

Circular economy: adopting new green trends in marketing for a sustainable consumer experience based on Internet of Things

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Abstract. *This paper presents the result of a research of the literature regarding circular economy, green trends in marketing, green IoT and consumer experience. Green concept was the main driver to link current marketing strategies for a sustainable consumer experience seen through consumers' buying behaviour nowadays. The key aspects of this paper consist of analysing the basic concepts of green IoT and green marketing, combined to create a greener consumer experience, becoming a meaningful part of the circular economy. Climate change and protecting our environment are the biggest challenges of the modern world. Energy consumption is at the highest level ever, and a solution addressed to these challenges should be found in order for businesses and consumers to fulfil their needs. Circular economy is considered also part of the solution, but people should become more aware about the principle of circularity, and what it means in practice. Considering applying green marketing and green IoT concepts into practice, this paper could offer a solution. Even if the green concept should be applied by both businesses and consumers, we didn't cover the consumer side, more specifically how they should act upon to become "greener" in their choices. Further research could be explored to find ways and means to educate the consumers.*

Keyword: circular economy, green marketing, green IoT, consumer experience, sustainability, environment protection, green education.

Introduction

Climate change seems to be the biggest challenge of the modern world, acknowledged by governments only recently. Even if the environmentalists sounded the alarm many decades ago, United Nations and the world leaders started to take the stance in this regard only in 1992 through the formalization of the United Nations Framework Convention on Climate Change (UNCCC). 197 countries adhered to the new organization agreeing rules and updating them through the Convention itself, the Kyoto Protocol and the Paris Agreement.

Up until now all industrial revolutions played their part into the climate change. From coal in 1765 to gas in 1870 and then nuclear in 1969 and renewables in 2000, all stages contributed to an updated and upgraded way of life and people wanting more and more by the decade. Basically, whatever we want and think of as an upgrade it means more resources like energy, raw materials and materials and rare earth metals. Thus, the translation of these needs is actually a burdensome on our planet, depleting its resources and polluting its air through greenhouse gas emissions.

Early 2000s, the word "green" was adopted. Academics and practitioners started to talk about green economies, green energy and the term has been used all over the world, in all areas of activities. International organizations and world governments started to put together green plans: the European Union (EU) adopted the EU Green Deal, US with Green New Deal, UNCCC with

the Paris Agreement and recently adopted The Glasgow Climate Pact. With different words, they all aim towards a contemporary, sustainable and competitive economy, where by 2050 no net emissions of greenhouse gases will be recorded and the economic development is dissociated from extensive use of resources, the ultimate goal being the protection of citizens' health and well-being from the risks posed by environmental threats (European Commission, 2019)". Along *green* other concepts have arisen like *net to zero*, *carbon neutral* and even *carbon negative*"

Putting together the needs of protecting our environment and planet and the constant need of improving our ways of living and now to respond to the challenges of the pandemic, the super-increased use of modern technologies required also a "green" solution. By combining IOT and green development, long-term sustainable development options can be loomed. This paper aims to present IoT and circular economy from an inclusive perspective based on identified research streams uncovered in the literature, thus, expanding the theory and providing practical options.

Literature review

Internet of Things – definitions and concepts

The 20th Century Digital Revolution with computers and supercomputers opened the stage for the Industry 4.0. or "smart factory" which has been summarized into four major chapters (Erboz, 2017): cyber-physical systems, Internet of Things (IoT), On-demand availability of computer system resources and Cognitive computing.

Internet of Things (IoT) is the pillar that mostly addresses the daily needs of people. IoT is a smart and compatible hub linked into an active worldwide grid, seeking to address the connectivity notion of everything from everywhere at any time (Ali et al., 2015) or more legible by merging a group of technologies like sensors, protocols of communications and Wi-Fi into the Internet (Sathyamoorthy et al., 2015). The consumer of IoT is us, the company we are working in, the city hall of the city we are living in, the manufacture that put together our car, furniture or appliances. Basically, each and every of us is a consumer of IoT.

TechJury predicted that by the end of 2021, 46 billion devices would be connected to internet, a 200% increase compared to 2016 (TechJury, 2022). In 2020, the average number of connected devices per household was 10. By 2030, every customer of IoT devices will own an average of 15 connected devices and the total worldwide number would be of 125 billion (TechJury, 2022). For example: A phone connected to the Internet, is also linked to your smart watch, headphones, TV, tablet, air conditioning, UV lamp, computer/laptop, NAS and even your car and all these without involving a wire. Through your phone these devices have a logical link with the internet, if not by themselves. It is an invisible link that drives our lives into the future.

Some of the tangible components of IoT are all these devices that are "smart", but in literature 6 elements of IoT have been found (Al-Fuqaha et al., 2015): *identification*, *sensing*, *communication*, *computation*, *services* and *semantics*. *Identification* names and matches services with demands (ex: electronic product codes – EPC). *Sensing* collects the data and sends it into a data base (ex: weather sensors, wearable devices, mobile phones etc.). *Communication* connects objects together to offer the service (Ex: Bluetooth, Wi-Fi, LTE etc.). *Computation* is performed by the hardware processing units together with the software installed (ex: Cloud platforms processing data in real-time and extracting various information from it). *Services* should be organized in four classes: *identity-related services* – identifying the objects, information; *aggregation services* – gather and summarize the needed raw information to be processed and reported; *collaborative-aware services* – further using of the obtained data to make decisions and react accordingly; and *ubiquitous services* – offer the collaborative-aware services to anyone on

demand, anytime and anywhere. *Semantic* is the ability to extract knowledge in a smart way in order to provide the required service (Zhu et al., 2015).

Green IoT – a logical step to green marketing

For all these technologies, services, and fulfilment of demands the common word is *energy*. The National Intelligence Council of U.S. (NIC) has included IoT among the six “Innovative Civil Technologies” that will impact U.S. power grids. The bigger the growth in numbers and power, the consumption of energy will increase exponentially taking us back to the need of finding a green solution, meaning a *green IoT*.

Green IoT is the energy efficient procedures, both hardware and software, focusing in two distinct directions: *upstream* by enabling the reduction of the greenhouse emissions of existing and future applications and services and *downstream* by reducing the greenhouse effect for IoT itself. The entire circuit should be based on green design, green production, green use and in the end green disposal and/or recycling the desired outcome being no or very small impact on the environment (Shaikh et al., 2015; Zhu et al., 2015; Murugesan, 2008).

Green marketing is the next logical step in companies’ efforts to reduce their carbon footprint. It should refer not only to promote the green products produced, but also to apply a green attitude in promoting those products and services.

Since the 70s, researchers defined green marketing according to the period. Peattie (2001) defined Ecological Marketing as dealing with all marketing processes that have caused environmental issues, but that could help to find a solution for those issues, while Fuller (1999) was writing about Sustainable Marketing as the overall activities of forecasting, applying and monitoring the progress, pricing, promotion and supply of products and services by meeting three criteria: (1) fulfil customer requests, (2) companies’ interests are met and (3) the overall activities are eco-friendly. No matter the term or the definition, in the end, green marketing should incorporate all three aspects of sustainability: economic, environmental and social. (Kumar et al., 2013)

Green marketing strategy is following the same steps defined by Kotler and Armstrong: segmentation, targeting, positioning and differentiation, but taking into consideration sustainability and protection of the environment (Kotler and Armstrong, 2010).

A properly conducted segmentation involves many aspects, criterions and types of segmentation, but adding the “green” angle, things are getting even more complicated. Literature review shows that traditional segmentation is not applicable to Green Marketing and that are two main lines in executing a green segmentation: according to consumer’s characteristics or according to purchase’s ones (Dangelico and Vocalelli, 2017). Active green activists and passive green activists have been identified (Dangelico and Vocalelli, 2017) or loyal green consumers, less devoted green consumers, consumers developing towards green, conservative consumers unwilling to change, consumers completely unwilling to change, according to their willingness to contribute to environmental protection (Banyte et al., 2010, Ottman & Books, 1998)

As for targeting, adding green it changes the entire spectrum from green consumers targeted with green products to expanding the targeted consumers by mentioning the green aspects of the products as the main features (Rex and Baumann, 2007). IoT could help for a better targeting of green consumers, through various actions: tactical (using green media and highlighting the green features of the products), quasi – strategic (adding a green brand to the existing ones), and strategic (opening a brand-new green business unit) (Polonsky and Rosenberger III, 2001).

The 4Ps (Product, Price, Place and Promotion) – playing their role in the green marketing mix. A perspective including IoT

Consumers notice the role played by companies in society and sustainable and green activities positively affect brand's image and brand loyalty (Nagar, 2013). Offering sustainable products should be complemented by the companies through their own sustainable image. Applying such strategies, it would help companies to position themselves even better in the 'green' context, but also to differentiate from their competitors. In fact, consumers are more likely to buy green products from green companies (Prakash, 2002).

Ginsberg and Bloom (2004) linked the number and the type of the implemented Green 4Ps with the strategy, identifying four types of green strategy (lean, defensive, shaded, and extreme). The more sustainable is a company, the higher the number of Green Ps, and it changes its status from "lean green" to "extreme green". So, "lean green" companies will adopt only Green Product; "defensive green" will add Green Promotion; "shaded green" will complement with Green Price; and, in the end, "extreme green" companies apply all 4 Ps.

Defining the Green Product posed some difficulties, but researchers tend to conclude that life cycles phases (before, during and after usage) (Dangelico and Pontrandolfo, 2010) and conception stage of the product (Commission of the European Communities, 2001) are very important, but also that a sustainable packaging is the most important aspect for such a product (Paço et al., 2014).

Green price is usually translated into a higher price due to various reasons: qualitative materials, costly production methods and increased taxation due to the internalization of environmental costs (Peattie and Crane, 2005). The consumer decides according to their beliefs if they are willing to pay a higher price and protect the environment or the companies should use various strategies to persuade them to contribute more for the future generations (Chan et al., 2012).

Green Place refers to distribution from production and end-user, but also to reverse logistics (Davari and Strutton, 2014) and IoT could play a key role in it. IoT together with reducing packaging, using integrated transportation solutions reduced the environmental impact of transportation and also developed reverse logistics (Polonsky and Rosenberger III, 2001).

A successful green strategy depends upon a good communication (Prothero et al., 1997). A green promotional strategy should not refer only to the product itself, but also to the company's commitments towards environment protection. Using IoT in this scope makes promotion even greener. An additional important tool in achieving a green marketing strategy is the use of ecolabels (Rex and Bauman, 2007).

Green marketing and its impact on consumer behaviour

Considering the 4Ps in the green marketing mix, we could identify the big part played by the consumer in the process of buying "green" products through the concept of "Environmental Awareness and Purchasing Green Products". According to the specialized literature, consumers with environmental awareness can be defined as ecologists being able to understand their involvement in reducing environmental pollution and having a sense of responsibility towards future generations in the use of resources (Bukhari, 2011). In other words, this kind of consumers with environmental awareness can have a positive impact in educating the green industry, by noticing the presence of natural resources and their cost of use on the planet.

Over time, since the introduction of the concept of green marketing, generations of consumers have exploited this relatively new trend of minimizing harmful effects on the environment, becoming increasingly aware of the circularity process, which is closely related to

the notion of circular economy. In the contemporary environment, the circular economy is a global solution for the proper use of resources, on the one hand by companies and on the other hand by consumers (Mostaghel and Chirumalla, 2021). Based on this premise, the circular economy involves the efficient use of resources and the reduction of losses, and at the same time it aims to protect the environment (Kirchherr et al., 2017).

Green products becoming premium products and vice-versa

Starting from the idea of product cycle as a solution for planet, we can integrate the concept of quality for the premium goods, which by their green characteristics, suggests the idea that the quality of products with green premium pricing is higher. Although the differences between a product and a green product consist in the mode of production, consumption, but also reuse, consumers often perceiving green products as luxury products, based on the price and the quality offered, a basic element in the marketing mix (Anwar and Jan, 2016).

Various studies show that there is a close connection between the perception of green products and the environment consciousness, accentuated by the quality component (Dangelico and Vocalelli, 2017). Thus, green marketing is becoming more and more important, which with the help of IoT, highlights the process of product circularity, migrating from the idea of luxury to the idea of online (Tu et al., 2017). We can ask ourselves in this sense, how do consumers see the transition from physical actions to online platforms, not only in the buying process, but also in the operation of product itself? The response is found in the relation of green marketing and its impact on consumer buying behaviour.

Green marketing and its impact on consumer buying behaviour

Trying to develop various strategies to target those consumers who have more responsibility for the environment, green marketing is becoming more and more about attitude and less about products. In this sense, we are talking about an education of consumers to respect the principle of the Three R's: reduce, reuse, recycle, through which they become more aware, more responsible, and more friendly with the environment. This is a model of future management, through which people not only save money and resources, but also protect our environment.

Hence, a new category of consumers appears, the green consumers, who can be seen as the key consumers who will not consume products that may harm or damage life itself (Podvorica and Ukaj, 2020).

Consumers' and companies' green education

In terms of green marketing, there is a rapid ongoing change in consumers buying behaviour, which sooner rather than later will have an impact on future generations of consumers. In a world where resources are becoming limited and pollution levels are rising, an education for the idea of green among companies will help consumers buy more responsibly, recycle packaging properly and reuse it functionally.

According to numerous findings of market research, a big majority of customers in the marketplace are willing to pay higher prices for green products. It is proven that the attitude and behaviour of consumers towards green products can be changed by the brand of a product, because a position of companies to protect the environment, implies a differentiation of the brand (Hartmann et al., 2005). At the same time, it was concluded that there is less commercial success for those products that do not involve bio or ecological characteristics through packaging, labelling or production. Closely related to the circular economy, the green economy aims at the impact of a

product on the environment, which is considered an integral part of its life cycle and serves as a credible attribute.

The connection between consumer behaviour and IoT

Internet of Things is currently an efficient way to highlight the principles of the global circular economy, by protecting the environment and promoting the concepts of reducing consumption widely. To improve consumer behaviour for a sustainable consuming, also known as a smart consuming (Podvorica and Ukaj, 2020), IoT helps to integrate all of the green principle through promoting them in an efficient way in relation to the green marketing mix (Dangelico et al., 2017). Even if is difficult to continuously adapt a good marketing strategy in the marketplace, companies can be sure that consumers will choose most of the time green products because of popular green education (Tu et al., 2017).

In a world where online is becoming more and more accessible, green marketing promotes it as a green, resource-saving solution, because green marketing means green education for future. To carry out for their social responsibility and adopt green strategies, companies do not have to produce in a green way, but to sell in a responsible-green way, so they can earn more profits and promote their brand value more effectively (Ottman, 1998).

The transition from physical to online involves high-level technology and innovation, combined with a green marketing system that protects the consumer and provides the desired products and services, as a solution to protect the environment.

People's psychological reaction to changes of the environment should be translated as a response to marketing green strategies. In this case, a green education will increase people green attitude toward the transition from physical to online. To find ways to persuade consumers to be environmentally responsible, IoT is trying to come up with automated, environmentally friendly solutions, because green marketing is a concept to educate, but IoT is a future service method.

Methodology

In this study, desk research was employed to uncover in the extant research streams in Green marketing and IoT. Thus, a number of 35 publications were consulted to uncover eight situation groups of mixing Green with IoT.

Starting from climate change and solutions available to businesses to answer this new challenge of becoming greener, data bases have been consulted starting from concepts like green IoT, green marketing, consumer behaviour and consumer experience. Results from the data bases inquires showed that the green attachment to the classical concepts is not widely researched and even less the interaction between them.

Based on literature review, the paper focuses on the green marketing concepts in connection with green IoT, as the next logical step for companies to reduce their carbon footprint, but also to fulfil the increased demand of consumers who are becoming more aware of the green concept and not only in products. It should refer not only to promote the green product, but also to apply a green attitude in promoting those products and services.

Results and discussions

Climate change and increasing use of energy in all our daily activities including marketing are posing challenges, not only for institutions, but also for people. Some solutions are already available, but they could be further improved and found new ones in order to compensate the demands of the circular economy.

The main findings of this paper are highlighted by outlined specialized opinions in circular economy for adopting new green trends in marketing. Even if there are separate solutions for industry and consumers, they are influencing each other in becoming more sustainable: industry by adopting new technology and consumers by preferring greener products. This stage of two ways of education should be better explored and new solutions should arise answering not only the questions on environment protection, but also to increase the benefits both for industry and the consumer.

Conclusions

Twenty years ago, internet, platforms, smart devices were only a sketch. Over the years, the sketch became a big design offering unlimited solutions to nowadays activities and Internet of Things is at the core of this architecture. IoT opened the door to infinite solutions that are still explored and discovered.

In this study 20 references were employed to identify 8 venues of research. Adopting new green trends in marketing could be translated as an effort done by the companies not only to protect environment, to become less energy dependable, to make their products greener, but also to attract green conscious consumers. On the other side, consumers choosing such companies will encourage them to continue their efforts in becoming even greener. Actually, we could consider this as a partnership where industry and consumers work together towards the same goal.

Encouraging consumers education for sustainability and promote it as a trend in marketing could become a way of supporting circular economy, IoT turning into one of the major parts of this endeavour. Education is also an aspect that should be addressed not only in theory but with practical examples that could be embraced by the wider business environment, fine tuning them for a better perception of green marketing and green IoT, and circular economy as a whole.

Contribution brought by this paper could be found in the results of the research methodology based on the revision of the specialized literature and it represents a topic of global interest. Starting from the basic concept – the circular economy and making connections in the green marketing segment promoted today through IoT, the topic of this research is based on opinions and specialized studies in the field of research based on innovation and creativity. We can therefore say, and this has emerged from all the articles researched for this paper, that creativity and innovation are the key elements of a cyclicity seen from the perspective of green marketing based on IoT. Therefore, this research provides a win-win relation for company, environment and consumers.

Given the future technology and analysing the current marketing trends, we could notice that IoT represents a new trend in a business world even more focused on sustainability. Recent studies show that through IoT, consumers are more inclined to buy green products, thus facilitating the consumption of eco or organic products and encouraging companies to adopt a responsible behaviour towards society and the environment.

According to Philip Kotler, Green marketing concept emerges from societal marketing (Kotler & Armstrong, 2010). By carrying out their social responsibility, companies add value to their visual identity by using green marketing and the system to adapt to market needs and requirements, by integrating the IoT into their operating structure, becoming more environmentally and consumer friendly. Consequently, consumer behaviour, influenced by attitude, leads to a buying experience, creating a trend in the market that could become cyclical in our future economy.

Summarizing all these concepts, opinions and premises, we can say that the circular economy, through its principles of sustainability, integrates a vital operating system of a responsible society, marked by green marketing and IoT.

The paper has its limitations as the concepts discussed by other fellow researchers in their papers are approached individually and not analysed as an “all together” concept. Even if the theoretical aspects are easy to combine, it feels the necessity of a quantitative and qualitative research by interviewing professionals both in marketing and IoT, but also the consumers that could give us a better perspective of what they liked and what they would prefer to see in the future to make their lives greener and see the climate change addressed in a sustainable way through circular economy and IoT.

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