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Internet of Things – one of the Digital Steps that Companies Should Consider towards Circular Economy and Sustainability An Exploratory Case Study Defined by the Sustainable Retrospective of one of the Top Global Retail Groups

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Abstract. *Are digitalisation and Internet of Things (IoT) enablers for the circular economy? This question is based on relatively new concepts, but with a strong foundation applied in the relationship between environment, economy, and society, which, through their roles, determines a sustainable approach towards a future which companies and consumers should share. In order to highlight the attributes of the circular economy in a direct relation with the influence of digitalisation and the IoT component, the theories of various experts prove our ability to perceive sustainability from a circular and digital perspective. Whether we talk about the interconnection between the process of monitoring the life cycle of a product and the adoption of artificial intelligence during the creation process, the circular economy is the solution that comes to support the business models which also use promotion through green marketing. The adoption of the principles of circularity overlapping technological practices supports the idea of creation of a world built on social responsibility, generating long-term social, environmental and governance benefits. Nowadays, society increasingly feels the need to adopt sustainable behaviour, building pressure on the way companies operate, produce, and sell. The case study performed on a global group that has already started to adopt circular business models through digital and especially IoT technologies is proof that this solution could be implemented quite easily by other companies and the race has already started.*

Keywords: circular economy, internet of things, digitalisation, circular business model, sustainability, marketing mix, case study

Introduction

Nowadays, the circular economy (CE) represents a worldwide solution for the responsible use of resources, through the activities conducted by companies, but also through the behaviour of consumers (Mostaghel & Chirumalla, 2021). Starting from this idea of the authors, we could say that CE represents a response to the current unsustainable linear economy, by involving the principles of circularity in the long-term business and marketing strategies of companies. Also, this type of economy started to be adopted because of the existing global challenges, and it represents a way to reduce consumption, recycle and reuse on a global scale, to protect the environment, promote well-being in society and maximise profit in economic terms.

Depletion of resources and climate change have raised concerns since many decades ago, with governments, society, business environment and academia searching for solutions to address these concerns. From that moment, concepts like green, sustainability, circular economy, and net to zero started to enter into our vocabulary and all the stakeholders involved modelling different

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strategies to achieve the final goal: saving the planet from our own actions. But from concept to solution, instruments were needed. At the same time, the world was facing a new Industrial Revolution where information technology, digitalisation and communication were used to improve people's lives. Over time, one element and concept of the digital environment proved its potential to tag, link and track various objects and things and that was the Internet of Things.

Internet of Things is the technology which enables connection through the internet among things equipped with sensors, gathering various data. And these could happen everywhere at any time (Hassan et al., 2015). Internet of Things (IoT) was found to be the one enabler that could reform not only the operation, but also the role of some industries like construction, services, manufacturing, and probably the most important ones, logistics and supply chains. In 1999, when Kevin Ashton had voiced for the first time the concept of "Internet of Things" (Ashton, n.d.), he did not foresee its impact. Only 10 years later, in 2009, he realised that this new concept means more than what it was intended for, like tracking things through the internet. He understood that IoT was actually the instrument that through computers being able to gather data by themselves, it would be able also to trail and count up everything, making it possible to cut waste, loss and expenses (Ashton, 2009).

The change in paradigm from linear to circular needed new economic and business models. And everybody started to look at digitalisation and found its benefits. It looked and it is still perceived as a race where governments try to keep up with the policies, companies to adapt their strategies and bring better, smarter, and more sustainable technologies and academia to interconnect all the efforts and give the sense of the next step in achieving the ultimate goal: sustainability.

During the next pages we will investigate various industries that have started to realise the importance of circular economy and sustainability and the helping hand that IoT could give them in order to achieve them. The paper proposes a literature review trying to answer various questions: Is IoT feasible to all industries to achieve a circular model of their business? How is IoT used now to achieve sustainability? How does IoT help the circular economy to be rapidly adopted, adapted, and evolve? In the same, this paper would propose to set a point zero of what has been achieved up until now and starting from this point through future research to understand what could be done more, given the technological advancements that happen on a daily basis.

Literature review

Circular economy seen through digitalisation– concepts and definitions

Starting from the 17 Sustainable Development Goals (*THE 17 GOALS | Sustainable Development*, n.d.) established by the United Nations Organization on the 2030 Agenda, we can notice a transition in the current linear economy towards a circular economy. In order to combat the current global challenges that we face, which include climate change, hunger and poverty, environmental degradation, ethical and societal issues, as well as pollution, the initiatives launched at the macroeconomic level represent a solution for the relationship between the economy, environment and society at micro-level.

The circular economy, in the true sense of the word, represents an alternative solution to the linear economy (*How to Build a Circular Economy | Ellen MacArthur Foundation*, n.d.), which is based on the principles of recycling, reduction and reuse. In this sense, the principles of the circular economy are increasingly applied in the long-term marketing strategy of companies, being implemented with the help of digitalization, a key component in the efficiency of human, material and financial resources (Velenturf & Purnell, 2021).

The digitization of the circular economy through IoT is one of the topics that makes behavioural changes in terms of the business model of companies, the transition to the circular economy being rather a transitional bridge from the classic marketing mix to the green marketing mix. Without a doubt, the green marketing component has become a decisive factor in the mission, vision, and values of companies and according to the specialists, a profitable and sustainable management process which takes shape as one of the key business strategies of the future (McDaniel & Rylander, 1993). The idea of this type of marketing based on IoT and on the internet of everything, represents one of the directions of the future that works to interconnect the processes of exploitation, manufacturing, consumption, and disposal with those of recycling, reuse, and reduction of consumption.

Linking circular economy and digitalisation in a future strategic approach, it nuances the potential of this type of green economy to amplify the efficiency of artificial intelligence and digital technologies through blockchain and Internet of Things to contribute to an environmental, social and governance performance. The environmental, social and governance components determine and encourage the responsibility of companies to be friendly to the environment, society, and employees, by assuming related sustainability objectives. The connection between these components and sustainability is given by the perspective from which we look and how a company is positioned in the market.

The implications of IoT in the circular remodelling process of companies – directions and perspectives

Above all, transformation of the economy into a circular and digital model is given by the way in which the 4Ps (price, product, placement, and promotion) are implemented, the process being deeply applied and with repercussions by the IoT factor. Also, starting from the principle according to which the world is in a continuous change, we can notice how technology has positive effects in protecting the natural environment and building an efficient society, IoT being that component offering the necessary support to companies on their way to a circular economy with maximum future effects.

One of the situations in which IoT makes its presence known, includes Life Cycle Assessment, also known as LCA, which represents one of the most common and well-known methods to quantify sustainability within organisations. In other words, this relatively new method is a process that closely follows the product's life cycle and emphasises the principles of the circular economy. Life cycle assessment (LCA) has made remarkable progress, since the first life-cycle-oriented methods were proposed in the 1960s. Currently, LCA is defined as a tool that assesses the potential environmental impacts and resource consumption in a product's life cycle, i.e., from raw material acquisition, via production and use stages, to waste management (Hauschild, M. Z., Rosenbaum, R. K., & Olsen, S. I., 2018).

Another direction through which the transition towards a circular economy with the help of IoT is represented by the supply-demand relationship, the market's response to the wishes and needs of consumers being the factor that determines the implementation of digitization in the production and consumption processes. Starting from the idea that the integration of technology in the transition to a green economy has the potential to enable local and global economies and business models to be more productive and sustainable (Chauhan et al., 2022), we can notice the benefits of IoT by interconnecting the production and offering processes assumed by the company. Considering the use of reusable packaging or products from recyclable materials, made with digital systems and the way to sell a product online, IoT together with the circular economy aims at the

life cycle of the product. Thus, in the digitization-circularity relationship, the design of the products must be shaped according to the present and future expectations of the market by respecting the 17 Sustainable Development Objectives and the usefulness of the product must be given by its recycling capabilities in a reusable manner.

Other directions through which the transition towards a circular economy with the help of IoT are marked by the capitalization of the digital sector to maximise the effects of sustainability to protect the environment, educate society and grow the economy, through the behaviour of companies and consumers, as a response to a smart and green world. The green marketing mix is involved in every activity of the companies, and, in this case, the digital component has a major role in supporting a sustainable system of production, sale and distribution. Also, the concept of marketing mix in a sustainable approach is practically an extension of classic marketing based on the idea of making profit, currently having environmental, social, and ethical components as its goal.

The LCA component, defined by circulation and technology

Thus, the CE system replaces the "end-of-life" approach with the principles of sustainability (Chauhan et al., 2022), incorporating digitization in the marketing strategy of companies with a future perspective. In order to intensify the effects of the circular economy in the long term through the environment, society and governance components in an innovative way, the technology through IoT reduces the carbon footprint in a fast and efficient way, adapted to the current sustainability standards.

The elements involved in the process of interconnecting the circular economy with the IoT component stand out especially through the adoption of new trends in promotion aiming the entire product life cycle and following the reactions of both companies and consumers.

In this sense, circular design is highlighted by the role of LCA and Social LCA, the latter having the role of tracking the effects throughout the product's life cycle and represents one of the elements of the green marketing mix. Practically, we no longer only follow the linear thread of the action, but also the long-term effects on a social, ethical, and moral level in relation to the environment, society, and economy.

On the other hand, in order to build an architectural system based on the relationship between LCA and ESG (Environment, Social and Governance) components and noticing the promotion component of new trends in sustainability, we must highlight the emerging technologies. These are defined as promotion trends and represent one of the means of reducing the carbon footprint. Innovative business models (Askoxylakis, 2018), as well as smart IoT objects, are integrated into the ecosystem based on maximising long-term positive effects in the relationship between environment, economy and society.

The classic linear economy model, the one that does not take sustainability into account, allows the consumption approach from the perspective of exploitation, production, use and disposal, without involving circularity processes. Thus, the interconnection of this concept of circularity becomes evident through the technologies used, the promotion being made on the circular flow of reusing the product and implicitly, the materials from which it is made. Also, IoT fundamentals are essential to be able to understand the term digital circular economy. Seen as a business strategy supported in an innovative way, the digital circular economy is more of a recurring model than a passing trend, based on a solid circular framework.

The Circular Economy urges the adoption of greener industrial practices, the use of renewable technologies, and the creation of useful instruments and legislation (Ghisellini et al.,

2016). These objectives are made possible by the IoT, which generates big data that allows for analyses aimed at increasing the efficiency of every step of the value chain. The IoT automatically and remotely monitors the effectiveness of resources during foraging, production, as well as at the end of their utilisation cycle. Therefore, the connection between CE requirements and IoT value drivers is essential for minimising ecological impact (Ingemarsdotter et al., 2020).

Circular Economy (CE) became the goal that every company wants to achieve no matter its area of activity. They have been pushed towards this either by policymakers, consumers, competition, supply chains or purely commercial (Agrawal & Singh, 2020). But in order to be successful in the transition from a linear economy to a circular one, radical changes should be applied in both production, but also in consumption (Genovese et al., 2017; Svorobej et al., 2019). Designing of new products that use recycled materials (Ford & Fisher, 2019), outsourcing, supply chains and reversed supply chains (Agrawal & Singh, 2020) could be the answer to the companies' endeavours to become as green and sustainable as possible. But all these have a common nominator, namely the digital technologies which have the ability to re-create business models and transform production and consumption through their capacity to hold the value of materials across various stages of the product life cycle (Ávila-Gutiérrez et al., 2019).

How companies could use IoT in applying circular models of business - some relevant findings of several studies

Since industries and academia put together the two notions, CE and IoT, several studies have been conducted trying to find how better to mix the elements of the two. Basically, we are talking about a goal that should be achieved, CE, through an already proven instrument, which is IoT.

McKinsey & Company has conducted various studies following the evolution and adoption of IoT in several industries over the last years. In 2015, analysing 150 cases from pure consumers of IoT to big productions using sensors to optimise their manufacturing, but also to protect their employees, they came to the conclusion that a right approach on connecting the physical and digital worlds could generate $11.1 trillion yearly in economic value by 2025 (*Unlocking the Potential of the Internet of Things | McKinsey*, n.d.). The gain would have seemed huge, but even so the big buzz around it have been considered by McKinsey pretty small compared with the actual potential of the IoT. 6 years later, in 2021, they took another look at IoT and its involvement into industries, concluding that by 2030 the economic value unlocked by the adoption of IoT could be between $5.5 trillion to $12.6 trillion. B2B applications would be the big winner accounting for 65% out of this forecasted economic gain with the B2C apps strongly recovering the gap. The good news comes from the fact that developed economies are losing their supremacy in this race counting for 55% in 2030 compared with 61% in 2020. It is a strong evidence of the fact that the developing world already started to adopt new and modern economic models where digitalisation has an important role (*Where and How to Capture Accelerating IoT Value | McKinsey*, n.d.).

Steps have been already made towards circular economy and sustainability through digitalisation and especially through IoT, but not all the companies have been brave enough to adopt the new trend. Significant gains have been registered when early investment has been made into IoT, proven by the companies that continued to invest into this area.

During our research, we found out that the supply chain area is one of the most advanced areas where IoT plays an important role, being an essential part in the advancement of link operations achieved via operational transformation (Li et al., 2020). (Prajapati et al., 2022) came with a model of a VCLSC or virtual closed-loop supply chain using novel blockchain and IoT in order for companies to achieve economic circularity and sustainability, but also to create a bigger

picture from where business organisations and governments to produce some significant policies that will benefit the environment, end consumers, and the growth of various organisations and the country. They have integrated the old school supply chains with the virtual ones into a new concept, where it accounts for the expenses of obtaining raw materials and components, moving them with a greenhouse gas emission tax, transferring, sorting, and producing finished goods, as well as reconditioning, reusing, and virtualization. Apart from these, managing IoT and blockchain infrastructure, purchasing RFID tags, maintaining security, and permanently storing data on blockchain should be also included. All these to capitalise on the TER or the total expected revenue.

The new technologies and the increased power of things through their sensors has opened new avenues for other models that could not only save money for companies, but valuable resources that could be recycled. Such an example is Closed-Loop Product Life management where instead of collecting data for the next generation of a product, the new model would propose for that data to be stored and analysed and the results to be used during the life cycle of the product and even more for the end-of-life of it, giving the chance to recycle whenever possible (Kiritsis, 2011).

Another example of how companies could use IoT in applying circular models of business is the creation of various marketplaces including on waste management. (Pacelli et al., 2020) offered the example of such a marketplace for metal scrap. The company producing scrap material uses IoT to detect the occupation of their storage area or/and what kind of scrap and automatically announcing the scrap recycler of its availability. It could turn into a direct offer or into a bidding process, anyhow it helps to recycle and reuse valuable materials and all of it in a very fast and predictive way.

Smart cities concept is another good example of how IoT helps a city to improve its circular economy and become as sustainable as possible, indirectly helping local companies to achieve this goal. Increasing population in the cities and with that the increased needs for transport, accommodation, shopping etc., became a challenge for the local authorities that started to search for solutions that could solve the challenges in a smarter way on a longer term. Every candidate for the city hall has in its speech references to transform the cities into smart ones: smart infrastructure, smart buildings, smart mobility, smart healthcare, smart security and s.o. Such projects could be fulfilled only by using sensors and IoT in order to gather data, interpret them and find the best solutions to solve the challenge. But this is not the only goal to turn a city into a smart one, but also to become more efficient, less polluted, and green in consumption (Talari et al., 2017).

Companies acting in areas like retail, agriculture and even forestry have been helped by IoT to become sustainable.

Retail is one of the largest users of resources, but also with a big potential, not always entirely exploited, to become circular models of business. From supply chains to stocks to reverse supply chains, retail companies are using digitalisation and IoT to turn their businesses into sustainable ones (Upadhyay et al., 2022). Through IoT, retailers are able to predict more accurately the demand of certain products. Up until now stock levels were monitored manually using bar codes, but now through block chain tracking these could be monitored in real time reducing the global inventory by 20% (*Bringing the Power of IoT to Supply Chain Management*, 2017), which is translated into a smaller carbon footprint.

In agriculture, IoT facilitates enhanced crop control, resource planning, cost-effective agriculture, increased quantity and quality, crop and field monitoring, and other tasks, by using a variety of IoT sensors, including air temperature, soil pH, soil moisture, humidity, and flow rate of water sensors (Dagar et al., 2018).

The Internet of Things has enormous potential to play a critical role in the management and security of forest ecosystems, an element that plays a critical role in the world's fight against climate change, pollution, and irrational use of resources. Forest management utilising the Internet of Things may achieve species and habitat protection and a sustainable wood production, avoidance of forest land degradation, forest fire warning, prevention, and control. IoT adoption in digital forestry provides effective operations, management, and forecasting for soil erosion, and fires (Salam, 2020).

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State of the art solutions – an exploratory case study defined by the sustainable retrospective of one of the top global retail groups

For a better understanding of the above literature review, we have decided for a short case study on one of the top retail groups in the world, acting in 32 different countries, on two continents, employing over half of a million people and with a total revenue in 2021 of over €133 billion. Schwarz Group chose a business model that could cover their immediate needs in the area where their main business lies, retail, but also address the future challenges that they may face in all predicted areas: food shortage, e-commerce, circularity, and recycling. Another component of their business model is to support other businesses delivering tailored solutions for their immediate and future needs (Schwarz Group, n.d.).

Situated in Neckarsulm, Baden-Württemberg, Germany, Schwarz Group has Lidl and Kaufland as its mainstays in retail. The Group gained its independence in providing food retail products through Schwarz Produktion, but also anticipated their needs for recycle, environmental and circularity solutions, creating its subsidiary PreZero. This makes Schwarz Group one of the few groups offering the complete value chain: manufacture, selling, recycling and waste disposal. We might say that through its investments Schwarz Group built a complete business circular model (Schwarz Group, n.d.).

The future of retail through internet and e-commerce has been taken into account by this company. Through its subsidiaries Stackit and Xm Cyber covered its digital needs but offered those solutions and digital services to other companies for their business and administration strategies (Schwarz Group, n.d.).

In that respect, the Group used the digital solutions offered by SchwarzIT, Stackit and Xm Cyber to answer its own challenges. And Lidl was one of the beneficiaries by trying and implementing various solutions not only for its own functions, but also for their consumers.

Driven by the 26th UN Climate Changes Conference goals to solve the climate crisis (Climate Change Summit COP26, n.d.) and its desire to become a circular model of business, up until 2030, Lidl committed to reduce its effective emissions by 80% compared with the 2019 amounts across all 32 countries where it operates. Some of the measures implemented consisted in

installing and operating 250 electric vehicle charging units, investments in onsite solar systems and modern, low emission cooling and illumination technologies (Warren, n.d.). As its functions could not be possible without a solid and committed supply chain, Lidl also supports its partners in their efforts towards net to zero, by helping them to use more efficiently various resources, including water and energy. The technologies implemented to achieve this goal would consist of a mix of internet and sensor technologies, meaning IoT, for a better management of fodder, soil and land, fertilisers, herd, and energy. One of the outcomes was the presentation of a carbon-neutral cheddar cheese from Wyke Farms (Warren, n.d.).

Lidl was also the beneficiary of a solution for an effective supply chain design, developed by Schwarz IT and Relex Solutions, a Finnish company that uses data gathered through IoT, algorithms and data processing to turn consumer commodities value chain into efficient ones. The solution helped Lidl for predicting and automated refills, providing them with more visibility into the distribution network, allowing the store to respond swiftly and effectively to developments, even if they are unforeseen. The solution proved invaluable during the start of the Covid-19 pandemic (Lidl Is Working with RELEX for Efficient Supply Chain Planning, 2022).

Bringing efficiency into its operation was not the only goal for Lidl. They addressed the question on how to educate customers, making them a partner in the race towards circularity. In 2022, using digital and IoT solutions, Lidl UK offered their customers the access to a smart replenishment station on the shelf with smart sachets for their washing detergents. The solution was designed together with a Chilean start-up, Algramo, and consists of a touch screen experience, where the customer picks up the pouch, chooses the preferred laundry detergent and follows the instructions on screen. The innovation continues with a special chip inserted in the pouches which counts the number of usages of that certain pouch and after the first use offering the customer a certain discount. By using this innovative technology, through sensors and data gathering, the benefits have threefold: in costs, by offering customers the cheapest washing compared with the single use products; for sustainability, as for each refill of every pouch 59g of plastic is saved, minimising also carbon emissions and water usage; and efficiency, both for customers as the fastest refill solution, but also for the stores as the machines are quite small, optimising the space on shelves and the transport of detergent in bulk being more efficient then in single bottles (Dennis, 2022).

Through its IT branches and Lidl, Schwarz Group also introduced solutions for the customers to adopt green and sustainable solutions in their own homes. Such an example is the Smart Home Lidl system which offers the entire set to turn a house into a smart one. Starting from the Hub/Gateway that helps to connect smart RGB bulbs, movement and security sensors, smart sockets and LED light ceilings, the consumer through a dedicated app is available to control its home, save energy and also be sure that everything is safe and sound (Russo, 2021).

These are only a few examples that proves that Schwarz Group through its various companies is one of the leaders in adopting a circular business model by using Internet of Things as one of the enablers, but also promoting circular economy, sustainability, and efficiency towards its partners and to its consumers. By adopting an overarching model that has an impact on its operations, but also on its customers and their way of life through their perception and behaviour, it gives an example and an impetus also to its competition, to other retail groups, to be more ambitious in this race towards net to zero.

Methodology

In this qualitative research work, a number of 37 articles, papers and internet sources were consulted to highlight the premises emphasised in the specialised literature in association with the characteristics of a circular economy with digital influence.

The work, "Internet of Things - one of the digital steps that companies should consider towards circular economy and sustainability. An exploratory case study defined by the sustainable retrospective of one of the top global retail groups" is therefore a revival of the relationship between the three components: circular economy, sustainability and IoT and presents the sustainable aspects to maintain the efficiency of the environment-society-economy from the perspective of the industries and the companies active in those areas.

Also, this research is based on the practices and influence of green marketing adopted in the exploitation, production, sale, and promotional activities of the business models present in a circular economy based on innovation and connected to sustainability concepts through the Internet of Things.

The design of the research is outlined both by reviewing the specialised literature and interpreting it in an analytical manner, as well as through a case study, which highlights the premises and results of the research in a qualitative way.

We have considered that a study case would complement very well the findings of this literature review. Through desk research we tried to answer why this particular company has adopted a circular business model and how it did. We have focused on contemporary events, using open-sourced documents and press releases building and exploratory and retrospective case study (Yin, 2009)

Results and discussions

The analysis of various sources and the results of the case study, showed that circular economy and digitalisation through its component IoT, are compatible and their interconnection is already used by various industries and areas. But more could be done, and the experience already gained by the companies using this mix might be the answer for future solutions. Now, they should be aware of what is needed and where to put into work their efforts and resources in order to achieve the next step of sustainability. Part of the questions posed at the beginning of this paper have been answered, but there is still one part that could be further addressed adding one more element, that experience of the companies: *How could IoT help further the circular economy to evolve?*

The perspective of the Schwarz Group case study highlights how the transition to a circular model is a challenge through the implementation of the IoT component in the subsystems of an organisation, impacting both the internal and external business environments.

Sustainable business models obtained through IoT have already been applied and companies experienced the benefits, but faced also various challenges and this poses additional questions that could be further explored: *Which are those challenges faced by the companies in their endeavours towards a circular model of business? Could they be overcome by the company itself or it needs outside expertise? In the digitalisation spectrum is IoT the only component that could help companies to achieve a higher degree of sustainability?*

In a short to medium long term, with the help of research and development, based on their experience, companies, either helped or not, will come up with business and marketing models that will help them to recycle, reuse, transform and become friendlier to the environment and society.

Conclusion

IoT technologies are already altering circular economy practices and existing business models, allowing businesses and organisations in a broad range of industry sectors to eliminate waste, circulate materials, and regenerate nature.

The two concepts, the circular economy and IoT, have been carefully studied by specialists in recent years and represent some of the current market trends, in terms of sustainability, with an emphasis on both the companies' activities and consumer behaviour. To adopt a circular business model, companies must integrate sustainability components in all their activities and follow the life cycle of products, the IoT factor succeeding in amplifying the effects on the environment, society, and economy in a responsible way. In this sense, the circular digital economy is the mechanism that generates economic profit for companies, in the same way as it seeks to achieve environmental, ethical, and social objectives.

From a circular perspective, this association of two concepts aims to create a business and a consumption model based on social responsibility, consumption reduction and product life cycle management in an efficient way and with maximum long-term effects, adopting the principles of reuse, recycling, and reduction. The latter principles represent a holistic solution in response to the classic consumption model, the implications being based on emerging technologies, quantifying the processes of sustainable development.

From a technological perspective, the digital component of IoT is the connection point between the present and the future of sustainability, allowing the development of new technologies to promote the concept of circularity. Compared to other types of innovative technologies, IoT represents an efficient and sustainable way through which organisations can respond to market demand, interconnecting digital solutions to maximise the potential of the circular economy.

Based on the opinion of specialists in the field, the successful transition of the circular economy to the digital sphere through IoT, represents a risk that involves radical changes in both the production and consumption processes (Korhonen et al., 2018). This context implies an alignment of Sustainable Development Goals (*THE 17 GOALS | Sustainable Development*, n.d.) with future technologies, creating an innovative and profitable environment for the life cycle of products. The implications of the circular economy on the environment, society and the economy through the adoption of the IoT component, are highlighted as a result, through the manufacturing and production processes of the companies that prove to be more and more improved day by day from a sustainable, technological and aspirational point of view.

Considering the qualitative part of this paper, we could acknowledge that the transition to a circular economy through IoT represents a state of the art approach. Globally, by using innovative technologies, major companies design the trends in terms of sustainability, addressing the macroeconomic issue of global environmental challenges, through solutions applied at microeconomic level. For retail, the future of commerce is predicted to be mostly electronic and smart, the solution for organisations to continue to be profitable and to adopt a responsible behaviour towards the environment, society, and economy, being the establishment of objectives aimed at the transition towards a circular economy marked by IoT support.

Therefore, taking into account the arguments presented in this paper, by carrying out a qualitative research, we can affirm that today's world is becoming more and more digital and circular, companies being determined by external and internal factors on a global level, to focus their activity on supporting a green economy, maximising the benefits and implications of IoT.

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