

Review

Marketing Strategies 4.0: Recent Trends and Technologies in Marketing

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Abstract: Industry 4.0 technologies have transformed the traditional methods of various study areas, using digitalization to fulfill sustainability and introduce innovative infrastructure. In the present era, every organization requires a distinct marketing strategy in order to meet customer and market demands in the form of products and services. Customer satisfaction, customer retention, customer behavior, customer profiling, and rewards systems are key parameters in the effective implementation of an organization's marketing strategy for achieving better productivity. There are limited studies that have focused on discussing all the Industry 4.0 enabling technologies used in marketing for transforming the digital and intelligent ecosystem. Based on the analyses, this study identified the applications of the Industry 4.0 enabling technologies for market strategies, such as strategic information for customer satisfaction of the target customer; development of digital infrastructure for receiving real-time feedback on products and services; forecasting customer behavior to develop personalized messages or services; using business analytics to strengthen the quality of a product or service; developing effective simulations to monitor, test, and plan product improvements, based on consumer and market demand. Finally, a framework is recommended, and the vital recommendations for future adoption while maintaining sustainability are discussed.

Keywords: digitalization; marketing strategies; Industry 4.0; blockchain; big data; customer retention



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1. Introduction

In today's competitive manufacturing environment, maintenance is a major concern, and businesses are approaching digital transformation from both a technological and management standpoint [1]. People's lives and workplaces are radically changing as a result of the digital revolution, but the public is nevertheless hopeful about the prospects that Industry 4.0 may present for sustainability [2]. Sustainable Development Goal 8 (SDG) talks about decent work and economic growth. Economic growth is essential for every country's development, and technology plays a vital part in it; SDG9 talks about industry, innovation, and infrastructure. As a result, there is an urgent need to innovate, particularly in technology, in order to achieve long-term goals and progress in various aspects of life.

In the current era of Industry 4.0 and the circular economy, businesses with morally sound and environmentally friendly practices are in high demand. Due to different operational and budgetary restrictions, small and medium-sized enterprises (SMEs) find it difficult to adopt Industry 4.0 technology. In the context of developing nations such as India particularly, the issue is more serious [3]. The requirement to connect numerous fragmented data sources, leverage advanced machine learning techniques for multi-objective optimizations, and construct changeable digital twins that can adapt to changing industrial setups, make it difficult to develop such technology-oriented systems [4]. Businesses

should monitor marketing differences and update themselves appropriately in order to establish a sustainable competitive edge and adapt to the digital changes occurring in our age. Companies must improve their marketing performance to thrive and overcome competition. Customer stratification, customer retention, customer profiling, and customer behavior analysis are key elements of enhancing the productivity of an organization. Here, the Industry 4.0 technologies such as the Internet of Things (IoT), cloud computing, artificial intelligence (AI)/machine learning (ML), big data, blockchain, robots, digital twin, and the metaverse play a crucial role, as already happens in different study areas with its real-time monitoring, predictive analytics, intelligent analytics, virtual representation, secured transaction, digital ecosystem, etc.

The implementation of digitalization comprises sociotechnical processes at social and institutional level. Here, we discuss the few studies that present the importance of digitalization to sustainability. Digitalization of any field is driven by Industry 4.0 technologies [5]. From the previous studies it is concluded that digitalization assists in achieving social, economic and environmental sustainability [6]. With regard to the current study, these technologies have the ability to meet sustainability demands in the market strategies of an organization, such as organizational value creation, strategy, and structure mechanisms. In [7], the authors analyze the research findings on the basis of the relation between sustainability and digital transformation at firm-level. In [8], the authors state that information technology is capable of the sustainable utilization of energy in the current scenario for sustainability. Authors in [9] conclude that digital-based innovation meets sustainability for the heuristic social relationship in the context of society 5.0. In [10], the authors discuss the fact that smartness and sustainability are the core components of macro-level trends in the tourism sectors. In [11–13], the authors address how digitalization and sustainability are vital to implement socio-economic aspects in traditional manufacturing. From the above studies, it is concluded that Industry 4.0 technologies have a significant role for achieving sustainability.

Based on this motivation, this study analyzed the previous studies that addressed the significance of Industry 4.0 for marketing. In [14] the researchers discuss the transformation from industrial revolution 1.0 to industrial revolution 4.0, although the study does not address the implementation of Industry 4.0 technologies. The authors of [15] address the significance of Industry 4.0 marketing, and discuss only IoT in marketing. In [16], the authors present the implementation of the industrial IoT, cloud computing, big data analytics, and AI in marketing for multiple applications; the remaining enabling technologies are not focused on in this study. In line with these facts and limitations, this study aims to discuss all the Industry 4.0 enabling technologies in marketing, to achieve sustainability in terms of social, environmental, and economic goals. The novelty of this study is in compiling all the Industry 4.0 enabling technologies in a single study with significance, applications, and future recommendations. The main contribution of the study is as follows:

- The significance of the Industry 4.0 revolution in overcoming challenges and improving marketing strategies with digital technologies is presented from a general and sustainability perspective.
- The integration of Industry 4.0 enabling technologies into marketing strategies is presented in a detailed and individual way for realizing retail marketing, customer relationship management, and new product development. Competitive advantage supports disintermediation, fights click fraud, strengthens trust and responsibility, and customer needs and desires in marketing.
- Finally, the article presents the discussion and recommendations that are vital for future enhancement.

The article is divided into various sections: Section 2 covers the methodology of the study; Section 3 focuses on Industry 4.0 and how it is connected with marketing strategies 4.0, with an overview of the various technologies impacting marketing strategies. Section 4 presents the various technologies of Industry 4.0 that can be used in marketing.

Section 5 covers the recommendations where the author suggests more investigations and offers more suggestions regarding the various technologies covered.

2. Methodology

In this study, challenges in previous studies and research questions are utilized to carry out the study. Based upon this aspect, articles were obtained to verify the challenges and to search for the answer to the research questions. The major research question framed in this study is: What is the impact of Industry 4.0 enabling technologies on marketing strategies for transitioning from traditional to digitalization? Based on this study question, we collected research articles from several databases, such as Web of Science, IEEE Explore, and Scopus. To find an answer to the research question, we looked through papers having logical strings. The following strings were considered for obtaining publications: “Industry 4.0 AND Marketing strategies”, “sustainability AND Marketing strategies”, “Industry 4.0 AND digitalization”, “Marketing strategies AND digitalization”, “Marketing strategies AND IoT”, “Renewable energy AND energy management”. The above search strings were used in the IEEE, Web of Science, and Scopus search filters. We searched articles on Web of Science and Scopus using the title, abstract, and keywords fields. In the instance of IEEE, we looked for articles that have abstracts. This study looked at papers from 2014 to 2022 of reputed journals such as *Journal of Cleaner Production*, *International Journal of Information Management (IJIM)*, *Journal of Interactive Marketing*, *International Journal of Production Research*, *Computers in Industry*, *Sustainability*, and *Applied Sciences*, *Agile Business Leadership Methods for Industry 4.0*, *Journal of Research in Marketing*, *Journal of marketing*, *IEEE Access*, *Journal of Strategic Marketing*.

The remaining articles in the journals are from conferences, books, and web links. After obtaining the articles, the study analyzed the previous studies and framed the methodology to present a study that outlines the significance of Industry 4.0 enabling technologies for marketing strategies. Initially, this provides an overview of marketing strategies and explains why the Industry 4.0 enabling technologies are required in marketing strategies. Following this, the individual Industry 4.0 enabling technologies presents its application for the marketing strategies. Finally, the discussion and limitations identified in the previous studies are presented, with future recommendations.

3. Overview of Marketing Strategies 4.0

The term “Industry 4.0” refers to a broad spectrum of contemporary notions whose precise differentiation and clear classification within a discipline are not always attainable [17]. However, it may be viewed as an amalgamation of various technologies such as IoT, cloud computing, big data, AI/ML, blockchain, digital twin, robots/drones, and the metaverse. The world has experienced a lot of advancements due to Industry 4.0. Industry 4.0 is the 4th generation, and has its use in various sectors such as medicine, management, agriculture, military, construction, etc. The central idea of Industry 4.0 is the trend of digitization, automation, and increased use of information and communications technology (ICT) [18]. People’s lives and workplaces are radically changing as a result of the digital revolution, but the public is nevertheless hopeful about the prospects that Industry 4.0 may present for sustainability [19]. These technologies are eventually anticipated to jointly determine Industry 4.0’s success.

Marketing is a business function that involves developing, communicating, and delivering value to customers, and it is also used to manage customer relationships in order to help the company and all of its stakeholders. Marketing, according to Kotler and Keller [20], is the process of recognizing and addressing consumer human and social requirements while retaining the company’s profitability. Marketing is an ever-changing business activity. It is influenced by a variety of factors, including technical advancement, economic downturns, conflicts and war, inflation, and energy shortages. According to Bala and Verma [21], the internet has considerably aided the transition to market-driven marketing approaches that include institutionalized techniques for gathering accurate

and timely information about the market, customers, products, and the overall business environment. Companies must integrate digital and traditional marketing techniques to ensure that clients' requirements are handled in exactly the right way to succeed in today's business environment [22].

Marketing has changed dramatically from Industry 1.0 to Industry 4.0. Marketing strategy 1.0 focuses primarily on selling things, independent of the requirements and preferences of the target market, and this is known as product-based marketing. In this regard, it tries to manufacture high-quality products that provide clients with functional benefits and markets through traditional media such as radio, television (TV), and e-mail [23,24]. An early phase of contemporary information is included in marketing strategy 2.0, where the extensive search and investigation of the customer's demands and requests are at the center, disclosing new target markets that turn into a positive asset. Customers are a part of the marketing plan in this revolution, and both the internet and traditional media are used for promotion and communication [25,26].

Marketing strategy 3.0 is a value/people-oriented period in which marketers are considered human beings with minds, emotions, and souls, as well as considering the consumer quality of customers. Consumer demands and expectations shift continuously during this period. As a result, businesses have undertaken continuous market research, examined technical advancements, and made them consistent with the values demanded by consumers [27,28]. Market strategy 4.0 majorly emphasizes personalization of services and products on the basis of big data analysis. In this way, the marketing approach integrates the offline and online interaction between consumers and companies. The integration of artificial intelligence and machine learning strengthens the process of customer interaction and also enhances the productivity of other technologies [14]. It is extremely important to better comprehend consumer expectations, reactions, and behavior and also crucial to concentrate on the revolution of marketing applications brought on by Industry 4.0 [20]. Modern marketing strategies and trends are always evolving. The primary driver of this revolution is the quick development of information and communication technologies [16]. As a result, Industry 4.0 is the advancement and integration of innovations from earlier industrial revolutions [29]. Several technologies influence marketing strategies, namely IoT, cloud computing, big data, artificial intelligence/machine learning, blockchain, digital twin, robots/drones as well as the metaverse (Figure 1). Beginning with IoT, its ultimate goal is to deliver plug-and-play technology that offers end-user flexibility, remote-access control, and ease of use [30].

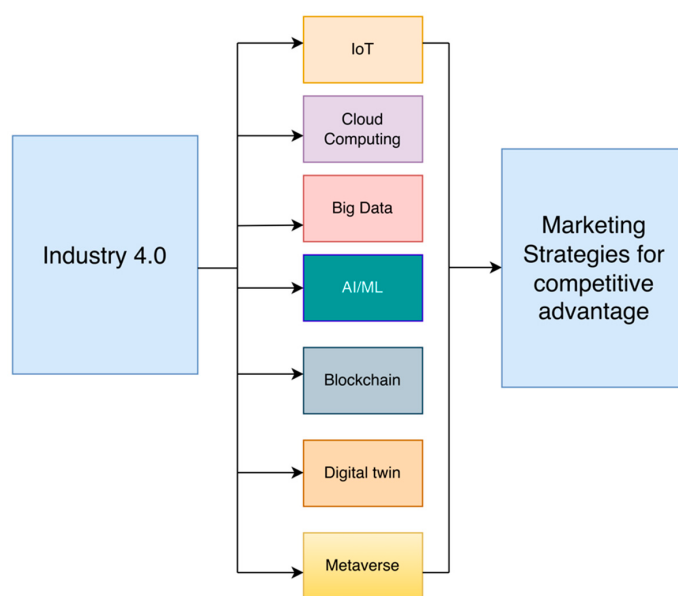


Figure 1. Technologies of Industry 4.0 that affect Marketing Strategies.

One of the most popular paradigms for computing called cloud computing promises to give consumers access to dynamic, dependable computer environments that may be modified and have their quality of service guaranteed [31]. Big data is another hot technology used in a variety of industries, including media and telecommunications, health care engineering, and finance, where firms must deal with enormous amounts of data and new technologies to store, handle, and analyze them [32]. AI is a phrase used to refer to the modeling of intelligent behavior by computers with little to no human involvement [33]. Blockchain technology has driven many projects across numerous industries with cryptocurrency bitcoin being the most famous example [34]. Similarly, robots and digital twins have also marked their presence in a huge number of sectors. The development of digital twin in the areas of people and society is known as the metaverse [35]. The succeeding sections consist of a detailed explanation of the various technologies of Industry 4.0 used in marketing strategies.

Table 1 presents the significance of Industry 4.0 technologies in general and on sustainability. IoT is specifically implemented to obtain strategic information in maintaining customer satisfaction for a long time and this technology enables the minimizing of the usage of paper documents for identifying the factors for customer satisfaction. Cloud computing empowers the establishment of a digital infrastructure for visualizing and monitoring the data and events from a location, and also creates a sustainable cloud for minimizing carbon reduction and responsible innovation. AI in marketing strategy enables the creation of artificial agents that suggest marketing actions on the basis of customers, focal competitors, and organizations. Moreover, it identifies and predicts consumer behavior. Big data in marketing strategy motivates the extraction of hidden insights about consumer behavior and also implement business intelligence to improve product and service quality. Blockchain empowers the creation of a digital reward system based on loyalty points with a secured peer-to-peer network. Digital twin enables the creation of simulation and test which products require for the improvement of customer satisfaction and retention. All these technologies enable the creation of a digital platform with responsible consumption and production and also innovation in the infrastructure.

Table 1. Impact of technologies on marketing in general and sustainability.

Technology	General	Sustainability
IoT	Strategic information for customer satisfaction of target customer.	Digitalization of documents minimizes the usage of paper and also minimizes waste generation in marketing.
Cloud computing	Development of digital infrastructure for accessing essential data at any time and from any location, as well as receiving real-time feedback on products and services	Sustainable cloud for carbon reduction and responsible innovation.
AI	AI is developing artificial agents that analyze data about customers, focal companies, and competitors to recommend marketing actions to achieve the best results. Analyzing and forecasting customer behavior to develop personalized messages or services.	Intelligent infrastructure with innovation.
Big data	Obtaining concealed knowledge about consumer behavior. Using business analytics to strengthen the quality of a product or service. Identifying target customers and marketplaces to establish strategies.	Minimizes the reduction of paper and enables responsible consumption and production.

Table 1. *Cont.*

Technology	General	Sustainability
Blockchain	To improve consumer retention, brands have begun gathering and retaining customer data systematically, usually through loyalty programs. Consumers can transact directly without going through intermediary layers in unintermediated markets.	Sustainable brand attachment through blockchain-based reward and loyalty programs.
Digital twin	Develop effective simulations to monitor, test, and plan product improvements based on consumer and market demand.	Enables responsible consumption and production.

4. Industry 4.0 Enabling Technologies in Marketing Strategies

In this section, we discuss the studies that have applied Industry 4.0 enabling technologies in marketing strategies for different applications, to enhance productivity.

4.1. IoT and Cloud Computing

IoT is a technology greatly affecting marketing solutions including retail marketing, customer relationship management, new product development, distribution, procurement, and promotions. It allows the connection of physical devices, resulting in information exchange that enables organizations to strategically become more efficient in the rising market dynamics, which has resulted in the creation of a long-lasting relationship with the customers [36]. To build these long-lasting relationships, IoT technology is used to forecast the demands of customers by analyzing their purchase patterns through the data collected by the organization. IoT has brought about new opportunities and methods for how customers experience shopping. When customers interact with the IoT technology, it culminates in value co-creation, which greatly affects customers' continuance intention and word-of-mouth intention [37]. It is widely believed that word-of-mouth is one of the key determinants affecting the customer's purchase decisions. In terms of the shopping experience, mobile commerce is another area where IoT has left its indelible impression, by allowing the integration of data according to time and location as well as context, with the help of location-based services [38]. This is in conformance with the technology adoption model (TAM) where perceived usefulness and perceived ease of use are the two main factors before any person accepts new technology [39].

Organizations can benefit from the data gained from IoT and monitor the customers' behavior and how they use a particular product. Moreover, it can also help design a new product by knowing what types of internet-enabled products are currently on the market and the customer's views about those particular products [40]. Business longevity can be achieved by enabling IoT devices in the products which are designed for the market [41]. Distribution has seen recent advances by inculcating IoT technology known as IoT-EDF (E-marketing and distribution framework). This IoT-EDF improves marketing strategies in the various stages of distribution and procurement. Thus, it helps in the retention of customers, as it uses a very strong source of information [42].

Cloud computing is a technology that is used to integrate a shared pool of resources in a centralized manner, which allows for better management and scheduling. E-Commerce has seen a significant amount of development with the help of cloud computing. Due to digitalization in marketing, many organizations need to store a huge amount of data, which becomes a cumbersome task wherein cloud computing becomes the need of the times. Moreover, large storage capacity is essential in mobile devices such as phones and laptops rather than desktops [43]. Globally, advertising is shifting from the web 2.0 to web 3.0 generation. Due to excessive competition in the market, organizations are focusing on marketing to target customers, which can be effectively achieved with the help of cloud computing [44].

This is because different customers have different purchase behaviors, and they need different advertisements to be persuaded to buy a particular product or service. Social media, along with cloud computing, has improved customer experience, which has ultimately elevated the degree of customer retention in any organization. This is because organizations work with huge amounts of data, consisting of the demography of the customers, the products they buy, and their purchase patterns, etc. [45]. Moreover, customer relationship management (CRM) uses the SAAS feature of cloud computing to fudge the CRM mechanism in any business process [46]. Green marketing is also another area where cloud computing may be effectively implemented. The green marketing model and cloud computing are fruitful in the development of any organization, as they result in reducing pollution in production, increase the employees' rate of task completion by almost 20%, and also enhance the brand image of the organization [47]. It is believed that cloud computing utilization (CCU) is beneficial in reducing the various marketing barriers that can be experienced by various SMEs. It can also be used to reduce the international barriers which are encountered by EM-SMEs [48].

4.2. Big Data

Marketing in the contemporary world is largely dependent on big data. Big data is a disruptive technology that has proved to be helpful in decision-making, and may be applied to the various elements of the marketing mix such as product, price, place, promotion, and people [49]. Due to the advent of electronic commerce, organizations can target any market without any location barriers. The basic features of big data are velocity, volume, and variety [50]. As marketing shifts from offline to online, there is a greater need to make strong marketing decisions, and one way to do so is by segmenting online customers. The data obtained from these customers is quite exhaustive and it needs advanced technologies such as big data for its analysis [51].

The big data derived from social interactions such as social media is termed social big data. Organizations can benefit from this social big data to make important business decisions [52]. As organizations have shifted from web 1.0 to web 2.0 technology, big data allows the use of effective customer relationship management (Social CRM). This ultimately increases customer engagement and satisfaction [53]. It may be observed that the data obtained from online reviews as well as promotional marketing strategies are good indicators of product demand [54]. This means that in order to understand a product's demand, organizations must focus on big data derived from online reviews and other promotional strategies. Once the marketing behavior is examined, it becomes easier to carry out the production process, as there is a proactive approach to identifying the needs and wants of the customers [55].

Figure 2 illustrates how a competitive advantage can be gained by using big data. Firstly, data is fetched from the customers with the help of organization resources such as CRM. Then, through various analyses, value can be created concerning the 4Ps of marketing. The development of big data has proved to be fruitful for managers, as they can evaluate their operations as well [56]. Physical, human, and organizational capital are the three resources that may alter the process of collecting, storing, and analyzing big data for decision-making [57]. However, the challenge for the organizations does not lie in the collection, storing, and analysis of data, but in the cleansing of data, which reduces noise and helps in better decision-making [58].

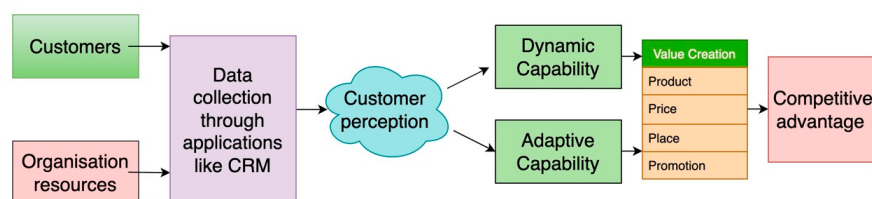


Figure 2. Competitive Advantage through Big Data.

Apart from the above-mentioned areas, big data has been of significance in the formulation and implementation of industrial strategies (B2B) (Figure 3). They may optimally select which strategy to use from differentiation, focus, or cost leadership, with the help of big data to gain a competitive advantage [59]. Here, we present the previous study big data framework [60] for competitive advantage, where it comprises different components for implementing intelligence and predictive analytics. This framework enables the formulation of the different queries that are important for implementing big data for competitive intelligence. The queries are: which type of data should be gathered? What methods are available for collecting real-time internal and external data? How does competitor data become meaningful patterns and knowledge? And what kinds of insights can be anticipated, translated, and analyzed in order to improve CI? Organizations find it challenging to modify their internal data strategies after comparing them with external, competitor data because of issues with data privacy, sensitivity, and sharing. It has been concluded that many organizations do not focus on storing the unstructured and social data, but it is vital to apply big data so as to understand changes in the current market.

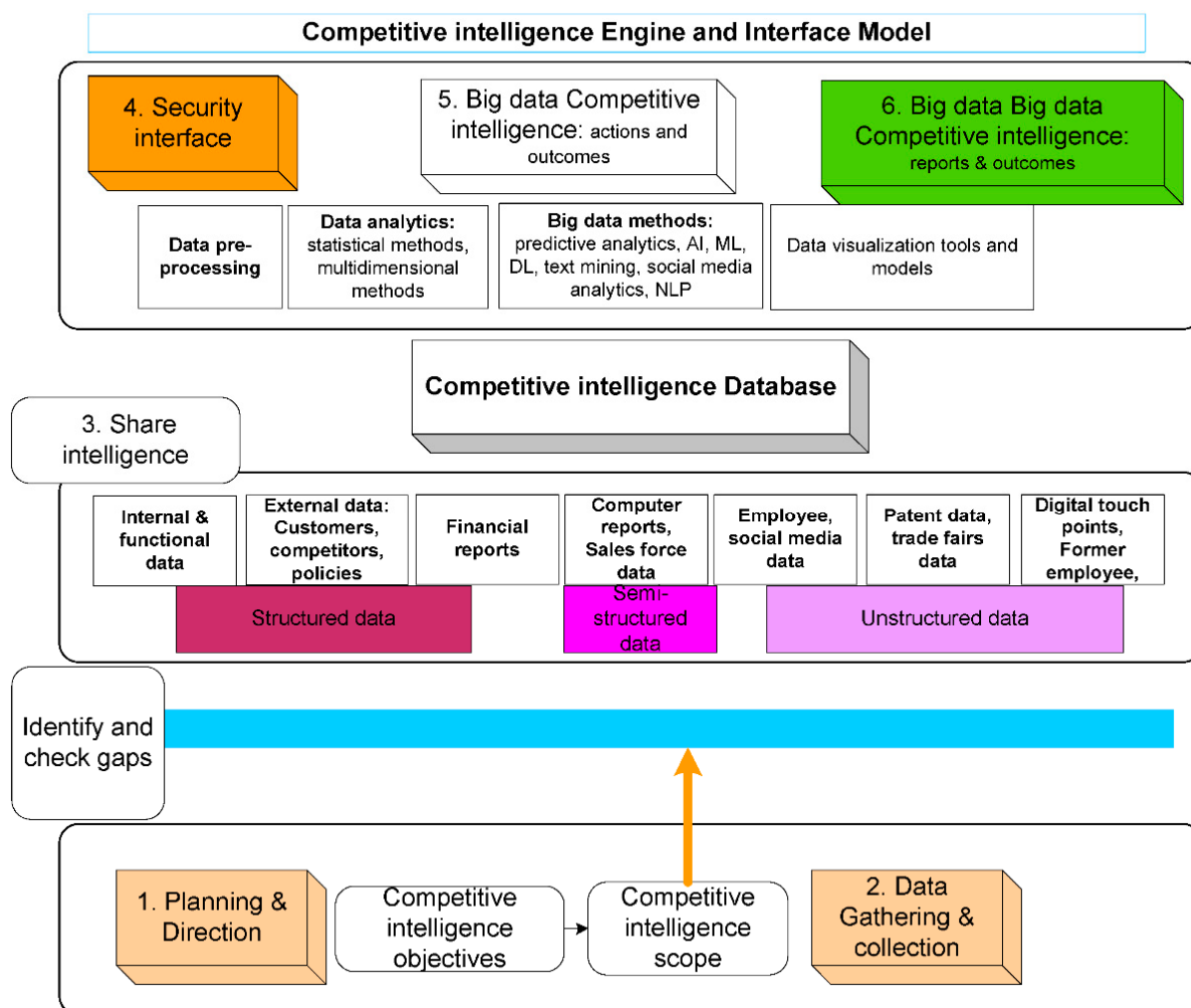


Figure 3. Big data-based framework for the implementation of competitive intelligence in marketing.

4.3. AI/ML

AI/ML has paved the way for ample opportunities in marketing solutions. A large chunk of research in AI is based on explaining actions or decisions on how humans behave in a particular situation [61]. ML models can be incorporated with the help of AI to make strategic decisions. Value creation through AI/ML can be achieved through four main sources:

- Decision support;
- New products and services;
- Automation;
- Customer and employee engagement [62].

The development in information and communication technology (ICT) has changed the B2B perspective in general, where a huge amount of data can be collected, stored, and analyzed using technology such as AI/ML [63]. Businesses that use CRM in B2B can benefit from the AI-based CRM, wherein complex data can be analyzed effectively for decision-making [64]. Moreover, the use of AI is all the more visible with the huge amount of data used by businesses, known as big data [65]. AI has found huge implementation in the retail industry. It is believed that when AI and HI collaborate, it may lead to better implementation and data analysis [66]. This is because in retailing, interaction with customers is essential; while doing so, one can benefit from making use of AI tools and take complex decisions. In this fourth generation of the Industrial Revolution, AI and ML have proved fruitful in anticipating the needs of the customers to meet their expectations [67].

AI/ML is not only used in B2B but also in B2C. Machines having greater learning abilities are able to perform better than those machines with non-learning abilities, as well as human beings. Therefore, businesses can analyze customer behavior, attitude, and purchasing patterns, which can be utilized to forecast sales for a particular period [68]. A report on a brewing firm depicted that the use of AI in the business allowed for better customer segmentation, which significantly improved sales [69]. Irrespective of the fact that marketing has seen huge advancements due to AI/ML, there are still challenges that businesses need to face, due to a lack of expertise for strategic implementation [70]. Moreover, many pitfalls, such as haphazardly defined objectives, unsafe learning environments, and biased AI need to be catered for in order to effectively implement AI in business [71]. It has been stated that sole dependence on AI may be fatal, and thus organizations should not completely disregard the traditional cognitive methods that have proved beneficial for many years. Thus, AI must be used in conjunction with the traditional cognitive processes [72].

4.4. Blockchain

Blockchain is viewed as a tool that can revolutionize systems in a variety of industries. It is popular right now, due to its strong foundation [73]. Most blockchain use cases are established to meet common objectives in the ecosystem, apart from improving corporate efficiency and competitiveness [74]. Blockchain technology can be a benefit for marketing, with particular application to supply chains and internal control of marketing operations, which can be further used by professionals to increase internal management systems and marketing initiatives, strengthening businesses' competitive advantage [75]. There are three main value drivers of blockchain technology that may be used in order to create a competitive advantage in marketing, which are as follows:

- Data ownership;
- Reputation;
- Tracking and verification [76].

Blockchain technology supports disintermediation, fights click fraud, strengthens trust and responsibility, ensures privacy protection, bolsters security, and promotes loyalty programs that give its customers access to exclusive experiences [77]. Since blockchain technology's fundamental tenet is privacy, customers will determine how and what they divulge to businesses, and when they are ready to do so, depending on the situation and the advantage they will need [78]. By altering how businesses and their customers connect, blockchain as the foundational technology combined with tokenization can profoundly disrupt marketing communication [79]. Blockchain is significantly used in online as well as offline retailing. It may be used in determining how permission marketing for impulse purchases might help offline/omnichannel companies revive sales through digital innovations [80]. The online marketing of agricultural products has also seen tremendous development, due to the increased implementation of blockchain technology [81]. Figure 4

shows how IoT and blockchain have become intermediators between the business and the customers. Businesses use applications such as ERP and CRM to collect customers information, and to do so, IoT and blockchain technologies are used. As a result of the distinctive characteristics of blockchain such as openness, decentralization, and permanency, it can foster a safer, more client-focused and open, marketplace for both consumers and companies [82]. However, considering that marketing operations primarily leverage blockchain as a widely used database, the data entered into such databases must be of a high standard, because a fault in the source will lead to disruption in the whole network [83].

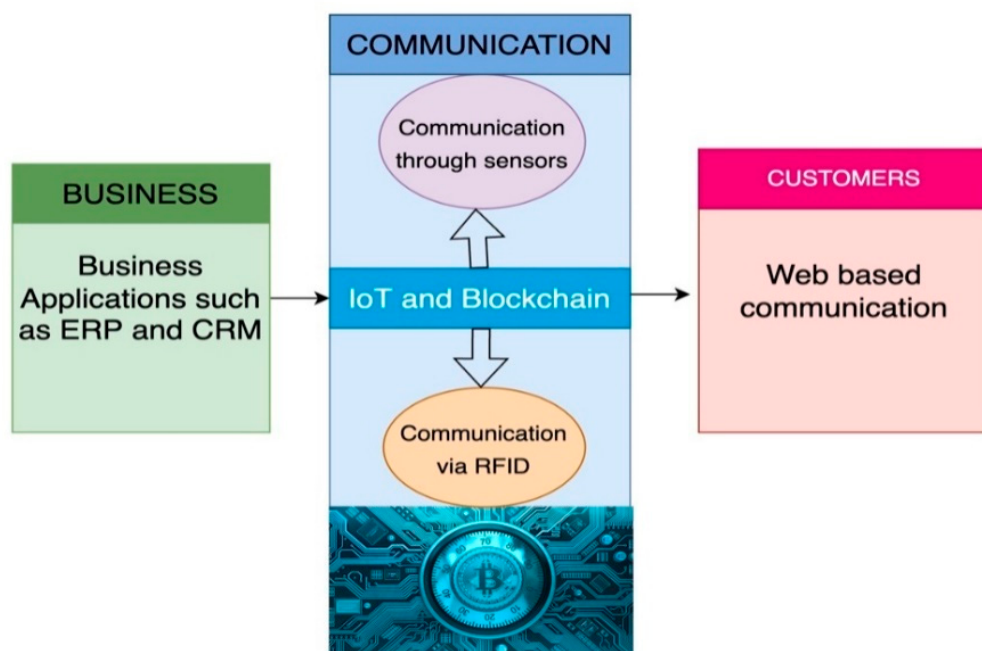


Figure 4. Communication through IoT and Blockchain.

4.5. Digital Twin

A digital twin (DT) is a model or virtual representation of a physical twin that is connected to the other through real-time data exchange. Conversely, it imitates its physical twin's condition in real-time [84]. The digital twin has its origin in the idea of a virtual and physical environment containing a system model, each connected by data and information flow, and may be traced back to the early 2000s, when Grieves first proposed it in the context of product lifecycle management [85]. When collaborating with augmented reality, the digital twin can be extremely effective, especially in marketing functions. The basic idea of this technology is the ability of the virtual world to interact with the real world via a screen [86]. The digital twin has found its use in the industrial product life cycle. Previously, simulations were made based on various models, but now, due to advancements in technology, organizations can handle huge amounts of data, and the digital twin can be effectively applied [87]. It has been shown that the digital twin has proved beneficial in value creation and effective decision-making for various strategic aspects of management [88]. The digital twin has also been significantly used in identifying customer needs and desires in marketing. The traditional approach used for the same takes into account the analysis of historical data, which becomes quite time-consuming. Therefore, to save time, the digital twin can be used to determine real-time consumer feedback and ultimately analyze their needs and desires [89].

4.6. Robots and Drones

Robots and drones have been a recent advancement in the Industrial Revolution 4.0. The development and commercialization of service robots, which offer human-robot

interaction (HRI) experiences in service delivery environments, have been boosted by the amalgamation of robotics, AI, and other technologies used in the industrial revolution 4.0 [90]. With time, drones have become affordable, due to the huge advancements in technology and ICT [91]. There has been a tremendous development of robots in the hotel industry as well, where robots carry out the tasks of human beings and are supposed to deliver quality service to their guests. Some hotels choose to use a blend of human and robotic service delivery [92]. Social robots have become popular in the hospitality and tourism industry. The effects of technological acceptance variables, service quality dimensions influencing perceived value, and two additional dimensions from human-robot interaction (HRI)—empathy and knowledge sharing—all influence visitors' inclinations to employ social robots [93]. The adoption of service robots in this environment seems to depend heavily on trust, which can be sparked by human-like cues that are similar to humans in terms of both appearance and social behavior. Therefore, we can see that robots have been used significantly in service delivery in marketing [94].

Figure 5 shows the three functional areas where robots can be used in marketing. They are:

- Resolving customer queries;
- Collection of data;
- Informing customers.

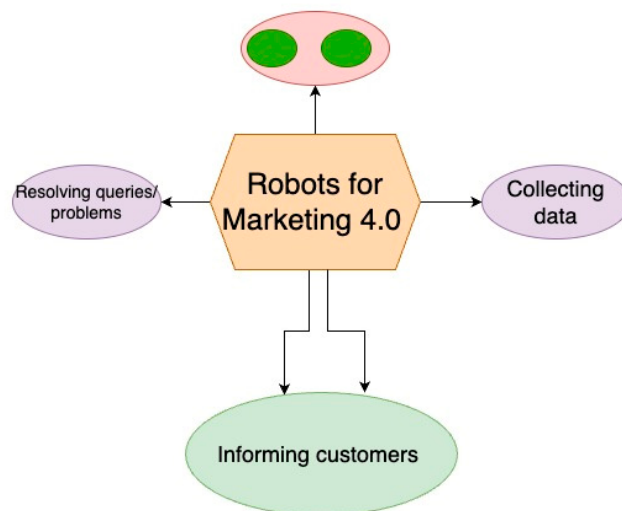


Figure 5. Robots in Marketing.

There are several factors which affect customer satisfaction concerning service delivery by a robot, such as the features of the robot as well as the ability to enhance or degrade any service vis-à-vis human service delivery [95]. The following attributes affect restaurant customers:

- Intelligence level of the robot;
- Likeability of the robot;
- Safety assured by the robot;
- Anthropomorphism;
- Animacy [96].

To gain satisfaction from customers regarding robotic service delivery in restaurants, organizations need to focus on perceived innovativeness, which ultimately fosters a desirable attitude towards the robot [97]. Drones are another form of technology prevalent in the service industry. Just as in the case of robots, certain characteristics affect the customer-drone relationship, such as perceived risk and attitude, as well as perceived benefits [60]. The drone is used in the food delivery service and models such as the technology acceptance model (TAM) as well as technology planned behavior should be used to determine behavioral intentions in the context of food delivery services via drone [98].

4.7. Metaverse

The metaverse is yet another technological advancement affecting various fields, and one in which marketing particularly holds an important place. Utilizing augmented and virtual reality technology, the metaverse has the potential to expand the physical world by enabling people to interact naturally in both real and simulated surroundings, using avatars and holograms [99]. It uses a pool of virtual reality platforms which have been used largely in the online gaming sector [100].

There has been additional reliance on the metaverse technology since the COVID pandemic, because it focus a lot on the least amount of human interaction, such as online education and elevated use of e-commerce [101]. There have been recent advancements in retailing since the advent of the metaverse. Retailers have now shifted to metaverse retailing, but there needs to be systematic, strategic planning to implement this technology [102]. The metaverse is also used in virtual commerce, which is an upgradation of e-commerce. Virtual commerce allows the consumers to better analyze a product by viewing it in three dimensions, rather than two dimensions [103]. A lot of top global brands such as Nike have started using the metaverse and have found it to be extremely interactive, due to the provision of the 3D digital space [104]. Advertising has experienced new opportunities with the help of metaverse technology. Similar to the information obtained in the context of traditional TV or online advertising, companies such as Metaverse, the advertising network on Second Life, rent out virtual billboards to businesses and then track who visits those billboards, to provide information to advertisers [105]. Irrespective of the fast-growing love for the metaverse, regulatory authorities must keep up regular checking, as it may result in fraud [106].

5. Discussion and Recommendations

Based upon the above discussion related to the different Industry 4.0 enabling technologies, here we would like to discuss and suggest vital recommendations for the future adoption of all enabling technologies, with the aim of the enhancement of innovative infrastructure. Figure 6 illustrates the various functional areas of marketing, which are CRM, advertising and promotion, retail, product development, and strategic decision-making. The various technologies that are used in these functional areas are named accordingly.

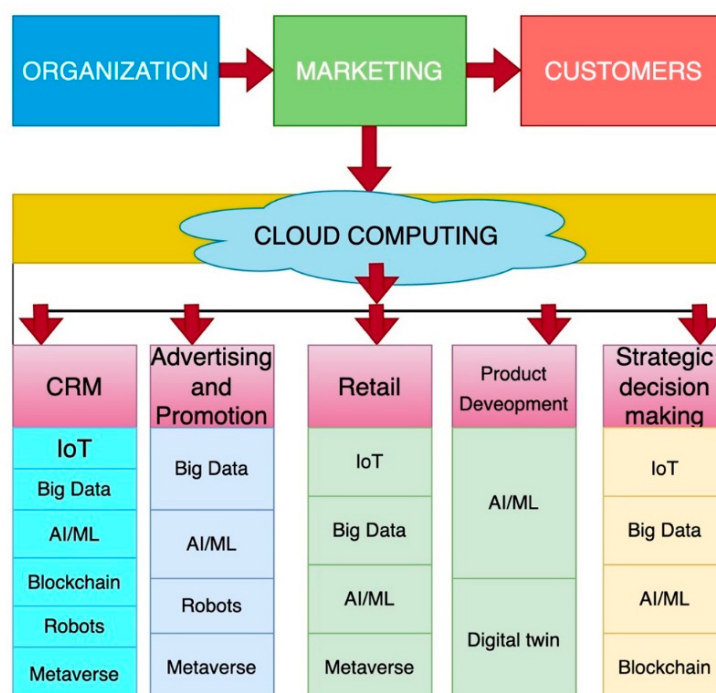


Figure 6. Use of technologies in various functions of marketing.

- The significant impact that IoT technology is having on a variety of daily activities as well as on the behavior of potential customers, is without a doubt one of its strongest points. As a result, it is a topic that deserves to be researched further in the future, especially with regard to what factors influence customer satisfaction due to IoT. In addition, future research might be carried out into how needs and wants can be effectively analyzed by the use of customer data, through IoT.
- The utilization of the cloud has made it possible to address a sizable portion of the issues that e-commerce merchants faced in integrating their services with consumers and rising demand. It has a lot of scope, and future research can be carried out into the ways through which various SMEs can optimize this technology for effective decision-making. Moreover, studies can be performed on how cybersecurity can achieve its maximum possibilities when using cloud storage, which is an issue faced by many organizations presently.
- Big data helps an organization make better predictions, and learning about marketing behavior through this technology would help it to predict business actions. However, various policies and procedures are needed to assist the adoption and application of Web 2.0 and big data technologies in various business functions, including supply chain management, customer relationship management, target promotion, and so on.
- AI/ML technology has become relevant in various functions of marketing such as in consumer behavior, online commerce, and advertising. Understanding how managers may develop innovative, competitive strategies that make use of the potential of the newest generation of AI is the need of the hour. Future studies can be carried out on formulating innovative models that integrate data science seamlessly with all aspects of design, execution, and measurement.
- Blockchain has demonstrated its potential to revolutionize traditional industries. Nonetheless, future research might be carried out on how security can be maintained while using blockchain, especially in the e-commerce sector.
- As it enters a stage of rapid development, where academics begin to investigate actual practices and technologies in the industry, the digital twin is gradually emerging from its infancy. There is still a long way to go before realizing the initial but lofty goal of fully comprehending and reflecting on every aspect of the physical twin. It can study customer feedback, and future research can be carried out on why a customer is behaving in such a manner, so that business decisions can be made accordingly.
- This article has comprehensively thrown light on the various areas where roots/drones are used in marketing strategies, with a special focus on the service industry. However, future research can be carried out into how robots can effectively provide service to guests and create a sense of trust in them.
- The metaverse is the latest technology in the field of marketing, and needs to be studied further to be able to use it in the areas of product promotion and consumer behavior. Moreover, the way these technologies are implemented and how these technologies will change the relationship between the organizations, customers, and other stakeholders, are the key areas to study in the future.

6. Conclusions

Marketing strategy plays a crucial role in enhancing the productivity of an organization. In the current scenario, technological intervention is required in marketing strategies to meet the customer and market demand, while maintaining sustainability. Based upon these motivations and the limitations of the previous studies, this study discusses the integration of Industry 4.0 enabling technologies in market strategies for customer retention, customer satisfaction, customer profiling, and reward systems through customer loyalty points. The study identifies the applications of the Industry 4.0 enabling technologies for market strategies such as strategic information for customer satisfaction of target customer, the development of digital infrastructure for receiving real-time feedback on products and services, the forecasting of customer behavior to develop personalized messages or

services, the use of business analytics to strengthen the quality of a product or service, and the development of effective simulations to monitor, test, and plan product improvements, based on consumer and market demand. Finally, the study presents vital recommendations for future enhancement and adoption for establishing innovative infrastructure within a sustainable environment.

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