Chapter 5

Connected Consumers: Unleashing the Power of IoT for Personalized Marketing ⦵

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Abstract:

This article delves into the intriguing synergy between the Internet of Things (IoT) and personalized marketing, two transformative domains in contemporary business landscapes. As IoT technology continues to proliferate, it offers unprecedented opportunities for businesses to collect, analyze, and utilize vast amounts of data from connected devices. Simultaneously, personalized marketing strategies have gained prominence, emphasizing tailored experiences for consumers. This research seeks to understand the dynamic relationship between IoT and personalized marketing, examining how IoT technologies enable enhanced personalization in marketing efforts.

The study employs an exploratory approach based on a compherensive literature review which reveal that IoT facilitates personalized marketing by providing real-time data on consumer behavior, preferences, and contextual information. This data empowers businesses to craft highly personalized marketing campaigns, resulting in increased consumer engagement associated with IoT-driven personalized marketing, including data privacy concerns and the need for transparent communication. It also explores the role of artificial intelligence and machine learning algorithms in optimizing marketing strategies within IoT ecosystems.

In conclusion, this research underscores the evolving landscape of personalized marketing through the lens of IoT, shedding light on the potential for businesses to forge deeper connections with consumers. As IoT continues to evolve, understanding its implications for personalized marketing becomes imperative for businesses aiming to stay competitive in an increasingly data-driven and customer-centric marketplace.

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Introduction

In today's world, with the proliferation of product variety and the expansion of markets, competition has intensified, elevating the significance of marketing strategies. To enhance the efficacy of marketing strategies, there is an increasing reliance on technology. The swift evolution of technology and its omnipresence in daily life have made accessing personal data quick and convenient, all while adhering to specific regulations. The simplification of data processing and the acquisition of meaningful outcomes, combined with technology's growing accessibility, offer distinct advantages to corporations. Among these technologies, the Internet of Things (IoT) stands out. Numerous technology firms are actively involved in IoT endeavors, enabling the analysis of individuals' behaviors to extract valuable personal data.

The widespread use of technology in every aspect of modern life, coupled with the proliferation of internet access through technologies like WiFi and 4G, has resulted in technological devices being prevalent in every facet of life. Globally, people have easy access to technology, and access to various platforms such as social media continues to grow day by day. The active use of technology by people from all walks of life, of all ages, and from various backgrounds contributes to the increasing importance and accelerated development of technology. In conjunction with these developments, the volume and quality of data being generated are increasing continuously. Data created by users across various platforms provide insights into users' preferences, daily habits, demographics (such as gender, race, age), and their country of residence. When used correctly, this data offers various advantages for companies.

IoT refers to the interconnected network of physical devices and objects embedded with sensors, software, and connectivity, enabling them to collect and exchange data over the internet. This technology has not only transformed industries but also paved the way for highly effective personalized marketing strategies that cater to individual consumer preferences and behaviors. IoT devices, such as smart home appliances, wearable gadgets, and even connected vehicles, continuously generate vast amounts of data. This data includes valuable insights into consumer habits, preferences, and real-time interactions with products and services. In the context of marketing, IoT allows businesses to harness this data to create tailored and hyper-personalized marketing campaigns.

Personalized marketing strategies in the IoT era involve leveraging data analytics, machine learning, and artificial intelligence to analyze the information collected from IoT devices. This relationship between IoT

and personalized marketing is a powerful one, as it enables businesses to move beyond generic mass marketing efforts and engage with customers on an individual level. In this article, we will explore how IoT technology is reshaping personalized marketing strategies, the benefits it offers to businesses, and the considerations and challenges that come with it. This analysis helps businesses gain a deep understanding of each customer's unique journey, preferences, and needs. As a result, companies can deliver targeted and relevant marketing content, product recommendations, and offers, ultimately enhancing the customer experience and driving higher engagement and conversion rates.

This study aims to investigate the contributions of data obtained through IoT in generating meaningful insights for personalized marketing strategies. In today's world, the use of IoT technology is steadily increasing, both by end-users and businesses, in various areas of daily life and across different sectors, such as industrial machinery and production lines. Additionally, it offers various benefits in sectors like healthcare, education, and agriculture. With competition intensifying across all industries, there is a growing need for technological advancements that can contribute to marketing efforts. IoT technology provides companies with valuable data to enrich their marketing strategies, and the insights derived from this data can be highly effective. This allows companies to gain a competitive advantage, increase their revenue, and achieve energy efficiency by implementing marketing strategies in less time and with a reduced budget. Moreover, customers benefit directly from receiving effective marketing services, saving time, and contributing to their budgets by avoiding unnecessary expenses. This research not only explains how companies and indirectly customers can create more effective marketing strategies using IoT technology but also contributes to the digital marketing literature and provides practical insights to marketing professionals and consumers in various sectors.

The study will include a review of literature and research on the use of the Internet of Things (IoT) in the marketing sector. It will examine how contemporary marketing strategies are developed, the acquisition of personal data through IoT, and the interpretation and utilization of this data in marketing strategies. The conclusion of the study will shed light on how data obtained through IoT contributes to personalized marketing strategies, accompanied by an explanation of the reasons behind this contribution. Furthermore, the study will provide future-oriented insights and recommendations based on the knowledge infrastructure obtained.

1. The Concept of the Internet of Things (IoT)

The Internet of Things (IoT) represents a technological revolution that embodies the future of communication and information processing. In short, the term "Internet of Things" also known as IoT, is derived from two words: the first word being "internet," and the second word being "thing" (Madakam, Ramaswamy and Tripathi, 2015).

1.1. Definition of IoT

The Internet of Things (IoT) is defined as the network of physical objects equipped with software and other technologies that connect and exchange data with other systems or devices over the internet (Gokhale, Bhat and Bhat, 2018). IoT can also be described as a universal network that facilitates communication not only between humans and humans but also between humans and objects, as well as between objects and objects, encompassing everything in the world. When defining IoT, we can refer to it as a vast network created by humans and internet-connected objects (Alpaslan and Delibalta, 2018).

In recent years, IoT (Internet of Things) technology has become one of the significant technologies of our time. This technology enables the connection of everyday objects such as cars, refrigerators, coffee machines, smartwatches, wearable health monitoring devices, home heating and cooling systems to the internet through embedded systems, facilitating communication and data transfer between these objects, humans, and processes. This has been made possible by allowing objects to be remotely sensed and controlled through the current network infrastructure, enabling the direct integration of the physical world with computer systems through IoT technology.

1.2. Historical Evolution of IoT

There is no unique definition available for IoT (Internet of Things) that is acceptable by the world community of users. In fact, there are many different groups including academicians, researchers, practitioners, innovators, developers and corporate people that have defined the term, although its initial use has been attributed to Kevin Ashton. The concept of the Internet of Things (IoT) was initially introduced in a presentation created by the British technology innovator Kevin Ashton for Procter & Gamble in 1999. Ashton (2009) articulated that when he first coined the term Internet of Things, he emphasized the dependence of computers and the internet on humans, highlighting that all existing data was generated through human

input. Moreover, he underscored the limitations of human time, accuracy, and attention. Consequently, he discussed the challenges associated with humans generating and collecting data in the physical world. Expanding upon Ashton's perspective, the need for more data and its utilization became apparent. Given the constraints on human time, the concept of using an alternative approach emerged, paving the way for devices to communicate with each other and share information through IoT technology.

The IoT has the potential to extend the scope of market research dramatically (Woodside and Sood, 2017). Internet-enabled devices produce data which can be analysed to identify usage patterns, not just when the device is used but also how the device is used, and via geo-location, where the device is used. In addition, if the geo-location data from Internet-enabled devices are combined with socio-economic data sets such as Mosaic (Mosaic, 2017), then the socio-economic identification of the users of the devices can be determined and analysed which brings the era of personalized marketing.

1.3. Applications of IoT

1.3.1. IoT in Health and Medical Areas

The convergence of the Internet of Things (IoT) and Machine Learning (ML) is revolutionizing various industries, and healthcare is no exception. The rapid expansion and advancement of the internet have ushered in a new era in healthcare, replacing traditional patient care methods with electronic healthcare systems. In this evolving landscape, IoT technologies are creating a cutting-edge medical equipment ecosystem that benefits both healthcare professionals and patients. IoT-connected devices and machine learning algorithms find applications across a wide spectrum of healthcare functions, from remote patient monitoring to process automation. Moreover, within the realm of healthcare, there is a growing demand for IoT solutions due to their cost-effectiveness, user-friendliness, and their ability to enhance the overall well-being and satisfaction of patients. These IoT-enabled medical applications offer more affordable alternatives, simplify complex healthcare processes, and ultimately contribute to improving the quality of life for individuals (Mondal et al., 2022).

One of the biggest advantages of this trend is the ability of technology to assist in cases where patients cannot have face-to-face consultations with their doctors. With the Internet of Things (IoT), it has become possible to remotely monitor a patient's condition without the need for physical meetings with the doctor. This has increased the likelihood of patients maintaining their health in a stable and controlled manner, making interactions with

doctors more effective and straightforward (Selvaraj and Sundaravaradhan, 2019). With IoT, the remote monitoring of a patient's health has become more accessible, and the reduction in hospital stays has contributed to lowering healthcare costs. These developments have had a positive impact on the quality of life, especially for elderly patients and those living alone.

1.3.2 Iot in Smart Homes

As the number of technological devices in homes continues to grow, along with the need for more comprehensive control over these devices, the concept of smart homes has gained significant popularity. For example, even household lighting offers a multitude of options, including various colors and light intensity settings. Managing the options of these household devices requires time and effort from individuals. This is where IoT (Internet of Things) technology, which is becoming increasingly prevalent, offers solutions to simplify the control of these technological appliances in homes. Today, some of the most widely used IoT-supported smart home applications include remote heating and cooling systems, the ability to remotely control cleaning robots, and the use of remote cameras for enhanced home security. These applications provide a safer environment, contribute to energy savings, and support an environmentally friendly lifestyle (Shapel, 2021).

1.3.3. IoT in Marketing

The continual evolution of marketing strategies is a natural outcome of the increasing competition among companies. Keeping track of developments that can positively impact the field of marketing and implementing them has paved the way for the rapid integration of IoT into marketing. Companies can now more easily monitor and respond to customer needs by utilizing data obtained from the devices customers use. In particular, gathering information about a customer's buying habits and gaining detailed insights into their interactions with devices and products, especially in online shopping, has become more accessible through IoT. Companies, by effectively interpreting and applying this data, can contribute to the enhancement of their marketing strategies (Roberti, 2016).

1.3.4. IoT in Production

According to Kumar and Iyer (2019), the use of IoT technology in the manufacturing industry is inevitable. IoT-enabled devices and software are utilized in various areas, including vehicle control, detecting instances of incorrect deliveries in advance and correcting shipment routes, and inventory tracking. For example, sensors in factory warehouses contribute

to the organization and more efficient utilization of inventory, as well as the identification of products with expired shelf life. IoT enables communication between factory employees and machines, which helps minimize errors that could result from human intervention.

Analysis of usage patterns of Internet-enabled devices could be used to inform new product design via identification of which functions are most commonly used on the device, how frequently they are used, and the different parameters of their usage. Haverila and Ashill (2011) discussed the importance of market intelligence on new product design success. Filieri (2013) commented upon the generic use of the web to gather customer data on new product design. The IoT can provide a higher level of market intelligence to support new product design, since actual product usage data could be gathered from all the devices of a given type in current use. Porter and Heppelmann (2014) commented that smart connected products allow companies to analyse product usage data and gain new insights into how products create value for customers.

1.4 Communication between "Things" of Internet

IoT devices can range from small sensors to large industrial robots. Hence, it's important to note that there is no single method for enabling communication between these objects. A multitude of technologies are employed to facilitate inter-device communication. For example, certain small IoT objects used in homes may utilize Wi-Fi for communication, while others can rely on mobile phones and Bluetooth. Furthermore, technologies such as 4G LTE, 5G, and notably LoRaWAN, which is gaining prominence in the realm of IoT, can also be mentioned as technologies that facilitate inter-device communication.

1.5 Architecture of IoT Technologies

A six-layered architecture was also proposed by Zhang and others (2012) based on the network hierarchical structure. As observed in the OSI Networking Model, the communication technology used in IoT has implemented the same application layers as computer networks. Typically, the application layer is the first layer, where user interactions with objects and internet access are provided. Following this, data generated by the user/object is transformed into a usable format in the presentation layer, and network connections are maintained in the session layer. The transport layer ensures the transmission of data, and then in the network layer, decisions are made regarding the route the data will take. The data link layer facilitates the

transmission of data using the chosen route. Finally, in the physical layer, the interaction provided by humans or objects is enabled to access the internet.

1.6 Requirements of IoT

1.6.1 Data Collection

The necessity for data collection by IoT devices holds significant importance in two distinct areas. The first crucial area is the collection of data from IoT objects used in the industrial sector. This is particularly critical for the proper functioning of devices in the industrial sector, and more importantly, for ensuring the provision of a healthy working environment for individuals in factories. The proper acquisition of data used in marketing strategies will also contribute to the success of marketing strategies. The Internet of Things (IoT) sensors and devices have become a real factor in customer interaction and data collection. As more devices become interconnected, more data will be generated, and if marketers can effectively analyze this data, they can have a message to convey to their customers. The key point in this regard is that the collected data should be defined in line with the needs of the customers (Gong, 2016).

1.6.2 Processing and Interpretation of Data

With the advancement of technology, the generation of a vast amount of data has increased even further, particularly with the advent of IoT technology. To process and interpret such a massive volume of data, advanced technologies are being utilized. Data analytics and advanced Customer Relationship Management (CRM) applications, aided by developed algorithms, are increasingly yielding better results by extracting meaningful insights from these extensive datasets. While research and development in this area are ongoing, there are still instances where the final analysis results are interpreted by humans. Therefore, these technologies remain open to further advancements and continuous development.

1.6.3 Data Security

Data security is one of the most significant challenges in the context of the Internet of Things (IoT). Particularly, accessing sensors can be relatively easy in cyberattacks. This situation not only opens the door to malicious use, endangering individuals' security but also poses a risk to companies as their data may be accessed by others for malicious purposes. In today's world, the lack of adequate emphasis on data security and the absence of comprehensive cybersecurity solutions represent substantial risks (Kumar and Iyer, 2019).

1.7 Problems and Challenges of IoT

The Internet of Things (IoT) has brought about numerous opportunities and advancements, but it also faces several problems and challenges that need to be addressed for its widespread adoption and success.

1.7.1 Technological Problems

IoT is a complex technology with various contributing factors. There are numerous methods and technologies available to facilitate inter-device communication. Factors such as which technology a specific device will use and whether a device will collect data or provide data introduce diverse requirements. Different technology options, market competition, the availability of various security solutions, and the creation of systems with unnecessary dependencies can hinder the development of efficient systems (Chen et al., 2014).

The IoT ecosystem consists of a wide variety of devices and platforms, making interoperability a significant challenge. Ensuring that different devices can communicate and work together seamlessly is crucial. As the number of IoT devices continues to grow exponentially, managing and scaling IoT networks becomes increasingly complex. Scalability issues can hinder the deployment of large-scale IoT solutions.

While IoT devices generate vast amounts of data, effectively managing, storing, processing, and analyzing this data is a significant challenge, requiring robust data management solutions. Many IoT devices are battery-powered or have limited power sources. Ensuring that these devices are power-efficient and have long battery life is crucial for their practicality.

1.7.2 Regulatory, Ethical and Sustainability Problems

IoT solutions often need to comply with various regulations and standards, which can vary by region. Navigating the regulatory landscape can be complex and time-consuming. The ethical implications of IoT, such as the responsible use of data and AI, need to be carefully addressed to ensure that IoT benefits society as a whole. The production and disposal of IoT devices can have environmental consequences. Sustainable design and responsible disposal practices are essential.

1.7.3 Security and Privacy Problems

IoT devices often lack robust security features, making them vulnerable to cyberattacks. This poses risks to both individuals and organizations as sensitive data can be compromised. The collection of vast amounts

of personal data by IoT devices raises concerns about user privacy. It's essential to establish clear regulations and guidelines to protect individuals' privacy. IoT devices are often deployed in critical applications, such as healthcare and industrial settings. Ensuring the reliability and availability of IoT systems is essential to prevent downtime and failures. Addressing these problems and challenges requires collaboration among governments, industries, and technology providers and developing comprehensive solutions for security, privacy, and interoperability, along with robust data management.

1.8 Advantages of IoT Applications

1.8.1 Advantages of IoT for Companies

One of the most significant advantages of IoT in today's world is the rapid access to a vast amount of data in various fields. Companies in different sectors can use this data to make better decisions. In the agricultural sector, companies can monitor environmental conditions in real-time and use IoT devices to adapt to changing conditions more effectively. For manufacturing companies operating in factories, IoT is becoming increasingly important. Tracking products in warehouses is not only crucial in terms of quantity but also for controlling attributes such as expiration dates, providing an advantage to companies. Another essential advantage is that IoT-derived information contributes to the development of companies' marketing strategies, allowing them to create more realistic strategies compared to competing firms (Chen et al., 2014).

1.8.2 Advantages of IoT for Consumers

IoT offers advantages not only to businesses but also to consumers, with many benefits. As more and more objects connect to the internet and utilize IoT technology, consumers can perform certain activities remotely. The combination of machine learning technology with IoT allows for the automatic operation of systems such as lighting and the preparation of morning coffee without the need for user interaction. In the near future, some tasks that users need to perform manually may be automated. Devices like Amazon Echo and Google Home can receive user commands to play music, provide information, and adjust lighting. Furthermore, remote monitoring of patients' health conditions and the facilitation of some treatments have become more accessible through IoT.

2. The Concept of Industrial Internet of Things (IIoT)

One of the areas where the Internet of Things (IoT) contributes is the industrial sector. With the efficient use of IoT technology in industry, research and development in this field have increased. Due to the unique features and requirements of IoT usage in the industrial sector, these efforts are referred to as Industrial Internet of Things (IIoT). The Industrial Internet of Things comprises a system formed by numerous devices connected through IoT technology. These systems can collect data to intelligently change their surroundings or behaviors, exchange data among devices in the system, analyze data, and take action based on the results obtained, all without human intervention. This autonomous operation of systems without human intervention distinguishes IIoT from IoT. IIoT not only facilitates machine-to-machine communication but also enables the execution of repetitive and simpler tasks such as organization, quality control, and installation without human involvement (Boyes et al., 2018).

2.1. Historical Evolution of IIoT

The emergence of cloud technology has provided the capability to easily store large volumes of data regardless of time constraints. This has given rise to the concept of IIoT, where data obtained from large robots and industrial systems used in industrial environments can be seamlessly stored in a cloud environment. With the ability to store vast amounts of data in the cloud, the creation of secure systems with remote access has become achievable without the need for human intervention.

2.2 Applications of IIoT

In the manufacturing industry, there are abundant opportunities to create new business areas and products with IIoT technology. Prioritized data collected from customers can be used to create smart systems that enable manufacturers to respond more quickly to customer needs, resulting in cost and time savings for manufacturers, as well as contributing to the reduction of production risks. By using sensors in the supply chain, real time inventory tracking can be conducted, and orders can be placed by the system before products run out. IIoT can enable systems in various other fields to operate autonomously, eliminating the need for human intervention and leading to more optimized and efficient systems.

IoT sensors can provide data on soil conditions, weather, and crop health in agriculture industry. Agribusinesses can use this data to personalize their marketing efforts, such as recommending specific fertilizers or pesticides.

3. The Concept of Personalized Marketing

Personalization in marketing is not a recent concept; its roots can be traced back to the 19th century. Ross (1992) discovered that personalized direct marketing letters were already in use as far back as 1870. In fact, marketers noticed the effectiveness of personalized salutations in increasing response rates as early as 1940, as demonstrated in an experiment by Time magazine (Reed, 1949). However, the appeal of personalization waned by the 1960s. This decline was partly due to the growing difficulty and cost associated with implementing personalized marketing efforts until the advent of modern computing power (Petrison et al., 1997). The fundamental idea behind personalization began to take shape when researchers began recognizing that markets were not homogenous; instead, they were made up of diverse customer groups with distinct needs and preferences (Smith, 1956).

The concept of personalization is central to the discipline of marketing, but remains multidisciplinary in nature as it intersects with domains such as business management, computer science, decision science, information system (IS), and psychology. According to Zanker et al. (2019), personalization embeds the application of artificial intelligence (AI) and machine learning (ML) in cognitive and social psychology.

Adomavicius and Tuzhilin (2005) furthered the personalization process by condensing the initial steps into two stages (i.e., understanding the customer and delivering the personalized offerings) and adding a third stage as a measurement of the impact of personalization. The personalization process can be generalized at a broader level as a value co-creation process for both marketers and customers (Vesanen and Raulas, 2006). Accounting for customer heterogeneity through value, knowledge, orientation, and relationships increases the role of personalization in marketing. According to Dawn (2014), personalization has transformed the traditional four "Ps" (i.e., product, price, place, and promotion) into five "Is," namely, identification, individualization, interaction, integration, and integrity.

With the increasing competition among companies, particularly in the marketing departments, the importance of creating innovative strategies has grown. Personalized marketing, as defined by Kim (2002), is used in the context of extracting a portion of a vast body of information that is relevant to only one individual or a group of individuals. Over the years, there have been various definitions of personalized marketing. Personalized marketing refers to the interactions created between companies and customers, targeting individual customers by using data obtained from customers, including their

behaviors, preferences, age, gender, and other personal information (Dahl and Fridh, 2019). According to Dawn (2014), with the increase in internet access, companies have started to interact directly with their customers.

In personalized marketing, the goal of companies is to deliver the right message to the right consumer at the right time (Tam and Ho, 2006). Using web-based personalization methods, it is now quite easy to deliver the right message to the right person thanks to the technology used today. In this regard, personalized messages from the company to the customer will contribute to customer satisfaction. To achieve this, it is not enough to classify products according to customer segments; product differentiation should be done at the individual consumer level to facilitate the implementation of personalization.

3.1 Advantages of Personalized Marketing

Personalized marketing offers several advantages for businesses aiming to connect with their target audience in a more tailored and effective manner. Personalized marketing offers various benefits for both customers and companies. It grabs the attention of individual customers by delivering content and offers that are specifically relevant to their interests and needs. This personalized approach is more likely to engage customers and hold their attention. One of the primary objectives of personalized marketing is to achieve individual customer satisfaction. Tailoring marketing messages and offers to individual preferences enhances the overall customer experience. Customers feel valued when businesses show that they understand their needs, which can lead to greater satisfaction and loyalty. The personalized experience provided to the consumer streamlines their entire process, fostering trust in the company and increasing the likelihood that the customer will choose the company again for future needs. Personalized marketing can lead to higher conversion rates as customers are more inclined to make a purchase when presented with products or services that align with their preferences and past behaviors. By consistently delivering personalized experiences, businesses can build stronger relationships with their customers, increasing the likelihood of repeat business and long-term loyalty. This, in turn, positively contributes to the company's revenues.

For companies, opting for personalized marketing over traditional marketing is a more cost-effective strategy. While personalized marketing may require an initial investment in data analytics and technology, it often proves cost-effective in the long run. Targeted marketing efforts are more likely to generate a higher return on investment (ROI) than broad, non-

personalized campaigns. Personalized marketing minimizes the risk of overwhelming customers with irrelevant or repetitive advertisements. This reduces ad fatigue, where customers become disengaged or annoyed with generic marketing messages. With personalization, companies, regardless of the industry, can access their customers' personal data and create targeted advertisements directly aimed at their customers, allowing them to gain a competitive advantage, whether they are large or small-scale firms. Personalized marketing relies on collecting and analyzing customer data, which can also be used to gain insights into customer behavior, preferences, and trends. This data-driven approach helps businesses make informed marketing decisions (Dahl and Fridh, 2019). Personalization enables businesses to suggest complementary products or upgrades based on a customer's past purchases or browsing behavior, potentially increasing the average transaction value. Businesses that successfully implement personalized marketing gain a competitive edge in the market. Customers are more likely to choose a brand that consistently delivers relevant and valuable experiences.

3.2 Challenges of Personalized Marketing

While personalized marketing can deliver significant benefits, it requires careful consideration of privacy, security, technology, and customer expectations. Businesses must navigate these challenges to create successful and ethical personalized marketing campaigns.

The methods used by companies for personalized marketing have raised concerns about customer privacy. Collecting and utilizing customer data for personalized marketing can raise privacy concerns. Businesses must adhere to strict data protection regulations (e.g., GDPR in Europe or CCPA in California) and obtain proper consent for data usage to avoid legal issues and maintain trust with customers. Storing and managing customer data carries security risks. Businesses must invest in robust cybersecurity measures to protect customer information from data breaches and cyberattacks. Personalization relies heavily on accurate customer data. Inaccurate or outdated data can lead to misguided marketing efforts and a poor customer experience. Maintaining data accuracy is also an ongoing challenge. Collecting data through a system based on users' online activities and creating behavioral profiles is a practice that involves tracking users' behavior over an extended period. These systems use customers' web browsers to gather data and enable long-term tracking of customer activities. Particularly, these practices often require minimal or no consent from customers, unlike social media applications (Toch, Wang and Cranor, 2012).

We know that companies now possess a wealth of data to develop an effective personalized marketing strategy. However, one of the challenges companies face is how these data are utilized and whether there is a sufficient budget to transform them into meaningful outcomes. Creating personalized content at scale can be resource-intensive. Businesses need to develop a strategy for generating and delivering relevant content to different customer segments. Identifying the right customer segments and targeting them effectively can be challenging. Overly broad or narrow segmentations can lead to inefficient marketing efforts. If there are inadequate resources or insufficient hardware for generating meaningful insights from the acquired data, it can become a disadvantage rather than an advantage for the company. Therefore, planning personalized marketing strategies and closely monitoring their results is crucial.

3.3 Personalized Marketing Tools

To create personalized marketing strategies, companies require a multitude of data obtained from various platforms. These data must be effectively utilized with the help of various tools to develop personalized strategies.

3.3.1 Analytic Platforms

Data analytics platforms are technological platforms that enable companies to collect data from different sources, analyze and consolidate this data, and engage with it. They also possess the capability to visualize the output. With these platforms, companies can use the data obtained through IoT technology to create analyses and visuals that can be used in personalized marketing strategies.

3.3.2 Data Management Platforms (DMP)

Data management platforms, also known as DMPs, are software platforms that provide solutions for data collection, efficient data analysis, and management of data for improving a company's marketing strategies (Bidel and Joyce, 2015). These platforms process and analyze customer data to generate meaningful insights using artificial intelligence algorithms. They are continuously developed by major technology companies due to their complex algorithms and the use of new technologies.

3.3.3 Email Marketing Platforms

Email marketing, one of the most effective personalized marketing methods, involves sending emails to existing or potential customers to

provide information about products and services. Reaching customers via email allows for advanced levels of personalization (Påhlman and Waldenskiöld, 2013). Email marketing platforms are software designed for automating email marketing. The aim is to reach existing customers with enticing emails and also to reach potential customers more easily.

3.3.4 Customer Relationship Management (CRM) Applications

The electronic and digital transaction space between organizations and their customers becomes a map that enables the emergence of description: individualized customer. New systems of representation in forms of writing, statistics, or digital information flows articulate newly ordered spaces of knowledge. In accordance with the database's law of representation, the object of representation who is the customer becomes observable, measurable, and quantifiable and individualized. Hence, the database not only individualizes the customer, it also constitutes the customer as a known and knowable object upon which the organization can act strategically. Organizations, institutions, and companies are now enabled to survey, observe, and individualize very large populations in very short amounts of time (Dholakia and Zwick, 2004).

All businesses require Customer Relationship Management (CRM) to sustain and survive in the long term (Hargreaves, 2018). CRM is a tool and strategy for managing customers' interaction using technology to automate business processes which consists of sales, marketing, and customer service activities. The aim of CRM is to find, attract new customers, nurture and retain them for future business. Companies use CRM in meeting customers' expectations and aligning with the organization's mission and objectives in order to bring about a sustainable performance, personalized customer relationships and ensure customer satisfaction (Påhlman and Waldenskiöld, 2013). Customer Relationship Management applications enable personalized marketing based on customer data. One of the customer data types found in CRM systems is data related to the customer's interactions with the company. Using this data, individual strategies can be developed to create personalized marketing strategies, and the outcomes of these strategies can be tracked using CRM applications.

3.3.5 Post-Click Landing Page Platforms

A post-click landing page is a web page that a user arrives at after clicking on an online source such as social media, another webpage's advertisement, email, or internet search results. Landing pages are web pages where online advertisements are continued to encourage users to perform a desired action

(Harwood and Harwood, 2009). Users are directed to landing pages that encourage them to take specific actions, and the design of these landing pages is tailored to promote the same content. This ensures that personalized marketing is continued through these platforms as users are more likely to click on advertisements created specifically for them.

3.3.6 IoT Data

Any data entered by a user of the Internet-enabled device, for example, which setting is chosen when operating a cooker, central heating system, or washing machine can also be available via the Internet. A low-cost geo-location function within an Internet-enabled device can indicate the geographical position of the device and via combination with geo-coded socio-economic data sets, the socio-economic group of the device user can be available.

IoT enables physical devices to connect and exchange data through the Internet, by collecting strategic information. The collection of a great amount of data represents a powerful force for understanding and predicting consumer behavior. It has the potential to expand communications and to create opportunities for companies to become more personalized, responsive, and even more proactive, especially in relation to customer service.

To develop marketing strategies based on customer preferences and tastes for personalized marketing, access to customer data is essential. There are two important criteria for achieving this. The first is that customers share their data and allow its use in marketing activities. Without the customer's permission to use their data, collecting individual data will be quite challenging. However, having access to a large amount of data does not necessarily mean having access to useful information and a greater competitive advantage. In order to develop more innovative businesses and increase market competitiveness, companies need to be able to transform data into information they can utilize and understand for continuously adjusting their customer relationships. Even if companies have access to this data, it will be meaningless if they lack effective teams and capabilities to derive meaningful insights from the data (Zengin, 2021).

Before the rapid spread of the internet, personal data was less accessible, and companies primarily had access to demographic and behavioral data. Creating personalized marketing strategies with these data was challenging for companies. However, today, the increasing prevalence of technologies like IoT and people's use of these technologies in various fields contribute

to the proliferation of individual data. This makes it easier for companies to access these data and enhance their efforts in personalization.

4. Impact of IoT on Personalized Marketing Strategies

In traditional marketing, when companies did not have access to the kind of data available today, they could create more general strategies based on the limited information they had. While these data couldn't provide detailed insights like customer preferences, strategies addressing a broad audience through methods such as TV and newspaper ads, magazine placements, and direct mail campaigns could be developed.

With the proliferation of data about customers through IoT today, companies have made changes in their marketing strategies and sometimes even in their organizational structures. Companies are leveraging the most innovative IoT and marketing solutions to advance their integrated marketing systems. The impact of the Internet of Things (IoT) on personalized marketing strategies is significant and transformative. IoT technology has revolutionized the way businesses collect, analyze, and leverage data to create highly personalized and effective marketing campaigns. IoT also enhances customer-firm relationships and provides strategic capabilities to companies (Nguyen and Simkin, 2017).

Personalized marketing is effective in creating more value for customers as it contributes to identifying customer needs. IoT devices, such as smartwatches, fitness trackers, connected appliances, and more, continuously gather a wealth of data about customer behavior and preferences. This data includes real-time information on activities, location, usage patterns, and more. Marketers can tap into this data to gain deeper insights into individual customer journeys. The goal of personalization is generally to deliver the right message to the right customer at the right time. This way, companies can reach out to each customer individually and satisfy them. When customers receive a message tailored specifically for them, they pay more attention to the content and are more likely to make a detailed decision. Customer data is used to create these personalized messages, which can be collected directly from customers or from external sources. IoT data allows for hyper-personalization, where marketing messages and offers are tailored to an individual's real-time needs and context. For example, a smart thermostat can send personalized energy-saving tips based on a user's usage patterns, location, and weather conditions. IoT also enables real-time marketing interventions. Businesses can send timely and relevant messages or offers when customers are most likely to act on them. For instance, a retailer can

send a special discount to a customer's smartphone when they are near the store (Madarasz, 2021).

In a network created by connecting smart objects, devices are now the means of generating data. With the increasing use of these devices in various aspects of daily life, accessing the trends of customers in many areas, offering them a personalized marketing experience, and achieving more successful results for companies with the individual data they generate have become possible. IoT helps in tracking customer interactions across multiple devices seamlessly. This omnichannel view enables marketers to provide consistent and personalized experiences as customers switch between devices (Alpaslan and Delibalta, 2018).

Customers do not just buy a product from companies; they experience a journey. For companies, this means they are not just selling a product but an experience. At this point, in a competitive and easily accessible environment, the personalized experience a brand offers to the customer becomes a determining factor in customer satisfaction and whether they will choose the company for their next need. To improve the customer experience, companies can use data from objects and the data customers generate with these objects, which can be used as a competitive advantage. IoT data can inform product development by providing insights into how customers use products and the problems they encounter. This feedback loop allows for the creation of products and services that better align with customer needs.

4.1 Examples for IoT Applications

The widespread adoption of personalized marketing has contributed to companies developing better strategies regarding when and what kind of messages or advertisements customers will receive. For example, sending an advertisement to someone who wakes up early in the morning can lead to negative perceptions about the company. Similarly, sending a snack advertisement to a customer who goes to bed late will not benefit the customer and may make them feel that the company is disturbing them at late hours. With IoT, customers can allow access to such personal data by applications and objects, enabling companies to acquire this information. With this information, companies can have access to customers' daily general information, and they can send messages within appropriate time frames and tailored to their specific needs, without causing any inconvenience.

The IoT household devices can be supported by smartphone applications provided by the manufacturer that can allow the customer to monitor and control the Internet-enabled device (for example, the Hive application

(Hive, 2017) for controlling household heating and lighting). Such smartphone applications can be used by the manufacturer to communicate with the customer with the Internet-enabled device to provide a new avenue for customer relationship management. For example, in terms of product support to advise how the Internet-enabled product can be optimally used, like helping about which settings on a washing machine might be suitable for different washing loads? Sensors in the Internet-enabled device could also monitor the operation of the device and advise the customer if servicing might be required, for example if a washing machine takes too long to fill up with water or if the drum does not rotate smoothly.

Streaming services like Netflix, Disney Plus and IoT-connected devices like smart TVs can analyze viewer behavior to recommend personalized content. This includes suggesting movies, TV shows, or music based on a user's viewing or listening history. One of the most successful examples of using IoT in personalized marketing is Spotify's "Discover Weekly" playlist, prepared individually for each customer. Spotify provides personalized recommendations to customers by analyzing the music they listen to, a vast amount of data from many other customers, and various and differently created historical and new data from existing playlists. With this music playlist recommendation, Spotify allows the customer to interact with their brand and recommended artists, while also facilitating a meaningful relationship with the company through the music playlists it creates (Madarasz, 2021). Another example is Netflix which is recommending films to its customers in a fully personalized way such as offering the same film by different thumbnails to two customers according to their previous different preferences.

4.2 Innovations Brought by the Internet of Things in Marketing

With the advent of the Internet of Things technology in marketing activities, certain results and requirements have emerged, leading to innovations in marketing.

4.2.1 Personalized Real-Time Marketing

In today's rapidly advancing technological landscape, customer attitudes have also diversified. These diversifications have led companies to develop new methods to maintain customer interest and meet their needs in real-time and on an individual basis. Therefore, in recent years, personalized real-time marketing has emerged. It aims to communicate systematically through various channels with customers based on real-time data and predictions derived from them (Kallier, 2017).

For example, when a user wants to buy a new phone, they search for new phones on Google from their phone and look at their prices. The data from this search on Google via the user's phone is transmitted to companies in real-time through IoT technology, and companies process this data instantly. Displaying a pop-up ad for the nearest phone store on the user's Google page on their phone is an example of personalized real-time marketing, and it illustrates how IoT contributes to this marketing method.

4.2.2 Big Data and Business Analytics

The rapid advancement of technology and the increasing prevalence of technologies like IoT have led to the generation of vast amounts of data in every field. This data contains so much information that not only processing it but also finding storage solutions for it using traditional methods is often impossible. This extensive data set is called "Big Data." Big data doesn't always translate to better marketing strategies. Big data contains vast amounts of highly complex data. Processing it requires more than conventional data analysis software. Software capable of handling big data and its complex data structures while making detailed predictions for customers is called "Business Analytics" software. Business Analytics software not only has the capacity to process big data but also possesses the ability to make detailed predictions for customers and product activation (Madarasz, 2021).

4.2.3 IoT Methods for Enhancing Personalized Marketing

In the past, companies' relationships with customers were primarily limited to physical sales points like stores. Using this method, very little information about customer behavior could be obtained. However, with the data obtained through IoT today, companies have started to increase personalized services. Companies can quickly identify problems and generate fast solutions by using IoT devices that customers are connected to. They can also increase their revenues by enabling real-time customer engagement and creating product value throughout the company's lifetime. In doing so, they save both time and energy, as IoT allows for faster results.

One method to enhance personalized marketing using IoT technology is Beacon technology. Beacons communicate via Bluetooth, allowing devices with location-based interaction capabilities to communicate with each other in close proximity. Retailers use IoT beacons and sensors in physical stores to track customer movements, gather data on foot traffic, and send personalized offers or notifications to customers' smartphones when they

are in proximity to specific products or sections. For instance, a customer browsing in the electronics section might receive a discount notification for a particular product (Alpaslan and Delibalta, 2018).

With the data obtained through the IoT, CRM systems will no longer be limited to working solely as target audience systems but will also function as systems capable of creating individualized strategies. For example, receiving a message about a store as you pass by its entrance in a shopping center can be given as an example of Beacon technology. Additionally, companies can track customers with beacons, map customer movements on a store-by-store basis, and improve product listings and in-store layouts with this information.

Wearable IoT devices, such as smartwatches and fitness trackers, provide valuable data on customers' activities, health, and preferences. This data can be used to tailor marketing messages and promotions. For example, a fitness tracker might suggest workout-related products or services based on a user's activity level.

IoT-enabled healthcare wearables collect data on users' health and fitness. This information can be shared with healthcare providers or used by health and wellness companies to offer personalized advice, products, or services.

IoT-enabled home appliances and smart home systems can collect data on consumer behavior and preferences. Marketers can leverage this data to offer personalized product recommendations and promotions. For example, a smart refrigerator might suggest recipes and ingredients based on its contents.

In the hospitality industry, hotels can use IoT devices to monitor guest preferences and behavior. Smart thermostats, room service apps, and keyless entry systems can all be used to personalize the guest experience and offer relevant promotions. At large events, IoT devices can help organizers gather data on attendee behavior. For example, tracking the flow of people through sensors can provide insights into which areas are most popular. Event sponsors can then tailor their marketing efforts based on this data.

Connected cars and IoT integration in the automotive industry enable location-based marketing. Businesses can send location-specific offers or advertisements to drivers as they pass by certain landmarks or stores. Additionally, in-car infotainment systems can display targeted ads based on user preferences and location.

4.2.4 Challenges of IoT Applications in Marketing

The accurate analysis of data used in marketing activities and its timely delivery to the right person are of great importance. The sheer volume and complexity of the data obtained through IoT raise the possibility of errors in the results of data analysis. Analyses created using highly advanced or unproven software may produce incorrect outputs, risking messages being sent to the wrong customer or to the right customer at the wrong time.

Additionally, data security is crucial, and any problem that may happen with customer data will impact the relationship between a firm and its customers. The findings also show that under the concern about the security of their personal information, customers might not be willing to engage in online platforms they are not familiar with, which highlights the importance of firms building trust with their current and potential customers in order to overcome this obstacle. IoT provides a greater scenario to better listen to customers' aspirations and to create safe engagement points, subsequently enhancing the customer experience through efficient relationship marketing strategies.

According to Zengin (2021), the increase in personalization and, naturally, the increase in data also mean an increase in cybersecurity risks. How companies protect and share the data they obtain is of paramount importance. Sharing data with third parties for marketing activities can carry significant risks when this data constitutes personal information. While current data protection laws may allow the sharing and use of much data for marketing activities, work in this area is ongoing. Restricting the use of customer data, especially when it comes to personal data, under the scope of cybersecurity, can have implications for the use of data in marketing activities.

Since there has been a massive Iot data surge that going, so it becomes naturally important for the digital marketers in implementing more stringent and strict rules in regards with security and safety of the customers. New technologies are being invented to account for any possible data breaches like encryption, authentications and blockchains. According to CISCO, by the end of 2020, the total data generated was more than 1 trillion GB. Effectively managing and assuring security of data becomes a real marketing challenge for the coming ages (Sehgal et al., 2022).

5. Conclusion and Suggestions

With the increasing importance of IoT technology in recent years, companies have been able to enhance their marketing strategies by harnessing

technological advancements. Personalized marketing strategies, in particular, have gained significant prominence with the utilization of IoT. The ability to execute personalized strategies offers numerous advantages for both customers and companies, making it a crucial element.

In today's competitive landscape, organizations must constantly evolve to remain competitive. One of the most crucial ways to achieve this is by tracking technological advancements and adapting them to their organizations. In the field of marketing, companies have been leveraging technology to create personalized marketing strategies in recent years. IoT has revolutionized personalized marketing by providing a wealth of real-time data and the tools to analyze and act upon it. This technology has opened up new possibilities for businesses to create highly targeted, relevant, and timely marketing campaigns that enhance customer engagement and drive business growth. IoT can foster deeper customer engagement by enabling interactive and personalized experiences. Companies that effectively leverage IoT for personalized marketing gain a competitive edge. They can deliver superior customer experiences that are difficult for competitors to replicate.

The future of IoT in personalized marketing holds tremendous potential for businesses looking to create more targeted and engaging customer experiences. IoT devices can provide a wealth of data beyond just browsing habits and purchase history. This data can include real-time location, physical activity, health metrics, and even emotional states. By integrating this diverse data into customer profiles, marketers can gain a deeper understanding of customer behaviors and preferences. Marketers can use this information to deliver highly contextual and relevant marketing messages. For example, a retailer can offer discounts on running shoes to someone whose fitness tracker data shows they've been jogging regularly. IoT devices in the health and wellness sector can enable targeted marketing for products and services related to fitness, nutrition, and well-being. Data from wearables can inform health-related marketing strategists. IoT also enables real-time interactions with customers based on their immediate needs and preferences. For instance, a hotel can use IoT sensors to detect when a guest is in their room and send personalized offers for room service or local attractions. Smart home devices can be controlled via mobile apps, and these apps can provide personalized recommendations or tips. In physical retail environments, IoT can enable personalized shopping experiences. For example, smart mirrors can suggest complementary clothing items based on what a customer is trying on, or stores can offer personalized discounts via beacon technology. IoT data, combined with machine learning and predictive analytics, can help marketers forecast customer behavior more accurately. This enables

proactive marketing strategies, such as offering product recommendations before customers even realize they need them.

With the rise of smart speakers and voice assistants, IoT presents opportunities for voice-based marketing interactions. Marketers can create voice-activated campaigns, enabling customers to interact with brands through natural language, leading to more personalized and conversational experiences. It can also provide seamless cross-device personalization. As customers switch between smartphones, tablets, wearables, and more, IoT ensures a consistent and personalized experience across all these devices.

IoT data can help businesses allocate marketing resources more efficiently. By understanding which marketing efforts are most effective for different customer segments, companies can optimize their marketing budgets. This results in more efficient budget utilization across various aspects. By using the data obtained through IoT technology, companies can provide personalized recommendations to their existing customers, aiming to increase customer loyalty. According to Zengin (2021), the best way to attract and retain customers is to engage with them in a personalized manner and offer customized experiences. Personalized experiences foster customer loyalty. IoT helps in creating ongoing engagement and loyalty programs that are highly personalized, thus increasing customer retention rates.

Despite the wealth of information that technology provides companies about customers, there are still areas where customer behavior is not fully understood, and analysis remains incomplete. Nguyen and Simkin (2017) suggest that a holistic approach to IoT adoption can lead to more effective marketing practices, but more research is needed to fully understand the positive and negative impacts of IoT. IoT data collection often involves privacy considerations. Businesses must navigate data protection regulations and ensure proper consent management when using IoT data for marketing.

Both managers and consumers should acknowledge that there is room for improvement in this field, even though successful outcomes are achieved when IoT data is integrated into personalized marketing. The knowledge of this study highlight the findings of some past research, emphasizing that personalized marketing strategies supported by IoT data lead to more successful outcomes for companies and convenient shopping experiences for consumers.

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