion of sustainable development. To answer the research question, the study took a qualitative methodology approach and studied greenApes and its potential users through a thematic analysis. The thematic analysis was developed through a coding process on the 15 interviews' transcripts. From the thematic analysis, 5 themes emerged and on them, the Game-Set-Match framework was constructed. The framework aim is to provide a tool for businesses that may want to verify the adequacy of their digital platform for sustainability to encourage valuable core interactions and thus potentially increasing sustainable behaviour. Nevertheless, it also presents limitations as seen in section 3.7. Following the logic of the framework, the platform for sustainability should "pull" the producers and the users to the platform with the *gamification* feature and enable interactions within them by the creation of a *social network* that keeps them engaged. Then, the platform should "facilitate" the interactions within the platform by providing *clarity* in its setting. Lastly, it needs to create a consistent and coherent user pool to enable smooth and spontaneous interactions among them; to do so (i.e. to match them effectively), *targeting* the appropriate user segment is crucial.

In conclusion, there is still a lot of space for further research and investigation, especially in the direction of possible other features to be investigated for the effectiveness of digital platforms for sustainability.

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