The Use of Big Data in Customer Acquisition and Retention

Xiaotian Wu[1, *]

[1] *College of Business, Auburn University, Alabama, 36849, United State*
[*]*Corresponding author. Email: xzw0080@auburn.edu*

ABSTRACT

This paper sought to examine the usefulness of big data in customer acquisition and retention. Data for the study were collected from secondary sources such as articles and online publications. The data were later analyzed using thematic content analysis. Findings indicated that big data is revolutionizing the interaction of companies with their customers. For instance, the study showed that the technology allows firms to learn about their customers and address their concerns before they occur. The findings also showed that big data is allowing firms to attract and retain clients. The technology achieves this role by offering insights that enable firms to provide customized services. However, the findings suggested that big data can bring out privacy and security concerns. Therefore, users need to put in measures to reduce the likelihood of increased privacy and security issues within their big data environment. For instance, firms can use data anonymization to reduce privacy issues within the big data ecosystem.

Keywords: *Big data, Customer acquisition, Customer retention, Big data analytic*

1. INTRODUCTION

1.1. Background

Deqiang says that big data entered China, just like other parts of the world, as a technical myth [1]. Many people considered it an impossibility despite its promise of a brighter future for human society. However, today, many countries, including China, have realized the potential of big data and have developed policies to guide its adoption. For instance, China came up with a few plans in 2012 to support and expand the big data industry. According to a study by Shih & Xue, the plans were motivated by the understanding that big data can help enhance governance and push manufacturing to maximize value [2]. These policies have led to increased adoption of big data among government departments and Chinese companies. For instance, Huang established that Alibaba (the largest technology firm in China) has already adopted big data [3]. The company is today considered to have big data approaches similar to those of Amazon. Numerous other Chinese firms have also adopted big data to enhance their operations. Wang, for instance, established that TikTok uses big data to analyze its customer data and personalize its services [4]. However, the effect of big data on some business operations is less known. For instance, most firms do not understand how to use massive data to acquire and keep customers. This is so because few studies have assessed the outcome using big data on customer acquisition and retention. The few available studies, such as Zhang & Xiao, center more upon the impact of big data on firm performance [5]. This study seeks to close the literature gap and help firms understand how to leverage big data and enhance customer acquisition and retention.

1.2. Related research

Le and Liaw discovered that the search for information, recommendation systems, customer service, and dynamic pricing significantly affect customers' responses. However, there are issues concerning security, privacy, group influences, and shopping addiction. These factors were proven to have considerable effects on customers' shopping behavior and planning. Shopping addiction is more influential than other elements such as group influence in determining a customer's consuming behavior [6]. Zhao proposes a Hadoop-based mixed recommender system made of online and offline components. User information, product information, and preference information are collected and processed through collaborative filtering, content-based filtering, and clustering models, respectively. Initial recommendation sets would be generated, filtered,

ranked, and finally appear on recommendation lists. These would be sorted into different layers. The online part consists of the service gateway and the recommendation engine. The offline part comprises a data layer, a recall layer, and a ranking layer [7]. Rao et al. acquired experimental results showing that machine learning (ML) can significantly improve the performance of big data gathering and marketing precision, increasing the marginal profit for different products and services. Specifically, they have connected tea-device properties with buyers through an FP-grow algorithm and a clustering method [8].

Tang and Wu primarily propose five paths for big data to play a more effective role in influencing consumer behavior. First, firms should construct a good recommendation system that benefits from big data. This enhances consumer evaluation and makes customers accept the system. Second, the company should create a dependable reputation system aided by big data. Third, there is a need to popularize and optimize virtual experiences. The fourth is to perfect the function of information inquiry. And the fifth is to build a secure, stable system [9]. Zhao recognizes the value of e-business across different countries supported by big data systems. Specifically, big data can achieve cross-border relationship marketing, dynamic pricing, and social media and mobile marketing. Besides, they can provide pertinent suggestions. Dynamic pricing can maximize corporate revenue, maintain brand image, and enhance corporate competitiveness. Correlation marketing can optimize product recommendations because customer data from different countries and various platforms can be collected and analyzed [7]. Chen addresses the tailored service that big data can render to increase transaction opportunities and explore potential customers. Specifically, the first step is web page extraction, where web pages are viewed, and downloads can be stored and studied for future recommendations. The second step is calculating key features based on user activities on websites and downloads. Users' behaviors are duly recorded in terms of access date and behavior sequence. The fourth and the fifth steps are interest modeling, user portrayal, and information recommendations [10].

Liu, et al. tackle the issue by focusing on user comments. Using a web-based program, the researchers gathered comments, reviews, and other consumer data. They ordered the consumer-perceived value in four dimensions and related categorizations. Quality was shown to be the most important of the four dimensions, process perception the second, emotional value the third, and risk, the last [11]. Shen notes the advantages of applying big data in e-business in examining the target market, making internal management effective, executing marketing precisely, and ensuring that credit evaluation is optimal. Offline and online sales methods and data can be collected to understand factors involved in consumption and associated data. Big data can even be

applied within the e-business platform, realizing multiple functions. Big data can also help achieve multiple authentications to protect any transactions and the security of personal information [12]. Akter and Wamba recognize the roles of big data in e-business. To be specific, big data can achieve personalization by promoting special content and promotions to a specific group of clients. Dynamic pricing can also allow platforms such as Amazon to monitor competing prices. Sensors can be placed in products, which can help with preventing failures before occurrence. Big data can also helo collect multiple information from multiple sources, thereby predicting more accurate arrival times [13]. Kshetri pays attention to the potential privacy, security, and welfare concerns intrinsically linked with big data. The type, amount, frequency, and importance of the data collected could create ethical concerns as such information may result in deceptive practices, consumer exploitation, and interest violation. Although collecting such data may jeopardize big data's ability to create value and benefits, not all people are comfortable with their information being collected and potentially abused [14].

1.3. Study objective

As stated earlier, few studies have explored the impact of big data on customer acquisition and retention. This means that most firms (especially small ones) may not understand how to leverage big data to acquire new customers or retain existing ones. This study seeks to help plug the research gap by examining the influence of big data on customer acquisition and retention. More specifically, the paper seeks to explore how firms in China use big data to attract and retain customers. The end goal of the paper is to ensure firms can leverage big data like firms such as TikTok and Alibaba to enhance their customer base and performance.

2. CURRENT SITUATION

Today, everyone knows that they cannot kickstart a transformation journey without big data. This tremendous watershed allows firms to have access to remarkably intricate data sets. It also lets them come up with solutions that cater to their customers' needs. But how do big data help companies attract and retain customers? Below we look at the main use of big data in managing customer relations.

2.1. Customer relationship management (CRM)

CRM entails a firm's engagement with existing and potential clients. It combines all customer touchpoints and is the requisite of firms that want to provide better customer service. Big data have enhanced the process. More particularly, big data allows gathering and evaluating many unstructured and complex data to gain additional insights. Rijmenam adds that big data to CRM

helps better service the customer and gives better results [15]. For instance, the study indicates that big data allows firms to determine what clients are talking about concerning a company's products or services. Such an element is not available on the traditional CRM system. It is only possible when big data is combined with CRM. Therefore, big data plays a critical role in sentiment analysis in CRM. The subjective data exists out of a company's CRM system, including social media sites. Big data technology allows users to find patterns and trends in the data, sales opportunities, and adjustments that need to be made to product offerings to boost sales. In addition, Rijmenam suggests that sentiment analysis helps firms understand and address customer issues before they spread too big [15]. For instance, Alibaba has combined big data and its CRM system to help predict customer wants. The tool gathers customer online data in real-time and analyses it to predict customer needs. The system also allows the company to identify customer issues and automatically redirect them to another system termed Ali Assistant. Therefore, big data is used by firms to enhance their CRM systems.

2.2. Personalization and customization of products and services

Anshari et al. indicate that big data support personalization and customization in business [16]. In other words, the authors suggest that big data allow firms to tailor their sales, services, and customer services to customer needs [16]. For instance, TikTok and Alibaba have achieved pervasive personalization with big data and AI. Alibaba, for example, has invested heavily in big data and associated analytics tools to equip its eCommerce ecosystem better. Sampi adds that using these technologies has helped create a highly personalized Taobao app [17]. The app uses push notifications to enhance sales. The notifications are tailored to all users and made relevant to them. This kind of personalization is made possible by using big data and big data analytics, which provide insights into the consumer search history, content of their wish list, and past purchases [17]. Tiktok has also grown and expanded rapidly in the last two years due to the high personalization of services. The company uses a machine-learning algorithm to personalize the services. For instance, people who often watch Tiktok videos will find similar videos whenever they log in to the social media platform. Big data analytics allows the company to understand the users and make recommendations based on their search history.

2.3. Attracting and retaining customers

Big data and analytics are also used to attract and retain customers. Klein suggests that big data and analytics allow firms to attract and retain customers [18]. The technology does this by ensuring that firms have the

necessary insights and provide personalized products. In other words, big data allows firms to focus on what best serves and interests their target customers. For instance, a company that uses big data and analytics can understand its target customers and provide customized services. In doing so, the company enhances customer experience and satisfaction, which are key to customer retention.

Additionally, understanding what customers want allows firms to provide customized offers based on their individual needs. Such offers make customers feel unique and special and keep patronizing a company for more. For instance, Tiktok became the largest growing social media platform in 2021 due to its ability to leverage big data and analytics [19]. The company uses machine learning and artificial technology to understand the target users and keep them hooked onto the platform by providing personalized videos [19].

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4. BIG DATA: ISSUES AND CHALLENGES

Big data and associated analytics are very useful to firms, as indicated above. They allow firms to attract and retain customers. However, there are some concerns. There are several concerns related to big data and big data analytics. Some of these issues are evaluated below.

4.1. Privacy concerns

The potential risk to privacy is among the downsides of big data and analytics. The technologies generate vast amounts of data. The data is usually generated from a data subject (such as consumers). However, the data ends up being used as a by-product in a company. For instance, Tiktok collects large volumes of data about its users and uses the data to gather insights about them. However, the collected data sometimes may end up being mishandled or misused by the data collector. The majority of privacy risks occur in the form of data breaches, brokerage, and discrimination. A data breach is a form of privacy concern that arises when someone accesses client's information without authorization.

Mostly, data breaches occur because people have used weak passwords. They also happen because system users have not updated the software and protected themselves from malware attacks. For instance, Hill & Swinhoe showed that an attacker obtained part on Sina Weibo's database in 2020 [19]. The attacker stole customer data (real names, phone numbers, and location) for more than 538 million accounts. The attack was due to poor security measured by the social networking site [19].

Data brokerage is another form of data privacy in the environment wherein people are using big data. The privacy concern entails the sale of unprotected data. For instance, NetEase's customer data was stolen and sold in 2015. The privacy issue involved 235 million accounts. However, the company denied that the action was a significant privacy issue. The last privacy concern, data discrimination, entails the development of algorithms that discriminate against people due to their ethnicity, gender, or age. For instance, some employee wellness firms and insurers may use big data to gather information about their target customers [21]. However, the information collected might be used to penalize some of the target consumers to amount to data discrimination. For instance, insurers may leverage their customer knowledge to prevent people with chronic health issues from accessing insurance [21].

4.2. Big data security

Data security and data privacy are not interchangeable concepts. However, the two terms are connected. For instance, bad privacy practices often lead to security vulnerabilities. The term "big data security" is an umbrella term that comprises all security tools and measures applied to data processes and analytics (Sundaram, 2021). The attacks on a company's big data systems (e.g., DDoS attacks, information theft, and ransomware) may originate from either online or offline spheres. The consequences of a security breach can be worse when it entails confidential or sensitive information [22]. The breach can cause businesses to pay fines for failure to meet the data security measures. In other words, failure to comply with the general data protection regulation and data loss protection can lead to fines. However, big data users can prevent such an occurrence by putting in place measures that enhance compliance. Kim et al. mention that big data security is about information and data security and monitoring [23]. Data security and information security are closely related as they involve the prevention of unauthorized access, modification, distribution, or use of data or information. Lu et al. add that security is all about ensuring cyberspace security, system integrity, and big data management [24]. This implies that big data security's main aim is to provide real-time monitoring of systems to spot threats, exposures, and atypical behaviors [24].

4.3. Data integrity problems

The term "data integrity" describes a big data set's quality, reliability, and completeness. In an enterprise, data integrity is built upon four major pillars: data enrichment, location intelligence, enterprise-wide integration, and accuracy & quality. The pillars allow firms to achieve data integrity. However, as data volume increases, it becomes difficult for some firms to maintain data integrity. For instance, the accuracy and completeness of data diminish as large volumes of data are mined. Brook suggests that data integrity is compromised by human error, transfer errors, physical compromise to devices, and bugs [25]. For instance, transfer errors (including data compromise and intended alterations) during transfer may cause a loss of data integrity. Brook adds that data is worthless without integrity and accuracy [25]. This means that data integrity is a major element that makes big data important. In other words, firms cannot gain reliable insights from big data if the data is compromised or altered.

5. SOLUTIONS

5.1. Data cryptography

The science of deciphering codes is a unique and interesting one. Intriguingly, one would work on systems wherein no one can understand its data unless with proper credentials. Previous studies have offered some solutions to the identified big data problems. For instance, Benjelloun & Lahcen identified some key solutions for big data security concerns [15]. The study showed that firms need to choose adequate security solutions that fit their situation. For instance, the study showed that firms could use data cryptography to ensure the confidentiality of big data [15]. The strategy entails the conversion of plain text into unintelligible or unreadable text. The method protects data from theft or alteration. It also restricts data access from unauthorized persons using private keys or hash functions. In my view, the best strategy to achieve data security with cryptography is to allow individuals within the organization to give their views on available systems. This might help brainstorm and determine the most secure big data analytics system.

I have also found layers of security to be an interesting area. It ensures that illegal access is difficult because one has to go through layers or stages before accessing data. According to Lu et al., essential data needs to be encrypted at all levels of security [24]. This means that firms should not overlook some areas of the big data environment. Benjelloun & Lahcen suggest using data anonymization to enhance the security and privacy of big data [15]. However, data anonymization ought to happen without affecting data quality or system performance. The technique can be achieved through data masking and pseudonymization [26]. Data masking requires firms to hide data within altered values. The method can include the use of modification techniques such as character substitution, encryption, and shuffling. Pseudonymization, on its part, is a data security technique that replaces private identifiers with fake ones (pseudonyms). For instance, they can replace the identifier "Stuart Mill" with "Smith James" [26]. The process is convenient and useful in reducing privacy issues and preserving the accuracy and integrity of data. In my view, data anonymization can only be effective only if everyone in the organization has adequate training on how it works. Individuals also argue that organizations need to have data security policies to ensure that everyone treats sensitive data the same way. Nevertheless, Individuals support the contribution of every employee to ensure that the system is secure and foolproof.

5.2. Cloud data storage

I have been using some cloud data storage services that fascinate me. One can save anything on cloud storage platforms and use a password to access it. This implies that while cloud data storage is a good strategy, an extra security measure is necessary. Benjelloun and Lahcen have established that firms may use centralized security management to reduce privacy and security concerns [15]. The authors suggest that firms should store their data on cloud storage systems rather than on actual devices. The

measure's objective is to leverage the standard and normalized conformity system and security infrastructure on the cloud. For instance, cloud systems are periodically updated and checked continuously to reduce security breaches. However, zero security risk can be difficult to achieve in the cloud. This is because the data security in the cloud would rely on the service providers. However, firms using the strategy can enhance its effectiveness by vetting the cloud providers. This means that they should ensure that the providers have adequate protection before using their services. Benjelloun & Lahcen add that there is a need for continuous surveillance in big data environments [15]. The strategy aims to help detect privacy and security issues in real-time. However, firms have to ensure continuous assessment and constantly check the big data environment for security threats. The use of data loss prevention, dynamic assessment of security details, and security info and event managing system (SIEM) can help achieve data security surveillance [15]. Besides, it is crucial to carry out audits regularly to identify areas that need to be enhanced. I also think that companies should specify the people in charge of big data analytics. Constant appraisals can identify employees who can be malicious with consumer or other data.

5.3. Employee sensitization and involvement

I have been thinking about the data breaches reported in the news in recent times. In most cases, I have realized that the systems are secure, but the employees are simply lax or incompetent. According to Talend, some organizations are likely to experience internal privacy risks [27]. This can occur due to carelessness on the part of employees. Therefore, there is a need to educate each employee on the best approaches to realizing data security and privacy. For instance, the employees need to know the importance of implementing security measures. In addition, the employees need to be part of the privacy and security management process to enhance its efficiency. I would say that every employee has a role in ensuring that data are safe at all times. Thus, organizations should have policies requiring employees to take responsibility in case of data failures. Most importantly, firms should ensure that employees use strong passwords, log off immediately after using computer systems, and change passwords frequently.

Maayan suggests that firms should implement policy-driven access controls to protect their big data platforms against insider threats [28]. The measure is sometimes considered a basic security tool in the workplace [28]. However, it can reduce security data breaches that insiders perpetrate. The author adds that key management can also help enhance security. The process is mainly concerned with the protection of cryptography keys from misuse or loss. The strategy is recommended for firms that use data cryptography as their main privacy-

enhancing measure. It ensures that the keys do not end up in the wrong hands. As I review these recommendations, I realize the need to involve every employee in ensuring that big data analytics systems are as secure as possible. The organization should specify the role that every individual must play in safeguarding and improving the system. An associated well-spelled policy can increase customers' confidence in the big data analytics system.

6. CONCLUSION

This paper has examined big data and analytics systems in today's business environment. The essay has shown that big data is revolutionizing how companies interact with their clients. For instance, the technology allows firms to learn about their customers and address their concerns before they occur. The paper has also shown that big data is allowing firms to attract and retain clients. The technology achieves this role by offering insights that allow firms to provide customized services. The essay has also shown that big data is not risk-free. The technology is prone to security and privacy concerns. This is because some unauthorized persons are likely to steal the collected data, manipulate it, or use it against the owners' wishes. Firms should, therefore, implement measures to prevent security and privacy breaches in the big data environment. For instance, the use of data anonymization can help reduce privacy issues within the big data ecosystem. Most importantly, firms should continuously audit their big data environment, identify vulnerable areas, and implement best practices to reduce the occurrence of privacy and security risks.

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