COMMUNICATION AND MEDIA IN ASIA PACIFIC (CMAP)
2024, VOL. 7, NO.2, 13-26.
http://doi.org/10.14456/cmap.2024.7

Exploration of Data Utilization in E-commerce: An Academic Inquiry

Watsayut Kongchan [a*]

[a]Chulalongkorn University, Thailand

ABSTRACT

This study examines the profound influence of big data on the e-commerce landscape, highlighting its integration into everyday consumer interactions through advanced information technologies. The paper focuses on how major e-commerce platforms leverage expansive data derived from consumer behavior, especially during high-engagement events like shopping festivals. Through advanced data mining, these platforms translate consumer activity data into actionable insights, enabling personalized marketing and strategic business optimization that enhance customer decision-making and satisfaction. The paper underscores the dual roles of big data: while it enriches user experience through tailored recommendations, it also raises concerns over privacy, data security, and the ethical implications of user data exploitation. These practices, exemplified by targeted impulse-buying tactics and dynamic pricing, present both opportunities and risks, especially in light of evolving regulatory frameworks, such as the EU's General Data Protection Regulation (GDPR) and Thailand's Personal Data Protection Act (PDPA). This paper concludes with a balanced discussion on the potential of big data in e-commerce to benefit businesses and consumers alike, advocating for ethical data governance to foster a transparent and trust-oriented e-commerce ecosystem.

Article Info
Received December 3, 2023
Revised November 3, 2024
Accepted November 18, 2024

Keywords: E-commerce, Big data, Online shopping, Data privacy, Thailand

Introduction

The advancement and expansion of communication and information technologies have significantly contributed to the integration of e-commerce into the daily lives of consumers. The internet has emerged as a pivotal platform for both individual and commercial transactions in the modern era. E-commerce platforms have become a significant part of the modern consumer landscape, providing a convenient and efficient way for consumers to purchase products and services (Alkan et al., 2021; Ken et al., 2022). In 2023, e-commerce sales in the United States reached $271.7 billion in Q3, marking a 7.8% growth over the previous year (Digitalcommerce360, 2023). Similarly, Eastern markets, particularly China, have witnessed exponential growth. For instance, Alibaba's "11.11 Shopping Festival" in 2022 generated over $84 billion in gross market value, dwarfing Western sales events such as Black Friday and Cyber Monday (CNBC, 2023). In Thailand, the e-commerce market has grown rapidly, particularly following Alibaba's acquisition of Lazada in 2016 (Reuters, 2016). Major events like Lazada's 11.11 sale in 2022 further underscored this growth, with over 20 times the average daily transactions (Prachachat, 2022). However, the global e-commerce landscape has undergone significant transformations, particularly since the COVID-19

CONTACT
Watsayut Kongchan (Ph.D., Chulalongkorn University, Thailand) is a lecturer, Department of Public Relations, Faculty of Communication Arts, Chulalongkorn University, Thailand.
***Corresponding author's email:** watsayut.k@chula.ac.th

pandemic, which has redefined consumer behavior and highlighted the critical role of big data in shaping online commerce (Bhatti et al., 2020; Zhang et al., 2020).

The exponential rise of e-commerce is inextricably linked to the rapid growth of Big Data. It encompasses vast datasets generated by consumer activities, including purchases, search queries, and online interactions (Yang et al., 2017). The COVID-19 pandemic magnified the importance of these datasets as consumer preferences shifted towards online shopping. E-commerce companies now use big data analytics to generate consumer insights, personalize user experiences, optimize sales strategies, and mitigate operational risks (OECD, 2020). For instance, platforms like Amazon and Alibaba deploy sophisticated algorithms to customize product recommendations, forecast demand, and manage inventory. This massive dataset, derived from customers' online transactions, is an intrinsic asset for companies, enabling them to enhance customer decision-making through various levels of data mining, including analysis, modeling, visualization, forecasting, and optimization (Chen et al., 2014).

At a strategic level, big data has proven instrumental in driving e-commerce innovation and growth. By analyzing consumer behavior, e-commerce platforms can engage in targeted marketing, enhance customer decision-making, and improve customer satisfaction (Alsmadi et al., 2023). These data encompass a full spectrum of rich information, managed and processed by technologies specifically developed for distributed and scalable storage environments (Chen et al., 2017). On a tactical level, e-commerce websites leverage data archives to attract individual attention, raise awareness, evaluate the impact of promotional events, and optimize consumer transactions. They develop personalized product recommendations based on consumers' prior interactions with the sites, manage risks, and support decision-making (Yang et al., 2017). This leads to impulse purchasing, a significant revenue source in e-commerce (Koski, 2004). Impulse purchasing, characterized by spontaneous, often uncontrollable buying decisions with little thoughtful consideration (Verhagen & Dolen, 2011), raises concerns about privacy violations and data leakage to third parties, such as advertisers or online social networks (Preibusch et al., 2016). This extensive use of consumer data raises concerns about privacy, security, and the ethical implications of data exploitation. High-profile incidents of data breaches and misuse have heightened public awareness of privacy risks (Bonneau & Preibusch, 2013). In Thailand, for example, the Personal Data Protection Act (PDPA), enforced in 2022, seeks to regulate the collection and use of consumer data by e-commerce platforms, ensuring transparency and accountability (Ministry of Digital Economy and Society, 2022).

Given these concerns about consumer online privacy and the exploitation of consumer data in online social networks and e-commerce sites, this paper aims to explore the dynamic interplay between big data and e-commerce, addressing not only the successes but also the challenges, as the industry adapts to changing market conditions. By examining the journey of big data in e-commerce use, the study contributes to a deeper understanding of how e-commerce platforms can effectively leverage big data to meet consumer and business expectations, while also navigating the complex issues of data use.

Exploring the Journey from Upstream to Downstream: Examining Consumer Digital Footprints and Big Data Processing in Online Shopping

The e-commerce landscape has evolved into a highly competitive environment where understanding consumer behavior through digital footprints is paramount for success. Digital footprints, comprising data generated by consumers' online interactions, reveal critical insights into purchasing habits, preferences, and engagement with e-commerce platforms. The consumer journey from upstream awareness to downstream purchase stages involves significant digital tracking and data processing that e-commerce giants utilize to remain competitive (Cheng et al., 2021). The ability to track and analyze digital footprints enables e-commerce firms to create highly personalized shopping experiences, a factor shown to increase consumer engagement and brand loyalty (Gonzalez-Fuentes, 2017).

Recent research highlights that the ability to process digital footprints extends beyond simply tracking consumer behavior. It enables the creation of predictive models, which e-commerce platforms use to anticipate trends and respond to shifts in consumer sentiment. For instance, algorithms trained on historical data can identify potential purchasing patterns, allowing businesses to adjust inventory or marketing tactics in real-time (Cheng et al., 2021). According to PwC study, mentioned by Echelon Edge (2023), companies that integrate big data analytics into their core operations outperform competitors by focusing resources more effectively and responding swiftly to market changes.

This digital journey from upstream awareness where consumers first encounter

products, to downstream decision-making (the final purchase) illustrates the crucial role of big data processing. Advanced data mining techniques allow companies to manage these insights at scale, enabling more accurate customer segmentation and enhancing brand relevance (Yoseph et al., 2020). The role of 'digital footprints' is particularly significant in emerging markets, where online shopping behaviors differ markedly from those in established markets. The concept of the digital footprints has become increasingly important in understanding online consumer behavior. Ghose and Todri-Adamopoulos (2016) explored how consumers' digital traces, including browsing history, social media interactions, and mobile app usage, can be leveraged to predict purchase intentions. Their research revealed that integrating multiple data sources improved prediction accuracy by up to 35% compared to traditional methods. A study of Southeast Asian consumers revealed that engagement patterns, response to online promotions, and purchasing behaviors vary by demographic, underlining the importance of region-specific data strategies (Storey & Song, 2017). In this sense, big data analytics serve as a bridge, allowing global platforms to localize their approaches in alignment with unique consumer behaviors, an area with considerable potential for future research and commercial applications (Pahnila & Warsta, 2010).

The Ways of Big Data Manipulation in Consumer Online Decision's Making

The growing interest in big data utilization stems not only from advancements in data mining technology but also from the evolution of internet technology. Initially, individual internet data, such as online user habits, may seem insignificant. However, when accumulated in sufficient volume and density for analysis, this data becomes invaluable. It can be used to predict consumer behavior, strategically manipulate user habits for organizational gain, extract consumer values, understand demands, and support decision-making by developing recommendation systems at various levels to finally lure the screen-shoppers into the purchasers (Chen, 2014). Wang et al. (2018) demonstrated that recommender systems in e-commerce platforms can address challenges such as scalability, sparsity, and cold start. By leveraging advanced algorithms and techniques, recommender systems can effectively provide personalized recommendations to users, overcoming the limitations of traditional recommendation approaches. This finding emphasizes the significance of recommender systems in enhancing the user experience and driving sales on e-commerce platforms.

Moreover, big data allows companies to fine-tune these recommendation systems continuously. According to Jannach and Adomavicius (2016), recommender systems dynamically learn from real-time user interactions, making them adaptive to consumer preferences that may shift rapidly due to trends or seasonal demands. This adaptability helps e-commerce platforms improve customer satisfaction and retention by offering more personalized suggestions. Such systems not only encourage higher purchase rates but also contribute to long-term customer loyalty by consistently aligning product recommendations with consumer interests (Ricci et al., 2015). Bradlow et al. (2017) examined how real-time pricing algorithms, powered by big data analytics, influence consumer behavior. They found that dynamic pricing strategies based on individual consumer data increased overall revenue by 7.8% compared to fixed pricing models. Chen et al. (2015) conducted a comprehensive study on the impact of big data analytics on consumer decision-making in online retail. They found that big data-driven personalization significantly improved the accuracy of product recommendations, leading to a 27% increase in conversion rates. This underscores the power of big data in tailoring the online shopping experience to individual preferences.

The process of consumer decision-making, whether online or offline, remains largely unchanged (Katawetawaraks & Wang, 2013). Originating from John Dewey's 1910 model, it typically starts with a need, leading consumers through a 5-step process: Problem Recognition, Information Search, Alternative Evaluation, Purchase, and Post-purchase Evaluation, in that order (Prasad and Jha, 2014). In online shopping, customers are drawn to products or services through online advertisements, promotions, and events, utilizing big data to capture their attention (Katawetawaraks & Wang, 2013). Customers then evaluate options and make selections based on their expectations. During the alternative evaluation stage, persuasive elements include well-structured graphic and message design. In the purchasing stage, both the price and the quality of information are crucial in the final purchasing decision (Koo et al., 2008).

This journey is sometimes recognized by the critics as 'Information Curation.' Whittaker (2011) defined information curation as the process of keeping, managing, and exploiting familiar information as a personal resource. This concept is particularly relevant in the context of e-commerce platform consumer data exploitation, as it highlights the importance of effectively organizing and utilizing consumer data to gain insights and improve decision-making. By curating and exploiting consumer data, e-commerce platforms

can better understand customer preferences and tailor their offerings accordingly. The role of information curation extends beyond individual transactions and can contribute to a deeper understanding of market trends, enabling businesses to respond proactively to shifts in consumer needs (Akter & Wamba, 2016). In the context of information curation, Benlian (2015) introduced the concept of 'content personalization fatigue.' The study showed that while personalized content initially increases engagement, excessive personalization can lead to decreased trust and purchase intentions. This highlights the need for a balanced approach in applying big data insights to consumer interactions.

Big data analysis in consumer behavior plays a significant role in developing marketing communication strategies and enhancing organizational production efficiency and competitiveness. By utilizing predictive analytics, companies can identify patterns in consumer behavior, anticipate future demands, and adjust their marketing efforts to target specific customer segments more effectively. For example, Ijomah et al. (2024) argue that big data analytics not only enhance the precision of marketing campaigns but also improve resource allocation, reducing costs and boosting ROI. In e-commerce, these insights enable the deployment of targeted advertising campaigns, which help in capturing customer interest through highly relevant messaging and personalized offers. Furthermore, big data enables companies to explore and test new business models, often based on the analysis of vast datasets that highlight emerging consumer needs. Consequently, daily transactions in the tens of thousands on platforms like Alibaba or Taobao are a testament to the effective application of big data in e-commerce (Hwang, 2017).

Big Data Manipulation: A Double-Edged Sword of Benefits and Drawbacks

In the digital transformation era, big data stands as a cornerstone for enhancing operational efficiency and customer satisfaction within e-commerce. By leveraging vast consumer datasets, platforms can refine marketing strategies, inventory management, and personalized consumer engagement. For instance, e-commerce platforms like Taobao employ tools such as 'Data Cube' to analyze individual attributes like age, gender, and interests to inform production and promotional decisions, allowing for targeted product offerings and favorable pricing (Hwang, 2017). On the surface, this approach appears mutually beneficial, with consumers enjoying tailored options and competitive pricing while businesses optimize inventory and profitability. However, these perceived benefits often obscure underlying privacy and data security risks that consumers may overlook (Preibusch et al., 2016).

Balancing Corporate Gain and Consumer Autonomy

While big data applications appear consumer-centric, their primary objectives are often corporate profit maximization, cost reduction, and resource efficiency (Kulvanitchaiyanunt, 2018). This raises ethical concerns regarding data appropriation, wherein companies utilize consumer data without explicit compensation, potentially impacting consumer autonomy and fairness. Brandbuffet (2017) argues that the substantial advantages derived from big data favor corporations, challenging the perception of a win-win scenario. For instance, Alibaba's integration of consumer data to offer low-risk credit loans at rates below traditional banks demonstrates data's role in reshaping financial models; however, it blurs the boundary between consumer engagement and exploitation (Chen, 2014).

The Hidden Costs for Consumers

While e-commerce organizations may reap lucrative benefits from consumer data, this comes at a cost. In the digital realm, personal data is a valuable asset, akin to currency (Bergström, 2015). For instance, Alibaba, a leading online shopping group in China, uses consumer data to offer credit loans with a remarkably low non-performing loan (NPL) rate, significantly lower than traditional banks (Chen, 2014).

Recent studies have shed light on the complexities of data valuation in the digital economy. Spiekermann et al. (2015) conducted an in-depth analysis of personal data markets, revealing that the monetary value of individual data points can vary significantly based on factors such as data type, quality, and potential use cases. Their research suggests that while consumers often underestimate the value of their personal information, businesses are increasingly recognizing its worth, leading to a growing disparity in data-driven transactions.

Data appropriation is a concerning aspect of big data exploitation, where organizations use consumer data for gain without compensating the user. This ranges from sharing user information between platforms for targeted advertising to more invasive practices like tracking online status through mobile phone battery data. In extreme cases, data brokers collect and sell personal profiles, circumventing consumer protections (The Guardian, 2016). Consumers may not be aware of the hidden costs associated with their data on these platforms. These hidden costs can include compromises to privacy and security, as well as

potential discrimination or price manipulation based on personal data.

Recent research has highlighted the potential for algorithmic bias in e-commerce platforms, where data-driven decision-making can lead to unintended discrimination against certain user groups (Lambrecht & Tucker, 2019). This bias can manifest in various ways, such as differential pricing or product recommendations based on demographic factors, potentially exacerbating existing social inequalities (Carter, 2018).

Furthermore, the indirect cost of data on e-commerce platforms can also be seen in the form of targeted advertising and personalized pricing. E-commerce platforms often collect and analyze consumer data to deliver tailored advertisements and pricing strategies (Riegelsberger et al., 2012; Chen et al., 2015; Xiao, 2022). This can result in consumers receiving targeted ads that may influence their purchasing decisions or even behavior like impulse buying.

Impulse Buying and Behavioral Influence through Data

The influence of big data on consumer purchasing raises concerns about impulse buying. Impulse buying behavior is a significant aspect of consumer behavior in the context of e-commerce platforms. With the increasing popularity of social e-commerce, understanding the factors that influence impulse buying behavior becomes crucial for businesses. Events like the 11.11 shopping festival highlight the risk of consumers making spontaneous, often unreflective purchases, driven by targeted marketing tactics that downplay the consequences of such behavior (Verhagen & Dolen, 2011). Impulse buying, as described by Weun et al. (1998), is influenced by various psychological factors and can be exacerbated in individuals with lower self-control, leading to more frequent online purchases and less concern for product quality or long-term implications (Reisig et al., 2008; Koski, 2004).

Recent studies have delved deeper into the psychological mechanisms underlying impulse buying in e-commerce settings. For instance, Zhang et al. (2020) found that the perceived ease of use and perceived usefulness of e-commerce platforms significantly influence impulse buying behavior. Their research suggests that the user-friendly interfaces and seamless transaction processes of modern e-commerce platforms may inadvertently encourage impulsive purchases.

Moreover, the role of social influence in e-commerce impulse buying has gained attention. Chen et al. (2019) investigated the impact of social presence on impulse buying in online group shopping contexts. Their findings indicate that the perception of others' presence and behavior in online shopping environments can significantly increase the likelihood of impulsive purchases, highlighting the complex interplay between social factors and individual decision-making in digital marketplaces.

Besides e-commerce events, live streaming e-commerce is an alternative way which various e-commerce platforms directly integrate in the app with the increasing popularity of live streaming commerce lately. Ming et al. (2021) investigate the influence of live streaming commerce on impulsive buying behavior. The study reveals that three dimensions of social presence in streaming events have a positive and significant impact on consumer purchasing. These factors, in turn, trigger consumers' impulsive buying behavior. The findings suggest that the social presence of the live streamer plays a crucial role in creating a sense of trust and flow state, leading to impulsive buying behavior. Additionally, the study highlights the moderating role of consumers' sense of power in the process from consumer trust, flow state to impulsive buying behavior.

Data Disclosure Concerns

The disclosing of personal data by companies like Alibaba and social media platforms has sparked controversy. Despite public statements to the contrary, internal documents and reports suggest that these organizations have considered or engaged in disclosing user data, a practice that raises significant ethical questions (The Verge, 2018; Indiatimes, 2018). The controversy surrounding the disclosing of user data in e-commerce shopping platforms has sparked significant debate and concerns in recent years. As consumers increasingly share personal information while engaging in online shopping, there is a growing concern about how this data is being used and whether it is adequately protected from unauthorized access or misuse (Bency, 2018; Yue & Hu, 2022).

On one hand, some argue that disclosing user data can provide valuable insights for businesses, allowing them to personalize advertisements and improve the overall shopping experience for customers (Bency, 2018; Li, 2023). On the other hand, critics argue that disclosing user data raises serious privacy concerns and leaves consumers vulnerable to potential misuse of their personal information. This debate is further fueled by the increasing reliance on big data in the e-commerce industry. As data brokers collect and disclose users' personal information, concerns about the ethical implications of this practice have been raised by privacy advocates and researchers alike (Bency, 2018; Li, 2023; Yan et al., 2023).

A recent survey of online users revealed that privacy concerns ranked as the most important

issue when transacting via the Internet (Arcand et al., 2007; Landeweerd et al., 2013). This highlights the growing importance of privacy in the online sphere and underscores the need for e-commerce firms to prioritize user privacy. To address the concerns surrounding user data in e-commerce, businesses must prioritize transparency and give users control over their personal information.

The ethical implications of data disclosure extend beyond individual privacy concerns. Scholars have begun to examine the broader societal impacts of widespread data sharing in e-commerce. For instance, Zuboff's (2019) concept of "surveillance capitalism" argues that the commodification of personal data fundamentally alters the power dynamics between corporations and individuals, potentially undermining democratic principles and personal autonomy.

Furthermore, the global nature of e-commerce has raised questions about data sovereignty and cross-border data flows. Researchers like Aaronson and Leblond (2018) have explored the geopolitical implications of data governance, highlighting the need for international cooperation in developing coherent data protection frameworks that can address the complexities of the digital economy.

Privacy in the Digital Age and Regulatory Approaches

Online interactions inevitably leave digital footprints, which are collected and processed by big data systems. This pervasive data collection raises significant privacy concerns, particularly on e-commerce platforms. This data can be potentially accessed and used by various entities, including governments, corporations, and hackers. As a result, there is an increased risk of privacy breaches, identity theft, and surveillance. Furthermore, the constant connectivity and convenience offered by digital devices have led individuals to willingly share personal information without fully considering the consequences. This has created a complex dilemma between the benefits of technology and the need for privacy protection.

The concept of "privacy calculus" has emerged as a framework for understanding how individuals weigh the benefits and risks of sharing personal information online (Dinev & Hart, 2006). This theory suggests that users engage in a cost-benefit analysis when deciding to disclose personal information, balancing the perceived benefits of personalized services against potential privacy risks. However, recent research has questioned the effectiveness of this model in the context of big data and e-commerce, where the long-term consequences of data sharing may be difficult for users to fully comprehend (Acquisti et al., 2015).

Efforts to address privacy concerns in the digital age have been made through laws and regulations, such as the General Data Protection Regulation (GDPR) in the EU and the California Consumer Privacy Act in the US (Jha et al., 2016). However, the impact of the digital age is so profound and pervasive that a single area of privacy law is unlikely to adequately address all of the challenges (Rengel, 2014). Despite efforts like the EU's GDPR to enhance data privacy rights, many regions, including Thailand, lack comprehensive data protection laws, leaving gaps in consumer privacy protection (Raul et al., 2017; Norton Rose Fulbright, 2014).

The effectiveness of these regulatory approaches has been a subject of ongoing research. For instance, Politou et al. (2018) conducted a critical analysis of the GDPR's "right to be forgotten" provision, highlighting both its potential benefits for individual privacy and the technical challenges of implementing such a right in the context of big data systems. Similarly, Tikkinen-Piri et al. (2018) examined the implications of the GDPR for data-intensive organizations, emphasizing the need for a proactive approach to data protection that goes beyond mere compliance.

Therefore, it is imperative for governments, policymakers, and individuals to adopt a proactive approach in safeguarding privacy rights. This may involve not only strengthening legal frameworks but also promoting digital literacy and empowering individuals to make informed decisions about their data. As Solove (2012) argues, a more nuanced understanding of privacy that goes beyond the traditional concept of secrecy is needed to address the complex challenges posed by big data and e-commerce.

The dualistic nature of big data--serving both corporate efficiency and consumer convenience--demands a balanced approach. Businesses must recognize that while big data manipulation drives revenue and operational success, ethical considerations surrounding privacy and consumer rights are equally paramount. Moving forward, an emphasis on transparency, user consent, and data security is crucial to foster a responsible, trust-centered digital ecosystem. As regulatory frameworks continue to evolve, corporations should prioritize ethical data practices to ensure a sustainable, fair, and consumer-friendly e-commerce environment.

Big Data Utilization and the Boomerang Effect

The rapid advancements in big data analytics have fundamentally transformed e-commerce, creating a feedback loop between consumer behavior and personalized experiences

known as the "boomerang effect" (Akter & Wamba, 2016; Chen et al., 2012). This phenomenon occurs when user interactions generate data that is then analyzed to shape future experiences, influencing subsequent consumer decisions. The boomerang effect can be understood through the lens of the "dynamic capabilities" theory (Teece, 2018), which posits that firms must continuously adapt and reconfigure their resources to maintain competitive advantage in rapidly changing environments. E-commerce giants like Amazon and Alibaba have operationalized this concept, leveraging petabytes of daily consumer data to generate precise recommendations and drive engagement (Bradlow et al., 2017). For instance, Amazon's recommendation engine, which accounts for a significant portion of its revenue, utilizes collaborative filtering and item-to-item collaborative filtering algorithms to analyze purchase history, product ratings, and browsing behavior (Smith & Linden, 2017). This level of personalization enhances customer experience but also raises questions about autonomy and informed decision-making.

The boomerang effect extends beyond product recommendations. Big data analytics enable dynamic pricing strategies, where prices fluctuate based on demand, competitor pricing, and individual consumer behavior (Chen et al., 2015). While this can lead to more efficient markets, it also raises concerns about price discrimination and fairness. A study by Hannak et al. (2014) found evidence of personalized pricing on several e-commerce sites, with prices varying by up to 23% for the same product shown to different users.

Furthermore, the boomerang effect influences inventory management and supply chain optimization. By analyzing historical sales data, seasonal trends, and external factors like weather or events, e-commerce companies can predict demand with increasing accuracy (Choi et al., 2018). This leads to reduced stockouts, lower inventory costs, and faster delivery times. However, it also concentrates market power in the hands of data-rich companies, potentially creating barriers to entry for smaller competitors.

The ethical implications of the boomerang effect are significant. While personalization can enhance user experience, it also raises concerns about privacy, data ownership, and the potential for manipulation. The concept of "filter bubbles" (Pariser, 2011) in e-commerce contexts suggests that highly personalized experiences may limit exposure to diverse products and ideas, potentially reinforcing existing preferences and biases. This aligns with the theory of "selective exposure" in communication research (Knobloch-Westerwick, 2015), which posits that individuals tend to seek out information that confirms their existing beliefs. Recent research has explored the psychological impact of the boomerang effect on consumer behavior. A study by Bleier & Eisenbeiss (2015) and Chernev et al. (2015) found that consumers exposed to highly personalized recommendations exhibited increased decision fatigue and decreased satisfaction with their choices over time. This suggests that while personalization can initially boost engagement, it may have long-term negative effects on consumer well-being and decision-making capabilities.

The boomerang effect also has implications for market competition and innovation. As e-commerce platforms accumulate more data, they can create increasingly accurate predictive models, potentially stifling competition from new entrants who lack access to such rich datasets. This data advantage can lead to market concentration, as seen in the dominance of platforms like Amazon and Alibaba in their respective markets (Khan, 2017). This trend aligns with the concept of "data network effects" (Gregory et al., 2020), where the value of a platform increases as it accumulates more data, creating a self-reinforcing cycle that favors established players.

Moreover, the boomerang effect intersects with emerging technologies like artificial intelligence and the Internet of Things (IoT). For instance, smart home devices integrated with e-commerce platforms can generate real-time data on consumer habits and preferences, further refining the personalization loop. A study by Mahroof et al. (2020) explored how IoT devices in retail environments can enhance the boomerang effect, creating seamless omnichannel experiences that blur the lines between online and offline shopping.

The global nature of e-commerce adds another layer of complexity to the boomerang effect. Cultural differences in privacy expectations and data regulations can lead to varying implementations and impacts of big data strategies across regions. For example, the EU's General Data Protection Regulation (GDPR) has forced e-commerce companies to adapt their data practices in Europe, potentially creating disparities in the level of personalization offered to consumers in different parts of the world (Tikkinen-Piri et al., 2018). Looking ahead, the evolution of the boomerang effect in e-commerce will likely be shaped by advancements in machine learning and artificial intelligence. Techniques like reinforcement learning and generative AI could enable even more sophisticated personalization strategies, potentially predicting and shaping consumer needs before they are consciously realized (Chen & Yao, 2017).

As e-commerce platforms continue to refine their big data capabilities, striking a balance between personalization and user autonomy will be crucial. Transparency in data collection and

usage, along with giving users more control over their data and personalization settings, could help mitigate some of these concerns while still leveraging the benefits of big data analytics. Future research should focus on developing ethical frameworks for big data utilization in e-commerce, exploring ways to maximize consumer benefit while minimizing potential harm. Thus, the boomerang effect represents both the immense potential and significant challenges of big data in e-commerce. As this phenomenon continues to evolve, it will be essential for researchers, policymakers, and industry leaders to collaborate in developing approaches that harness the power of big data while protecting consumer interests and fostering a competitive, innovative e-commerce ecosystem.

Discussion

The exploration of big data utilization in e-commerce highlights a sophisticated interplay between advanced data analytics and consumer behavior, yielding significant insights and posing complex challenges. This study shows how big data enables e-commerce platforms to tailor experiences through mechanisms such as personalized recommendations, real-time pricing, and predictive analytics, ultimately elevating customer satisfaction and loyalty (Chen et al., 2014; Wang et al., 2018). However, such data-driven personalization brings potential drawbacks, especially in relation to privacy concerns and ethical considerations. The ethical complexities of balancing innovative data applications with consumer rights underline the need for companies to approach data utilization responsibly (Bergström, 2015; Rengel, 2014).

One particularly notable phenomenon, the "boomerang effect," demonstrates how consumer data shapes future interactions. It embodies the dual nature of personalization: enhancing user experience on one hand, and limiting consumer autonomy on the other (Akter & Wamba, 2016). Platforms like Amazon and Alibaba excel in predictive modeling and recommendation algorithms to create personalized shopping journeys that cultivate brand loyalty (Smith & Linden, 2017). However, such highly curated experiences can unintentionally confine consumers within their existing preferences, reducing exposure to diverse options. This filter bubble effect raises ethical questions about consumer autonomy and the potential biases within recommendation algorithms (Pariser, 2011; Knobloch-Westerwick, 2015). Developing strategies that respect user independence while maximizing personalization is key for achieving a balanced approach.

Further examination reveals how data manipulation strategies aim to influence consumer decisions, highlighting both the potential and risks associated with these methods. Recommender systems and dynamic pricing mechanisms help platforms increase conversion rates and improve the consumer journey, creating a competitive advantage (Jannach & Adomavicius, 2016; Chen et al., 2015). However, price discrimination and aggressive impulse-buying tactics, particularly during high-volume events like the 11.11 shopping festival, present risks to consumer welfare and signal a potential need for regulatory safeguards (Verhagen & Dolen, 2011; Preibusch et al., 2016). Excessive manipulation of consumer data through personalized pricing and recommendations can erode consumer trust and negatively impact perceptions of e-commerce platforms (Benlian, 2015). Thus, while these technologies enhance user engagement, maintaining transparency in data-driven decision-making is critical.

The ethical considerations surrounding data disclosure and privacy remain essential. The study underscores the challenges e-commerce platforms face in balancing the benefits of consumer data exploitation with the right to data privacy, leading to calls for regulatory action like the EU's General Data Protection Regulation (GDPR) (Politou et al., 2018). Effective data governance frameworks, particularly those incorporating privacy-by-design principles, are needed to address consumer anxieties around potential data misuse (Bency, 2018; Raul et al., 2017). Global discrepancies in data protection laws further complicate this issue, as consumers across different jurisdictions may receive varying levels of protection. Addressing these differences through cross-border collaboration could help establish a consistent global standard for data privacy, enhancing consumer confidence in e-commerce environments (Aaronson & Leblond, 2018).

This review emphasizes that although big data analytics bring undeniable benefits to e-commerce, they also demand a responsible approach to foster a sustainable, trust-centered digital marketplace. A balanced strategy that emphasizes ethical data handling, respects user autonomy, and aligns with regulatory standards is vital to addressing these challenges.

Challenges and Future Trends in Big Data for E-commerce

As big data analytics continue to evolve, their applications in e-commerce are expanding. Yet, they also present complex challenges that affect businesses, consumers, and regulators alike. The ever-increasing volume and velocity of data

generated on e-commerce platforms require significant advancements in data processing capabilities and data governance frameworks. Studies forecast that the demand for data analytics solutions in Southeast Asia, for instance, will see an annual growth of 20% as platforms adopt increasingly sophisticated tools to address the nuanced needs of consumers (Brandbuffet, 2017). However, this expansion brings to the fore critical issues surrounding data security, privacy, and consumer trust.

One prominent challenge is the security of consumer data, which has been exacerbated by the widespread digitalization of transactions and the rise of IoT devices in the e-commerce ecosystem. As companies gather and process vast amounts of data, they become vulnerable to breaches, exposing consumers to risks such as identity theft, fraud, and data misuse. Research shows that consumer trust in e-commerce is heavily reliant on data security, with breaches causing lasting damage to brand reputation and consumer confidence (Preibusch et al., 2016). To mitigate these risks, e-commerce companies must adopt comprehensive data governance policies that encompass secure data handling practices, including encryption, access control, and real-time monitoring for unusual activity (Jha et al., 2016).

Additionally, the sheer scale of big data creates analytical challenges, such as handling unstructured data, managing data sparsity, and overcoming algorithmic bias. A study by Wang et al. (2018) highlights that many e-commerce platforms struggle with scalability and data sparsity, which can lead to inaccurate predictions and reduced efficacy of recommendation systems. To address these issues, platforms are increasingly investing in artificial intelligence (AI) and machine learning (ML) to refine data processing and interpretation. As machine learning algorithms evolve, they allow companies to create more accurate behavioral models, though they also raise ethical concerns regarding transparency and accountability, as the decision-making processes of complex algorithms remain opaque to end-users (Raji & Buolamwini, 2019).

Future trends in big data for e-commerce point towards a heightened focus on privacy-centric models, predictive analytics, and augmented customer insights. Privacy-centric data management strategies, such as privacy by design, will likely become industry standards as platforms work to align with regulations like the EU's General Data Protection Regulation (GDPR). This regulatory framework has set a precedent for data protection, with provisions requiring companies to ensure data privacy and user consent, inspiring similar legislative efforts globally (Raul et al., 2017). Meanwhile, predictive analytics is expected to evolve with advancements in AI, allowing e-commerce platforms to move from reactive models to proactive, anticipatory models that engage consumers before they articulate a need (Assunção et al., 2015).

Future directions and challenges in the application of AI and ML for data analytics in e-commerce also emerge from this. These technologies have the potential to elevate data-driven insights to new levels, facilitating predictive analytics that can cater to consumer needs with unprecedented precision (Assunção et al., 2015; Raji & Buolamwini, 2019). However, as AI-driven personalization grows more advanced, ethical concerns around algorithmic transparency and accountability increase. The opaque nature of certain ML processes can leave consumers feeling uncertain about how their data is utilized and may lead to mistrust (Broklyn et al., 2024). Future research should thus focus on establishing guidelines for transparency in machine learning applications, ensuring that e-commerce platforms operate with accountability and fairness in their algorithmic practices.

In the future, as companies continue to grapple with ethical, technical, and regulatory challenges, they will need to embrace innovative yet responsible approaches to data management. Success in this evolving landscape will depend on platforms' ability to foster transparency, secure data practices, and maintain a balanced focus on both business objectives and consumer rights (Jha et al., 2016).

Conclusion: Navigating the Balance of Growth and Ethics in Big Data

The rise of big data has reshaped e-commerce, presenting platforms with powerful tools to engage consumers and optimize operations. However, this evolution comes with ethical and regulatory responsibilities that must be addressed to ensure a fair and sustainable digital marketplace. While big data has undeniably improved efficiency and personalization in e-commerce, it has also introduced risks related to privacy, security, and the ethical handling of consumer information (Chen, 2014).

The boomerang effect exemplifies the double-edged nature of big data: while it allows companies to create value and meet consumer demands, it also poses risks of data exploitation and erosion of consumer autonomy. Research suggests that fostering a responsible approach to data management, through transparency and user consent, can mitigate these risks while promoting trust (Rengel, 2014; Zuboff, 2019). Such an approach is essential for maintaining consumer confidence, as trust forms the cornerstone of brand

loyalty and long-term business success (TRUSTe, 2013; Preibusch et al., 2016).

Moreover, as the regulatory landscape evolves, e-commerce platforms must remain proactive in adopting privacy-focused frameworks that comply with global standards. Compliance with regulations like GDPR not only shields companies from legal repercussions but also reinforces a commitment to ethical data practices. The California Consumer Privacy Act (CCPA), for example, has introduced provisions that empower consumers with greater control over their data, setting a benchmark that has influenced privacy laws beyond the United States (Jha et al., 2016).

In conclusion, while big data offers immense potential for growth in e-commerce, a balanced approach that respects consumer rights and upholds ethical standards is essential. Platforms that prioritize data protection, user consent, and transparency will be better positioned to succeed in an era where data-driven innovation and consumer trust are intrinsically linked. As technological advancements continue, fostering a culture of ethical data practices will be critical for building a resilient, trustworthy, and consumer-centric digital ecosystem.

Limitation and Further Research Suggestions

This paper provides an academic discussion on consumer big data in e-commerce but lacks an empirical research methodology, limiting the depth of its findings. Future studies could employ structured research methods likes surveys or case studies with e-commerce platforms to gather practical insights into big data utilization and consumer responses. Additionally, this paper does not fully address the COVID-19 pandemic's
impact on online shopping, which has raised urgent needs for improved cybersecurity and resilient supply chains. Further research should examine how e-commerce platforms have adapted data management and security measures in response to these changes.

Finally, as privacy laws evolve, future research could explore how compliance with regulations such as GDPR and Thailand's PDPA influences consumer trust and operational practices in e-commerce, providing actionable recommendations for a more secure and consumer-centered marketplace.

Declaration of AI-assisted Technologies in the Writing Process

During the reparation of this work, the author use*ChatGPT-4o* and *Perplexity Pro* to translate and refine the English language. After using these tools, the author reviewed and edited the content as needed and takes full responsibility for the final content of the publication.

ORCID ID

Watsayut Kongchan: http://orcid.org/ 0000-0002-7868-3249

References

Aaronson, S. A., & Leblond, P. (2018). Another digital divide: The rise of data realms and its implications for the WTO. *Journal of International Economic Law, 21*(2), 245-272.

Acquisti, A., Brandimarte, L., & Loewenstein, G. (2015). Privacy and human behavior in the age of information. *Science, 347*(6221), 509-514.

Akter, S., & Wamba, S. F. (2016). Big data analytics in E-commerce: A systematic review and agenda for future research. *Electronic Markets, 26*(2), 173-194.

Alkan, Ö., Küçükoglu, H., & Tutar, G. (2021). Modeling of the factors affecting e-commerce use in Turkey by categorical data analysis. *International Journal of Advanced Computer Science and Applications, 12*(1). https://doi.org/10.14569/ijacsa.2021.0120113

Alsmadi, A. A., Shuhaiber, A., Al-Okaily, M., Al-Gasaymeh, A., & Alrawashdeh, N. (2023). Big data analytics and innovation in e-commerce: current insights and future directions. *Journal of Financial Services Marketing*, 1-18.

Arcand, M., Nantel, J., Arles-Dufour, M., & Vincent, A. (2007). The impact of reading a website's privacy statement on perceived control over privacy and perceived trust. *Online Information Review, 31*(5), 661-681.

Assunção, M. D., Calheiros, R. N., Bianchi, S., Netto, M. A. S., & Buyya, R. (2015). Big data computing and clouds: Trends and future directions. *Journal of Parallel and Distributed Computing, 79-80*, 3-15. https://doi.org/10.1016/j.jpdc.2014.08.003

Bency, M. A. (2018). Successive security challenges implementation on the Internet of Things. *International Journal of Trend in Scientific Research and Development, 2*(2), 161-177. https://doi.org/10.31142/ijtsrd8342

Benlian, A. (2015). Web personalization cues and their differential effects on user assessments of website value. *Journal of Management Information Systems, 32*(1), 225-260.

Bergström, A. (2015). Online privacy concerns: A broad approach to understanding the concerns of different groups for different uses. *Computers in Human Behavior, 53*, 419-426. https://doi.org/10.1016/j.chb.2015.07.025

Bhatti, A., Akram, H., Basit, H. M., Khan, A. U., Raza, S. M., & Naqvi, M. B. (2020). E-commerce trends during COVID-19 Pandemic. *International Journal of Future Generation Communication and Networking*, *13*(2), 1449-1452.

Bonneau, J., & Preibusch, S. (2010). The privacy jungle: On the market for data protection in social networks. In *Economics of information security and privacy* (pp. 121-167). Springer.

Bradlow, E. T., Gangwar, M., Kopalle, P., & Voleti, S. (2017). The role of big data and predictive analytics in retailing. *Journal of Retailing, 93*(1), 79-95.

Brandbuffet. (2017). *SCB fun tong Big Data nai Thai toh krachood, Pakthurakij aow ma chai tang reang "ngan-ngen-knon"* [SCB predicts a booming growth of big data in Thailand, with businesses utilizing it across "work, finance, and people"]. https://www.brandbuffet.in.th/2017/11/bigdata-strategic-beyond-marketing-tool

Broklyn, P., Olukemi, A., & Bell, C. (2024). *AI-driven personalization in digital marketing: Effectiveness and ethical considerations.* https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4906214

Carter, A. (2018). Weapons of Math Destruction: How Big Data Increases Inequality and Threatens Democracy. *Journal of Comparative Research in Anthropology and Sociology*, *9*(1), 89-94.

Chen, D. Q., Preston, D. S., & Swink, M. (2015). How the use of big data analytics affects value creation in supply chain management. *Journal of Management Information Systems, 32*(4), 4-39.

Chen, H., Beaudoin, C. E., & Hong, T. (2017). Securing online privacy: An empirical test on Internet scam victimization, online privacy concerns, and privacy protection behaviors. *Computers in Human Behavior, 70*, 291-302. https://doi.org/10.1016/j.chb.2017.01.003

Chen, H., Chiang, R. H., & Storey, V. C. (2012). Business intelligence and analytics: From big data to big impact. *MIS Quarterly, 36*(4), 1165–1188.

Chen, J., Tao, Y., Wang, H., & Chen, T. (2015). Big databases fraud risk management at Alibaba. *The Journal of Finance and Data Science*, *1*(1), 1-10.

Chen, J., Xu, H., & Whinston, A. B. (2019). Moderated online communities and quality of user-generated content. *Journal of Management Information Systems, 36*(3), 723-757.

Chen, M., Mao, S., Zhang, Y., & Leung, V. C. M. (2014). *Big data: Related technologies,*

challenges, and future prospects. Springer.

Chen, Y., & Yao, S. (2017). Sequential search with refinement: Model and application with big data. *Management Science, 63*(12), 4345-4365.

Cheng, C., Lu, M., & Tsen, H. (2021). Predicting online consumer transaction from big data: Influential factors and strategic planning. *Wireless Communications and Mobile Computing, 2021*. https://doi.org/10.1155/2021/8834713

Choi, T. M., Wallace, S. W., & Wang, Y. (2018). Big data analytics in operations management. *Production and Operations Management, 27*(10), 1868-1883.

CNBC. (2023). *Black Friday shoppers spent a record $9.8 billion in U.S. online sales, up 7.5% from last year*. https://www.cnbc.com/2023/11/25/black-friday-shoppers-spent-a-record-9point8-billion-in-us-online-sales-up-7point5percent-from-last-year.html

Digitalcommerce360. (2023). *US ecommerce sales rise in Q3, but growth remains flat*. https://www.digitalcommerce360.com/article/quarterly-online-sales

Dinev, T., & Hart, P. (2006). An extended privacy calculus model for e-commerce transactions. *Information Systems Research, 17*(1), 61-80.

Echelon Edge. (2023). *How data-driven organizations outperform their competitors?* https://www.echelonedge.com/infographics/how-data-driven-organizations-outperform-their-competitors/

Ghose, A., & Todri-Adamopoulos, V. (2016). Toward a digital attribution model. *MIS Quarterly, 40*(4), 889-910.

Gonzalez-Fuentes, M. (2017). The organization of the future and the marketing function. In *Advances in Computational Intelligence and Robotics* (pp. 126-145). https://doi.org/10.4018/978-1-5225-1656-9.ch007

Gregory, R. W., Henfridsson, O., Kaganer, E., & Kyriakou, H. (2020). The role of artificial intelligence and data network effects for creating user value. *Academy of Management Review, 45*(4), 795-817.

Hannak, A., Soeller, G., Lazer, D., Mislove, A., & Wilson, C. (2014). Measuring price discrimination and steering on e-commerce web sites. In *Proceedings of the 2014 Conference on Internet Measurement Conference* (pp. 305-318).

Hwang, K. (2017). *Cloud computing for machine learning and cognitive applications*. MIT Press.

Ijomah, T. I., Idemudia, C., Eyo-Udo, N. L., & Anjorin, K. F. (2024). Harnessing marketing analytics for enhanced decision-making and performance in SMEs. *World Journal of Advanced Science and Technology*, *6*(1), 001-012.

Indiatimes. (2018). *Alibaba under fire over use of customer data*. https://tech.economictimes.indiatimes.com/news/internet/alibaba-under-fire-over-use-of-customer-data/62389748

Jannach, D., & Adomavicius, G. (2016). Recommendations with a purpose. In *Proceedings of the 10th ACM Conference on Recommender Systems* (pp. 29-38).

Jha, A., Lin, L., & Savoia, E. (2016). The use of social media by state health departments in the US: analyzing health communication through Facebook. *Journal of Community Health, 41,* 174-179.

Katawetawaraks, C., & Wang, C. L. (2013). Online shopper behavior: Influences on online shopping decision. *Asian Journal of Business Research, 3*(2), 66-74.

Ken, R. R. W., Yahya, A., & Anastasya, D. (2022). The influence of perceived trust, service quality, and perceived risk: SME's interest in using e-commerce. *Journal of Social Science, 3*(4), 2720-9938.

Khan, L. M. (2017). Amazon's antitrust paradox. *Yale Law Journal, 126*, 710-805.

Knobloch-Westerwick, S. (2015). *Choice and preference in media use: Advances in selective exposure theory and research*. Routledge.

Koo, D. M., Kim, J. J., & Lee, S. H. (2008). Personal values as underlying motives of shopping online. *Asia Pacific Journal of Marketing and Logistics, 20*(2), 156-173.

Koski, N. (2004). Impulse buying on the internet: Encouraging and discouraging factors. In M. Seppä et al. (Eds.), *Frontiers of E-Business Research* (pp. 21-34). Tampere University of Technology and University of Tampere.

Kulvanitchaiyanunt, A. (2018). *Big data series II: Think like a data scientist*. Se-education.

Lambrecht, A., & Tucker, C. (2019). Algorithmic bias? An empirical study of apparent gender-based discrimination in the display of STEM career ads. *Management Science, 65*(7), 2966-2981.

Landeweerd, M., Spil, T., & Klein, R. (2013). The success of Google search, the failure of Google health, and the future of Google plus. In *International Working Conference on Transfer and Diffusion of IT* (pp. 221-239). Springer.

Li, G. (2015). *Big data related technologies, challenges, and future prospects*. Springer.

Li, Z. (2023). E-commerce platform data governance environment: Concepts, elements, and implications. *Frontiers in Business, Economics and Management, 7*(2), 99-104. https://doi.org/10.54097/fbem.v7i2.4850

Mahroof, K., Omar, A., Rana, N. P., Sivarajah, U., & Weerakkody, V. (2020). Drone as a Service (DaaS) in promoting cleaner agricultural production and Circular Economy for ethical sustainable supply chain development. *Journal of Cleaner Production, 287*, 125522.

Ming, J., Zeng, J., Bilal, M., Akram, U., & Fan, M. (2021). How social presence influences impulse buying behavior in live streaming commerce? The role of S-O-R theory. *International Journal of Web Information Systems, 17*, 300-320. https://doi.org/10.1108/IJWIS-02-2021-0012

Ministry of Digital Economy and Society. (2022). *Thailand Personal Data Protection Act (PDPA)*. Retrieved October 21, 2024, from https://www.mdes.go.th/mission/

Norton Rose Fulbright. (2014). *Global data privacy directory.* http://www.nortonrosefulbright.com/files/global-data-privacy-directory-52687.pdf?fbclid=IwAR0u5mO8ULBFTCIY-ANDdkLv-AMdAIytJTUKJym9SGOCyUra4otrPmBL7FY

OECD. (2020). *E-commerce in the time of COVID-19*. https://www.oecd.org/content/dam/oecd/en/publications/reports/2020/10/e-commerce-in-the-time-of-covid-19_bb699f3a/3a2b78e8-en.pdf

Pahnila, S., & Warsta, J. (2010). Online shopping viewed from a habit and value perspective. *Behavior & Information Technology, 29*(6), 621-632.

Pariser, E. (2011). *The filter bubble: What the Internet is hiding from you*. Penguin UK.

Politou, E., Alepis, E., & Patsakis, C. (2018). Forgetting personal data and revoking consent under the GDPR: Challenges and proposed solutions. *Journal of Cybersecurity, 4*(1). Article tyy001. https://doi.org/10.1093/cybsec/tyy001

Prachachat. (2022). *Lazada 11.11 shows sathiti yod kai toh 20 tap teab wela pokati* [Lazada 11.11 shows sales statistics growing 20 times compared to regular periods]. https://www.prachachat.net/ict/news-1116512

Prasad, K. R., & Jha, M. (2014). Consumer buying decisions models: A descriptive study. *International Journal of Innovation and Applied Studies, 6*, 2028-9324.

Preibusch, S., Peetz, T., Acar, G., & Berendt, B. (2016). Shopping for privacy: Purchase details leaked to PayPal. *Electronic Commerce Research and Applications, 15*, 52-64. https://doi.org/10.1016/j.elerap.2015.11.004

Raji, I. D., & Buolamwini, J. (2019). Actionable auditing: Investigating the impact of publicly naming biased performance results of commercial AI products. In *Proceedings of the 2019 AAAI/ACM Conference on AI, Ethics, and Society* (pp. 429–435). https://doi.org/10.1145/3306618.3314244

Raul, A. C., Manoranjan, S., & Mohan, V. (2017). *The privacy, data protection, and cybersecurity law review*. Law Business Research Ltd.

Reisig, K., Reisig, M., & Pratt, T. C. (2008). Low self-control, routine activities, and fraud victimization. *Criminology, 46*(1), 189-220. https://doi.org/10.1111/j.1745-9125.2008.00101.x

Rengel, A. (2014). *Privacy in the 21st century*. Martinus Nijhoff Publishers.

Reuters. (2016). Alibaba buys control of Lazada in $1 billion bet on SE Asia e-commerce. https://www.reuters.com/article/us-lazada-m-a-alibaba-idUSKCN0X90HT

Ricci, F., Rokach, L., & Shapira, B. (2015). *Recommender systems handbook*. Springer.

Smith, B., & Linden, G. (2017). Two decades of recommender systems at Amazon.com. *IEEE Internet Computing, 21*(3), 12-18.

Solove, D. J. (2012). Introduction: Privacy self-management and the consent dilemma. *Harvard Law Review, 126*, 1880.

Spiekermann, S., Acquisti, A., Böhme, R., & Hui, K. L. (2015). The challenges of personal data markets and privacy. *Electronic Markets, 25*(2), 161-167. https://doi.org/10.1007/s12525-015-0191-0

Storey, V., & Song, I. (2017). Big data technologies and management: What conceptual modeling can do. *Data & Knowledge Engineering*. https://doi.org/10.1016/j.datak.2017.01.001

Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal, 18*(7), 509-533.

The Guardian. (2016). *Companies are making money from our personal data--but at what cost?* https://www.theguardian.com/technology/2016/aug/31/personal-data-corporate-use-google-amazon

The Verge. (2018). *Facebook might not sell user data, but internal documents suggest it was certainly considered.* https://www.theverge.com/2018/11/29/18117582/facebook-six4three-internal-documents-emails-selling-user-data

Tikkinen-Piri, C., Rohunen, A., & Markkula, J. (2018). EU General Data Protection Regulation: Changes and implications for personal data collecting companies. *Computer Law & Security Review, 34*(1), 134-153.

TRUSTe. (2013). *U.S. consumer privacy. Confidence privacy report: What consumers think, business impact, and recommended actions*. http://www.theagitator.net/wp-content/uploads/012714_ConsumerConfidenceReport_US1.pdf

Verhagen, T., & Dolen, W. V. (2011). The influence of online store beliefs on consumer online impulse buying: A model and empirical application. *Information & Management, 48*(8), 320-327. https://doi.org/10.1016/j.im.2011.08.001

Wamba, S. F., Akter, S., Edwards, A., Chopin, G., & Gnanzou, D. (2015). How 'big data' can make big impact: Findings from a systematic review and a longitudinal case study. *International Journal of Production Economics, 165*, 234-246. https://doi.org/10.1016/j.ijpe.2014.12.031

Wang, J., Huang, P., Zhao, H., Zhang, Z., Zhao, B., & Lee, D. L. (2018). Billion-scale commodity embedding for e-commerce recommendation in Alibaba. In *Proceedings of the 24th ACM SIGKDD International Conference on Knowledge Discovery & Data Mining*. https://doi.org/10.1145/3219819.3219869

Weun, S., Jones, M. A., & Beatty, S. E. (1998). Development and validation of the impulse buying tendency scale. *Psychological Reports, 82*(3), 1123-1133.

Whittaker, S. (2011). Personal information management: From information consumption to curation. *Annual Review of Information Science and Technology, 45*, 1-62. https://doi.org/10.1002/ARIS.2011.1440450108

Woo, J. (2006). The right not to be identified: Privacy and anonymity in the interactive media environment. *New Media & Society, 8*(6), 949–967.

Yan, J., Liang, X., & Zheng, X. (2023). Influence mechanism of adoption willingness of personalized recommendation information on e-commerce platforms based on structural equation modeling. In *Proceedings Volume 12586, Second International Conference on Green Communication, Network, and Internet of Things (CNIoT 2022)*. https://doi.org/10.1117/12.2670328

Yang, C., Huang, O., Li, Z., Liu, K., & Hu, F. (2017). Big data and cloud computing: Innovation opportunities and challenges. *International Journal of Digital Earth, 10*(1), 13-53. https://doi.org/10.1080/17538947.2016.1239771

Yoseph, F., Ahamed Hassain Malim, N. H., Heikkilä, M., Brezulianu, A., Geman, O., & Paskhal Rostam, N. A. (2020). The impact of big data market segmentation using data mining and clustering techniques. *Journal of Intelligent & Fuzzy Systems*, *38*(5), 6159-6173.

Yue, H., & Hu, W. (2022). E-commerce data access control and encrypted storage based on Internet of Things. *Mathematical Problems in Engineering, 2022*. https://doi.org/10.1155/2022/4547002

Zhang, W., Leng, X., & Liu, S. (2020). Research on mobile impulse purchase intention in the perspective of system users during COVID-19. *Personal and Ubiquitous Computing, 25,* 157-167. https://doi.org/10.1007/s00779-020-01460-w

Zuboff, S. (2019). *The age of surveillance capitalism: The fight for a human future at the new frontier of power* Public Affairs.