The Intersection of IoT, Marketing, and Cybersecurity: Advantages and Threats for Business Strategy

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https://doi.org/10.18034/abr.v15i1.740

ABSTRACT

This paper examines how IoT, marketing, and cybersecurity affect current corporate strategy, including its benefits and drawbacks. The research examines how data-driven insights from IoT improve marketing tactics and the cybersecurity risks of linked devices. The research synthesizes secondary data to explore the dynamic interaction between IoT, marketing, and cybersecurity. The key results show that IoT helps organizations create targeted marketing campaigns using real-time data, but it also increases the attack surface, posing cybersecurity threats. Many IoT devices lack security and data privacy, which threatens corporate operations. The report also stresses integrating strong security measures into design, using adaptive security frameworks, and collaborating between marketing and IT departments. Policy implications include enterprises implementing more apparent cybersecurity principles and educating employees, while legislators should regulate data privacy, secure gadget manufacture, and cross-sector cooperation. This report emphasizes balancing innovation and security to maximize IoT-driven marketing tactics while minimizing cybersecurity concerns.

Key words: Internet of Things (IoT), Marketing Strategies, Cybersecurity, Data Privacy, Business Strategy, IoT Security, Data-Driven Marketing, Consumer Trust, IoT Risks

INTRODUCTION

Technology has revolutionized business, enabling connectedness, data-driven decision-making, and digital innovation. The Internet of Things (IoT), a network of devices that interact and share data, has revolutionized automation and efficiency (Chitra et al., 2024; Devarapu, 2020; Dhameliya et al., 2024; Fadziso et al., 2023; Farhan et al., 2024; Gade, 2023; Venkata, 2023). IoT is becoming a staple of contemporary marketing tactics, helping companies study consumer behavior, tailor customer experiences, and improve operations (Boinapalli et al., 2023; Devarapu, 2021; Goda, 2020; Gummadi, 2022; Talla et al., 2023; Tejani et al., 2024; Venkata et al., 2024). As businesses implement IoT-driven initiatives, they face complex and developing cybersecurity concerns that may damage confidence, disrupt operations, and jeopardize sensitive data (Gummadi, 2023; Gummadi, 2024; Jasti et al., 2023; Kamisetty, 2022; Talla, 2024). Businesses face a double-edged sword when integrating IoT into marketing. On one side, IoT devices like smart sensors, wearables, and linked home goods provide massive volumes of data that reveal user preferences and habits (Kamisetty, 2024; Allam et al., 2024; Rodriguez et al., 2023; Sridharlakshmi et al., 2024; Talla, 2023). These insights enable marketers to create targeted, tailored marketing, boost consumer engagement, and boost ROI. IoT allows real-time monitoring and reaction, enabling predictive analytics and marketing agility (Allam et al., 2024; Narsina et al., 2022; Nizamuddin et al., 2024; Onteddu et al., 2022; Richardson et al., 2023). In data-driven marketplaces, companies that use IoT may acquire a competitive edge.

However, IoT gadgets have created new weaknesses, making cybersecurity a significant issue for enterprises. IoT systems' interconnectedness increases the attack surface, increasing data breaches, illegal access, and criminal activity (Kamisetty et al., 2021; Kommineni et al., 2024; Kothapalli, 2021; Manikyala et al., 2024; Mullangi et al., 2023; Narsina et al., 2021). Data breaches in marketing campaigns may result in brand harm, legal liabilities, and customer distrust. IoT, marketing, and cybersecurity

challenge business strategy, forcing companies to balance innovation and security (Kothapalli, 2022; Manikyala et al., 2023).

This complex relationship between IoT, marketing, and cybersecurity affects corporate strategy (Kothapalli et al., 2024). To maintain long-term success and consumer trust, companies must balance IoT adoption's pros and cons with a thorough cybersecurity strategy (Manikyala, 2024). As data privacy and security regulations change, firms must adjust to meet higher requirements, complicating strategic planning (Kothapalli et al., 2024; Maddula, 2018; Mallipeddi, 2022; Manikyala, 2022).

This essay examines how firms might use IoT to improve marketing while managing cybersecurity issues. It investigates how IoT may boost innovation, consumer engagement, and operational performance. Meanwhile, it emphasizes the risks of inadequate cybersecurity protection and the necessity for proactive and comprehensive risk management. The paper explores this junction to show organizations how to use IoT while protecting their operations and reputations.

Businesses must integrate IoT, marketing, and cybersecurity in a data-driven environment. Organizational performance and resilience in the digital era depend on carefully balancing these elements. This report contributed to the debate by presenting insights and suggestions that combine technological innovation with strong cybersecurity procedures to keep firms competitive and safe in a shifting context.

Statement of the Problem

The combination of IoT, marketing, and cybersecurity creates a vast potential and dilemma for contemporary enterprises. As IoT revolutionizes data generation, collection, and use, its integration into marketing strategies gives organizations unprecedented potential to understand customer behavior, customize experiences, and maximize operational efficiency (Maddula, 2023; Boinapalli, 2023; Kamisetty et al., 2023). Due to their dependence on networked devices and real-time data analytics, organizations risk data breaches, privacy violations, and cyberattacks (Maddula et al., 2024). Businesses must balance technology innovation with security to preserve trust and competitiveness.

IoT's disruptive influence on numerous businesses and cybersecurity's rising relevance have been well documented, but marketing research at the junction of both fields is lacking (Allam, 2023). Studies on IoT's technical and operational elements or cybersecurity in isolated areas are shared. Few studies examine how IoT-driven marketing and cybersecurity affect corporate strategy (Talla, 2022; Goda et al., 2024). This gap highlights the need for a more integrated approach to understanding how firms may use IoT for marketing while tackling cybersecurity dangers.

This research investigates how IoT, marketing, and cybersecurity affect corporate strategy. It examines IoT's marketing benefits, such as predictive analytics, consumer involvement, and cybersecurity threats. The report seeks to help firms balance these conflicting characteristics to maximize IoT advantages without sacrificing data security or consumer confidence.

This study also seeks to connect theory and practice. The report analyzes real-world events and developing trends to provide organizations with meaningful solutions in this complicated terrain. It enhances our knowledge of how IoT and cybersecurity affect marketing strategy and corporate success.

Fixing this issue is crucial for the sustainability of a data-driven economy company. Lack of cybersecurity concerns increase as IoT use increases, threatening enterprises and the digital ecosystem. The analysis shows the need for a balanced, forward-thinking strategy that balances technological innovation with cybersecurity resiliency. It concludes that IoT deployment must be aligned with strategic goals to boost growth, customer satisfaction, and organizational integrity.

The report aims to help firms capitalize on IoT's benefits while minimizing hazards. The study addresses the intersection of IoT, marketing, and cybersecurity to help firms create creative and secure strategies to succeed in an increasingly linked world.

Methodology of the Study

This qualitative study uses secondary data to examine IoT, marketing, and cybersecurity and their effects on corporate strategy. The review article synthesizes data from peer-reviewed academic articles, industry reports, government publications, white papers, and case studies. The technique identifies, analyzes, and integrates literature to comprehend the issue. Thematic analysis guides the assessment process, concentrating on significant topics such as IoT's marketing benefits, cybersecurity risks, and strategic concerns for enterprises. The study seeks to uncover trends, research gaps, and practical suggestions by combining findings from many sources. Based on known knowledge and current conversation, this technique provides a comprehensive and vigorous assessment of the issue.

Leveraging IoT for Data-Driven Marketing Strategies

The Internet of Things (IoT) has changed marketing by introducing new data collecting, analysis, and customer interaction channels. Smart sensors, linked appliances, wearables, and cars create massive volumes of data. When used correctly, this data may provide unmatched insights into customer habits, preferences, and interactions, helping firms create highly focused, customized, and successful marketing campaigns.

Data Collection and Consumer Insights: One of the most significant benefits of IoT in marketing is its capacity to collect real-time, detailed data about consumers' behaviors, locations, and actions. Fitness trackers measure a consumer's health and exercise, whereas smart home gadgets track house utilization. It helps organizations identify their target audience by monitoring client preferences more precisely than previous techniques (Maddula, 2023). Businesses may track client behavior using IoT data over time, creating a more dynamic and continuing customer engagement. Additionally, IoT data may be utilized to construct complete consumer profiles and segment audiences using exact criteria. Businesses may segment customers by lifestyle, shopping habits, and real-time marketing demands. Personalization lets organizations go beyond generic marketing efforts and create content, discounts, and services that connect with specific consumers, increasing engagement and happiness (Ammirato et al., 2019).

Personalization and Targeted Marketing: Real-time data from IoT allows marketers to personalize content and promotions. Marketers may use IoT to construct context-aware ads that adjust to real-time data. Retailers may use sensors or mobile applications to monitor customers' in-store activity and deliver targeted offers as they approach product categories or aisles. Customers' devices may get tailored discounts or product suggestions based on browsing history or location. Predictive marketing uses IoT data to forecast client requirements and preferences before they express them. Businesses may predict customer needs and provide them by monitoring IoT data patterns. This predictive power helps firms satisfy clients by offering answers and goods before they ask for them.

Improved Customer Experience and Engagement: IoT may improve customer experience by making business-consumer interactions more smooth and engaging. Smart thermostats, keyless access systems, and customizable lighting in hotel rooms allow visitors to tailor their stay, improving their experience. Businesses in numerous industries may communicate with clients in real-time to increase brand loyalty and affinity (Allam et al., 2024). Businesses may enhance the customer experience by connecting IoT with CRM systems to deliver targeted support and service. Customer care teams can resolve problems quickly, provide tailored advice, and boost satisfaction using real-time data.

Optimization of Marketing Efforts: Businesses can optimize marketing efforts and measure results using IoT solutions. Businesses may evaluate marketing strategies in real-time and make improvements using extensive customer data. Using constant feedback to fine-tune marketing tactics improves efficiency, lowers waste, and allocates money to the most successful channels. IoT also enables cross-channel marketing, allowing organizations to link physical and digital efforts effortlessly. Retail shop IoT beacons may broadcast customized ads to clients' cellphones, enabling a seamless experience that links internet browsing and in-store activities (Shim et al., 2019).

Table 1: Comparison of Traditional vs. IoT-Driven Marketing Strategies

Aspect	Traditional Marketing	IoT-Driven Marketing
Data Collection	Surveys, focus groups	IoT devices, sensors, apps
Personalization	Limited, based on broad segments	Real-time, individual-level data
Customer Engagement	One-way communication	Interactive, two-way communication
Campaign Timing	Static, pre-planned	Dynamic, real-time adjustments

Table 1 lists the main distinctions between IoT-enabled marketing and conventional marketing techniques. These include real-time response, customization, consumer interaction strategies, and data-collecting techniques. Incorporating IoT into marketing strategy changes how firms interact with consumers and improves operations. IoT devices provide massive quantities of data that may be used to customize, optimize, and drive marketing. Organizations will have more relevant methods to identify and communicate with consumers as IoT evolves, solidifying its place in contemporary marketing. As this change occurs, organizations must realize the cybersecurity threats to safeguard their data and preserve consumer confidence, as discussed in later chapters.

Cybersecurity Challenges in IoT-Driven Business Models

IoT integration into corporate models creates huge cybersecurity potential and difficulties. Due to the increased use of networked devices, massive volumes of data may be used to improve marketing, operations, and customer experiences. However, IoT's linked gadgets, systems, and networks create weaknesses that hackers may exploit. Cybersecurity issues must be addressed to protect sensitive data and organizational assets when firms use IoT for strategic benefits (Heinis et al., 2018).

The interactions during an IoT-based cyberattack in a corporate network are shown in the diagram in Figure 1.

A hacker exploits an IoT device vulnerability to start the flow. Through communication with the server, the hacked IoT device introduces harmful malware or starts illegal data access (Maddula, 2024). The server processes this unlawful request, which might compromise the system or result in data exfiltration. The IT security system works to identify and stop the attack simultaneously, either by sending out alarms, preventing the hacker from accessing the system, or shutting it down.

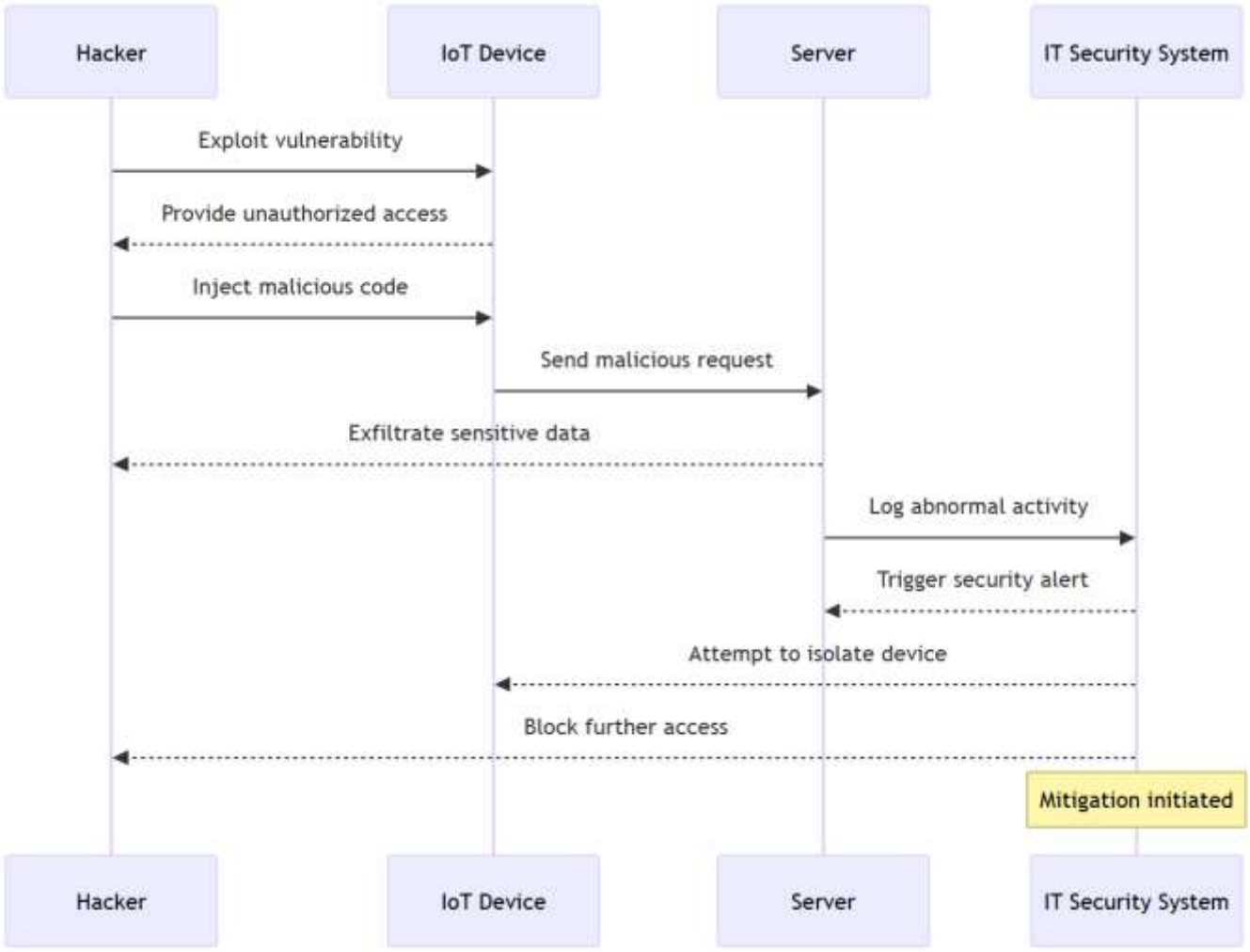

Figure 1: IoT Attack Workflow in Business Networks

Expanded Attack Surface: The increased attack surface of IoT is a significant cybersecurity issue. Bad actors get new access points with every IoT device linked to a network. Wearables, smart home appliances, industrial sensors, and related vehicles may be used to break into networks. Businesses using more IoT devices in their marketing strategy risk exploitation. Cybercriminals may exploit devices without strong protection to access company networks, steal data, or disrupt operations (Allam et al., 2024). Many IoT devices lack security safeguards to prevent these issues. Manufacturers sometimes emphasize usefulness and cost above security, making weak or obsolete software vulnerable to attacks. Thus, firms utilizing these devices without sufficient protection may unintentionally risk data breaches, ransomware attacks, and other cyber intrusions (Nagy et al., 2018).

Data Privacy and Protection: IoT devices capture tremendous volumes of sensitive user data, including financial, behavioral, and personal. This data may help marketers create tailored ads and tactics. Cybercriminals seek IoT networks because of their data riches. IoT devices collect more personal and customer data, raising privacy issues as firms face more regulatory scrutiny. Data collectors must have adequate privacy protections. To protect sensitive client data, IoT devices must encrypt it in transit and at rest. To secure personal data, businesses must follow strict data protection standards like the European

General Data Protection Regulation (GDPR). Financial fines, brand harm, and customer distrust may occur if not.

Lack of Standardization and Interoperability: Lack of uniformity across devices, platforms, and communication protocols is another IoT-driven business model cybersecurity issue. Unlike conventional IT systems, IoT devices run on distinct operating systems, software frameworks, and communication protocols. Due to this inconsistency, IoT security regulations are complex to deploy across devices. Furthermore, IoT device compatibility across platforms might pose additional dangers. A vulnerability in one device may spread via linked networks, escalating an assault. Businesses must concentrate on developing unified security standards and procedures to secure all devices and networks from external attacks to meet these difficulties (Tarifa-Fernández et al., 2019).

Device Authentication and Access Control: Many devices lack proper authentication and access control, which is essential to IoT security. Security breaches may occur if unauthorized people access IoT networks and devices without robust authentication. Cybercriminals may obtain access to critical devices and systems by exploiting weak or default passwords or bypassing authentication measures. Secure access control is essential for restricting device and data access to authorized users. Enterprises must utilize multi-factor authentication (MFA) and role-based access controls to restrict users to relevant data and systems. These techniques reduce cyber incidents by lowering unauthorized access risks.

Supply Chain and Third-Party Risks: Businesses adopting IoT technology generally use third-party hardware, software, and cloud services. External partners may provide specialized knowledge and cost savings, but they can increase security threats. A third-party system vulnerability or vulnerable item from an external provider might undermine the IoT ecosystem. Companies must carefully evaluate their suppliers' security policies and guarantee that third-party equipment and software meet their internal security requirements. Third-party risk management programs may sometimes discover and address vulnerabilities before they become threats (Sharma et al., 2017).

IoT offers organizations great opportunities to boost marketing and operational efficiency but poses serious cybersecurity risks. A robust cybersecurity framework is needed to defend IoT-driven business models from the larger attack surface, privacy concerns, standards, authentication, and third-party dangers. Businesses may reduce these risks and protect their data, reputation, and bottom line by prioritizing security from the start and implementing strong security procedures. As companies incorporate IoT into their marketing efforts, cybersecurity will become more critical to their success and longevity.

BALANCING INNOVATION AND SECURITY IN IOT

The Internet of Things (IoT) has driven innovation across sectors, helping organizations better marketing, customer experiences, and operations. As IoT use accelerates, enterprises must balance innovation with cybersecurity. In a context where organizations want to use IoT technology to achieve competitive advantages, disregarding security may lead to data breaches, financial loss, and reputational harm. Innovation and security must be balanced for sustained development and corporate success (Fernández-Caramés & Fraga-Lamas, 2018).

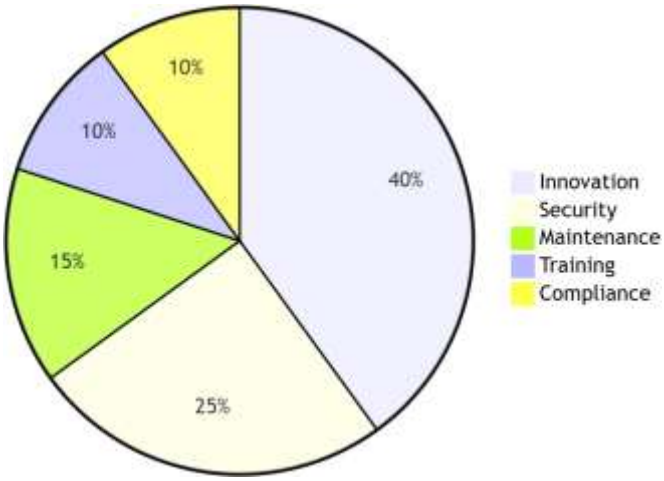

Figure 2: IoT Budget Allocation

The distribution of an average IoT budget among the following categories is broken out in depth in the pie chart in Figure 2:

- **Innovation:** New IoT technology and R&D expenditures.
- **Security:** Investing in monitoring, compliance, and cybersecurity technologies.
- **Maintenance:** The price of keeping up IoT infrastructure.
- **Training:** Funds are set aside to help staff members become more proficient in cybersecurity and IoT.
- **Compliance:** Investing in adherence to industry-specific and legal requirements.

Embracing Innovation without Compromising Security: Understanding that innovation and security are not mutually incompatible is a significant problem in balancing them. IoT provides new prospects for data-driven marketing, tailored consumer experiences, and operational efficiency, but organizations must put cybersecurity first when designing and deploying IoT devices and systems.

Businesses may reduce risks without impeding innovation by integrating security into IoT devices and service development. To accomplish this, enterprises must emphasize proactive security and security by design. Encryption, secure data storage, and strong authentication are needed to safeguard sensitive IoT data. IoT security should be effortlessly incorporated into device functionality to avoid affecting performance or innovation. Lightweight security mechanisms that don't overtax devices' processing power may balance innovation with protection (Lim & Taeihagh, 2018).

Adaptable Security Frameworks for Dynamic IoT Environments: IoT ecosystems continually change with new devices, apps, and technologies. Companies must create adaptive security frameworks that can expand and evolve with these changes. Traditional cybersecurity techniques may not be enough to manage IoT settings' high interconnectedness, various devices, and real-time data flows. Flexible, layered security strategies help balance innovation and security. This plan should balance prevention and response to handle new vulnerabilities and minimize IoT innovation disruption. Businesses should use intrusion detection systems (IDS) and continuous monitoring to identify and react to real-time cyber-attacks. Network segmentation and device isolation may also prevent security vulnerabilities from spreading across linked systems (Hacioglu & Sevgilioglu, 2019).

Collaboration between Marketing and IT Teams: Marketing and IT teams must collaborate more as IoT becomes key to marketing efforts. Traditional marketing departments concentrate on consumer interaction, customization, and company development, while IT and cybersecurity teams secure systems and data. In IoT, both teams must collaborate to provide security without compromising marketing. IoT may help marketing teams obtain data for customer insights and targeted campaigns, but they must be aware of the hazards of collecting, keeping, and transferring sensitive consumer data. However, the IT department must follow security measures to secure consumer data and comply with data privacy laws. Businesses may create creative, secure IoT-driven marketing campaigns by promoting cross-functional cooperation and communication (Addae et al., 2019).

Building Consumer Trust through Security: Maintaining customer trust is crucial to IoT innovation and security. Customers are worried about how firms utilize and secure their data as IoT devices gather more data. Losing client trust due to security neglect may harm the reputation and company. However, firms emphasizing security and transparency may gain customer confidence and boost loyalty and engagement. Companies should inform consumers of their data security and privacy policies. This might include explicit data protection rules, data collection and usage transparency, and consumer data choice control. Businesses may strengthen client connections and stand out by protecting customer data.

Continuous Evaluation and Improvement: Due to the fast evolution of IoT devices and cybersecurity threats, businesses must regularly assess and enhance their security. Risk assessments, vulnerability testing, and security protocol changes are needed to balance innovation with security. Employee training and awareness campaigns should also be funded to ensure staff understand cybersecurity and follow best practices. Businesses should also monitor cybersecurity trends and IoT risks. Engaging with industry experts, attending security events, and engaging in collaborative cybersecurity projects may help firms innovate while avoiding dangers.

MAJOR FINDINGS

Businesses face significant possibilities and challenging problems at the convergence of IoT, marketing, and cybersecurity. A detailed review of these three areas reveals several major conclusions highlighting their strategic significance for current company structures.

IoT Drives Personalized and Data-Driven Marketing: This research found that IoT boosts data-driven marketing. IoT helps organizations understand customer behavior, preferences, and interactions by collecting massive volumes of real-time, detailed data from connected devices. This data improves consumer engagement with tailored marketing material, offers, and suggestions. Businesses may now measure client interactions across numerous touchpoints, enabling more integrated and targeted marketing. Gathering contextual data like location, activity patterns, and purchase history enables dynamic, context-aware marketing techniques that improve consumer experience.

Expanding Attack Surface and Cybersecurity Risks: IoT devices in company processes increase cyber attack entrance points, widening the attack surface. Businesses face a significant cybersecurity risk because IoT devices' interconnection generates weaknesses that criminal actors may exploit. Many IoT devices, especially third-party ones, lack strong encryption, secure authentication, and frequent software upgrades, making them ideal targets for hackers. These security holes raise the danger of data breaches, ransomware attacks, and other cyber threats that may ruin a company's operations, finances, and reputation.

Data Privacy and Compliance Challenges: IoT devices capture massive volumes of personal and sensitive data, raising privacy issues. According to the survey, companies are under growing pressure to safely manage customer data and comply with legal frameworks like the GDPR and CCPA. Without sufficient data protection, firms face regulatory fines and consumer distrust. According to the report, businesses must create clear data privacy policies and secure data practices to encrypt, store, and utilize customer data by privacy rules.

The Need for Security by Design in IoT Development: Businesses must include security in the development lifecycle of IoT devices and systems, known as "security by design." Many IoT devices are susceptible because of cost and utility trump security. The report advised organizations to include security elements in IoT goods and services. This comprises encryption, secure communication protocols, and device authentication to prevent unwanted access. Organizations should routinely upgrade IoT devices and systems with security updates to combat new attacks.

Cross-Functional Collaboration for IoT Security and Marketing Integration: The results also show that marketing and IT must collaborate to create and implement safe IoT-driven marketing strategies. Marketing teams optimize campaigns using IoT data, consumer involvement, and customization. These efforts must be paired with effective cybersecurity to safeguard sensitive consumer data. Marketing and IT work together to integrate security and data protection into marketing strategies. This cross-functional collaboration helps firms match innovation objectives with cybersecurity needs, guaranteeing successful and safe marketing.

The Role of Consumer Trust in IoT-Driven Business Strategies: Another result is that customer trust is crucial to IoT-driven corporate initiatives. People worry about handling and securing as companies acquire more personal data via IoT devices. This research shows that companies emphasizing cybersecurity and data transparency are more likely to retain customers. Businesses that fail to secure consumer data or are seen as disregarding privacy risk losing customers and reputation.

Continuous Evaluation and Adaptation of Security Practices: The survey revealed that firms must constantly assess and adjust their security processes to IoT technology and new cybersecurity threats. IoT ecosystems are dynamic. Therefore, organizations need adaptable security frameworks that can expand with technology. A secure IoT infrastructure requires risk assessments, vulnerability testing, and security protocol upgrades. Businesses could also promote cybersecurity awareness by training personnel to spot and prevent security risks.

This research shows that IoT, marketing, and cybersecurity are interconnected; therefore, firms must negotiate this convergence carefully. Businesses may establish creative and safe strategies by exploiting IoT's promise for individualized marketing while addressing data collecting and device interconnectivity cybersecurity issues. The research also stresses incorporating security into design, promoting cross-functional teamwork, retaining customer confidence, and adapting to new threats. These results help firms maximize IoT's promise while protecting their operations, reputation, and customer connections.

Limitations and Policy Implications

This research sheds light on IoT, marketing, and cybersecurity, but it has limits. First, secondary data limits the research to current literature, which may not reflect the newest IoT technology or cybersecurity issues. The conclusions are also based on industry patterns and may not apply to particular industries or areas with different legislative and technology settings.

For regulatory reasons, organizations must include strong cybersecurity safeguards in IoT systems to ensure innovation does not compromise security. Policymakers should clarify data privacy, secure device manufacturing, and cross-sector cooperation policies. Companies should also teach staff about IoT security concerns to promote a proactive security culture.

Conclusion

Businesses looking to maintain a competitive edge in an increasingly digital environment face tremendous potential and difficulties at the nexus of IoT, marketing, and cybersecurity. Marketing tactics have changed due to IoT-driven advancements, which allow companies to understand customer behavior better, provide individualized experiences, and increase operational efficiency. Businesses may develop more focused and successful marketing efforts using real-time data from connected devices, eventually increasing consumer happiness and engagement.

These developments do, however, carry several intricate cybersecurity dangers. The increasing dependence on networked devices increases the attack surface, leaving companies vulnerable to threats that bad actors might exploit. Many IoT devices lack strong security features, which raises the risk of operational interruptions, privacy violations, and data breaches. To prevent innovation from compromising security, these dangers highlight the need for companies to include cybersecurity considerations in IoT systems from the outset.

The study's conclusions emphasize the need for a well-rounded strategy in which companies take proactive measures to solve security issues while using IoT's potential to boost marketing effectiveness. Organizations may create creative and safe IoT strategies by encouraging cooperation between marketing and IT departments, including security in the design process, and ensuring data protection laws are followed.

In the end, companies that can effectively manage the nexus of IoT, marketing, and cybersecurity will be in a strong position to prosper in a world that prioritizes digitalization, gaining customers' confidence and preserving a competitive advantage while protecting their operations and brand. To ensure long-term viability and profitability, organizations must adapt their cybersecurity strategy in tandem with the ongoing evolution of IoT.

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How to cite this article

Yamin, A. B., Talla, R. R., & Kothapalli, S. (2025). The Intersection of IoT, Marketing, and Cybersecurity: Advantages and Threats for Business Strategy. *Asian Business Review*, *15*(1), 7-16. https://doi.org/10.18034/abr.v15i1.740