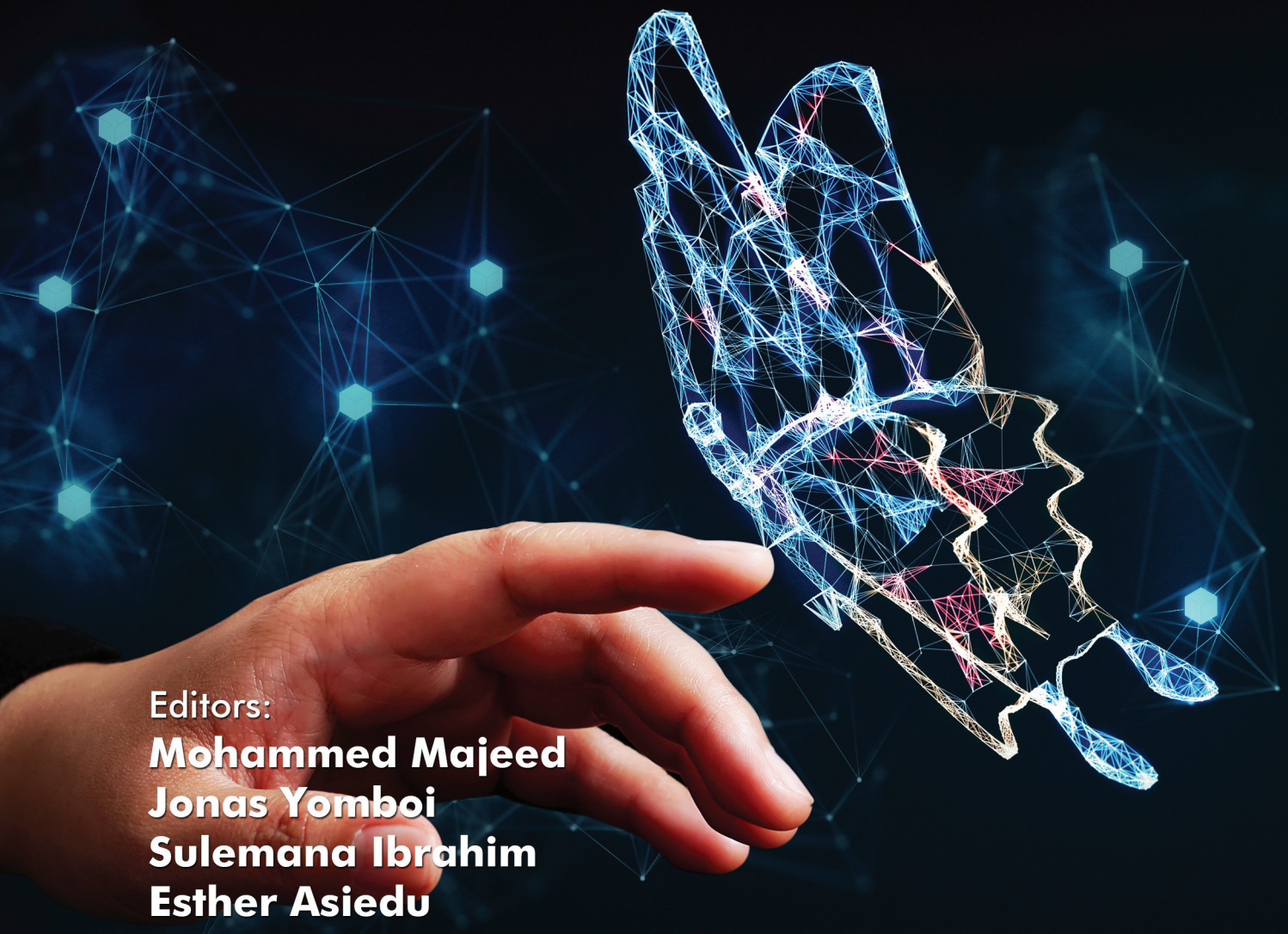
DISRUPTIVE TECHNOLOGIES AND BUSINESS INNOVATION: IOT IN PERSPECTIVE



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PREFACE

In contemporary times, a widespread recognition of the significance of the Internet of Things (IoT) is evident among various stakeholders, including advertisers, marketers, and customers. The editors seek to enhance the knowledge of marketers and customers regarding IoT technology in order to optimize the utilization of data and customer-related information obtained from various web-connected devices. The book demonstrates the ways in which the IoT enriches the customer experience, supports the volume of data acquired through interconnected devices, and expands the range of analytics. The book presents a diverse array of marketing opportunities, encompassing enhanced sales strategies for existing products and services, the provision of highly tailored client experiences, and the possibility for innovation in the form of new products, services, research, and pricing. The IoT provides organizations with the ability to obtain real-time visibility into the actual functioning of their systems, hence enabling them to gain valuable information pertaining to many aspects, such as machine performance and marketing operations. The book endeavors to examine multiple facets of utilizing the Internet of Things for marketing purposes, delineate significant challenges, and provide possible remedies. Marketers have the opportunity to leverage the vast potential of the Internet of Things (IoT) in the future. Nevertheless, the current body of literature pertaining to marketing strategies for the IoT remains limited in scope and depth (Riyas et al., 2023). The book demonstrates the ways in which IoT is facilitating the growth of businesses and enhancing the attractiveness of their products and services to consumers. IoT facilitates global corporate connectivity and data sharing.

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CHAPTER 1

Internet of Things in Marketing: An Introduction

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Abstract: The Internet of Things (IoT) has evolved into a worldwide infrastructure that facilitates advanced services through the interconnection of diverse entities, both tangible and intangible, utilizing information system technology. This study is an analysis of the impact of Internet of Things (IoT) technology on business and marketing. The study provides a comprehensive examination of IoT technology, encompassing important aspects, operational domains, and many applications within the realms of business and marketing. Companies globally are increasingly directing their attention towards the Internet of Things (IoT) due to its capacity to provide remarkable growth prospects rather than being influenced just by the prevailing buzz surrounding it. This chapter presents an introductory overview of the impact of the Internet of Things (IoT) on marketing and business domains.

Keywords: Internet of things, Technologies, Marketing, Organizations.

INTRODUCTION

Numerous firms are currently engaged in the development of technologies that possess the capability to autonomously interact with customer support systems and promptly deliver feedback to clients. According to Britt (2021), the integration of the Internet of Things (IoT) is causing significant changes in the realm of business, particularly in the domains of production and product creation. With the assistance of the ongoing epidemic, firms are currently able to enhance and ensure improved customer experiences that prioritize safety. The Internet of Things (IoT) technology is being utilized on a global scale, finding applications in various sectors like product flow monitoring, supply chain management, building automation, healthcare systems, and security infrastructure (Sharma & Gupta, 2021). In addition to product quality, clients in the tourism and hospitality

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industry also prioritize the technology employed in their experiences. From the standpoint of IoT customers, several key aspects come into consideration, including security, the provision of smart services encompassing various domains such as homes, buildings, cities, health, transportation, and industry, and the impact on healthcare and the potential for innovation (Lee, 2019). The Internet of Things (IoT) has been successfully used across various industries, including cities, hospitality, tourism, healthcare, and transportation. The tourism and hospitality industry is characterized by its interconnectedness with many sectors, owing to its wide range of activities encompassing various services, including transportation and museums (Li, 2021). According to Sharma and Gupta (2021), the Internet of Things (IoT) has the potential to make significant contributions to the field of tourism, particularly in the areas of personalization and enhancing the overall tourist experience. The concept of the Internet of Things (IoT) pertains to the interconnection of things and systems, establishing a networked relationship between these entities and human users. This chapter presents the concept of the Internet of Things (IoT) and connected things as a progressive advancement in technological development. According to Batat (2022), this technology has the capability to convert both basic and intricate everyday items into interconnected objects, enabling a comprehensive understanding of consumers and facilitating the provision of personalized and seamless customer experiences across online and offline channels. These technologies facilitate the implementation of applications and services across various domains, including but not limited to medicine, wellness, home automation, agriculture, the manufacturing sector, transport, logistics, and ready-to-wear. The initial section of this chapter examines the relationship between interconnected devices and the Internet of Things (IoT). Subsequently, an examination of the effects of these technologies on customer experience and consumer behavior is provided. According to Ivanov *et al.* (2017), subsequent to this, firms have the potential to revolutionize their interactions with customers through the utilization of the Internet of Things (IoT) and connected objects. This presents many prospects, advantages, and obstacles.

The integration of Internet of Things (IoT) technology in the realms of business and marketing is of utmost importance, encompassing both the operational and customer-facing aspects. This integration facilitates the development of intelligent goods and the implementation of targeted marketing campaigns to engage with customers effectively. The provision of IoT support by companies has the potential to generate value, facilitate strategic decision-making, foster innovation, enhance design processes, and ensure the security of customer service. In the context of consumer behavior, it is noteworthy that the Internet of Things (IoT) exerts a significant impact on individuals' inclinations to acquire products. The current body of research concerning the impact of the Internet of Things (IoT) on business and marketing is still relatively limited. However, this presents

promising prospects for future studies, particularly in investigating the interplay between IoT and business model innovation, framework development, dark side behavior, demand service, customer preference, marketer behavior, adoption of new-age technology, conceptual understanding, network dynamics, and big data analysis. The Internet of Things (IoT) technology facilitates the integration of individuals, processes, data, and other objects into a cohesive network, resulting in the generation of valuable insights that can be translated into tangible actions. This capability has the potential to generate novel experiences and possibilities for entrepreneurs and business professionals (Ivanov *et al.*, 2017). The current potential presented by technology is unparalleled since it allows for engagement with a staggering number of 4.5 billion internet users. The aforementioned circumstances offer many opportunities for enterprises to devise novel business strategies in order to expand their market presence (Lee, 2019). This chapter presents an introductory overview of the impact of the Internet of Things (IoT) on marketing and business domains.

This chapter aims to address a research gap in the existing literature by providing a comprehensive analysis of the relationship between the Internet of Things (IoT) and critical domains within the realms of business and marketing. Furthermore, this chapter elucidates how the amalgamation of these factors might foster the formulation of more robust marketing tactics, along with its ramifications on the realm of the company. The findings of this chapter indicate the necessity for future research endeavors that are more extensive and thorough in order to go deeper into the subject matter and examine the rate at which technology is advancing.

LITERATURE

Internet of Things (IoTs)

The inception of the Internet of Things (IoT) was first documented in 1999, as noted by Marek and Woźniczka (2017). The technology in question has significantly contributed to the development of a communication framework that facilitates connectivity between diverse devices. This has resulted in the establishment of methods of communication that are not just between individuals but also amongst organizations and multiple systems (Abdel-Basset *et al.*, 2019). Furthermore, it enables the acquisition of data from several devices and facilitates their storage. The Internet of Things (IoT) significantly contributes to enhancing operational efficiency as a result of its exceptional capacity to gather extensive amounts of data (Song & Li, 2020). The Internet is a significant innovation that is extensively utilized by individuals across diverse businesses (Nasereddin & Faqir, 2019). The primary aim of this initiative is to disseminate knowledge and enhance

CHAPTER 2

Product and the Internet of Things (IoT)

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Abstract: The implementation of a marketing mix is vital in order to enhance partner satisfaction and ensure the consistent delivery of high-quality products in sufficient quantities. The tool in question is utilized to assess the degree of achievement in marketing endeavors, encompassing elements such as product. Yet less is done conceptually on how IoTs affect product management. Hence, this chapter reviews the extant literature on the aspects of the product that IoT impacts. The primary objective of IoT technologies for enterprises is to address market needs and demands while also generating demand through the provision of a distinctive and satisfactory customer experience. The benefits include customer engagement, product innovation, exposing the utilization of the product, quality control, quality of products and services, product style, the provision of after-sales service, the product line length within the realm of IoTs commerce, various stock-keeping units (SKUS), the fulfillment of customer demand, and the breadth of firms' portfolio. Consequently, it is anticipated that this technological advancement will contribute to a prosperous period for brands.

Keywords: Internet of things, Marketing, Product, Services, Technology.

INTRODUCTION

According to Liu *et al.* (2019), the marketing idea posits that the profitability of an organization is contingent upon its ability to meet the desires and requirements of its stakeholders. By generating profits, the firm can facilitate its growth and advancement, hence enhancing the level of satisfaction experienced by its stakeholders. The implementation of a marketing mix is vital in order to enhance partner satisfaction and ensure the consistent delivery of high-quality products in sufficient quantities. The tool in question is utilized to assess the degree of achievement in marketing endeavors, encompassing elements such as product, price, distribution, and promotion (Firman *et al.*, 2020). A perpetual conflict

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arises between the structured aspect and the imaginative aspect of the subject matter. According to Kusuma *et al.* (2020), the discipline of effectively identifying target markets and engaging in activities aimed at attracting, keeping, and expanding customer base is referred to as the science of customer relationship management. This involves the creation, delivery, and communication of exceptional customer value. Based on the findings of the literature review, it has been shown that marketing activity and innovation are the primary mechanisms *via* which value is generated for customers. Moreover, the proliferation of digital technologies has prompted numerous scholars to explore the potential of utilizing these technologies to expand marketing endeavors as a means of fostering innovation within organizations (Baumgärtner & Winkler, 2003). The Internet of Things (IoT) has emerged as a prominent and widely adopted technology within the realm of digital technologies. It has opened up new avenues for doing innovative research in the field of marketing operations. The advent of Internet of Things (IoT) applications has had a profound impact on several aspects of human existence, significantly enhancing the efficacy and significance of endeavors undertaken by individuals and organizations alike. In the present era, a vast number of commonplace items have been integrated with sophisticated sensors, wireless networks, and cutting-edge computing functionalities. The proliferation of these technologies has led to the emergence of wearables, smart home applications, sophisticated healthcare systems, "smart cities", and industrial automation (Chen & Ji, 2016; Marjani *et al.*, 2017). After a prolonged period of ambiguity, the Internet of Things (IoT) appears to be on the verge of transitioning into widespread adoption within the realm of corporate operations. There is a growing trend in the adoption of IoT technology by enterprises, as evidenced by the predicted global count of IoT-connected devices reaching 43 billion by 2023 (Gupta *et al.*, 2017). The Internet of Things (IoT) exemplifies the increasing inclination toward physical items that feature both computer and communication capabilities, enabling them to collaboratively collect information in real time (Guo *et al.*, 2013).

During the period prior to the advent of the Internet of Things (IoT), consumer items were mostly developed with the intention of possessing aesthetic appeal, ensuring user safety, exhibiting durability, offering cost-effectiveness, generating desirability, and eventually fulfilling their intended functionalities. The design of a product remains substantially unchanged from its pre-sensor, pre-processing capabilities, and pre-software integration era. However, smart products possess basic distinctions from their non-intelligent counterparts. By utilizing enhanced network flexibility, including artificial intelligence, and possessing the ability to deploy, automate, orchestrate, and protect a wide range of devices on a large scale, the Internet of Things (IoT) facilitates the connection and data exchange between billions of objects and systems (Kumar & Nayak, 2018). Currently, there

is a trend in which commonplace gadgets such as dishwashers, thermostats, dryers, and refrigerators are being engineered to gather and exchange data, resulting in the establishment of an interconnected network of systems. The Internet of Things (IoT) phenomenon has been examined from both technological and conceptual perspectives. The technical components of the Internet of Things (IoT) were examined by researchers Tan and Wang (2010), who focused on topics such as interoperability, architecture, and identification. These features were also explored by Haller *et al.* (2009), who emphasized the importance of addressing and managing heterogeneity and interoperability within the IoT. In contrast, numerous scholars have undertaken theoretical investigations of the Internet of Things (IoT) with regard to various stakeholders, including users, governments, and companies (Haller *et al.*, 2009; Peoples *et al.*, 2013; Weber, 2010; Zhao *et al.*, 2013). Yet less is done conceptually on how IoT affects product management. Hence, this chapter reviews the extant literature on the aspects of the product that IoT impacts.

LITERATURE

IoT

The Internet of Things (IoT) is a term used to describe technology that connects almost all devices. These interconnected things must have addresses, distinctive identifiers, and Internet connectivity. IoT devices can include almost anything, including computers, cars, people, sensors, and refrigerators (Cuit, 2016). IoT technology makes it possible for physical objects to have virtual representations by connecting them to the internet. IoT technology has greatly benefited from contemporary advancements in communication, applications, and equipment (such as wireless sensor networks and radio frequency identification). IoT infrastructures produce large volumes of data (Big Data) in a wide range of applications (Cui, 2016). The Internet of Things (IoT) promises to provide the advantages of the Internet—data exchange, remote control capability, constant connectivity, and so forth—to physical items and services (Almugari *et al.*, 2020).

Product

What satisfies the needs and desires of consumers is the product. A physical object can be considered palpable, as can a service, a concept, or an experience (Carniel, 2022). Products are defined as tangible items that are intended for sale and offer a range of advantages that can be used to satisfy client wants. Selling the product's essence, such as its advantages, practicality, or essential features that business partners seek, is essential when it comes to marketing products. A company's target market is served by a product, which is a combination of commodities and services (Mashur *et al.*, 2019; Klongthong *et al.*, 2020). Because

CHAPTER 3

Internet of Things (IoT) and Pricing

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Abstract: The Internet of Things (IoT) is a rapidly expanding network of interconnected computing devices that have recently attracted the attention of governments and businesses. There is no need for human interaction when using the IoT. The medical, transportation, and automotive industries have been among the first to take advantage of some of the most innovative uses of the Internet of Things. Although it is the only part of the marketing mix that actually generates revenue, price is also crucial. Therefore, this chapter explores how IoT can be used to determine the best pricing strategy for a company's goods and services.

Keywords: Internet of Things, IoT, Internet, Price, Pricing, Technology.

INTRODUCTION

Intelligent sensors, often known as Internet of Things devices, are essentially handheld computers. The term "Internet of Things" refers to the network of physical computers, mechanical or digital devices equipped with software, sensors, and processing ability that are connected to one another and the internet in order to share and receive data and information. Any living creature, human or otherwise, with an implanted technology that can be read by another person or that can communicate with another IoT device can be considered a thing in the Internet of Things (Williams, 2022). This information is then sent from the device *via* an IP network, such as the Internet. This is after it has been compiled from a wide variety of hard data sources. Depending on the task at hand, the sensor may also include amplifiers, filters, and converters. Battery-operated gadgets with unique Internet Protocol (IP) addresses power the Internet of Things. Most sensor readings are sent to a central hub or gateway in the Internet of Things. Data is rou-

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tinely filtered and normalized by IoT gateways. Raw sensor data is typically collected and organized by the IoT gateway.

Traditional methods of advertising are also being disrupted by the Internet of Things. Personalized information, tailored advertising messages, and sales promotion offers are only some of the ways that retail establishments, sales networks, public utilities, and outdoor advertising suppliers have utilized IoT technology, as noted by Mittal (2012). In the near future, consumers will only receive filtered message content tailored to their specific requirements and interests, whether they access the information through conventional means of communication or *via* smart devices such as smart refrigerators. Customers will no longer be subjected to intrusive advertising that could detract from their overall experience. Therefore, businesses can mitigate customer complaints about generic advertising through the IoT. With the ability to communicate with users of a wide variety of smart devices, there is a chance to track and analyze their actions and to keep businesses proactively oriented toward providing satisfying customer service. It provides companies with an almost boundless window of opportunity to learn about their consumers' wants and requirements and respond appropriately and promptly. In addition, it is said that IoT can completely change how businesses interact with their customers. The breadth of reciprocal connections will expand beyond the human-centric paradigm as customers can interact with smart items, and objects can operate together as assemblages through a process of ongoing interaction (Hoffman & Novak, 2018).

The Internet of Things is used to process and store this massive amount of data and information on the cloud. Insights gained from this are used to further tailor advertising campaigns to individual consumers. Internet of Things (IoT) solutions are being used in today's businesses for a wide variety of purposes, including customer support, sales, and market research (Williams, 2022). All of this information is put to good use by analyzing user patterns and serving up more relevant ads and content. Data and network traffic are both impacted by the Internet of Things; therefore, it takes specialized knowledge to manage both effectively and derive value from them. Thanks to the Internet of Things, businesses can better understand their customers' regular purchase processes. This allows for more effective transmission of marketing messages at the appropriate stage of the buyer's journey (Williams, 2022). The Internet of Things is assisting businesses in growing and improving their offerings to customers. The Internet of Things is helping companies connect globally and share marketing data (including pricing, product, promotion, and location). This chapter looks at the application of IoT in the price and pricing of company products.

LITERATURE

IoT in Marketing

In 1985, at a Congressional Black Caucus Foundation wireless session supported by the FCC, Peter Lewis first used the word. At the time, he defined IoT as "the integration of people, processes, and technology with connectable devices and sensors." While Lewis's words did not catch on right away, by the late '90s and early 2000s, the concept of an interconnected network of everyday objects became increasingly mainstream. The Internet of Things (IoT) was conceived as a way to improve people's daily lives by allowing objects to quickly and remotely respond to their needs and requests. In recent years, the technology has gained momentum thanks to the proliferation of wearable and smart gadgets like the light and door home sensors we are all getting used to.

Marketers who can extract actionable insights from this wealth of data and insights into customer behavior will always be ahead of the competition (Williams, 2022). Because of the wealth of information made available by the Internet of Things (IoT), modern marketing is more data-driven. They make use of previously unavailable data and information about customers' device interactions and use it to make personalized outreach. They take in essential information, learn about the customer's purchasing process, and tailor the experience to the individual. By integrating their products in a smart way, they are able to meet their consumers' demands at the moment with relevant material and messages (Williams, 2022). With the use of IoT, marketers will be sure to deliver individualized communications regarding remedies to our respective problems, whether it be dandruff or hair loss. The Internet of Things has made it easier for salespeople to close deals and for customers to have their problems resolved in record time. Smart CRM (Customer Relationship Management) systems are used by marketers to sort through the deluge of data they get and organize it in real-time. Faster sales closure and greater levels of customer satisfaction are the result (Porter & Heppelmann, 2014). Nowadays, communication between organizations and departments is usually swift and painless. As an added bonus, this enables marketers to instantly adapt their messaging in response to customer purchases from other businesses.

Price/Pricing

A good or service's price is the amount that customers must pay to acquire it. It is the cost to the buyer in exchange for the benefits promised by the seller and the cost to the seller in exchange for the offering. What buyers are ready to give up in terms of time or effort is considered part of the price (Carniel, 2022). Since price is the only variable that can actually turn a profit, it plays a pivotal role in any

CHAPTER 4

Promotion and the Internet of Things

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Abstract: This chapter seeks to examine the potential effects of the Internet of Things (IoT) on the marketing and advertising strategies employed by firms to promote their products and services. The Internet of Things (IoT) has evolved as a novel paradigm for the future iteration of the Internet. The Internet of Things (IoT) involves the connection of a vast number of devices to the Internet, resulting in a significant data repository that can be utilized by a variety of applications. The future trajectory of the Internet is anticipated to involve the integration of diverse gadgets, establishing connections between physical items and digital elements, thereby expanding the boundaries of the global network. The Internet of Things (IoT) is a contemporary concept that pertains to items endowed with digital capabilities, enabling them to establish communication through the Internet. It is widely regarded as an integral component of the future Internet landscape.

Keywords: Advertising, Firm, Internet of things, Internet, Promotion, Technology.

INTRODUCTION

The advancement of technology has brought about changes in the methods used to communicate with consumers. The field of marketing has seen significant transformations in tandem with advancements in technology. The prevalence of Internet marketing is rapidly supplanting conventional approaches to marketing. The Internet of Things (IoT) is a novel paradigm shift within the field of technological innovation (IT), which pertains to the utilization of Internet connections for the purpose of transmitting and exchanging information. The Internet of Things (IoT) is an emerging paradigm that enables the interconnection of various objects *via* the Internet. These devices encompass sensors and actuators that possess the capability to function and transfer data with limited or no human interaction. The Internet of Things (IoT) has exerted a significant impact on various domains, with numerous applications having been successfully deployed

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in sectors like healthcare, transportation, logistics, and manufacturing (Gubbi et al., 2013). Nevertheless, the advancement of the Internet of Things (IoT) is encountering numerous obstacles, particularly in the realm of data management (Pogorelova et al., 2016). New solutions may be necessary for managing IoT systems and services due to their unique properties, such as diverse enormous-scale designs and the presence of different and massive data. Conventional handling of information methodologies may become difficult to handle in this context. The Internet of Things (IoT) is predominantly facilitated by technological advancements that establish connections between gadgets, hence facilitating inter-device communication. Connectivity options encompass a variety of advantages and disadvantages, with certain alternatives being better suited for specific scenarios, such as intelligent houses, while others may be more fitting for Internet of Things (IoT) functions like automated manufacturing. The technologies can be classified into two distinct categories: IoT data protocols, which facilitate the exchange of information between devices in the absence of a web connection, and connected device protocols, which establish connections between devices and enable their integration with the internet. The promotional aspect within the marketing mix pertains to the Internet of Things. The investments and challenges associated with IoT devices for enterprises primarily pertain to the strategic approaches and initiatives undertaken by companies to enhance the visibility and marketability of their products and services. This encompasses various aspects such as brand promotion, product attributes, features, and overall business operations (Varadarajan, 2015; Gillespie & Swan, 2021). The primary focus of the communication pertains to investments and problems in Internet of Things (IoT) applications for organizations. Its intended audience consists of individuals or groups that the company aims to attract, with the objective of enhancing brand recognition, brand loyalty, and sales (Wu & Li, 2018; Grewal & Levy, 2021). Numerous academics have conducted research on the utilization of Internet-based technologies or platforms in the context of public relations endeavors (Dozier, Shen, Sweetser, & Barker, 2016; Tankosic, Ivetic, & Vucurevic, 2016; Wang, 2015). Additionally, certain scholars have employed descriptors such as Digital, Online, or E-Public Relations to characterize this emerging phenomenon (Vercic, Vercic, & Sriramesh, 2015). Nevertheless, there is a scarcity of scientific literature regarding the ramifications of the Internet of Things (IoT) on marketing promotion. The significance of the Internet of Things (IoT) in enhancing decision-making within the field of marketing research is of paramount importance. The implementation of Internet of Things (IoT) technologies holds the capacity to revolutionize the field of marketing research. According to Marek and Wozniczka (2017), it is of utmost importance to augment users' comprehension of the potential benefits that can be derived from utilizing Internet of Things (IoT) capabilities. The implementation of automated processes for

generating real-time data flow facilitates marketing researchers in discerning efficacious ways to foster favorable client engagement. The increased availability of consumer data enhances the decision-making capabilities of both academics and practitioners, as it enables them to make more confident and well-informed decisions. The deployment of Internet of Things (IoT) solutions presents a multitude of opportunities for augmenting marketing research. This is particularly true for digital marketers who want access to extensive data regarding consumer trends and opinions related to the continuous utilization of Internet of Things (IoT) technologies. The availability of a larger dataset for analysis is perceived as beneficial for digital marketers, as it allows them to optimize certain procedures and effectively target varied consumer segments (Nguyen and Simkin, 2017). The clear prospect of doing predictive analysis on the needs and preferences of target customers arises from the direct linkage between the Internet of Things (IoT) and cloud computing. Hence, the chapter aims to look at the implications of IoTs on the promotion of a firm's products and services.

LITERATURE

IoT

Fletcher (2015) provides a comprehensive historical context for the Internet of Things (IoT) by tracing its inception back to the foundation of the MIT Auto-ID Centre in 1999. The establishment of the Centre aimed to develop a diverse range of detection methods suitable for industrial applications, with the objective of minimizing errors, facilitating automated processes, and improving overall efficiency. One crucial element of the technology in question was the utilization of Radio Frequency Identification (RFID) tags. These tags facilitated the detection, distinctive verification, and provision of detailed information regarding the objects being tagged by centrally located services. Subsequent efforts yielded advancements in the capability to trace objects throughout the entire production and distribution process, discern manufacturing obstacles, minimize reliance on human labor, and mitigate instances of theft. The author notes that the progress of IoT is propelled by the advancements in technology for wireless communication and computers embedded in devices. The Internet of Things (IoT) endeavors to establish interconnectedness across several facets of human existence, wherein intelligent devices would furnish notifications, dispense guidance, and deliver computerized aid. Despite the significant growth in the advancement of technology and the increasing uses of the Internet of Things (IoT), there exists a considerable degree of diversity and ambiguity in its definition. Minerva *et al.* (2015) present a comprehensive and universally accepted characterization of the Internet of Things (IoT), offering a precise and unambiguous delineation. The concept of the Internet of Things (IoT) entails the creation of a network that is

CHAPTER 5

Internet of Things and Marketing Mix

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Abstract: A genuine innovation for companies is the Internet of Things. Contemporary business sectors can be totally transformed by tiny gadgets with strong algorithms at their core, which can lower costs, boost productivity, and eliminate dangers. This chapter's goal is to review the body of research on the connection between the Internet of Things and the marketing mix. Today's businesses have access to a multitude of instruments and platforms that have improved our ability to communicate with clients (promotion) and link them with the goods and services (place), price, products, people, and physicals that will improve their lives. The success of our campaigns is still, nonetheless, firmly rooted in the four fundamental marketing tenets of product, pricing, place, and promotion. Effective marketers have the ability to combine these concepts with strategies like the ones listed above to get the consistent, lucrative results that their companies require.

Keywords: Internet of things, Marketing mix, Product, Price, Promotion, Place.

INTRODUCTION

In the contemporary corporate environment characterized by intense competition and reliance on technology, the mere presence of a website or participation in conventional marketing practices falls short of meeting the necessary requirements. The Internet of Things (IoT) is undergoing a rapid transformation of the global landscape and holds significant promise for providing advantages to organizations across several sectors. The proliferation of interconnected gadgets has significant ramifications for marketers seeking to engage their target audiences. The Internet of Things (IoT) refers to the interconnectedness of both electronic and physical components (Darius, 2023). This connectivity facilitates interoperability across commonplace objects, such as appliances and bells for doors, and *via* the World Wide Web. By leveraging sensors and integrated processors, these interconnected devices possess the capability to be controlled from a distance, enabling them to engage with their surroundings and exchange

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data autonomously without the need for human intervention. The 4p model of marketing encompasses the fundamental components of product, price, promotion, and place, as discussed by Chernev (2018) and Kucuk (2017). The marketing mix is a widely recognized term used to describe the model. The marketing mix of The Internet of Things (IoT) encompasses various applications, investments, and problems for organizations. This framework enables enterprises to effectively achieve their marketing objectives and exert a positive influence on their target audience (Baines, Fill, & Rosengren, 2017). The marketing mix elements are commonly employed by firms in the Internet of Things (IoT) applications to promote their products and services, as well as to facilitate brand development and building endeavors. The development and implementation of marketing plans and strategies are of utmost importance for enterprises, particularly in relation to the Internet of Things (IoT) applications. This is essential for the purpose of establishing and maintaining a competitive advantage (Chernev, 2018; Stead & Hastings, 2018; Grewal & Levy, 2021). The investments and problems associated with the applications of the Internet of Things (IoT) in organizations are crucial for ensuring the integration and synergy of the elements specified in the marketing mix model. These aspects must work together harmoniously and complement each other effectively in all marketing strategies and plans (Abratt & Bendixen, 2018; Deepak & Jeyakumar, 2019).

IoT has emerged as a prominent phenomenon in the field of digital technology over the last five years (Colwyn, 2015). Nevertheless, the discourse surrounding the utilization of the Internet of Things (IoT) in the field of marketing has been notably constrained. Hence, this chapter delves into the utilization of the Internet of Things (IoTs) in the field of marketing, with a particular focus on its impact on the marketing mix, commonly known as the 4Ps. Consequently, our study provides four distinct contributions to the existing body of literature. This study contributes to the advancement of knowledge regarding the potential of IoT technology in facilitating the digitalization of corporate operations for management and marketing objectives. Managers and marketers can utilize existing data to suggest specific technological tactics that align with common managerial tasks, aiming to rejuvenate a corporation. This chapter's goal is to review the body of research on the connection between the Internet of Things and the marketing mix.

LITERATURE

IoT

According to Madakam *et al.* (2015), IoT has significantly transformed the information and communication technology (ICT) landscape by merging the

realms of communication, particularly the Internet, and physical items, sometimes referred to as "things" (Madakam *et al.*, 2015). The Internet of Things (IoT) undoubtedly represents a highly useful instrument for comprehending client data and enhancing the efficacy of marketing initiatives. Monitoring consumer activity on their smart devices provides valuable insights into the items and services that may pique their interest for potential purchase. Intelligent gadgets possess the capability to store and manage a substantial volume of information, which can be leveraged to examine significant insights pertaining to clients' shopping and evaluating behaviors. Furthermore, such data has the potential to provide valuable information on customers' daily lifestyles (Simões *et al.*, 2019). The primary objective of the IoTs is to establish connectivity on a global scale by collecting data from tangible objects (Erboz, 2017). According to Rahman and Rahmani (2017), computers and other advanced gadgets acquire data and utilize it in order to make informed choices about operations. The implementation of the Internet of Things (IoT) technology enhances the agility and integration of company activities, leading to the attainment of a competitive advantage through the utilization of intelligent computing. According to Akhtar *et al.* (2018), the future significance of enterprises' IoT capabilities lies mostly in their capacity for flexibility and informed decision-making.

Marketing Mix (7Ps)

The marketing mix is a fundamental concept in the field of marketing. It refers to a set of controllable marketing tools that a company uses to serve its markets. Marketing includes the activities involved in advertising, selling, and distributing goods or services to consumers. Marketing comprises a comprehensive range of activities and is frequently executed by both internal and external stakeholders, including advertising, social media experts, sales representatives, and marketing professionals. Marketing is an essential corporate endeavor that plays a pivotal role in facilitating the creation of customer value and fostering robust customer relationships. The primary objective of this study is to explore and devise effective techniques that will assist organizations in enhancing their sales income for their products and services, thus enabling them to attain a more prominent market share.

The marketing mix's beginnings may be traced back to the year 1960 when it was initially published in E. Jerome McCarthy's well-acclaimed publication, Basic Marketing - A Managerial Approach. Subsequently, the phrase "marketing mix" was formally established by Neil Borden, a renowned Harvard professor, in his seminal work titled "The Concept of the Marketing Mix", published in 1964. Borden explicated that his concept was derived from the influence of his colleague, James Culliton (1959), who drew a parallel between accomplished

CHAPTER 6

Place/Distribution and the Internet of Things

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Abstract: The Internet of Things (IoT) is a remarkable technological advancement that facilitates the seamless integration of computing devices for the purpose of transmitting data across a network, eliminating the need for direct human-to-human or human-t--computer engagements. This chapter intends to look at how IoT impacts the distribution of firms' products. The implementation of IoT-based advanced distribution, materials handling equipment, and sensors in warehouses has the potential to significantly transform operations, resulting in increased efficiency, cost-effectiveness, and productivity. The integration of the Internet of Things (IoT) into warehouse operations encompasses the real-time monitoring of equipment, goods, pallets, and personnel, as well as the measurement of their performance.

Keywords: Distribution, Internet, Internet of things, Place, SCM, Technology.

INTRODUCTION

The pervasive integration of new technologies into various aspects of daily life has contributed to the prevailing notion that for every societal concern, there exists an information and communication technology (ICT) solution capable of effectively addressing it. The "Internet of Things" (IoT) has emerged as a frequently advocated answer in contemporary discourse. The perceived universal remedy within the realm of information and communication technology (ICT) encompasses various facets and is associated with diverse technological alternatives, frequently exhibiting significant disparities. The Internet of Things (IoT) is a remarkable technological advancement that facilitates the seamless integration of computing devices for the purpose of transmitting data across a network, eliminating the need for direct human-to-human or human-to-computer engagements (Atzori *et al.*, 2017). This technology has the potential to create numerous opportunities within the context of contemporary smart grid systems and energy markets. The impact of the Internet of Things (IoT) on several aspects

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of the smart grid, including smart cities, smart homes, home energy management systems, energy harvesting systems, intelligent networks of sensors, and centralized generation (CG), has been discussed in the literature (Kabalci *et al.*, 2019). The Internet of Things (IoT) offers significant benefits by fostering increased innovation and competitiveness within the realm of electronic marketing and distribution. IoT technologies employed in the realm of digital marketing lack a comprehensive and integrated perspective when it comes to identifying the advancements in electronic marketing. Numerous marketing platforms have acknowledged the disadvantages associated with forming distribution agreements with marketing firms (Joghee, 2021). According to a recent report by Gartner (2020), the Internet of Things (IoT) is projected to have a significant impact on enterprises, with its adoption rate expected to reach 26 billion devices by 2020. According to Gartner, it has been projected that providers of Internet of Things (IoT) products and services will create additional revenue surpassing $300 billion by the year 2020. This revenue is expected to be mostly derived from the provision of services. The projected outcome of this development is a global economic value-add of $1.9 trillion, achieved through the sale of products and services across various end markets. It is imperative for businesses to seize this chance for substantial expansion in order to remain competitive. The integration of technological capabilities within gadgets has the potential to significantly influence supply networks. The comprehensive integration of sensors into every stage of the supply chain, encompassing raw materials, product components, finished items, individual cartons, containers, shipments, and delivered orders, will result in a profound transformation of the whole supply chain and distribution process. The concept of the Internet of Things (IoT) involves the integration of intelligent devices and sensors with advanced data analytics and cloud computing technologies. According to Schwaderer (2015), the emergence of this paradigm shift introduces novel complexities pertaining to software delivery, upgrades, and security. The utilization of IoT technology is necessary for several applications, such as enhancing energy efficiency, augmenting the proportion of renewable energy, and mitigating the environmental consequences associated with energy consumption. Therefore, the Internet of Things (IoT) has the potential to facilitate the transformation of energy networks, particularly distribution networks, from a centralized structure to a distributed, intelligent, and integrated distribution system, which is essential for the successful implementation of renewable energy sources (RESs) like wind and solar energy (Yu *et al.*, 2015). Furthermore, it facilitates the transition of multiple small-scale energy consumers into prosumers by consolidating their energy generation and optimizing their energy consumption in a manner that benefits the overall grid system. The realization of automation, integration, and control processes within the grid network can be facilitated by employing Internet of

Things (IoT)-based systems, which rely on the utilization of sensors and diverse communication technologies. The Internet of Things (IoT) revolution is expected to have a significant impact on enterprise applications and supply chain solutions. This revolution will involve the intelligent connection of people, processes, data, and physical objects through the use of devices and sensors. The implementation of automation in the manufacturing process and the enhancement of visibility within warehouses are increasingly seen as essential requirements. The utilization of strategically deployed devices and systems in the production chain enables the creation, processing, and analysis of data, resulting in a notable reduction in visibility gaps and the introduction of substantial flexibility. Evolving solutions facilitate the utilization of simulation, predictive capabilities, and modeling techniques to effectively mitigate costs and enhance service and quality levels in real time. The term "place" within the marketing mix pertains to the distribution channels and methods utilized to deliver products to the end consumer. Organizations strategically develop communication channels in order to effectively reach a large client base while minimizing costs. The advent of the internet has significantly altered the positioning component inside the marketing mix. The concept of the point of purchase can be categorized into various types, including seller-controlled sites, third-party hosted seller-oriented sites, third-party hosted consumer-seller neutral sites, purchaser-controlled sites, and buyer-controlled sites. Organizations are currently engaged in the development of websites that are tailored to meet the distinct needs and preferences of individual countries. The aforementioned criteria may pertain to language, product assortment, and cultural distinctions. The internet has also brought about changes in the distribution methods. Organizations must make a strategic determination regarding the distribution of goods, weighing the option of utilizing intermediaries vs adopting a direct-to-consumer delivery approach. Organizations can employ a hybrid approach that combines both intermediary and direct distribution methods. This chapter intends to look at how IoT impacts the distribution of firms' products.

LITERATURE

IoT

The Internet of Things (IoT) leverages Internet infrastructure to establish connectivity among tangible entities, sometimes referred to as "things". This technology is currently in its early stages of development. It encompasses a range of physical devices that can be employed in various applications, including both domestic appliances and industrial machinery. These devices have the capability to deliver significant data and a range of services to individuals through the use of appropriate sensors and internet connections. For instance, the implementation of

CHAPTER 7

Internet of Things in Marketing: The Customer Experience

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Abstract: Undoubtedly, the Internet of Things (IoT) possesses the capacity to enhance customer experiences. The exponential growth of technology has had a profound influence on various aspects of enterprises. In addition, the Internet of Things (IoT) facilitates the exchange of data, facilitates the control of inventory, enhances security measures, and contributes to heightened levels of efficiency and production. The purpose of the chapter is to review the literature to understand how IoT is used in marketing to affect customer experience. IoT has the capability to revolutionize current business models by facilitating novel interactions and establishing new partnerships between organizations and their customers. Adopting the end-customer standpoint offers guidance and illuminates potential avenues for the creation of services that are embraced and financially supported by both enterprises and customers. This will facilitate the development of novel and inventive services, thereby fundamentally transforming operational practices across several sectors in the future. The contemporary customer base is undergoing a transformation, wherein they are increasingly accustomed to immediate accessibility. Consequently, they now anticipate that their consumption and purchasing encounters will be characterized by immediacy, distinctiveness, and emotional resonance. Therefore, it is imperative for organizations to gain a comprehensive understanding of the fundamental shifts in consumer habits in order to develop appropriate and pleasurable customer experiences across both online and offline channels. In the preceding study, the focus was on the emergence of a novel type of consumer, with particular attention given to the evolution of their social standing, requirements, and their involvement in the brand or company's interactions.

Keywords: Customer, Experience, Internet of Things, Internet, Technology.

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INTRODUCTION

According to Eguillor (2018), it was projected that by the year 2020, the global quantity of Internet-connected devices would approach approximately 50 billion. The pervasive presence of newly interconnected items serves as a testament to the significant scale of this technological phenomenon, exemplified by the Internet of Things (IoT), which spans various industries, sectors, and geographical locations worldwide. With the increasing prevalence of smart and online interaction capabilities being integrated into a wide range of objects, the potential applications become limitless. The Internet of Things (IoT) is a significant technological development with the potential to exert a lasting influence on the social landscape in the foreseeable future. The continuous expansion of emerging interconnected gadgets presents several opportunities across various industries while also introducing a novel framework for marketing management and client interactions (Eguillor, 2018). The optimization of customer service can be achieved by the utilization of real-time information offered by these technologies. In the realm of marketing and advertising, this phenomenon results in the emergence of novel prospects for engagement. The concept of the Internet of Things (IoT) refers to a network of numerous physical objects or entities, commonly referred to as "things", which are equipped with software, sensors, and various other technologies. These objects are capable of communicating and exchanging data with other systems and devices through the internet. The Internet of Things (IoT) refers to a network of interconnected mechanical and digital devices, computing systems, and objects. The transmission of data through a network can occur without the need for direct interaction between humans and computers or between humans themselves. In the contemporary business landscape, the integration of the Internet of Things (IoT) and automation technologies presents a multitude of opportunities for enhancing consumer experiences. Enterprise process automation enables organizations to establish comprehensive workflows, thereby expediting the execution of repeated tasks that would otherwise demand the attention of essential personnel. The implementation of automation techniques enables professionals to allocate a greater portion of their efforts towards the creation of exceptional customer experiences while reducing the time spent on mundane activities such as data entry. Kwiatkowska (2014) posits that the Internet is undergoing a transformation from a network primarily comprised of interconnected computers to a network encompassing diverse devices such as autos, cellphones, household appliances, and toys. These devices remain consistently connected, engaging in communication and information exchange with one another. This facilitates the establishment of a continuous flow of data regarding how a consumer utilizes specific products over the course of their life cycles. Furthermore, the Internet of Things (IoT) presents a substantial capacity for innovation and enables marketers to develop novel

strategies for attaining a competitive edge. Furthermore, it aids organizations in the endeavor of effectively overseeing customer experience throughout their interactions with a company, brand, or product, resulting in heightened customer contentment and improved business outcomes.

The Internet of Things has a profound influence on all industries and facets of our daily existence. This technique warrants significant study due to several compelling justifications. The primary advantages of the Internet of Things (IoT) encompass the interconnection of small-scale components that are integral to our everyday routines, facilitating the exchange of data and enabling the automation of various processes. A plethora of applications are currently accessible to fulfill the needs of consumers, business enterprises, and infrastructural requirements. This essay will primarily concentrate on the Internet of Things (IoT) and customer experience management, considering their significant potential in several domains. The Internet of Things (IoT) is a technology that is neither novel, overblown, nor remote. The existing presence of this phenomenon is pervasive and is expected to undergo further advancements and utilization. Hence, the chapter looks at the IoT to affect customer experience.

LITERATURE

CX

Customer experience management is a matter of concern for both service companies and customers alike. Regrettably, it is prevalent for this service to exhibit a significantly substandard degree of quality. In contemporary times, adherence to modern methodologies, integration of cutting-edge technologies, and provision of exemplary customer service are crucial for the success of a corporation. The competition is highly intense, and the consequences of failure are significant. The correlation between the quality of a customer experience plan and the likelihood of achieving success is positive. The Internet of Things (IoT) holds a distinct position within the various methods employed to enhance the consumer experience. The concept of customer experience encompasses the various interactions that occur between a customer and an organization or product. These interactions are characterized by their unique nature and can encompass logical, sentimental, sensorial, tangible, and even spiritual elements (Gentile, Spiller, & Noci, 2007). Alternatively, customer experience can be understood as a multifaceted concept that encompasses the cognitive, affective, behavioral, physical, and psychological reactions of customers to the products and services a business provides throughout their purchasing journey (Lemon & Verhoef, 2016). According to Sudolska (2011), the customer experience encompasses the entirety of impressions formed as a consequence of all

CHAPTER 8

Internet of Things, Marketing, and Market Research

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Abstract: Research is a systematic investigation of a specific subject, conducted with the aim of gathering empirical evidence and drawing logical inferences. Research is widely recognized as a key instrument due to its pivotal role as the initial phase in the marketing process. This chapter aims to investigate the utilization of Internet of Things (IoT) applications in the field of marketing and market research, with a specific focus on how firms employ IoT devices. No research is done today without technology tools such IoT and related technologies. Market research is employed as a means of gathering pertinent information regarding the market, encompassing customer demands, preferences, interests, market trends, and prevailing fashion, among other factors, *via* IoT. Marketing research is conducted with the objective of supplying managers with precise and reliable information to aid in making crucial marketing decisions. Therefore, market research is characterized by its specificity, as it provides insights and comprehension of a particular market that may not be applicable to other markets. On the other hand, marketing research is characterized by its generic nature, meaning that it has the potential to address a wide range of marketing issues.

Keywords: Internet of things, Market, Marketing, Research, Technology.

INTRODUCTION

The concept of the Internet of Things (IoT) has garnered significant attention in recent years, emerging as a prominent term in the technological landscape. However, it is only in recent times that the genuine transformative capabilities of this technology have started to become apparent. In its most basic form, the Internet of Things (IoT) refers to the notion of interconnectedness among many items seen in daily life, such as streetlights, industrial machinery, and wearable devices. These objects are equipped with sensors and are capable of wirelessly ex-

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changing pertinent data with one another. Given the proliferation of numerous applications now in operation, along with the continuous discovery of new ones, it is reasonable to anticipate that a significant portion of our daily existence will soon be influenced by Internet of Things (IoT) devices. In the contemporary era of consumer connectivity, there exists a convergence between the physical and digital realms, resulting in a symbiotic relationship where these two domains mutually engage. The integration of big data, analytics, and mobile technologies facilitates the seamless sharing and collection of data among various objects and devices within a linked network, with minimal reliance on human interaction. According to Chhatwal (2023), the utilization of the Internet of Things (IoT) offers several advantages, including cost reduction, enhanced production and efficiency, and heightened convenience. In essence, the Internet of Things (IoT) offers considerable advantages to companies and market researchers by furnishing them with a vast array of consumer behavior data that can be effectively leveraged to enhance their financial performance. Smartphone applications provide consumers with the opportunity to engage in product experimentation within the realm of beauty prior to committing to a purchase. Market analysts must prioritize industries that are relevant to IoT adoption when attempting to identify future trends. This chapter aims to investigate the utilization of Internet of Things (IoT) applications in the field of marketing and market research, with a specific focus on how firms employ IoT devices.

LITERATURE REVIEW

Internet of Things

According to Javaid and Khan (2021), the Internet of Things (IoT) facilitates the transmission and reception of both information and physical items *via* the Internet. Smart hospital technologies and concepts are regulated by both wireless and fixed internet connectivity. The use of the Internet of Things (IoT) in the medical area relies heavily on a range of medical devices, diagnostics, sensors, advanced imaging technologies, and artificial intelligence. In order to fulfill the necessary objective, intelligent gadgets have the capability to exchange and record data within the context of everyday activities. This application is being implemented in various domains, including residential environments, smart urban areas, leisure platforms, automotive systems, and interconnected healthcare services.

Marketing and Market Research

Research is commonly characterized as a dynamic, conscientious, and methodical endeavor of investigation with the objective of uncovering, interpreting, and refining factual information. These two names have a semblance of synonymity,

even with a distinction of merely three letters; nonetheless, they are not truly synonymous. It is important to differentiate between market research and marketing research. Market research often includes studies and investigations pertaining to the market, while marketing research involves actions focused on marketing-related research.

Market Research

Market research is conducted to determine the viability of a novel service or product through the implementation of customer surveys and direct study. Market research allows a company to discern its target market and get feedback and various forms of customer input regarding their level of interest in a certain product or service (Vexco, 2023). Market research is a systematic investigation that analyzes the market for a specific commodity or service in order to ascertain the potential response of the target audience. The process may entail gathering data for the purpose of market segmentation and product differentiation, enabling the customization of advertising strategies, or the identification of traits that are perceived as significant by the consumer. In order to complete the market research process, a corporation is required to undertake a number of duties. Data collection is crucial and should be tailored to the specific market sector being analyzed (Vexco, 2023). The analysis and interpretation of the collected data are necessary for the company to assess the existence of patterns or significant data points that can inform the decision-making process. Market research plays a crucial role in facilitating firms' comprehension of the demand and viability of their products, as well as their potential performance in real-world settings (Vexco, 2023). Market research is conducted by utilizing primary or secondary data sources which offer unique perspectives on a company's product. Market research plays a crucial role in the research and development (R&D) phase of a firm, contributing significantly to its achievements and expansion. The principal objective of engaging in market research is to get insights into the market pertaining to a specific product or service, with the aim of determining the anticipated response of the target audience towards that product or service. The data acquired *via* the implementation of market research can be utilized to customize marketing and advertising strategies or ascertain the preferences and needs of consumers. Market research explores several aspects of the target market, including their requirements, desires, spending patterns, and traits. Additionally, it can draw comparisons with both competitors and prevailing industry benchmarks. Market research serves as the initial step for businesses to evaluate the feasibility of introducing new goods or services to their intended market. During the course of this process, it frequently uncovers previously unidentified target markets and discerns client desires and requirements.

CHAPTER 9

Smart Manufacturing for Fashion Firms

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Abstract: Industries in many parts of the world today have evolved as a result of rapid advancement in information and manufacturing technologies. In Ghana, the product manufacturing subsector, of which the fashion industry is a part, has also continued to evolve just as the technological advancement progresses. As a result, companies (fashion houses) are consistently looking for innovative ways to adapt to the ever-growing demands of consumer's trendy wear. In view of the fact that the world is experiencing low growth in the global economy, the fashion industry, realizing this, has adopted smart manufacturing to enable it to maintain its relevance in the global economy. Thus, smartening up factories is crucial in this era of industrial revolutions. The traditional methods of operation by the fashion industry continue to fade as e-commerce booms. There is a need for the fashion industry to evolve by adopting smart manufacturing, which may help the textile and garment industries become more environmentally responsible and efficient, as well as boost business output and efficiency by equipping "smart factories" with automated processes and technological advancements. The purpose of this chapter is to review the literature on key areas of smart manufacturing for fashion firms. It has been revealed in the chapter that the projected advantages of the fourth industrial revolution are being fulfilled by smart manufacturing projects. By integrating digital technologies with traditional automated manufacturing processes, the manufacturing industry is projected to see a new growth trajectory. More so, the smart factory can actively participate in the transition of industries by utilizing the internet, data analytics, and sensors. This will eventually lead to technological advancement at all stages of the manufacturing process. However, not every firm will be able to balance the benefits of upgrading technology, installing security systems, and retraining workers against the associated costs. Making a factory smart requires input from many departments within a firm, but ultimately, the decision must be taken on an accurate assessment of its financial viability for the facility or business model in question.

Keywords: Augmented reality, Artificial intelligence, Fashion firms, IoT, Virtual reality, Smart manufacturing.

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INTRODUCTION

Companies are looking for innovative ways to adapt to the ever-evolving demands of consumers as a result of globalization and the rapid advancement of computer technology (Ge, Liu & Ma, 2018). Smartening up factories is crucial in the Fifth Industrial Revolution. This is due to the fact that we have entered a period of low growth in the global economy. The fashion industry has realized that adopting smart manufacturing (Internet of Things (IoT), virtual reality (VR), augmented reality (AR), artificial intelligence (AI), *etc.*) is crucial to its continued success (Lee, Ju & Lee, 2021). The term "Industry 5.0" describes an environment where humans and intelligent machines operate together. With the help of cutting-edge tools like the Internet of Things (IoT) and big data, robots can improve human productivity. Technology and efficiency are the cornerstones of Industry 4.0, and they bring a human dimension. All sectors will be affected by the emerging global ecosystem that is Industry 5.0. Humans and machines may finally find common ground thanks to Industry 5.0 (Martins, 2022). The ultimate objective is to combine the unmatched creative problem-solving abilities of humans with the unmatched cognitive perfection of robots in order to design and implement effective processes. With the help of IoT and AI, the fashion industry has completely revamped its supply chain, allowing for instantaneous reactions and widespread customization. Traditional offline market structures have been disrupted by the advent of e-commerce, which reduces the time and distance between sellers and customers. As e-commerce continues to boom, even more so during the epidemic, it is altering the fashion industry's traditional methods of operation (Lee *et al*., 2021). As an added bonus, smart manufacturing may help the textile and garment industries become more environmentally responsible and efficient. In addition, businesses have attempted to boost output and efficiency by equipping "smart factories" with automated processes and technological advancements (Industrynews, 2018). Keeping up with the times and remaining competitive in today's industry require a constant focus on digital innovation. The garment industry has recently begun digitizing its operations to get vital data and develop insights. The value of data has expanded beyond process monitoring to include a better grasp of what is most important to customers and how to best meet their demands (Apparel Resources, 2018). Technology from the areas of production, information, and communication is part of a "smart factory", with the latter two having the potential to be integrated throughout the entire supply chain.

According to Hsieh (2021), global retail sales fell in 2020 for the first time since the 1960s. Likewise, as a result of the epidemic, technology-based manufacturing and online retail sales increased dramatically. In reality, there was a 36.6% rise in global traffic to e-commerce sites between January 2020 and June 2020. There would be more than $4 trillion in global e-commerce sales by the end of 2020, or

18% of all retail sales (Hsieh, 2021). By 2025, it is expected that online shopping will make up at least 25% of all retail sales. There is no denying that this is an issue that demands attention from the business world, specifically in the digital sphere. When it comes to retail e-commerce sales in the United States, the clothing and accessories industry is currently in second place, with a share of 20.7%. The global value of all fashion items sold online is projected to hit $953 billion by 2024, growing at a CAGR of 12.7%. The purpose of this chapter is to review the literature on key areas of smart manufacturing for fashion firms.

LITERATURE

Smart Manufacturing

In order to establish a more advantageous system for businesses that focus on manufacturing and supply chain management, the term “smart factory” refers to a factory in which traditional production processes and operations are integrated with digital technology, smart computing, and big data (Sarkar, 2020). Flexibility in production, mass customization, higher quality, and higher productivity are the goals of smart manufacturing, also known as Industry 4.0. (Zhong *et al*., 2017). Industry 5.0, the next stage of the Industrial Revolution, places a premium on actual statistics, sensor technology, networking, automation, and algorithms; a smart factory is one manifestation of this trend. Industry 5.0 manufacturing will involve the use of machine learning, robotics, AI, the IoT, data analytics, and augmented/virtual reality (Sarkar, 2020). Establishing a digitally-enabled “smart factory” is one of several viable options for improving efficiency and productivity in the workplace. By implementing a smart factory, a company can prevent operational downtime and other productivity difficulties because of the smart factory's capacity to adapt and learn from data in real time (Jagdish, 2018). According to Jagdish (2018), “only the appropriate kind of data used in the right setting with the right people behind it assists in creating the big improvements.’

A smart factory is a manufacturing facility that is capable of autonomously connecting, collecting, and analyzing data through the use of Internet of Things (IoT) devices for communication (Kim & Moon, 2020). Building a fashion system on the backs of product quantities that are more in sync with market demand, more in line with consumers' expectations, highly customizable, and transparent throughout their whole lifecycle is possible with the help of smart factory and automation technologies (Bertola &Teunissen, 2018). The cutting, sewing, and inventory divisions in the savvy fashion sectors have improved the quality of the fabric used in making blazers and jackets that are made to order. Fabric, raw materials, order status, and blazer pressing are all monitored *via* the barcode system. Its complex manufacturing system may be monitored in a more

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Dr. Mohammed Majeed is a distinguished academic and researcher currently serving as a Senior Lecturer at Tamale Technical University, where he holds the position of Head of the Department of Logistics and Procurement Management. With an impressive academic background, Dr. Majeed has earned two doctoral degrees—a Doctor of Business Administration (DBA) and a Doctor of Philosophy (PhD) in Marketing—earning him the title "Dr²."

Dr. Majeed is also known for his strong presence in the publishing world, collaborating with eminent academic publishers and contributing record, with articles featured in renowned academic Publishers including Emerald, Wiley, Taylor & Francis, Springer, Cogent, Routledge, and Apple Academic Press. His research interests span several vital areas in contemporary marketing and business, such as value co-creation, digital marketing, green and sustainable practices, branding, and consumer behavior.

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