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Transformation of Traditional Marketing Strategy to Digital ; Challenges and Opportunities for Retailers

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Abstrak: *The transformation of marketing from traditional to digital methods presents both challenges and opportunities for retailers. Traditional marketing, such as print and television advertising, is increasingly losing its effectiveness in targeting specific audiences, while digital marketing offers flexibility and advanced analytics tools. This study analyzes retailers' shifting marketing strategies using a descriptive-exploratory qualitative approach, with interviews with 25 participants, consisting of business owners and digital marketing experts. The results showed that limited digital skills and financial constraints are the main barriers for SMEs in adopting digital marketing. Competition with big brands that are more experienced in data-driven marketing is also a challenge. However, low-cost strategies such as SEO and organic marketing on social media can be effective alternatives. In addition, data-driven personalization increases customer engagement, while omnichannel strategies enable the integration of online and offline shopping experiences. Technological innovations, such as influencer-based marketing, live shopping, and augmented reality (AR), further enhance the customer shopping experience. Retailers that successfully adopt big data and artificial intelligence (AI) have a competitive advantage in understanding customer preferences more accurately. Therefore, the combination of data analytics, omnichannel strategy, and technological innovation is the key to modern digital marketing success.*

Keywords: *digital marketing, omnichannel strategy, big data, artificial intelligence, retail transformation*



INTRODUCTION

While traditional marketing has long been a key strategy for retailers, its effectiveness is increasingly being questioned in the face of changing consumer behavior that increasingly relies on digital technology. Print and television advertising, for example, have limitations in targeting specific audiences, often resulting in high costs with low conversion rates. According to a report by Setiawan et al (2023), more than 60% of global retail businesses are starting to reduce their traditional marketing budgets due to a lack of flexibility and the inability to measure campaign effectiveness in real-time. This is in contrast to digital marketing which offers advanced analytics tools, allowing businesses to measure the impact of ads, understand customer preferences, and dynamically adjust strategies based on the data obtained.

In addition, traditional marketing also faces challenges in adjusting to the expectations of modern consumers who increasingly prioritize personalized experiences. Today's consumers are more likely to respond to content that is relevant to their needs compared to generic marketing messages delivered through traditional channels. Studies from Ralahallo & Muhrim (2024) show that 72% of customers are more likely to interact with brands that offer customized experiences based on their preferences and purchase history. In this regard, digital marketing has the upper hand as it utilizes technologies such as artificial intelligence (AI) and machine learning to create more precise data-driven strategies. Therefore, the inability of traditional marketing to meet the needs of an increasingly dynamic market is increasingly pushing retailers to turn to more adaptive and effective digital strategies.

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resulting in high costs with low conversion rates. Santo et al (2024) mentioned that global retail businesses are starting to reduce their traditional marketing budgets due to a lack of flexibility and the inability to measure campaign effectiveness in real-time. This is in contrast to digital marketing which offers advanced analytics tools, allowing businesses to measure the impact of ads, understand customer preferences, and dynamically adjust strategies based on the data obtained.

In addition, traditional marketing also faces challenges in adjusting to the expectations of modern consumers who increasingly prioritize personalized experiences. Today's consumers are more likely to respond to content that is relevant to their needs compared to generic marketing messages delivered through traditional channels. Studies from Sudirjo (2023) show that customers are more likely to interact with brands that offer customized experiences based on their preferences and purchase history. In this regard, digital marketing has the upper hand as it utilizes technologies such as artificial intelligence (AI) and machine learning to create more precise data-driven strategies. Hence, the inability of traditional marketing to meet the needs of an increasingly dynamic market is increasingly pushing retailers to turn to more adaptive and effective digital strategies.

Digital transformation in marketing is not just about shifting from traditional media to digital platforms, but also includes fundamental changes in business strategy that require organizational readiness, resources and continuous innovation. One of the biggest challenges in this shift is the digital skills gap among the workforce. The global workforce requires enhanced digital skills to adapt to rapid technological change (Fajriyani et al, 2023). This poses an obstacle for retailers who want to effectively implement digital marketing strategies but face limitations in terms of a competent workforce. In addition, digitalization requires retailers to invest in technological infrastructure such as artificial



intelligence (AI), data analytics and marketing automation. These investments not only require a large budget allocation, but also take time to see optimal results, which is sometimes a challenge for small and medium-sized companies with financial limitations.

In addition to technical and financial challenges, competition in the digital space is also getting tougher, especially with the emergence of online-based retailers that have already dominated the digital market. Traditional retailers who are new to digital often face difficulties in standing out amidst the many competitors who are more established in utilizing data-driven marketing algorithms and search engine optimization (SEO) techniques (Dwivedi et al., 2021). More than 50% of retailers who are new to digital marketing experience difficulties in achieving optimal online visibility due to lack of experience in data-driven marketing strategies. In addition, customer loyalty in the digital era is more dynamic compared to the traditional marketing era, where consumers have many choices and can easily switch brands based on price, reviews, and user experience. Therefore, retailers who want to succeed in digital transformation must not only master technology but also develop more personalized and relevant customer experience-based marketing strategies to increase their competitiveness in an increasingly competitive market.

The opportunities offered by digital marketing not only include a wider market reach, but also enable retailers to develop more accurate and effective data-driven strategies. By utilizing technologies such as artificial intelligence (AI) and big data analytics, retailers can identify consumer trends, predict market preferences, and adjust their marketing strategies in real-time (Sulistyawati, 2024). In addition, digital marketing enables more precise customer segmentation, where retailers can target audiences based on demographic factors, shopping behavior, as well as their interactions across various digital platforms.

This not only improves marketing efficiency, but also helps build long-term relationships with customers through a more personalized and relevant approach.

In addition to the advantages in market segmentation, digitalization also gives retailers access to expand into global markets at a lower cost than traditional marketing. E-commerce, social media, and omnichannel strategies have changed the retail landscape, allowing businesses of all sizes to compete more fairly in the digital realm. Studies from Sutomo (2023) show that retailers who adopt omnichannel strategies integrating online and offline shopping experiences have higher levels of customer loyalty than those who rely on only one marketing channel. In addition, digital marketing enables the implementation of direct interaction-based strategies, such as influencer marketing, live shopping, and augmented reality (AR)-based experiences, which can significantly increase customer engagement. As digital technology continues to evolve, retailers that are able to adapt and optimally utilize these innovations will have a greater chance of improving their competitiveness and profitability in the digital economy.

METHOD

This research uses a qualitative method with a descriptive-exploratory approach to analyze the transformation of marketing strategies from traditional to digital, including the challenges and opportunities faced by retailers. The research subjects consisted of 25 participants, which included 20 retailers from various business scales as well as 5 digital marketing experts who have experience in helping businesses transition to digital strategies.

Data was collected through in-depth interviews with business owners, marketing managers and industry experts to explore experiences and obstacles in digital transformation. In addition, participatory observation of digital marketing practices implemented by retailers and document analysis from academic journals, industry



reports and relevant case studies were conducted.

Data were analyzed using thematic analysis, which included data reduction, grouping into main categories (digital marketing strategies, challenges, opportunities, and impact of digitalization), and interpretation in the context of digital marketing theory. Using this method, the research is expected to provide comprehensive insights into how retailers adapt to digital transformation and identify the challenges and opportunities that arise in the process.

RESULTS AND DISCUSSION

Challenges in Traditional Marketing to Digital Transformation for Retailers

1. Digital Skills Gap and Technology Adaptation

The digital skills gap and challenges in adapting new technologies are significant barriers to digital marketing transformation, especially for small and medium-sized enterprises (SMEs). Many retailers, especially those operating on a small scale, still rely on traditional marketing methods such as print advertising and physical store promotions, which are increasingly losing out to data-driven marketing and digital platforms. In an increasingly digitalized world, SME retailers face difficulties in adopting strategies that rely on data analytics, market segmentation, and the use of digital platforms to engage with consumers. Technologies such as artificial intelligence (AI) and marketing automation are increasingly dominating the market, yet most SMEs feel left behind due to their limited skills and understanding of how these technologies can be applied to boost their business efficiency. According to research by Dzirkullah & Chasanah (2024), around 40% of SMEs report difficulties in implementing new technologies due to a lack of digital skills among their staff, which limits their ability to

compete effectively in the rapidly evolving digital marketplace.

Based on an interview with DW, a digital marketing consultant who has worked with many SMEs, he highlighted that

"Many small business owners feel intimidated by sophisticated digital tools and feel they don't have the time or resources to learn them, when they can actually help them improve their efficiency and market reach."

Research conducted by Harto et al (2023) also shows that SME owners often feel they do not have the time or resources to invest in learning new technologies, even though they know the potential benefits that can be derived from data-driven marketing. Most SMEs still stick to the old ways because they do not feel confident in their understanding of technology. However, data-driven and digital marketing allows them to be more effective in reaching a wider audience at a lower cost, as well as being able to measure results more accurately. This digital skills gap relates not only to a lack of knowledge about digital tools, but also to limitations in using data to make better business decisions. Many small retailers do not fully understand the potential of their data and often fail to leverage it to improve customer experience or optimize their marketing strategies.

In addition, the adoption of new technologies, such as AI and marketing automation, often requires significant investment in training and technology infrastructure updates. Many SMEs are hesitant to invest in these technologies because they feel uncertain about the returns. As JL, an SME owner in the retail sector, put it,

"We know that AI can help, but we don't know where to start or how to use it"



efficiently we lack the resources for training and implementation."

Limited funds and lack of time to engage in the learning process of new technologies are significant deterrents. Research from Indrawati (2020) confirms that many SMEs feel inhibited by the high initial costs required to adopt advanced technologies such as AI. The research suggests that while technologies such as AI have the potential to reduce long-term costs and improve efficiency, many small firms perceive the initial costs and uncertainty about the short-term benefits as major barriers to adoption.

To address this digital skills gap, SMEs need to invest in human capital training and development to keep up with technology. However, this training doesn't have to be expensive or complicated. Various affordable online courses and digital seminars can provide the necessary insights without having to involve huge costs. Research by Rupeika et al (2022) showed that digitally transformed SMEs engaged in online course-based training or mentoring, which proved to be more effective compared to more expensive and time-consuming in-house training. In addition, the use of marketing tools that are user-friendly and do not require in-depth technical skills can be a good first step. Many platforms today offer customized solutions for small businesses, allowing them to do digital marketing in a simple and effective way. In addition, collaborating with digital marketing service providers or consultants who are experienced in implementing new technologies can be a solution to reduce the learning burden and help SMBs navigate the complex world of digital marketing. With the right strategy, small retailers can leverage technology to improve their competitiveness, even with limited resources.

2. Financial Barriers and Technology Investment

The shift to digital marketing, while offering great potential in expanding markets and improving operational efficiency, is often faced with significant financial barriers. Retailers have to face high initial investment costs to install adequate technology infrastructure. This infrastructure includes hardware and software to support digital marketing operations, such as analytics tools to measure campaign performance, data management systems, and software for marketing automation. In a study by Sudirman et al (2023), they state that a robust technology infrastructure is essential to ensure the smooth execution of digital marketing strategies. However, the cost of building and maintaining this infrastructure can be prohibitive for retailers with limited budgets. As shared by DS in his interview, many retailers feel overwhelmed by the high costs associated with procuring technology and managing algorithm-based advertising campaigns, which are an important part of digital marketing.

Besides the high initial investment, operational costs in digital marketing are also a big challenge. Managing algorithm-based advertising campaigns on platforms such as Google Ads and Facebook Ads entails ongoing costs. In many cases, these costs can be substantial, especially in highly competitive sectors. A study conducted by Dzulfikri et al (2024) revealed that larger and more established retailers often have higher marketing budgets, which allows them to command the digital advertising space. This makes it difficult for smaller retailers to compete in the long run, as the high advertising costs cannot be covered by the revenue they generate. AR, stated in his interview:

"Without adequate budgets, small-scale retailers will struggle to compete



with large competitors who already dominate the digital market and have much larger marketing budgets."

This financial barrier exacerbates the inability of small retailers to utilize the full potential of digital marketing. Without adequate investment in technology and advertising, small retailers may not be able to optimize digital platforms to attract relevant consumers, or even make sense of the data generated from their campaigns. As explained by Prahendratno et al (2023) in their book *Digital Business Strategy*, the inability to analyze and use customer data effectively hinders companies in developing stronger relationships with their audience. In this case, digital marketing should serve as a tool to strengthen relationships with customers through a better understanding of their preferences. Without the right tools, such as a customer relationship management (CRM) system, companies may struggle to retain customers and increase loyalty. This suggests that retailers who are unable to invest in the right technology will not only be hampered in acquiring new customers, but also in retaining existing ones.

For retailers with limited budgets, alternative strategies are key to staying competitive. By utilizing more organic and low-cost digital marketing, such as search engine optimization (SEO) and social media marketing, retailers can reduce their financial burden without sacrificing reach. A study by Dwivedi et al (2021) suggests that by relying on strong SEO strategies and organic social media campaigns, small retailers can reach relevant audiences at a lower cost. In addition, it is important for retailers to choose marketing channels that suit their capabilities and maximize the use of existing resources. With a deep understanding of the audience and market trends, retailers can plan a more effective digital

marketing strategy, even with a limited budget. However, the biggest challenge remains in managing resources efficiently, so that digital marketing can run optimally without straining the company's finances.

3. Fierce Competition and Dynamics of Consumer Behavior

As digital transformation accelerates, competition on online platforms has now reached a very intense level. Businesses, both big and small, are turning to the digital world to access a wider market. However, for retailers who are new to the digital world, the biggest challenge is fighting for visibility amidst the dominance of large, established brands. Big brands like Amazon, Walmart, and Tokopedia have a significant advantage thanks to their mastery of data and technology-based marketing. As business strategist Michael Porter points out in his book *Competitive Strategy*, large companies often have a "scale advantage" that allows them to beat smaller competitors in terms of cost and marketing. On the other hand, retailers who are new to the digital world often do not have enough data to design effective marketing strategies, so they have to compete with sophisticated algorithms mastered by big players who have been operating for a while.

Increasingly dynamic consumer behavior also affects the way retailers compete in the digital market. Modern consumers are not only looking for products, but also for relevant, personalized and interactive experiences. Research conducted by Accenture shows that 91% of consumers prefer brands that can offer experiences that are personalized and relevant to their needs. This forces retailers to use technologies such as big data and AI (Artificial Intelligence) to understand individual preferences and provide more targeted product recommendations. In this context, data-driven



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marketing becomes very important, as it can help retailers utilize existing information to create shopping experiences that match consumer expectations. As MS explained in his interview, today's consumers are more likely to choose brands that are able to deliver interactions that emphasize emotional aspects and relevance, rather than just functional transactions.

In addition, consumers are also increasingly concerned with the values promoted by brands. Concern for social issues, sustainability, and corporate ethics increasingly dominate their purchasing decisions. In a study by Hamizar et al (2024), it was found that consumers who identify themselves with social or environmental values tend to choose brands that show commitment to these issues. Therefore, retailers who only focus on financial gain without paying attention to aspects of social responsibility and sustainability risk losing market share. Brands that are able to communicate sustainability and social values clearly and consistently have the potential to build stronger relationships with consumers. With consumers' increasing transparency and awareness of the social and environmental impacts of their purchasing decisions, retailers must adapt their marketing strategies to the needs and expectations of consumers who are increasingly prioritizing ethics and social responsibility.

These challenges, while great, also present opportunities for retailers who are able to adapt quickly. Advanced technologies, such as Augmented Reality (AR), Virtual Reality (VR), and AI, can be leveraged to create a more interactive and personalized shopping experience. In a study conducted by Firmansyah et al (2024), companies that adopt new technologies in interactions with consumers, such as the use of AR to try products virtually, experience a significant increase in consumer engagement. In addition,

an omnichannel approach that integrates shopping experiences across multiple platforms, both online and offline, is increasingly becoming a crucial strategy to provide a seamless experience for consumers. In an interview, A mentioned a marketing executive from a leading e-commerce company, emphasizing that to stay competitive, retailers must ensure that every touch point with consumers-whether it is through an app, website, or physical store-delivers a consistent and valuable experience. As such, innovations in technology and marketing approaches that focus on personalized, relevant and interactive consumer experiences will be key for retailers to survive and thrive in this increasingly competitive market.

Digital Marketing Optimization Opportunities and Strategies for Retailers

1. Use of Data Analytics for Marketing Personalization

The use of data analytics for marketing personalization is one of the key foundations of modern digital marketing strategies. In the era of big data and artificial intelligence (AI), retailers can now access a vast amount of data that reveals consumer behavior and preferences in greater depth. Using this technology, they can not only see the buying patterns that occur, but also predict future consumer needs with a high degree of accuracy. According to a study published by Statista in 2023, retailers using data-driven analytics recorded a significant increase in the effectiveness of their campaigns as well as customer engagement. This approach allows retailers to craft highly personalized marketing campaigns, from relevant ad delivery to customized product recommendations based on a customer's purchase history or interactions on digital platforms.



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The ability to predict what consumers will need next is one of the biggest advantages of utilizing big data and AI in marketing. As stated by HL, a digital marketing expert, in his interview.

"The data collected from customers' online behavior allows us to not only understand what they are buying, but also when they are likely to buy it and what drives their purchase decision."

This statement illustrates how in-depth data analysis can help retailers to not only utilize historical data, but also predict future consumer needs with greater precision.

Furthermore, data-driven marketing personalization has a direct impact on sales conversion. Data allows retailers to more precisely determine the right time to launch promotions, as well as the most relevant content for each customer segment. In many cases, this approach leads to a significant increase in conversion rates and sales. For example, a data-driven marketing strategy conducted by Amazon showed that product recommendations generated from historical user data increased their sales substantially. In addition, this personalization also strengthens the relationship between the customer and the brand. By providing an experience that feels more personal and tailored to customer preferences, companies can build stronger loyalty, which ultimately results in greater long-term value for the business.

Statista also reports that the use of data-driven analytics not only increases customer engagement in the short term, but also strengthens more loyal long-term relationships. One concrete example is the strategy implemented by major retail companies such as Nike and Starbucks, which routinely send offers that are highly tailored to their customers' individual behaviors and preferences. This shows that personalization is not just about

offering products that consumers want, but also about creating experiences that make them feel understood and valued.

However, it is important to remember that this use of data analytics must be done carefully, especially in relation to the privacy and security of customer data. In the interview he emphasized that customer trust is the most important thing. Therefore, companies must maintain transparency and ensure that customer data is used in an ethical and secure manner. This will build strong trust, which is crucial in maintaining customer loyalty.

Thus, while challenges related to data management and privacy remain, the benefits offered by data analytics in marketing personalization are undeniable. Retailers that integrate this technology into their strategies have the opportunity to create more relevant customer experiences, increase sales conversions, and ultimately build long-term, mutually beneficial relationships.

2. Omnichannel Strategy for an Integrated Shopping Experience

Omnichannel strategies are increasingly becoming a major focus in the modern retail world due to their ability to integrate multiple shopping channels, both physical and digital, into one seamless experience for customers. This approach not only bridges the gap between physical stores and e-commerce platforms, but also creates more flexible channels, allowing customers to interact with brands through diverse touchpoints whether through social media, mobile apps, or even in in-person interactions in physical stores. According to research by Yin et al (2022), retailers who successfully implement an omnichannel strategy experience higher customer retention rates, as they are able to provide a more complete, personalized, and relevant shopping experience. In an interview



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JH, a retail expert who has worked for more than two decades in the industry, stated,

"Today's customers want an uninterrupted shopping experience between the physical and digital worlds. They want to shop anytime and anywhere, and if they can't get that, they'll look for other alternatives."

This shows the importance of channel integration that not only provides convenience, but also creates more value for consumers.

A successful omnichannel implementation involves incorporating multiple channels for consistent communication, better data integration, and personalized customer experience. For example, a customer who begins a product search through social media can proceed to purchase the item on an e-commerce site seamlessly, or even choose to pick up the product at a nearby physical store. This concept prioritizes convenience and comfort, two factors that are highly valued by consumers today. In addition, an omnichannel strategy allows retailers to offer better customer service, such as returns or exchanges that can be made both on online platforms and in physical stores. Research from Unhelkar et al (2022) shows that companies that integrate inventory management systems across their sales channels can reduce operational costs by up to 20%, as they can track stock and demand in real-time, reduce product discrepancies, and improve customer experience.

However, despite the benefits, the biggest challenge in adopting an omnichannel strategy is the need for high coordination between various departments - marketing, logistics, and customer service - to ensure a consistent experience. Retailers must be able to leverage the right technology, such as customer relationship management (CRM) systems and data-driven analytics tools, to provide a

personalized and relevant experience. In an interview with Forbes Retail Experts, MR, a digital strategy leader at a global retail company, said

"Tidak ada gunanya mengintegrasikan saluran jika Anda tidak memahami data di balik perilaku pelanggan. Teknologi memungkinkan kami memberikan pengalaman yang benar-benar relevan, tapi kita harus tetap waspada terhadap pentingnya interaksi manusia dalam pengalaman belanja tersebut."

This statement underscores that while technology plays a huge role in connecting channels, the right human touch remains an important element in building lasting customer relationships.

In conclusion, an omnichannel strategy is not just about providing customers with a wide selection of channels, but rather creating an integrated shopping ecosystem that focuses on the changing needs of customers. With the flexibility offered by these channels, retailers can not only enhance a better shopping experience, but also strengthen customer loyalty, creating deeper and more lasting relationships with consumers. As technology evolves and consumer behavior changes, retailers who are able to harness the power of omnichannel wisely will have a significant competitive advantage in an increasingly crowded market.

2. Technological Innovation to Increase Customer Engagement

Technological innovations in digital marketing have triggered a significant transformation in the way companies interact with customers, with a focus on deeper and more personalized engagement. Three key innovations that have proven effective in



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improving customer engagement are influencer-based marketing, live shopping and augmented reality (AR). Influencer marketing, for example, leverages the power of public figures who have great influence on social media to build closer relationships with their audiences. According to a study by Widodo et al (2024), influencer-based marketing results in higher engagement compared to traditional advertising as followers of influencers tend to trust their recommendations more. However, the challenge lies in the need to ensure alignment between the brand values and the influencer's character. If the collaboration between the brand and the influencer is not authentic, customers may feel that the interaction is merely commercial-based, potentially reducing trust and engagement.

In addition, live shopping has developed into an increasingly popular trend, especially in Asian markets, and is now starting to penetrate Western markets. This technology offers a more interactive and engaging shopping experience, where consumers can view products live via live streaming and interact with sellers or hosts in real-time. In Forbes (2023), DP, CEO of Fiscal Solutions, said that live shopping removes the distance between the product and the customer by allowing them to experience the product firsthand. This builds a sense of urgency, which motivates quick purchase decisions.

This shows how live shopping not only provides added value in the form of live product information, but also creates a more immersive buying experience, which was previously not possible through traditional shopping platforms.

Furthermore, augmented reality (AR) technology has opened up a new dimension in digital marketing by allowing customers to virtually try products before making a purchase. AR provides an immersive experience that not only visualizes products in real life, but also

allows customers to have a “try-on experience” without having to leave home. A report from Budiarto (2025) shows that consumers feel more confident to buy products they try through AR, as they can see firsthand how the product will look or function in their daily lives. However, the application of AR in marketing faces challenges related to the need for more sophisticated hardware and software as well as seamless integration with online shopping applications. Without proper execution, this technology can feel more like a gimmick than a solution that truly enhances the customer experience.

Overall, the utilization of these technologies shows that customer engagement in digital marketing is no longer just about offering the right product at the right time, but about creating a more immersive and interactive experience. However, while innovations such as influencer marketing, live shopping, and AR provide a lot of potential to improve customer engagement, retailers must be cautious in utilizing these technologies. Failure to align technology with customer expectations and needs, or inauthentic use, can risk damaging brand image and reducing desired engagement. As John Davis, an observer of marketing technology said in his interview with TechCrunch (2023),

“Innovation without a deep understanding of the target audience will only lead to its confusion. The key to success is to combine creativity with accurate data on consumer preferences and behavior.”

Thus, while these technological innovations open up great opportunities, retailers must be able to integrate and adapt the technology with a broader, data-driven marketing strategy to ensure its success in improving customer engagement



CONCLUSIONS

Transformasi digital dalam manajemen bisnis dan akuntansi berkembang pesat dengan penerapan kecerdasan buatan (AI) dan Internet of Things (IoT), yang meningkatkan efisiensi dan otomatisasi operasional. Di bidang akuntansi, AI mengotomatiskan pencatatan transaksi, rekonsiliasi data, dan analisis laporan keuangan secara real-time, sehingga mengurangi kesalahan manusia dan juga biaya administrasi. Studi menunjukkan bahwa perusahaan yang menerapkan AI dalam audit mengalami peningkatan efisiensi sebesar 40%. AI juga membantu analisis keuangan memproses data besar dengan kecepatan tinggi, memberikan wawasan yang akurat tentang arus kas dan risiko bisnis. Meskipun memiliki banyak manfaat, penerapan AI menghadapi tantangan keamanan data, sehingga perusahaan harus mengadopsi sistem enkripsi dan keamanan yang kuat. Selain itu, IoT mengoptimalkan operasi dan manajemen rantai pasokan melalui pemantauan aset secara real-time, sehingga mengurangi kesalahan pencatatan hingga 30%. Teknologi IoT juga mendukung distribusi barang yang lebih efisien dan pemeliharaan prediktif, sehingga mengurangi waktu henti produksi hingga 20%. Namun, adopsi AI dan IoT menghadapi kendala biaya yang tinggi, regulasi yang tidak jelas, dan ketergantungan pada vendor teknologi. Regulasi yang ketat seperti GDPR menjadi tantangan tersendiri bagi perusahaan dalam mengelola data IoT. Selain itu, perusahaan harus memastikan tenaga kerja yang siap untuk digitalisasi dengan pelatihan keterampilan teknologi. Dengan strategi yang tepat, AI dan IoT dapat menjadi pendorong utama transformasi digital, meningkatkan efisiensi operasional, dan memberikan keunggulan kompetitif bagi perusahaan di era digital.

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