Internet of Things (IoT) as an Instrument to Improve Business and Marketing Strategies. A Literature Review

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Abstract
Creative destruction used by German sociologist Werner Sombart in 1913, and later known as Schumpeter's gale, could be considered the first conceptual stage of what happens nowadays in all industries "forced" to use the digital environment. First three industrial revolutions experienced by the humanity happened in over three centuries with tangible results that improved immensely the day-to-day life of people. The fourth one happened in decades, and it was characterized by the use of information and communication technology in various industries. As the literature review has revealed, Internet of Things (IoT) is part of Industry 4.0., linking industries and consumers in a smarter way through sensors and other devices, collecting valuable data and helping companies. This article proposes a navigation throughout the literature to demonstrate that IoT is a new and modern solution that has a big potential for development to help businesses to take smarter and swifter decisions from data gathered indirectly from consumers. Given that the papers analyzed are quite recent, we would say that this topic of IoT is only lightly investigated, and it opens many subjects of discussions, not only on the business and marketing side, but also economically, socially, and of course, technically. Various questions have arisen during the research: Is there a limitation in using this instrument in business and marketing strategies? Either technical or legal? The ethics of this process is under question and both companies and governments dedicated a lot of time to understand the implications of IoT in the future.

Keywords: Internet of Things (IoT); Industrial Revolution; Industry 4.0; marketing strategies; consumer behaviour;

JEL Classification: M31; M15; O30;

DOI: http://doi.org/10.24818/ejis.2022.26

1. Introduction

In 1913, the German sociologist Werner Sombart, in his work "Krieg and Kapitalismus" (War and Capitalism, 1913) was using for the first time the term of creative destruction. Creative destruction, often known as Schumpeter's gale, is a notion in economics that has been most closely associated with Austrian-born economist Joseph Schumpeter, who popularized it as a theory of economic innovation and the business cycle since the 1950s. According to Schumpeter, the "*gale of creative destruction*" describes the process of various methodologies that continually revolutionizes the economic model from within, constantly dismantling the old one and progressively establishing the new one (Schumpeter, 2010 [1942]).

Received: 15 May 2022; Revised: 4 September 2022; Accepted: 30 November 2022

Is there a link between Schumpeter's gale and the Industrial Revolutions that preceded and succeeded the idea? Humankind has witnessed four industrial revolutions conscious about changes, but not about the theoretical term.

The descriptor "Industrial Revolution" believed to have first appeared in a letter sent by French diplomat Louis-Guillaume Otto on July 6, 1799, proclaiming that France had entered the race to industrialize (Teich *et al*., 1996). According to Raymond Williams (1976) in his book *Keywords: A Vocabulary of Culture and Society* in the entry for "Industry", it wasn't until Southey and Owen, writing between 1811 and 1818, that the concept of a fresh societal system based on massive industrialization became crystal obvious. Prior to that, Blake, writing in the early 1790s, and Wordsworth, writing around the beginning of the 19th century, hinted at this possibility (cited in Williams, 1976).

The shift to new industrial methods in Great Britain, continental Europe, and the United States occurred between roughly 1760 and 1820 in the period known as the Industrial Revolution (European Route of Industrial Heritage, 2022). The shift from hand to machine production, new chemical and iron manufacturing techniques, increased use of steam and waterpower, the development of machine tools, and the growth of the mechanized factory system were all part of this transformation. The Industrial Revolution also ushered in a period of extraordinary population expansion (European Route of Industrial Heritage, 2022).

The Industrial Revolution was a watershed moment in history, affecting practically every area of everyday life in some manner. Average income and population, in particular, began to expand at an unprecedented rate. Some economists claim that the most important effect of the Industrial Revolution was that the general population's standard of living in the western world began to rise consistently for the first time in history, while others claim that it did not begin to improve meaningfully until the late 19th and early 20th centuries (Feinstein,1998; Szreter and Mooney, 1998; Lucas, 2002). In general, six factors aided industrialization: high levels of agricultural productivity, which provided an excess of manpower and food; a pool of managerial and entrepreneurial skills; the availability of port facilities and transportation infrastructure, which made it possible to move materials and outputs cheaply; natural resources such as coal and waterfalls; political stability and a legal system that encouraged business; and financial capital available for investment (Cipolla, 1972; Rider, 2007).

In the last centuries, world economy has faced four industrial revolutions with the first one pertaining in the 18th century prompting the creation of power through steam and helping the industries to generate eight times the volumes produced by the traditional spinning wheels in the same amount of time (Desoutter, 2022). The 19th century and the advent of electricity meant the inception of the second industrial revolution, including also the introduction of assembly line manufacturing. An example would be the adoption of mass production from a Chicago slaughterhouse to automotive manufacturing by Henry Ford (1863-1947) (Desoutter, 2022). After more than 50 years, in the 1970s, the third industrial revolution came with partially automate manufacturing methods by using memory-programmable controllers, computers and even robots and without the need of human intervention (Desoutter, 2022).

The 3rd Industrial Revolution has opened our way into the 4th one, the one that we are now living in. Information and communication technology are now working hand in hand with the manufacturing industry, already equipped with computers, creating a digital twin on the Internet. Other benefits brought by the digital twin were the exchange of information between various users, but also the data created for themselves. This Industrial Revolution

is also referred as Industry 4.0 (Desoutter, 2022). It has the ability to alter various business decisions, companies and their managers being part of wider networks, smart ones, that could provide them more focused business intelligence, employ more flexible means of delivering accurate information at the appropriate moment. With the rising usage of these technologies, inside factories, but also out in the world, the maintenance personnel could be easily provided now with documentation and service history fast and accurate, they preferring to spend their time addressing issues rather than wasting time attempting to get the technical knowledge they want (Desoutter, 2022). In a nutshell, Industry 4.0 is a game-changer for businesses across all industries. As a result of the digitization of manufacturing, the method through which things are manufactured and delivered, as well as how products are maintained and enhanced, will all change. Based on these considerations, it may legitimately stake a claim to being the beginning of the 4th Industrial Revolution (Desoutter, 2022).

The present study represents a literature review on Internet of Things (IoT), looking at 42 resources, research papers and Internet sources being used, putting together the existing information in order to draw a bigger picture of what IoT means and how it could influence smarter, faster and better business and marketing decisions for companies using collected data through various devices. The paper will be structured in 4 parts, first one as a scene setter for the studied concept, second describing the methodology used, third and fourth being dedicated to results and discussions, and conclusion.

2. Scene setter for the concept of Internet of Things (IoT)

Industry 4.0 (I 4.0)

Industry 4.0 is an idiom that has gained popularity in recent years to describe the continuing transitions occurring in manufacturing and supply chain networks (Ivanov *et al*., 2021), while its definition is drawn from the actual applications of the concept. One of the examples could be Siemens and the company's transformations through technological advances. By utilizing an open operating system and the Internet of Things (IoT), Siemens' cloud-based manufacturing platform MindSphere can generate information for advanced analytics, allowing it to digitally manage a variety of interconnected systems and machines across multiple factories (Siemens, 2019, p. 1).

Aside from practitioners, the concept of I 4.0 differs from academic field to academic discipline. Industry 4.0 has been defined as technological advancements, performance outcomes, operations management (OM) improvements, and market evolutions in disciplines such as engineering, management, supervise, and information science (Oztemel and Gursev, 2020; Tang and Veelenturf, 2019; Yin *et al*., 2018). Taking the management field as an example, Piccarozzi *et al.* (2018) state that Industry 4.0 combines IoT with manufacturing processes. This allows manufacturers to use entirely digital, linked, smart, and decentralized value chains that can achieve additional flexibility and resilience to firm economic efficiency and allow them to build versatile business strategy. Oztemel and Gursev (2020) call Industry 4.0 a method to move from machine-based manufacturing to digital manufacturing. Recent studies show that, in the I 4.0 context, OM research has been mostly focused on how these technologies could be applied in various industries like processing additives, artificial intelligence, also known as AI, IoT, automation through robots and, the newest one, in blockchain (Ivanov *et al.*, 2019; Tang and Veelenturf, 2019;

Calzavara *et al.*, 2020; Olsen and Tomlin, 2020;). We will define I 4.0 from the point of view of the OM: Industry 4.0 is a combination of technologies, organizational concepts, and management principles that make a network that is cost-effective, responsive, resilient, and sustainable. This network is data-driven and can quickly change its structure and components to adapt to changes in the demand and supply environment (Ivanov *et al*., 2021).

Value chains in manufacturing are intricate. Technological advancements have benefited the corporate sector in a variety of ways. According to Erboz (2017), businesses have been undergone a dramatic transformation from a traditional stance to smart companies due to the implementation of digitalization, IOT and/or CPS (Cyber Physical Systems).

Internet of Things (IoT)

The essential goal of the IoT is to link the world by gathering data from physical items (Erboz, 2017). Computers or elevated devices take data and use it to make operational decisions (Rahman and Rahmani, 2017). By the usage of IoT, the business operations become more agile and integrated as well as achieving competitive advantage on the basis of smart computing. As a result, organizations' IoT capabilities, which are largely related with flexibility and informed decision - making, will be critical in the future (Akhtar *et al.*, 2018). In fact, according to Madakam *et al.* (2015), IoT has changed the ICT environment through the combination of the worlds, those of communication, specifically the Internet, and that of objects, namely things (Madakam *et al.*, 2015).

The Internet is a worldwide network of various networks of computers: civil, public, scientific, commercial, and government, ranging in size from small to worldwide and connected by a variety of electronic, wireless, and optical communication networks (Nunberg, 2012). According to various statistics webpages (Datareportal, 2022; Statista, 2022; Internet Live Stats, 2022), 2022 is the year when the psychological threshold of 5 billion internet users was surpassed, accounting for almost 2/3s of the total population.

When it comes to Things, it can be any item or individual that the real world can differentiate. Everyday objects include things that we usually do not think of them as electronic: food, garments, and household equipment and various specialized items; but also, architecture, art and touristic sights, and their entire medley, heritage, and complexity (Evangelos *et al*., 2011). That indicates that things here can be both alive and non-living, such as people, animals, and non-living objects. Things in this physical or material universe are now genuine objects.

Defining the Concept

At present, there is no convergence between scientists and professionals when it comes to defining IoT (Madakam *et al.*, 2015). The term 'Internet-of-Things (IoT)' was first introduced by Kevin Ashton to describe how IoT can be created by "*adding radiofrequency identification and other sensors to everyday objects*" (Ashton, 2009). Whatever the description, all of them agree on one thing: Firstly, the internet was created by information produced by individuals, and then objects intervened creating the next layer of the internet (Evangelos *et al*., 2011). Evangelos *et al.* (2011) also tried to put together a definition of this new concept of IoT, as an overall and open network, comprising intelligent things that could self-organize themselves, collecting and exchanging data, but also responding to various circumstances and events happening around them.

IoT finds itself in a continuous development, being at the forefront of the information technology sector (Madakam *et al*., 2015), gaining popularity in the last 15-20 years due to its vision of interconnected physical items, anytime and anywhere, but not for everybody

(Evangelos *et al*., 2011). IoT could also be considered a trifecta worldwide network, with humans and things communicating between and among them, the only rule being for each and every of them a unique identity to be assigned (Aggarwal and Das, 2012).

IoT portrays a world in which almost anything may be connected and interact in a more sophisticated manner than ever before. In fact, the concept prompts the idea that objects can be linked, although they can be identified as individual units (Biddlecombe, 2005; Butler, 2020; Dodson, 2008; Gershenfeld *et al.*, 2004; Lombreglia, 2010; Reinhardt, 2004). An Electronic Product Code (EPC) network has been considered to build most of the existing support of IoT: coded RFID labels and IP addresses connected together (Graham and Haarstad, 2014). Generally speaking, when we think of "being connected," it is actually our thinking of technological equipment such as servers and computers as well as tablets and mobile phones. Known as the Internet of Things, sensors found in infrastructure projects or healthcare products are linked over the Internet, spawning impressive volumes of data. When things are able to detect their surroundings and communicate with one another, they become powerful tools for comprehending and responding to complexity in real time. One aspect of this which is revolutionary, it is that these data systems are creating a lot of traction, and some of them are even capable of operating substantially without the need for human involvement.

Beginning

Things like wireless sensors and nanotechnology are critical to the Internet's development because it represents the future of computing and communication (Madakam *et al.*, 2015). The IoT relies on dynamic technological progress in these disciplines. The first known internet appliance is from the early 1980's and it was a Coke machine installed at Carnegie Mellon University. The program was written in the same building, and it was tracking the supply of the cans. If the programmers wanted to visit the machine in person, they could use the Internet to check on its status and see if a cold drink was ready for them when they arrived (Evangelos *et al.*, 2011). Even though the term "Internet of Things" was firstly addressed by the Executive Director of Auto-ID Labs at MIT, Kevin Ashton, in 1999, the growth of the buzzword began with a coffee vending machine in the early 1980s (Evangelos *et al.*, 2011). IoT originally gained traction in the market research community in 2003, thanks to the Auto-ID Center and other related publications.

A short history of IoT

Probably, the inception of information technology happened in mid-19th century with the advent of the telegraph (the first landline). Progress continued with the machines being able to exchange messages, but the breakthrough was on June 3, 1900, when wireless telegraphy became reality through the first radio voice transmission. After 50 years, next step took place with computers and from that point their development was fulminant becoming better and smaller (Foote, 2022). In 1962, DARPA (Defense Advanced Research Projects Agency) used Internet as a means of communication for the first time, and it was in the 80s when the modern internet became public and commercial and service providers let people use ARPANET (the successor of DARPA). Satellites and landlines are used for most of the Internet of Things to communicate (Foote, 2022). When the Department of Defense set up a stable, well-functioning system of 24 satellites in early 1993, Global Positioning Satellites (GPS) became a real thing. This quickly led to private, commercial satellites being launched into space, making the IoT a lot more useful (Foote, 2022).

Specific milestones in the development of IoT can be considered the following:

End of the 20th century, technology was advanced enough to connect household appliances to the Internet. As a result, LG introduced the world's first refrigerator with this capability of connecting to the Internet, but data processing and storage were still challenging. The solution was cloud computing, which began to evolve in 1999 under Amazon's auspices. However, it required time for its work to be completed (Perenio, 2019).

After 1999, when Ashton voiced for the first time the term IoT, applications have started to emerge. Walmart and the US Department of Defence used IoT, tagging and RFID as a way to keep track of their inventory (Foote, 2022). This gave the impetus to IPSO alliance to consider the development of IoT technologies through a group of firms that has ultimately evolved into a signal for multinational corporations (Perenio, 2019).

In 2010, China has announced that the Internet will be one of the country's five priority study topics during the next five years. It became evident that data collection, processing, and storage were of interest to not only huge enterprises, but also to the government (Perenio, 2019). 2010 was also the birth year of the Industrial Internet of Things (IIoT) with many big companies developing and adopting their own tailored systems, as an extension of IoT. The actual term of IIoT was firstly expressed by General Electric in 2012. Actuators, smart sensors, robotics and software conducting production processes were linked into the companies' industrial applications in order to boost quality, quantity and in the end market shares. Common IIoT uses include Smart production; Predictive and preventative maintenance; Smart grids; Smart cities; Linked logistics; Digitized supply chains (Foote, 2022). Also, in 2010, Google Street View has received a new boost through the Wi-Fi networks that were on a rise. It became capable of collecting data, but also displaying panoramic images (Perenio, 2019).

In the coming years, IoT was at the forefront of many discoveries, being identified as one of the most promising technologies to evolve (Perenio, 2019). From real applications of the concept like the Jamie Siminoff's Ring doorbell in 2011 (Foote, 2022) to attempts of standardization of its use like the adoption of IPV6 in 2012 by the major internet providers, which will make the Internet having more address space around the world (Foote, 2022), IoT has already started to show its potential.

In 2012, the largest Internet conference in Europe, LeWeb, was entirely devoted to this subject, IoT, and famous magazines like Forbes, Fast Company, and Wired magazines started to write about this new concept. The race has already begun, with IoT being spoken about and companies becoming more interested in adopting it (Perenio, 2019). The smart city became a reality in 2012 with the help of IoT, when Smart City Switzerland became a pilot project run by the Swiss Federal Office of Energy. At that time, academia, professionals, and public administration were only discussing the future of smart cities based on sensors and IoT. Now, over 60 projects are run by Smart City Switzerland, further encouraging researchers and industries to come up with new ones. Traffic monitoring, Air quality monitoring, Smart transportation, Smart parking, and Smart public lighting are part of the nowadays smart cities, but also buildings started to become part of these projects, being integrated into the overall concept of a smart city (Foote, 2022).

In 2013 other technologies have been added to the concept: wireless communication, MEMS (micro-electromechanical systems) and integrated systems, but also new devices as medical equipment, like heart monitor implants, and farm animal's biochip transponders (Foote, 2022). Only in 2015, smartphones have been added to this private club. At that time, IoT was welcomed by marketers with open arms in 2015. Customers and products'

locations are taken into account when marketing teams use sensors in these devices to send out specific promos (Foote, 2022).

IoT Applications

IoT has become affordable to many organizations due to technological advancements, especially in the field of sensors (Oracle, 2022; Terra, 2022):

- *Connectivity*. A variety of internet protocols have made it simple to connect sensors to the cloud and other "things" for data transfer (Oracle, 2022).
- *Platforms for cloud*. Cloud platforms are becoming more widely available, allowing organizations and individuals to use technology without having to maintain it all (Oracle, 2022).
- *AI and data science*. Businesses may gain insights faster and easier with breakthroughs in machine learning and analyses, as well as access to large volumes of cloud-based data. These new technologies continue to push the limits of IoT, and IoT data feeds these new technologies (Oracle, 2022).
- *Conversational artificial intelligence (AI)*. Natural-language processing (NLP) is currently a financially effective endowment of IoT devices, Alexa or Cortana being suitable examples (Oracle, 2022).
- Entities and fields that employ sensors are the ones benefiting the most from IoT (Terra, 2022).
- *Manufacturing* - The use of production-line monitoring to enable proactive repair on equipment when sensors identify an impending malfunction can give manufacturers a competitive advantage. Sensors can detect when a plant's productivity is at risk. Using sensor alerts, producers are able to inspect equipment accuracy more rapidly and, if necessary, take it out of production while repairs are being made. Improved asset performance management and cost savings can be achieved by implementing this strategy (Terra, 2022).
- *Agriculture* - Monitoring and controlling micro-climate conditions is now possible thanks to IoT technology, which in turn leads to increased productivity, through a focus on watering and fertilizing efficiency based on measuring ground humidity and structure. For example, if sprinkler systems only spray water when necessary, this avoids squandering a valuable resource (Terra, 2022).
- *Automotive* - IoT applications can have a big impact on the automobile industry, which stands to benefit greatly. Additionally, to the advantages of IoT in manufacturing, sensors can identify technical problems of moving vehicle and assist in assessment and troubleshooting. Employing data captured by IoT-based applications, automotive suppliers may gain a better understanding of how to keep vehicles functioning smoothly and owners informed (Oracle, 2022).
- *Logistics and transportation* – Through various IoT applications that could assist transportation and logistics systems, data sensors are able to help rerouting inventory-carrying fleets of various means of transportation based on weather conditions and vehicle and driver features. Sensors for tracking and tracing, as well as temperature management, might be built into the inventory itself. Temperature-sensitive inventory is common in a number of industries, such as pharmaceutical industries, food and beverage, or floral, and IoT monitoring apps that give alerts when temperatures rise or fall to a level that risks the product would be quite helpful (Oracle, 2022).
- *Retail* - Retail IoT apps improve inventory management, customer service, supply chain optimization, and operational expenses with. Smart shelves equipped with weight sensors can collect RFID-based data and convey them straight to an IoT

platform to manage inventory and give notifications in real time when things are running short. Customers can receive relevant offers and promotions via beacons, making their shopping experience more enjoyable (Terra, 2022).

- *Consumer Use* - IoT gadgets attached to wearables and smart homes apps make life easier for private citizens. Fitbits, cell phones, Apple watches, and health monitors are a few examples of wearables. Products and services are boosted through these gadgets. Arriving home, you would realize that the temperature is set at an optimum level together with humidity, and all these because of the smart home technology. Now you can begin cooking dinner in advance and have it ready for you when you arrive at your destination. In addition, the consumer may manage appliances and lights from afar, as well as activate a smart lock and without a physical key to let people in, making security more accessible (Terra, 2022).
- *Public Sector* - There are numerous advantages to using IoT in the public sector and in other service-oriented sectors. IoT-based solutions can be used by government-owned utilities to alert its customers about massive and smaller disruptions in public amenities, such as power, water or sewer services. IoT apps can collect data about the cause of a disturbance and suggest courses of action to assist utilities recover more quickly from disruptions (Oracle, 2022).
- *Healthcare* - The healthcare business gains a lot from IoT asset monitoring, wheelchairs and other patient-assistance items being suitable examples, as such equipment can be easily located, and thus efficiently used. This method can be used to keep track of a large number of hospital assets in order to assure proper utilization and accurate financial reporting for all of the hospital's physical assets (Oracle, 2022).
- *Healthcare for patients* - Hospitals may monitor their patients' health at home using wearable IoT devices, which reduces hospital visits while still delivering real-time information that could potentially save lives. As a result, there is less time spent waiting for a free bed in hospitals thanks to the use of smart beds. When vital equipment is equipped with IoT sensors, it can make the difference between life and death. In regards with elder people, IoT is very useful when there is a life-threatening situation (falls, heart attacks or diabetic crises) (Terra, 2022).
- *Insurance* - IoT wearables, such as Fitbit, may be eligible for insurance reductions. Insurers can offer more personalized coverage and promote better habits by utilizing fitness tracking, which helps both the insurer and the consumer in the long term (Terra, 2022).
- *Utilities / Energy* - IoT sensors can be used to detect external factors such as temperature, humidity, or lighting. Since humans are notoriously bad at remembering things like turning off lights or lowering the temperature, IoT sensors can help create algorithms that automatically would create patterns according to the consumption of energy. No matter the purpose, IoT-driven environmental control would save energy, helping not only the individual, but also the environment. Data collected via IoT can assist in identifying and controlling disturbances, and improving usage efficiency (Terra, 2022).
- IoT can also be employed to ensure a *safer working environment*, workers being warned about hazards and being assisted on possible options to proceed. In the event of a disaster, people can be alerted or rescued as quickly as possible thanks to IoT sensor-based apps. Equipment worn by people to gauge health and weather indicators make use of IoT input, helping them monitoring themselves, but also allowing doctors to keep tabs on their patients from afar (Oracle, 2022).

The world of IoT applications is large and growing. Duggal (2022) posits that IoT applications are ubiquitous, being found in the consumer world, for commercial purposes, but also addressing military needs. Industrial Internet of Things and infrastructure should also be mentioned. Consumer IoT is intended mostly for daily usage with home appliances, voice assistants and light fixtures being the most used. Military Things is used during battles through surveillance robots and human-wearable biometrics (Duggal, 2022).

Internet of Everything (IoE) –Internet of Nano-Things (IoNT)

The implementation of IoT is an ongoing one. New fields and industries are penetrated by sensors and apps, Internet of Everything (IoE) and Internet of Nano-Things (IoNT) looming as two examples to support this statement (Miraz *et al.*, 2015).

3. Methodology

As research methodology, an exploration of the extant literature was performed through desk research. Thus 42 resources, both research papers and Internet sources were used in order to create a bigger picture of IoT inception, starting from creative destruction and Schumpeter's gale up until Industry 4.0 and the fresh new concepts of Internet of Everything and Internet of Nano-Things (IoNT). We started from the premise that in order to understand the concept and try to predict the future of IoT, it is important to know when and how it started, what was the context of earlier stages, how they have helped in achieving goals and develop further aspirations, being known the humankind intricate behaviour and its inclination for research and development.

We have looked into various definitions of IoT, trying to shape a definition of our own, exploring ways and areas in which IoT has been used up until now. The final goal of this study is to better understand how IoT has evolved over the years and, by finding its nowadays applications, how it can be further used in marketing strategies helping to open further avenues in this area of research and applications.

4. Results and discussions

During the research we followed the history of the concept even further from its inception, creating the bigger picture of Industrial Revolutions that led to the appearance of this new development where machines read people preferences, choices in different environments and circumstances, called Internet of Thins or shorter, IoT. We have found which areas IoT is already used and how it is translated into practice.

Various questions have arisen during the research: Is there a limitation in using this instrument in business and marketing strategies? Either technical or legal? We have found that IoT applications could be countless, because the amount of data gathered is huge. It seems that the most important obstacle is the human mind that programs the machines to deliver the wanted results which are supposed to analyze the quantity of data gathered every second. The final goal would be to get the results needed in taking the best business and marketing decisions. The countless applications open further avenues of exploring, challenging academia and companies in searching and researching ways in fulfilling their needs and the consumer needs in the end.

As for the legal aspect, this could be another obstacle, that business environment, governments and international organizations have just started to explore. Up until now, data security and privacy have been identified as legal aspects that could impose some boundaries in exploiting IoT, being of paramount importance to respect these fundamental rights. Future research could be helpful to see if other legal avenues would emerge from using IoT, trying to find the right balance in order not to block the advancements in the industry.

Given that the papers analyzed are quite recent, we would say that this topic of IoT is only lightly investigated, and it opens many subjects of discussions, not only on the business and marketing side, but also economically, socially, and of course, technically.

5. Conclusion

The present research is a review of the extant literature on IoT. IoT should be deemed a broad research field as it touches upon almost every aspect of our lives. There is not one definition that could be considered an overall one, meaning that the concept needs further consideration from the researchers and academia, in general, with industries playing their applied part. Various questions could be addressed: What is the life span of IoT? Is IoE a replacement or only an addition for IoT? Are the marketing people using in full what IoT offers? Are there any areas that have not been considered by IoT?

IoT approaches its 25th birthday, with elements of it being studied since middle of the 20th century, but it cannot be disregarded the technological advancements made in the last decade and the penetration into industries and into our lives. Maybe that is why industries needed to have a fast approach, understanding the implications of such a technology in the future. Just imagine, being able to collect valuable data about various consumers without actually physically getting in touch with them. Even more marketing specialists being able to understand what consumers want for the future only by interpreting the data collected thorough IoT. The average and rate of having a happy consumer, one that would look for your products and services, have increased exponentially, making the markets basically impossible for those industries and companies that have not yet adopted modern technologies like IoT. Future research should expand the exploration of the impact of IoT on business and marketing aspects in various industries.

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