

## Tactical Marketing Mix Driven by Digital Innovations for the Fifth Generation of the Industrial Revolution (4P's/4C's Based on BC, CC, QC, Web 4.0)

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### مزيج تسويقي تكتيكي مدفوع بالابتكارات الرقمية للجيل الخامس من الثورة الصناعية (Web 4.0 و QC و CC و BC بناءً على P's/4C's)

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**Summary:** These research papers address an increasingly important topic: tactical marketing supported by digital computing innovations, particularly in the context of the fifth generation of industrial revolutions. The study concludes that decision-making and formulation of marketing mix strategies (new product development, smart pricing, integrated marketing communications, distribution channel management, and logistics) based on cyber-physical systems and disruptive algorithmic technologies, such as blockchain, cloud storage, quantum computing, and the symbiotic and semantic web. All the emerging revolutionary technologies lead to a competitive advantage based on hyper-personalization of the customer experience.

**Keywords:** Marketing Mix; Digital Innovations; Industry 5.0

**Jel Classification Codes:** M30; M31; M37

ملخص: تتناول هذه الأبحاث موضوعاً متزايد الأهمية: التسويق التكتيكي المدعوم بابتكارات الحوسبة الرقمية، لا سيما في سياق الجيل الخامس من الثورة الصناعية. وتخلص الدراسة إلى أن عملية صنع القرار وصياغة استراتيجيات المزيج التسويقي (تطوير المنتجات الجديدة، والتسعير الذكي، والتسويق المتكامل، وإدارة قنوات التوزيع، والخدمات اللوجستية) تعتمد على الأنظمة السيبرانية الفيزيائية والتقنيات الخوارزمية الثورية، مثل سلسلة الكتل (البلوك تشين)، والتخزين السحابي، والحوسبة الكمومية، والويب التكافلي والدلالي. وتؤدي جميع هذه التقنيات الثورية الناشئة إلى ميزة تنافسية قائمة على تخصيص الفائق لتجربة العميل.

الكلمات المفتاحية: المزيج التسويقي؛ الابتكارات الرقمية؛ الثورة الصناعية الخامسة

رموز تصنيف JEL : M30 ؛ M31 ؛ M37

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## **I- Introduction :**

The tactical marketing mix (4P's) represents a set of decisions, encompassing variables employed to achieve the desired objectives (profitability, market share, customer satisfaction) by creating synergy between the mix's components, ensuring its effectiveness in positively influencing the needs and desires of the public in a way that is more effective than competitors in the target market. One of the most important tasks assigned to marketing activity management is the function of producing goods and services that match customer desires, pricing them in line with their capabilities and potential, and delivering them at the appropriate time and place by selecting professionally qualified intermediaries. Then, promotional campaigns are launched to highlight the product's advantages. To implement the modern marketing concept (4C's), a company must utilize the elements of the marketing mix, which is a set of integrated marketing activities that primarily work to satisfy customer needs and desires, ensuring a high degree of customer satisfaction. This enables the company to build a lasting and strong relationship with them. Furthermore, the efficient and effective use of marketing elements in business leads to attracting new customers and retaining existing ones.

The revolutionary transformations of tactical marketing within the context of scientific development and technical progress on the global stage. The wonderful synergy and alliance between the marketing profession and artificial intelligence enhanced by quantum computer science, blockchain, cloud storage, and the symbiotic and semantic web have resulted in the emergence of many digital technologies and cyber innovations that contribute to improving and customizing the marketing mix outputs that respond to the tastes of consumer groups and purchasing segments. This motivates companies and business organizations to achieve the goals of generating additional sales and increasing profit margins, in addition to enhancing the return on investment. Competitive advantage is a fundamental element, cornerstone, and main pillar in the issues of algorithmic marketing based on the hyper-personalization of customer experiences, especially as the world is on the verge of a new wave of cumulative industrial revolutions in its fifth generation.

While Industry 4.0 revolved around the integration of automation and digitization, Industry 5.0 is about the collaboration of humans and machines. Human curiosity has helped transform science fiction into science, a tangible physical reality, and is now an integral part of our lives and culture. The fifth wave of the industrial revolution is fundamentally about protecting the environment and achieving sustainability. The era in which human societies and the business world live today appears to be characterized by unprecedented complexity and accelerating pace. Evidence of this is the very short time gap between the fourth and fifth industrial revolutions, and this strategic alliance between humans and mechanical machines, supported by technological innovations and enhanced by cyber-physical systems. The fifth industrial revolution places the human element at the center of attention, and Industry 5.0 powered by technology and digital computing has already become a focus of tactical marketing decision-makers.

The marketing mix has been impacted by the advent of algorithmic marketing, a personalized, optimized, and agile approach. It is also a natural outcome of the strategic alliance and remarkable integration between computer science and marketing. Tactical marketing decisions have become more productive and profitable, due to the automation of marketing tools and methods, including product planning and development, pricing policies and methods, promotional activities and efforts known as integrated marketing communications, and the management of distribution channels and logistics. Tactical marketing has become real-time, as the cyber marketing alliance, based on disruptive technologies, is based on sensing and monitoring consumer behavior, that is, identifying trends and expectations among shoppers, in addition to studying and understanding the psychological factors and social conditions that influence purchasing decisions. This leads to increased competitiveness for tactical marketers from an effective performance perspective. Given that today's markets have become complex, ambiguous, turbulent, and data-rich, the automation of marketing tools and methods to shed light on the dynamics of hyper-personalization, understand customer psychology and sociology, and contribute to improving and rationalizing the marketing decision-making process becomes critical.

The purpose of this research paper is to provide an analytical reading of relevant research and studies that help the researcher design and engineer a panoramic framework for the smart marketing mix decision driven by innovative algorithmic technology solutions. This results in remarkable advantages and gains represented in hyper-personalization, by improving positive customer experiences through their enjoyment of the shopping journey, i.e. satisfaction and fulfillment of needs and desires, which will be reflected in customer retention rates, turnover, and brand loyalty.

## **II– Blockchain-Powered Tactical Marketing Mix:**

The modern trend in marketing and sales involves the widespread application of advanced computer technologies in marketing decision-making. The phenomenon of tactical marketing converging with cyber-computing systems and networks is experiencing strong and remarkable growth, accelerating and expanding exponentially. This section of the study identifies how the use of blockchain leads to decentralized organizational capabilities and plays a critical role in effective marketing decision-making and achieving the desired competitive advantage in a digital environment. Before delving into the deeper implications and strategic ramifications, the literature review revealed that blockchain technology is the need of the hour. It is a highly advanced, integrated mechanism and a type of distributed database that allows users to store data in blocks linked to each other via cryptography. This interconnected, consistent, and accurate data is then shared to conduct business, track orders, payments, and accounts, in secure, reliable, and transparent ways. It is specifically designed to preserve the data stored in it, ensuring it remains stable and consistent, preventing deletion and modification. This means that once information is stored in the blockchain, it cannot be altered later. It prevents unauthorized transaction entries and creates consistency in the shared view of these transactions. One of the most prominent features of this advanced tool is that it eliminates intermediaries, completing transactions without the need for a third party such as a bank, auditor, or anyone else who adds costs and makes errors.

It's worth noting that the use of blockchain applications in the ICT environment initially emerged with the design of cryptocurrency systems, such as Bitcoin. Indeed, it is considered the backbone of cryptocurrencies in the monetary system and the financial industry. However, the impact of blockchain as a digital innovation extends beyond the financial and banking sector and can also impact supply chain management, trade, healthcare, real estate, and data storage. This technology, as an emerging evolutionary breakthrough, is new to the consumer-centric marketing industry and is poised to witness tremendous improvements in its impact on tactical marketing activities, especially with the proliferation of e-commerce platforms and channels, the significant increase in online business, and the adoption of smartphone applications and digital watches in online shopping. Blockchain is expected to be integrated into the marketing mix to maximize value delivered to the end consumer. Blockchain contributes to a consumer-centric paradigm, enforces marketing discipline, promotes disintermediation, helps combat click manipulation and click fraud, enables the protection and assurance of privacy, data ownership, and digital identity, enables enhanced security, contributes to the empowerment of innovative loyalty programs, and increases governance, trust, transparency, and accountability. This facilitates greater scale and targeting to improve brand trust, increase consumer satisfaction, and encourage engagement and advocacy services that offer exclusive experiences to their customers. Recent research highlights the erosion of trust in brands globally.

Remarkably, in the age of digitization and supercomputing power, blockchain technology has disrupted classic tactical marketing approaches and introduced entirely new marketing trends (restructuring or reengineering). Furthermore, the uses of blockchain that have attracted attention in marketing and commerce systems are multifaceted. Marketing practitioners are increasingly applying and utilizing this revolutionary technology due to its strong foundations and unique capabilities: security, transparency, distribution, decentralization, encryption, immutability, and tokenization. It has an increasing scope in various marketing and customer relationship management sectors, including, but not limited to creating new products and services, supporting customer databases, customer engagement, brand engagement, market sensing, retail, advertising, content marketing, logistics, and supply chains. With the widespread availability of data, challenges arise related to big data, privacy, and security, leading to marketing fraud and spam. Finally, it's worth noting that, given that the application of blockchain in tactical marketing is new and promising, and most of it is conceptual, immature, and still under development, the potential impact of this technology is expected to be felt in the coming years. However, there are already promising projects that have the potential to change the landscape of this industry, providing an early adopter's advantage for existing or emerging brands.

See: Antoniadis, I., Kontsas, S., & Spinthiropoulos, K. 2019; Aliahmadi, A., Nozari, H., & Ghahremani-Nahr, J. 2022; Madhani, P. M. 2022; Yan, C., et al. 2021; Kathuria, S., & Tandon, U. 2025; Roshanak, R., et al. 2024; Peres, R., et al. 2023; Jain, D., et al. 2021; Harvey, C. R., et al. 2018; Stallone, V., et al. 2021; Ertemel, A. V. 2018

Figure (1): Benefits of Blockchain in Marketing



The source: Spice Works Team. 2019

### III– Cloud Computing-Powered Tactical Marketing Mix:

In this digital age, cloud computing is one of the most important cyber innovations. According to Synergy Research Group estimates, in the first quarter of 2024, global spending on cloud infrastructure services grew by \$13.5 billion, or 21 percent, compared to the first quarter of 2023, bringing total spending to more than \$76 billion for the three months ending March 31. Looking at the full year, the market is now in a healthy position. With a revenue run rate of \$300 billion, it's clear why it's so competitive. Despite its size, the cloud market remains a virgin market growing at an exponential rate, with year-over-year growth accelerating for the second consecutive quarter. Amazon Web Services (AWS) leads the pack with 31%, followed by Microsoft Azure with 25%, and Google Cloud Platform (GCP) with 11%, as the world's largest cloud computing provider, controlling a combined 67% of this untapped market.

This section of the study focuses on examining the decision-making process based on the marketing value of cloud computing and its associated smart solutions. There is an urgent need to understand the issues surrounding tactical marketing based on powerful cloud computing software. Cloud computing, a major development in the history of computer science, information systems and technologies, and the Internet, plays a pivotal role in our daily lives—as individuals, organizations, and governments alike. Its importance and interest have grown steadily over the past few years. Here, we look at its nature: the provision and rental of IT resources, access to, and hosting of cloud-based websites, to calculate resources and products on demand and as needed, instead of purchasing, owning, and maintaining physical data centers and servers. These cloud services and

platforms include, but are not limited to, data storage, databases, networking solutions, software, and business intelligence.

Cloud-enabled tactical marketing modeling, or rather, a marketing mix built on cloud-based software and hardware, leveraging advanced technologies such as development tools, business applications, data storage, and networking solutions, has become a self-evident reality and indispensable in business environments. It is both a challenge and an opportunity, as it generates tremendous benefits for companies, bringing added value and significant benefits to marketing management and sales performance. The quality of a sound and correct marketing decision depends on the quantity and quality of stored data, facts and information. The more computer centers and servers within cyber environments and virtual worlds produce accurate, flexible, transparent and easily accessible data, the more rational, prudent and wise their exploitation, use and marketing employment will inevitably allow and enable marketers practicing the marketing profession, from small startups to giant global institutions, to gain beneficial practical effects ranging from customer relationship management systems to marketing automation solutions, which can be summarized in the following points:

- Embody optimal, flexible, and data-driven marketing, achieving outstanding and unique commercial and sales results by engaging stakeholders and empowering customers closely.
- Promote more personalized and precise marketing strategies, i.e., hyper-personalization of customer experiences, as this provides unprecedented opportunities to leverage real-time data.
- Improve marketing planning by enabling proactive remote work, by providing access to data and applications from anywhere, anytime.
- Create a framework for customer engagement in marketing decisions, based on the practical use of accurate data derived from attribute analysis tools.
- Provide the speed, agility, scalability, and predictability that enable marketers to develop solutions to marketing mix problems based on strengthening the customer's data center.
- Significantly increase company profits. Studies have proven that intelligently employing data mining technology for marketing operations is profitable for online retailers.
- Optimize market segmentation by providing effective means for automatic customization to individual market segments, as customers desire unique, attractive, and personalized products.
- Analyze consumer behavior and purchasing decisions based on emotional and rational needs. Many cloud-based marketing programs are already being used.
- Predict future purchasing patterns, understand customer behavior, efficiently identify their preferences, and target potential users with a personalized advertising plan.
- These cloud services allow marketers to monitor campaigns and activities across mobile, social, and web platforms, as internet usage increases across devices.
- Integrate cloud tools with digital and e-marketing components, facilitating marketers' efficient performance and optimal analysis of data extracted from customer interactions.

See: Nezami, M., et al. 2022; Pratiksha, S., & Kavitha, M. 2023; Ahmad, S., & Museera, S. 2024; Dong, X. 2025; Jayadeva, S. M., et al. 2022; Mastorakis, G., 2014; Jeknić, J., & Kraut, B. 2015; Jia, D., & Wu, Z. 2022; Khorraminia, M., 2019; Gammelgaard, B., & Nowicka, K. 2024

Figure (2): Advantages of Cloud Computing in Marketing



The source : Zote, J. 2025

#### **IV– Quantum Computing-Powered Tactical Marketing Mix:**

Quantum computing represents a truly dramatic leap forward in the world of science fiction, enhanced by revolutionary digital technologies. In brief, it is a field that combines the foundations of quantum mechanics and computer science to deal with and computationally process complex data sets. It leverages advanced computing systems, artificial intelligence, quantum machine learning algorithms, predictive analytics for big data, and other advanced technologies.

The global quantum computing market reached approximately \$1.3 billion in 2024 and is expected to grow dramatically due to the digital boom, reaching \$5.3 billion by 2029. This section of the research aims to review the various aspects of the use of quantum computing for purposes, practices, and tactical marketing issues, identifying some of the key problems, issues, and challenges, and presenting possible solutions. As the marketing mix is always at the forefront of innovation and creativity and is the most adaptable and dynamic area to the rapidly evolving digital landscape, this discussion will explore how quantum computing can restructure tactical marketing to become more competitive and profitable.

From the above, it can be said that the latest developments and prospects for embracing quantum computing as a decisive factor in solving intractable computational problems in the marketing mix will undoubtedly be extremely bright and exciting. Marketing and sales executives' reliance on quantum algorithms will provide real competitive advantages to brands and add

dynamic value to businesses. Quantum computers, with their astonishing capabilities and tremendous potential, will reshape the entire marketing industry at a faster pace, with more powerful analysis, and more efficient.

The convergence of quantum computing and marketing data analytics has given birth to quantum marketing. Quantum marketing is a novel methodology that applies fundamental quantum principles to marketing mix policies, tactical marketing programs, and consumer psychology. This pioneering new philosophy harnesses the power of quantum-inspired algorithms, such as superposition, entanglement, and uncertainty, and harnesses the predictive power of super-fast, high-speed quantum computers to improve real-time marketing decision-making. The invaluable benefits, which are truly quantum leaps, can be summarized as follows:

- Enhance sales results and efforts, driving future growth, leading to improved hyper-personalization of the customer's purchasing experience and journey.
- Create more targeted and relevant marketing campaigns and messages, positively impacting the effectiveness of administrative, strategic, and tactical marketing.
- Perform marketing tasks and roles with unparalleled speed and accuracy compared to traditional computer-driven marketing.
- Assist in capturing and disseminating data, thereby generating valuable information useful in supporting and informing decision-making.
- Strong participation in conducting marketing research, surveys, in-depth interviews, and measuring impressions, perceptions, and attitudes.
- Analyzing customer data in real time helps predict consumer behavior and anticipate purchasing decisions with unprecedented accuracy.
- Marketers understand, interact, and communicate with customers across a variety of tastes, enhancing engagement, approval, support, and loyalty.
- Gain deeper insights into shoppers' responses, expectations, tendencies, preferences, trends, and motivations.
- Engineer and design products and services to be fully aligned with the needs and desires of the audience, based on their complex patterns and fluctuating moods.
- Revolutionize algorithmic pricing, as there is a need to explore quantum computing for smart and dynamic pricing.
- Exploit quantum computing for promotional purposes by integrating it into media planning and marketing communications to achieve the desired engagement.
- Develop unique and eye-catching digital advertising tools with engaging content and creative design based on data analytics.
- Strengthen the outcomes of social responsibilities, ethical obligations, and environmental considerations in marketing and commercial activities through fraud detection.

See: Narayan, M., et al. 2025; Olawore, O. C., 2025; Rajamannar, R. 2021; Tanguturi, R. C., et al. 2025; Leonelli, F. 2024; More, P., & Pothula, S. S. K. 2025; Sáez-Ortuño, L., et al. 2024; Srivastava, R., et al. 2016; Saleem, A. 2024

Figure (3): Benefits of Quantum Marketing Strategies



The source : Saleem, A. 2024

### **V– Web 4.0-Powered Tactical Marketing Mix:**

This section of the study provides a brief overview of the evolving landscape of digital marketing, e-commerce, social media, and customer relationship management (CRM) in the era of the fourth generation of the web, also known as the Web 4.0. Web 4.0 is an innovative tool that represents a manifestation of the fifth wave of the industrial revolution, penetrating various aspects of daily life. Its impact on the quality, insight, and wisdom of marketing decisions has become an attractive and fertile field for advanced academic research and field studies. Accordingly, this section will examine the key features of the tactical marketing approach based on what is known as Web 4.0. It is worth noting that the marketing mix has also gone through several evolutionary stages in a chronological sequence, within the context of the transition from traditional to digital marketing, starting with Marketing Systems 1.0 and reaching 5.0. This is synchronous and in line with the chronology of web development, which are all cumulative and constructive developments (Web 1.0, Web 2.0, Web 3.0, and Web 4.0).

In this context, the web is an integral part of the internet, the largest global information medium. The fourth wave of web software and browsers is characterized by an open, hyper-

intelligent, and sustainably connected (always-on) network. It possesses unique properties that have given it this momentum and importance, as it relies on the power of:

- Artificial intelligence algorithms.
- Machine-to-machine (M2M) communications.
- Predictive analytics.
- Semantic web technologies.
- Machine learning algorithms.
- Deep learning models.
- Natural language processing.
- Large language models.
- Chatbots.
- Virtual assistants such as Alexa, Siri, and Google Assistant.
- Internet of Things sensors.
- Virtual and augmented reality applications.
- Blockchain, etc.

Its popularity and demand have increased with the proliferation of self-driving cars, digital cities, smart factories, etc. Therefore, the symbiotic Web 4.0 is a natural extension of its semantic or decentralized predecessor, the search engine-based Web 3.0, where computers generate and consider new information instead of humans. In this regard, Web 4.0 aims to develop physical and cyber coexistence, and to create a cooperative relationship between humans and machines or the things around them, that is, to be more precise, to remove the boundaries separating humans and machines, so that the Internet and the Web merge and become immersed in the daily lives of individuals, so that each individual is immersed in his digital environment, and melts and merges in his cyber environment. Thus, we are facing radical changes, especially with what is known as the world of the Metaverse. From the above, tactical marketing, with its contemporary trends and methods, is one of the important sectors that will change completely and automatically thanks to the use of the highly intuitive, advanced, and always-on Internet technologies of Web 4.0.

The reality is that all versions and manifestations of the next generation of the World Wide Web, from its birth in the late twentieth century until today, with each new version and fundamental discovery, bring with it great benefits and opportunities for the interactive and targeted marketing mix, increasing sales more efficiently. The phenomenon of the connection between tactical marketing and the fourth wave of the web with a participatory approach has several justifications, the most important of which is the allocation of huge marketing budgets for the smooth transition towards digital transformation and the adoption of electronic media, including mobile phones, tablets, and connected smart TVs.

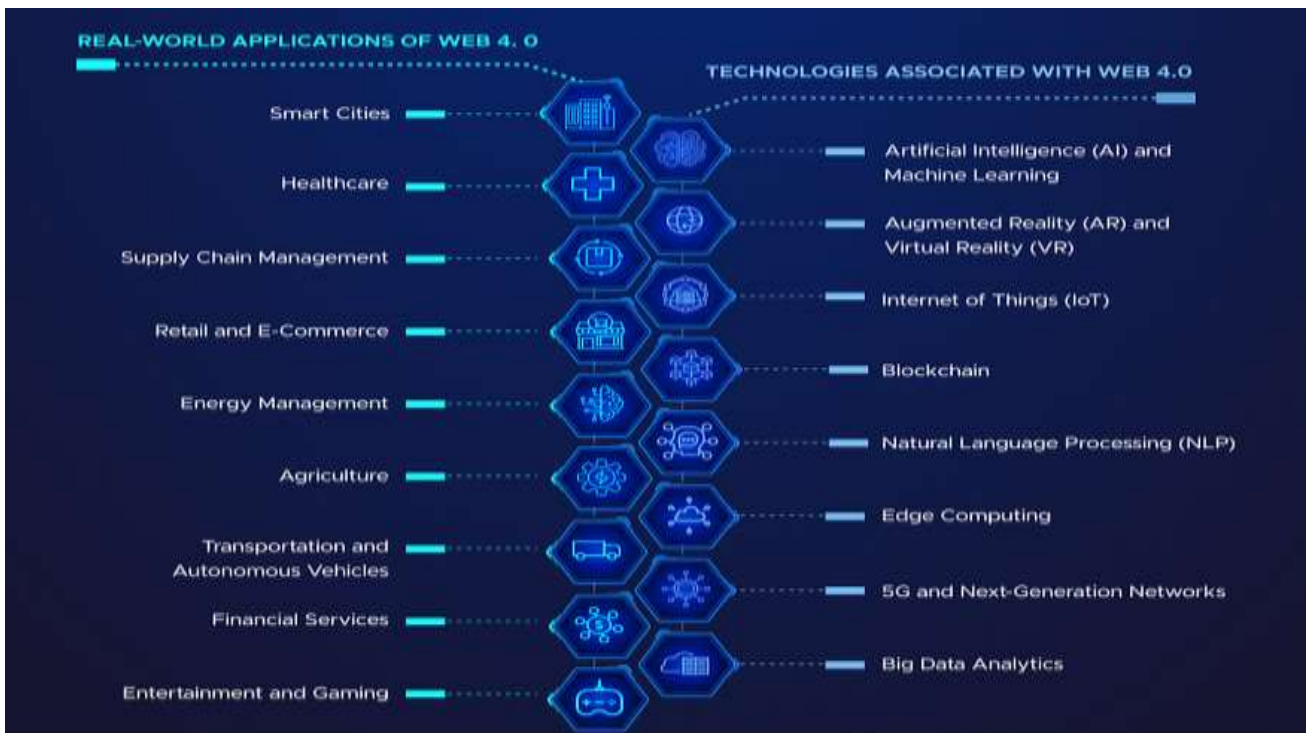
In this context, we highlight the most important marketing outcomes that will result in the medium and long term from the successful and effective implementation of collaborative or cooperative web technologies. The development of Web 4.0 provides competitive advantages and capabilities that are considered winning cards, enabling marketers to reap the fruits of this cyber age with a higher level of intelligence, moving forward in achieving victories and winning in new real and virtual markets. Software agents residing on computers or roaming the internet can communicate and reason with other systems to work collaboratively. Below is a concise summary of the most important returns of tactical marketing powered by Web 4.0:

- It drives and enhances proactive decision-making and business automation, thanks to the continuous flow and supply of information and constant feedback.
- It provides responses that facilitate and enrich consumers' social and personal lives, as quality of life is linked to data and interactive communication.
- It enables quick, easy, focused access, and more efficient, personalized, and dynamic targeting of customer experiences, engagement, recommendations, reviews, and ratings.
- It provides a platform for businesses to be accessible to consumers 24/7, increasing satisfaction, happiness, and customer retention.
- 3D browsers allow shoppers to take virtual visits and tours of stores and showrooms to search for the product they love, prefer, and admire.
- Personal digital assistants enhanced with voice or facial recognition technologies can alert and warn consumers if the same product is priced lower elsewhere.
- It enhances the performance of voice search devices, as marketers need to create and optimize voice search content and conversations, creating immersive experiences that engage customers.
- It increases consumer trust in brands, products, and services, enhancing satisfaction and loyalty, as it incorporates greater interactivity, personalization, and collaboration.
- It allows for deeper penetration into existing and current markets, the discovery and development of new online markets, and the generation and development of new demand or desires.
- It contributes to generating original creative ideas, which help marketers design and develop new products and intelligently manage the lifecycle of goods and services.
- It explores the depths of consumer behavior and delves into the purchasing decisions of consumers, who are primarily influenced by emotional and rational needs.
- It plays a distinct and vital role in innovative promotional campaigns, particularly advertising targeting, by focusing on audiences in more detailed, targeted, and personalized ways.
- It revolutionizes distribution channels and outlets, such as retail and shopping, as well as supply chains and supply networks based on massive databases.
- It enhances online marketing and advertising strategies, improves search engine visibility, personalizes email newsletters and blogs, and creates content.

- It increases the phenomenon of business-to-business (B2B) consolidation, allowing for real-time information sharing and the introduction of new services at lower prices.
- It influences future market trends, directions, and dynamics, as companies compete to maximize value delivered in line with audience needs and expectations.

See: Melnyk, A. 2024; Dakouan, C., et al. 2024; Li, L. 2023; Adams, R. L. 2015; Anwar, A. A. 2022; Ghelani, D., & Hua, T. K. 2022; Ibrahim, A. K. 2021; Yıkılmaz, I. 2020; Nath, K., & Iswary, R. 2015; Almeida, F. 2017

Figure (4): Exploring Web 4.0: The Next Generation of the Internet



The source: Medium Team. 2024

## VI- Conclusion:

In conclusion, large companies in general, and marketing departments in particular, are attempting to integrate technology into their marketing mix, which is not only reshaping tactical marketing decisions but also consumers' expectations, perceptions, and demands for products and services. Traditional marketing decisions will be replaced by intelligent marketing actions and real-time decision-making, given the significant resources that marketers in global organizations and multinationals are investing in research and development to remain competitive. This study examines the multifaceted role of digital innovations and information technologies in the marketing mix revolution, supported by intelligent applications and solutions for the fifth generation of the industrial revolution and software for cyber-physical systems. It highlights the advantages and benefits for marketing professionals, including the remarkable transformative potential of hyper-personalization of customer experience, which places companies at the forefront of competitive markets. Leveraging these revolutionary technologies results in increased customer loyalty,

satisfaction, trust, engagement, and advocacy, as well as profits, sales, and market share. As a result, IT has a strong and ongoing impact on all marketing and sales departments and divisions, especially those operating in highly competitive markets and industries.

Technological and computing advancements have led to the massive popularity of digital innovations, the recognition of their incredible potential, and their increasing adoption among businesses. The steady growth and exponential increase in globalization and the internet have led to the expansion of international markets within which companies conduct their marketing and business activities. This has also led to the growing consumer demand for products and services and their diversity. This has created an urgent need for more data, information, and insights. For these reasons, the widespread use of digital and electronic innovations, computing and cloud technologies, and cyber-physical systems is accelerating today. These innovations are the cornerstone of Industry 5.0. The data-gathering power of computers and their ability to quickly transform this data into information and knowledge make all marketing decisions more rational and effective. In this way, the outcomes of marketing mix policies and strategies are improved, costs associated with marketing, promotional, and logistical efforts are reduced, and, most importantly, they have contributed to increased customer satisfaction and loyalty by strengthening their competitive edge based on hyper-personalization of customer experiences. Here are the most important findings:

□ Research trends reveal that the blockchain-based marketing framework is still in its infancy, and marketers need to embrace the applications of this technology to survive in the rapidly evolving business landscape. Recently, blockchain has attracted academics and practitioners to study the underlying processes and opportunities for implementing this revolutionary technology from a marketing perspective. It increases customer trust and loyalty towards brands, as trust is the primary driver of consumer-brand relationships when applying blockchain in digital marketing.

□ Providing the power of cloud computing with its massive resources, especially with the rapid development of the information age, Internet applications, social networks, mobile phones, and e-commerce, and in the midst of studying the uses of cloud computing, it became clear that there are many gains closely related to the field of marketing, such as increasing the competitiveness of business organizations and retail stores to implement marketing campaigns and programs, in a shorter time and at a lower price, and smooth and easy access to customer data more efficiently, and optimal integration and extraction of data.

□ Quantum marketing is a strategic and positive alliance between quantum computing and marketing activities. Quantum algorithms and ultra-fast quantum computers enable the identification of complex purchasing patterns and the analysis of customer data. This contributes to the study and understanding of consumer behavior, enabling the ability to predict purchasing decisions, identify emerging trends, and optimize marketing strategies accordingly. This leads marketers toward a more targeted, personalized, and appropriate marketing mix, thus ensuring sustainability and staying ahead of the competition.

□ Web 4.0 is the fourth cyber wave of the hyper-intelligent web, which has undergone several evolutionary stages since its inception. It has brought about a radical transformation and a

qualitative leap in human-machine interaction in the era of science fiction and the information and communications technology revolution. The symbiotic and collaborative web technology will resonate tremendously and have a dramatic impact on the digital marketing process in entirely virtual environments. It also possesses amazing capabilities for analyzing consumer purchasing intent. Web 4.0 can even make purchasing decisions on behalf of the consumer without the need for consultation, delivering personalized and targeted content based on the end user's preferences and behavior. Therefore, a Web 4.0 marketing strategy is the future of digital marketing.

In conclusion, tactical marketing is one of the areas most impacted by disruptive technologies, a significant ally for marketing mix decision makers. Our findings indicate that the transformative power of computing and cloud technologies not only enhances the efficiency and effectiveness of marketing decisions, but also that their most significant contribution lies in the hyper-personalization of unique and exceptional customer experiences. This reflects the most important competitive advantage that can be achieved, made possible today more than ever thanks to scientific developments and technological advancements. Marketing mix decisions supported by cyber-physical systems in the era of Industry 5.0 are leading to more dynamic, responsive, and personalized marketing approaches and strategies, resulting in better engagement and fundamentally changing the relationship between brands and consumers. The paper concludes with recommendations for future research and practical implications for marketers aiming to leverage disruptive technologies. Therefore, we recommend that marketing decision-makers who are interested in excellence and who aspire to excel should intensify their investment in continuous research and development and quickly adopt the transformative potential of digital innovations, given their benefits and returns for the long-term prosperity of the business organization.

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