EAI Endorsed Transactions
on Scalable Information Systems
Research Article EAI.EU

Edge Computing in E-commerce Business: Economic Impacts and Advantages of Scalable Information Systems

Dikson Silitonga[1*], Siti Alfia Ayu Rohmayanti[2], Zaenal Aripin[3], Dadi Kuswandi[4], Arif Budi Sulistyo[5], Juhari[6]

[1]Institut Bisnis Nusantara, Jakarta, Indonesia
[2]Universitas Airlangga, Surabaya, Indonesia
[3]Universitas Sangga Buana YPKP, Bandung, Indonesia
[4]Universitas Gunadarma, Jakarta, Indonesia
[5]Universitas Banten Jaya, Serang, Indonesia
[6]Universitas Pertiba Pangkalpinang, Indonesia

Abstract

INTRODUCTION: Edge Computing brings better responsiveness and faster customer experiences, while Scalable Information Systems enable efficient business growth management.
OBJECTIVE: This research analyzes the economic impact of using Edge Computing in E-Commerce businesses and reveals the advantages of Scalable Information Systems.
METHOD: The research approach used is a mixed-method, which includes quantitative data analysis and interviews with key stakeholders in five E-Commerce companies.
RESULTS: The research results show increased responsiveness, operational efficiency, cost savings, enhanced data security, and better customer retention due to the implementation of Edge Computing. Scalable Information Systems also help E-Commerce companies manage rapid business growth flexibly.
CONCLUSION: This technology provides significant and relevant advantages in improving company performance and competitiveness in a competitive E-Commerce context.

Keywords: Edge Computing, E-Commerce, Scalable Information Systems, Economic Impact, Business Growth.

Received on 15 May 2023, accepted on 29 October 2023, published on 10 November 2023

doi: 10.4108/eetsis.4375

1. Introduction

E-commerce has experienced rapid growth and has become one of the most critical aspects of the modern business world. This concept refers to buying and selling products and services online via electronic platforms, such as websites, mobile applications, and online marketplaces. E-commerce has become a significant force in the global economy, changing how companies interact with customers and conduct transactions [1], [2]. The role of technology in online business is the key to the success of e-commerce. Technology has enabled online businesses to create more efficient and engaging customer experiences. Optimized websites and mobile apps give customers 24/7 access to various products and services, allowing them to shop anytime and anywhere. Technology also enables deep personalization, with algorithms that analyze customer shopping behaviour and offer relevant product recommendations [3], [4].

*Corresponding author. Email: diksonpanuturi@gmail.com

Technology plays an important role when it comes to security and trust. Secure online payment systems, data encryption and privacy protection are key elements that enable customers to feel comfortable shopping online; this also helps online businesses to maintain customer trust and minimize the risk of data loss or theft of personal information. Technology also facilitates efficient inventory and supply chain management [5], [6]. With a smart, integrated inventory management system, businesses can optimize their product stock and avoid inventory shortages or excesses, reducing operational costs and increasing efficiency.

In the highly competitive world of E-commerce, technology also provides a significant competitive advantage. Data analytics allows businesses to understand customer behaviour and market trends, which can be used to make smarter decisions in marketing strategy and product development. The role of technology in E-commerce is vital. It has profoundly changed the business landscape, providing customers convenience and personalization and helping businesses grow and compete in an increasingly digital and global marketplace [7], [8]. Technology is not just a tool; it is the foundation of the entire E-commerce ecosystem that continues to grow.

E-commerce has also developed very rapidly in Indonesia in recent years. As a country with one of the largest populations in the world and increasingly widespread internet penetration, Indonesia is a beautiful potential market for e-commerce businesses. The rapid growth in this industry highlights several important factors that have influenced changes in how business is conducted and how consumers interact with the marketplace [9], [10]. It should be noted that Indonesia has a vast and rapidly growing population, creating an up-and-coming market for E-commerce companies. Increasing internet penetration and use of mobile devices across the country has created better connectivity for people, opening up significant business opportunities [10], [11]. Data on predicted numbers of e-commerce users in Indonesia in 2024 is presented in the following image:

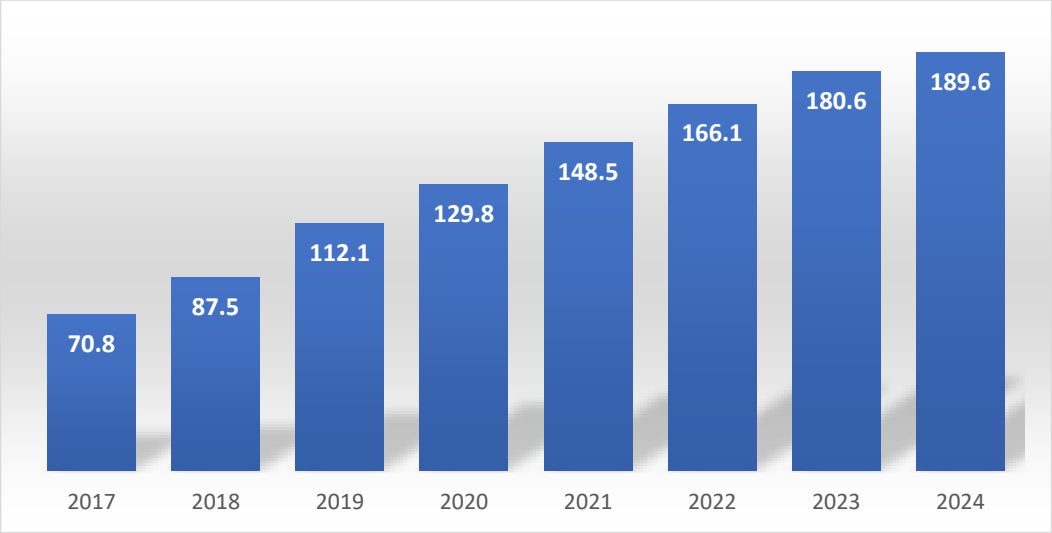

Figure 1. Predicted Number of E-Commerce Users in Indonesia (2017-2024) (In Million)

Source: Tempo.co (2020)

It is important to realize how important mobile devices are in the Indonesian E-commerce ecosystem. The use of mobile applications has dominated access to E-commerce platforms, with many users more comfortable shopping through apps than through websites. Therefore, E-commerce companies have invested significant resources in developing and maintaining user-friendly and reliable mobile applications. The important role of digital payments is also worth noting. Indonesia has seen growth in the use of digital wallets and online payments, which has increased customer convenience in shopping online [12], [13]; it also allows access to more customers who may not have access to traditional payment methods.

Logistics and shipping are other important elements in Indonesian E-commerce. As an archipelagic country with a wide geographical spread, Indonesia has its own challenges in terms of shipping goods. E-commerce businesses have responded by investing in better logistics infrastructure and collaborating with delivery service providers. This is a crucial step to ensure that goods can be delivered to customers quickly and efficiently. In terms of regulations set by the Indonesian government, the Indonesian government has begun to regulate the E-commerce industry to protect consumers and monitor the growth of this sector; this includes regulations related to taxes and consumer protection, which will reflect an awareness of the importance of maintaining the integrity of the E-commerce market and maintaining consumer trust [14], [15].

Although E-commerce has experienced rapid growth, the sector also faces several challenges, such as intense competition and security of online transactions. Increasingly intensive competition encourages E-commerce companies to innovate and provide added value to their customers [16], [17]. The security of online transactions is also a significant concern because of the increasing number of online transactions. Awareness of safe practices in online shopping is essential to protect consumers from the risk of fraud [18].

E-commerce in Indonesia has excellent growth potential because it is supported by technological developments, increased connectivity and changes in consumer behaviour. As the government continues its efforts to regulate this sector, it is hoped that these positive developments will continue and contribute to the country's economic growth. E-commerce companies must also continue to adapt to dynamic changes in the industry, solve challenges, and maintain service quality to retain and attract more customers in the future. E-commerce has become an essential sector in the Indonesian economy. The rapid growth in E-commerce reflects the role of technology and the Internet in changing how people shop and do business in Indonesia. With great potential and the use of technology that continues to develop, E-commerce in Indonesia is expected to continue to develop and contribute to the country's economic growth [19], [20].

E-commerce and Edge Computing are closely related to optimising online business customer experience and operational efficiency. Edge Computing enables data processing closer to the source, minimising latency and increasing responsiveness in E-commerce, which is essential in real-time applications such as product personalisation, shopping analytics, and efficient supply chain management. Edge Computing can improve security by managing sensitive data locally, an essential aspect of trusted E-commerce [21], [22]. With the integration of Edge Computing, E-commerce can deliver customers a faster, more personalised, and reliable shopping experience and increase their operational efficiency.

The background to the development of Edge Computing in modern computing reflects the evolution of technology that allows processing data closer to the source. Data in traditional computing is sent to a remote data centre (cloud) for analysis and processing. However, with the rise of the Internet of Things (IoT) and data-heavy applications that require real-time performance, the need has emerged to reduce latency and increase efficiency [23]. This is what is driving the development of Edge Computing. Edge Computing allows data processing to be carried out at a location closer to the data source, such as IoT devices, sensors, or mobile devices. This reduces latency, increases responsiveness, and reduces network load. For example, Edge Computing can enable fast analysis of online transactions in E-commerce businesses and provide customers with a better shopping experience. This development is also driven by increasingly powerful and energy-efficient processing hardware advances. With miniature computers with high computing capabilities, companies and organisations can use Edge Computing to optimise their operations. Understanding the background and development of Edge Computing is very important in modern computing, especially in the E-commerce industry, which continues to increase [24], [25]. To understand Edge Computing more clearly, the author will provide a simple overview, which will be presented in the following image:

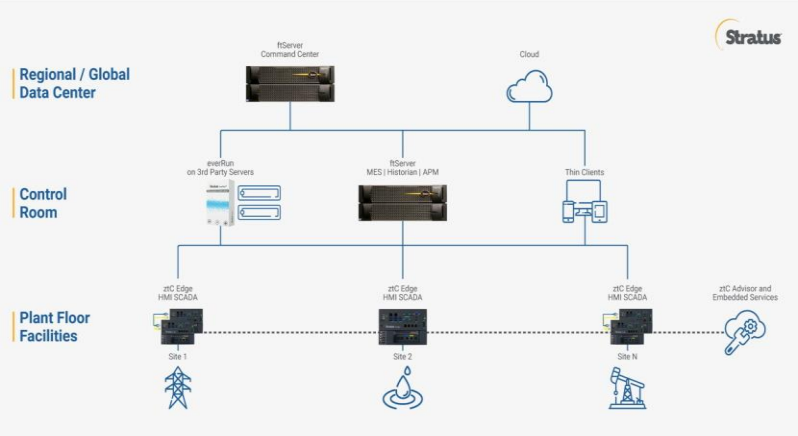

Figure 2. Edges Computing Ecosystem

Source: Stratus (2023)

One of the main challenges is latency in real-time applications such as autonomous cars or IoT-based health systems; delays of even a few milliseconds in data processing can have serious consequences. Edge Computing allows data processing to be carried out closer to the data source itself, reducing latency while maintaining the desired data integrity and speed. This is especially important in online banking, gaming, and video streaming services, where real-time responsiveness is critical. Edge Computing also reduces network and communications infrastructure load because not all data has to be sent to a central data centre for analysis [26], [27]. This saves bandwidth and energy, becoming critical in an increasingly connected and sustainable environment.

In the modern E-commerce business, the development of Edge Computing has opened up new opportunities; for example, online stores can utilise real-time analysis to recommend products to customers based on their shopping behaviour, and payment processing can be done more quickly and safely. In addition, supply chain and inventory management can be optimised more efficiently through real-time physical store or warehouse location monitoring [28]. The background to the development of Edge Computing reflects a response to the development of computing needs in an increasingly sophisticated digital era. This technology has enabled significant transformation in various industries, including E-commerce, significantly impacting performance, efficiency, and user experience. As hardware technology becomes increasingly powerful

and energy efficient, Edge Computing continues to develop and is expected to play an increasingly significant role in modern computing.

2. Literature Review

2.1. The Concept of Edge Computing and its Differences with Cloud Computing

The Edge Computing concept is an approach to computing that emphasises data processing and computing carried out closer to the "edge" of the network, which means closer to the data source or device that produces the data [29]. This differs from Cloud Computing, where data and computing are centralised in remote data centres. The following are the differences between the two concepts:

Table 1. Difference between Cloud Computing and Edge Computing

Cloud Computing	Edge Computing
It is the on-demand delivery of computing resources including servers, storage, databases, and software over the Internet.	It refers to the deployment of data-handling or other network operations away from the cloud servers, to the edge of the network.
Location coverage is global because data centers are located around the world.	It brings computation closer to the network edge where the data is gathered at source.
The average response time is in minutes or days.	The average response time is in milliseconds.
The cloud requires a huge amount of bandwidth.	The amount of bandwidth is significantly reduced.

Source: DB (DifferenceBetween.net (2023)

Edge Computing enables real-time data processing, reduces latency, increases responsiveness, and reduces network load. This is an ideal approach for applications that require speed and efficiency, such as the Internet of Things (IoT), industrial automation, and data-heavy applications that require fast performance [30], [31].

2.2. Previous Research on the Application of Edge Computing in Various Industries

The implementation of Edge Computing has become a revolutionary innovation changing the landscape of various industries worldwide. In an era where data is becoming increasingly abundant and speed is at a premium, Edge Computing is emerging as a solution that enables data processing closer to the source, reduces latency, and enables real-time response [32]. This concept has significantly impacted various sectors, from manufacturing to health, energy, transportation, and agriculture, bringing unprecedented efficiency, safety, and flexibility.

The manufacturing industry has adopted Edge Computing to improve supply chain management, implement real-time machine monitoring, and optimise production operations. On the other hand, Edge Computing enables local processing of medical data, enabling faster patient health monitoring and more effective responses in the healthcare sector. Edge Computing in the transportation industry is used for fleet management and real-time tracking, optimising routes, and increasing fuel efficiency. In the energy sector, using Edge Computing in intelligent electricity grid management has brought energy savings and better reliability of electricity supply. This technology in smart farming monitors plants growth conditions in real time, helping farmers make smarter decisions. In the introduction, we will explore some concrete examples of

how Edge Computing has revolutionised these industries and opened the door to new opportunities. The following are examples of previous research on the application of Edge Computing in various industries:

1. Manufacturing: A study in the manufacturing industry tries to integrate Edge Computing in production systems to optimise supply chain management, real-time machine monitoring and predictive maintenance. By using sensors connected to computers at the physical location of the factory, Edge Computing enables data analysis close to the source. Machines can predict potential damage and take corrective action before damage occurs, increasing production efficiency and reducing downtime [11], [13].
2. Health: In this Health sector, research has focused on using Edge Computing in IoT-based medical devices. An example is using sensors attached to patients to monitor their vital signs. The resulting data is analysed locally on Edge devices, enabling medical teams to access patient health information in real-time without sending data to the cloud. This increases reactivity and allows rapid intervention when there is a change in the patient's condition [15], [17], [27], [33].
3. Transportation and Logistics: Research in the transportation and logistics industry has explored the application of Edge Computing for fleet management and real-time tracking. Using Edge sensors and devices, companies can track location, vehicle condition and fuel usage in real-time. This allows companies to plan more efficient routes, minimise waiting times and reduce operational costs.
4. Energy: Edge Computing has been used to manage smart electricity networks (smart grids) in the energy sector. This research uses Edge devices to process data from various sources, including power plants, consumers, and renewable energy. With this, the system can automatically optimise energy distribution, reduce waste, and increase the reliability of electricity supply [34], [35].
5. Agriculture: Edge Computing supports the "smart farming" concept in the agricultural sector. Through sensors planted in the field and Edge technology, farmers can monitor soil temperature, humidity, and crop growth conditions in real time. This data can help make more intelligent decisions regarding irrigation, fertilisation, and crop protection, increasing crop yields and agricultural efficiency [36], [37].

These studies show that Edge Computing enables more innovative and more responsive use of data in various industries. By processing data closer to the source, businesses and organisations can optimise their operations, increase efficiency and improve customer service.

3. Method

This research uses a mixed-methods approach, which combines quantitative and qualitative data analysis to evaluate the impact of Edge Computing in E-commerce businesses. This approach allows the author to comprehensively explore scalable information systems' economic aspects and benefits. The author collected quantitative data from several leading E-commerce companies adopting Edge Computing. This data includes Responsiveness, Operational Efficiency, Data Security, Customer Potential, and Page Load Time. This data is taken from internal company reports, historical analysis, and interviews with company executives. The author also conducted in-depth interviews with key stakeholders in E-commerce companies that have adopted Edge Computing to collect qualitative data. This interview aims to understand how Edge Computing has impacted business strategy, data security, and customer experience.

The analytical tool used is quantitative data, which is analysed using statistical software such as SPSS, while qualitative data is analysed using a thematic analysis approach; the author also uses software for data visualisation to present findings in graphs and tables that are easy to understand. The research sample consists of five E-Commerce companies operating in different markets. This sample selection was made intentionally to cover various aspects of E-commerce businesses, including company size, business model, and target market. Quantitative data was analysed first, followed by in-depth interviews with stakeholders. Data analysis was carried out sequentially, with findings from quantitative data used as a basis for qualitative interviews.

The interview informants in this research are the main stakeholders in E-commerce companies adopting Edge Computing. This could include corporate executives, information technology managers, supply chain managers, and other professionals making strategic decisions about using Edge Computing in E-commerce businesses. Interviews to gain in-depth insight into the economic impact benefits of scalable information systems and challenges that may be faced in adopting Edge Computing technology in the context of their E-commerce business.

4. Result and Discussion

4.1. Economic Impact of Edge Computing in E-Commerce Business (Qualitative Data Analysis)

The economic impact of Edge Computing in the E-commerce business is very significant. One of the main benefits is reduced latency in data processing, which results in faster responses in various aspects of E-commerce operations. With Edge Computing, companies can provide customers with a more responsive shopping experience, such as faster page load times and more efficient transaction handling. This means customers are more satisfied and more likely to keep shopping on that E-commerce platform, which can increase revenue and customer retention.

Edge Computing can also reduce infrastructure and operational costs. By processing data closer to the source, companies can reduce dependence on remote data centres, which can save on server rental and data shipping costs. It can also optimise the use of resources, such as energy, which can ultimately reduce operational costs. By reducing costs and increasing efficiency, Edge Computing can contribute positively to the profit margins of E-commerce companies, which is an essential aspect in a competitive economic context [38], [39]. Along with that, this technology also has a positive economic impact on the E-commerce business ecosystem as a whole, encouraging innovation and growth in this sector; this can be seen from the results of interviews in this research:

To informant 1, who comes from E-Commerce company 1 and has the answer as a stakeholder, the author asked, "How does the use of Edge Computing affect the performance of E-Commerce 1 and contribute to the growth of your business?" the informant's explanation is as follows:

"*Edge Computing has had a significant impact on our performance. One of the main things we noticed was the increased responsiveness of our platform. We can serve content faster to our customers, increasing customer satisfaction levels. We've also observed a decrease in the rate of complaints regarding slow page load times. Conversions have increased as customers tend to stay on our site longer. From a growth perspective, this has helped us gain a larger market share and increase our revenue.*"

E-Commerce 1 experienced increased responsiveness and increased conversions thanks to Edge Computing. This means their website users experience a faster and smoother shopping experience, increasing customer retention and revenue.

To Informant 2, the focus question was "How has Edge Computing helped E-Commerce 2 in reducing operational costs or increasing efficiency?" the informant's explanation was as follows:

"Edge Computing has brought us several economic benefits. We have reduced infrastructure costs and network bandwidth by processing data closer to the source. We no longer need to send large amounts of data to remote data centres, which means savings in server rental and data delivery costs. It also reduces energy usage in data centres. In our day-to-day operations, we also benefit from more efficient supply chain management, resulting in significant cost savings in inventory and shipping. This has helped us improve our operational efficiency and profit margins."

E-Commerce 2 has recorded significant infrastructure and data delivery cost savings. With Edge Computing, they can reduce server and bandwidth costs and save energy in the data centre. This has helped them improve operational efficiency and profit margins.

To Informant 3, the question focused on Can E-Commerce 3 share insights about the security benefits provided by Edge Computing in E-Commerce operations, informant 3's answer was as follows:

"Security is a key factor in our E-Commerce business, and Edge Computing has played a vital role. We can better manage sensitive data locally with data processing close to the source. This means that customer and transaction data does not have to be sent to the cloud or a remote data centre, which can reduce potential risks related to data security. We can also implement additional security measures on Edge devices, such as faster threat detection and real-time response to possible attacks. This has increased our data protection level and given our customers extra confidence."

E-Commerce 3 emphasises the importance of data security in E-Commerce businesses. With Edge Computing, they can better manage customer data locally, which reduces security risks associated with sending data to the cloud or remote data centres.

To Informant 4, the question focused more on How Edge Computing has influenced customer experience and customer retention rates in E-Commerce 4; the informant's answer was as follows:

"Edge Computing has been a game changer for our customer experience. We have provided a faster, more responsive, and personalised shopping experience. Faster page load times and real-time analytics have allowed us to provide more relevant product recommendations to customers, which increases cross-product sales. This has increased customer retention, as customers return to our platform for a better shopping experience. We have seen a significant increase in our customer retention rate, which in turn has had a positive impact on our revenue. Satisfied and loyal customers are a valuable asset to our business."

E-Commerce 4 reports significant improvements in customer experience. With the use of Edge Computing, they can provide a faster and more personalised shopping experience, which has resulted in increased customer retention and an increase in their revenue.

Interview with informant 5 as the last informant, focused on How Edge Computing affects the performance and operations of E-Commerce 5, the informant's answer is as follows:

"Edge Computing has brought positive changes in our performance and operations. Our website page load times have improved, increasing customer satisfaction levels. Within our operations, we have managed inventory and shipping more efficiently, resulting in significant cost savings. With Edge Computing, we also can process transactions in real-time, which positively impacts our operations and customer response. This positive impact has helped us retain and attract customers in a highly competitive market."

E-Commerce 5 reported improvements in their performance and operations thanks to Edge Computing. Faster response in their website page load times means a smoother customer shopping experience, increasing customer satisfaction. They noted better inventory management and shipping efficiencies, resulting in significant cost savings in their operations. The ability to

process transactions in real time also helps provide faster customer responses. This positive impact of Edge Computing overall increases E-Commerce 5's competitiveness in a tight market and helps them retain and attract more customers.

4.2. Economic Impact of Edge Computing in E-Commerce Business (Quantitative Data Analysis)

In processing quantitative research data originating from primary data regarding several critical variables in implementing Edge Computing in E-Commerce. The author collected quantitative data from several leading E-commerce companies adopting Edge Computing. This data includes metrics such as Responsiveness, Operational Efficiency, Data Security, Customer Potential, and Page Load Time; descriptions of these variables are presented in the following paragraphs:

1. Responsiveness: How quickly the E-commerce platform can respond to customer requests and provide a faster shopping experience.
2. Operational Efficiency: Implies reduced operational costs and more efficient use of resources due to Edge Computing.
3. Data Security: Refers to efforts to protect customer and transaction data from potential security risks and threats.
4. Customer Retention: Demonstrates the ability to retain existing customers and attract new ones thanks to improvements in the shopping experience and responsiveness.
5. Page Load Time: Describes how quickly an E-commerce website can load pages, influencing customer satisfaction and conversion rates.

These variables are vital in measuring and understanding the impact of implementing Edge Computing in the E-commerce businesses sampled in this research and how this technology impacts various aspects of operations and customer experience. The SPSS test results are presented in the following table:

Based on the results of data analysis via SPSS, it can be seen that the significant results in implementing Edge Computing in the E-commerce business can be described as follows:

1. Increased Responsiveness: Improved responsiveness thanks to Edge Computing makes the customer experience more positive. Customers tend to be more satisfied because they can shop faster and more smoothly. The economic impact of better responsiveness is an increase in the number of customers completing transactions, which can ultimately increase company revenue.
2. High Operational Efficiency: Improved operational efficiency means companies can manage resources more efficiently. Companies can increase their profit margins by reducing operational costs, such as server costs and data transmission. This can contribute to the overall economic health of a company.
3. Enhanced Data Security: Better data security is an investment in building customer trust. In the long term, this can result in higher customer retention rates, considering customers tend to remain loyal to businesses they consider safe. This is important in maintaining revenue and maintaining business reputation.
4. Increased Customer Retention: Better customer experience and improved data security can increase customer retention rates. Satisfied and loyal customers are more likely to make repeat purchases, which can provide ongoing revenue to the company.
5. Fast Page Load Times: Faster page load times increase customer satisfaction and conversions. In E-commerce businesses, increased conversions mean more transactions completed successfully. This is a significant factor in increasing business revenue.

With these impacts, companies implementing Edge Computing in their E-commerce business can achieve increased revenue, operational cost savings, higher customer trust, and strong customer retention, resulting in solid and sustainable economic growth.

Scalable Information Systems (Scalable Information Systems) offer a variety of valuable advantages in the modern business context. One of its main advantages is its ability to accommodate rapid growth and changes in the scale of a company's operations. As a business grows, a scalable information system can expand its capacity and functionality without replacing the entire IT infrastructure [8], [9]. This allows companies to be flexible in dealing with ever-changing market demands, accelerate the launch of new products or services, and efficiently deal with surges in data traffic. Scalable information systems also offer advantages in terms of performance. The system can maintain high responsiveness and fast task completion times by adapting to varying workloads. This means more efficient use of IT resources and a better user experience because scalable infrastructure can grow in line with demand, and companies can save on costs associated with significant initial investments. In general, the use of Edge Computing has 5 aspects that are interrelated and mutually beneficial and have a very significant impact, which can be described as follows:

Table 2. Multiple Linear Analysis Results

Coefficient

Model		Unstandardised Coefficient		Standardized Coefficient	t	Sig.
		B	Std. Error	beta		
1	(Constant)	35.214	2.617		13.547	.000
	Responsiveness	.512	.117	-.814	-4.314	.001
	High Operational Efficiency	1.105	1.005	-.155	.957	.273
	Enhanced Data Security	.769	.835	.483	.863	.351
	Data Security	.836	.963	.217	1.153	.394
	Customer Retention	.549	.816	.312	1.129	.426
	Page Load Time	.598	.634	.257	1.127	.145
a. Dependent Variable: The Economic Impact of Edge Computing						

Source: Data Proceed

Scalable information systems allow companies to be more connected and integrated. Data can easily flow from one system component to another, enabling companies to make smarter, real-time decisions. With good integration, companies can also maximise the use of their data, create new opportunities, and expand the scope of their operations. These benefits positively impact the company's efficiency, productivity, and competitiveness in an increasingly global and competitive market. Thus, scalable information systems are critical to future business success [36], [40].

Edge Computing and Scalable Information Systems have substantially impacted the E-Commerce industry. This combination of technologies not only impacts performance but also changes the operational paradigm of E-Commerce companies. The enhanced responsiveness provided by Edge Computing provides a faster and more responsive customer experience, increasing customer retention and generating higher revenue. The advantages of Scalable Information Systems mean that E-Commerce companies can quickly adapt to rapid business growth and demand fluctuations, ensuring efficient operations and saving on operational costs. Improved data security is critical in maintaining customer trust, a key element in customer retention. The ability to respond quickly to market changes through real-time analysis means that E-Commerce companies can stay competitive and keep up with market trends. Edge Computing and Scalable Information Systems are substantial pillars in creating a healthy and sustainable economy for E-Commerce companies facing increasingly complex challenges in this digital world [40], [41].

5. Conclusion

This research reveals that using Edge Computing in E-Commerce businesses positively impacts responsiveness, customer experience, and conversion. Scalable Information Systems enable rapid business growth management, operational efficiency, and cost savings. Better data security is also an essential focus in protecting customer trust. The research results highlight the critical role of this technology in improving efficiency, customer retention, and response to market changes. Investments in Edge Computing and Scalable Information Systems are relevant and beneficial for E-Commerce companies in maintaining competitiveness and success in a dynamic market.

References

[1] A. V. Barenji, H. Guo, Y. Wang, Z. Li, and Y. Rong, “Toward blockchain and fog computing collaborative design and manufacturing platform: Support customer view,” Robot Comput Integr Manuf, vol. 67, p. 102043, 2021.

[2] A. Kumari, S. Tanwar, S. Tyagi, and N. Kumar, “Fog computing for Healthcare 4.0 environment: Opportunities and challenges,” Computers & Electrical Engineering, vol. 72, pp. 1–13, 2018.

[3] A. H. Sodhro, Z. Luo, A. K. Sangaiah, and S. W. Baik, “Mobile edge computing based QoS optimization in medical healthcare applications,” Int J Inf Manage, vol. 45, pp. 308–318, 2019.

[4] A. M. Rahmani et al., “Exploiting smart e-Health gateways at the edge of healthcare Internet-of-Things: A fog computing approach,” Future Generation Computer Systems, vol. 78, pp. 641–658, 2018.

[5] A. A. Mutlag, M. K. Abd Ghani, N. al Arunkumar, M. A. Mohammed, and O. Mohd, “Enabling technologies for fog computing in healthcare IoT systems,” Future generation computer systems, vol. 90, pp. 62–78, 2019.

[6] Abdul Jalil Kahditani. (2022). The Function of Pragmatics in Translation and the Pragmatic Challenges Translators Face. Journal of Language and Linguistics in Society(JLLS) ISSN 2815-0961, 2(05), 48–56. https://doi.org/10.55529/jlls.25.48.56

[7] Adetoyi, H. N., Solaja, O. O. ., Abiodun, A. S., Daini, T. G. ., & Solesi, O. A. . (2022). The Impact of Ambulance usage on the Conveyance of Accident Victims in Lagos State Emergency Management Agency (Lasema). Journal of Nursing Research,Patient Safety and Practise(JNRPSP) 2799-1210, 2(06), 1–5. https://doi.org/10.55529/jnrpsp.26.1.5

[8] Anjana Rajeev T. (2021). Writing Ithihasa: Subversion Of Mythical Stereotypes In Select Novels In Indian Literature. Journal of Women

Empowerment and Studies (JWES) ISSN:2799-1253, 1(01), 17–21. https://doi.org/10.55529/jwes.11.17.21

[9] C. Li, J. Tang, H. Tang, and Y. Luo, "Collaborative cache allocation and task scheduling for data-intensive applications in the edge computing environment," Future Generation Computer Systems, vol. 95, pp. 249–264, 2019.

[10] C. Li, Y. Zhang, X. Gao, and Y. Luo, "Energy-latency tradeoffs for edge caching and dynamic service migration based on DQN in mobile edge computing," J Parallel Distrib Comput, vol. 166, pp. 15–31, 2022.

[11] C. Li, J. Bai, Y. Ge, and Y. Luo, "Heterogeneity-aware elastic provisioning in cloud-assisted edge computing systems," Future Generation Computer Systems, vol. 112, pp. 1106–1121, 2020.

[12] C. Zhang, "Design and application of fog computing and Internet of Things service platform for smart city," Future Generation Computer Systems, vol. 112, pp. 630–640, 2020.

[13] Chalachew kassaw, Alem Eskeziya, & Habtamu Endashaw. (2021). Poor Sleep Quality And Associated Factors Among Individuals In COVID-19 Quarantine Center, Southern Ethiopia, 2020. Journal of Mental Health Issues and Behavior(JMHIB) ISSN: 2799-1261, 1(01), 1–11. https://doi.org/10.55529/jmhib11.1.11

[14] D. P. Sejati, "Pengangguran serta Dampaknya terhadap Pertumbuhan dan Pembangunan Ekonomi," AKSELERASI: Jurnal Ilmiah Nasional, vol. 2, no. 3, Nov. 2020, doi: 10.54783/jin.v2i3.313.

[15] D. Novak, M. Batko, and P. Zezula, "Metric index: An efficient and scalable solution for precise and approximate similarity search," Inf Syst, vol. 36, no. 4, pp. 721–733, 2011.

[16] D. Berdik, S. Otoum, N. Schmidt, D. Porter, and Y. Jararweh, "A survey on blockchain for information systems management and security," Inf Process Manag, vol. 58, no. 1, p. 102397, 2021.

[17] D. Liu, Y. Zhang, D. Jia, Q. Zhang, X. Zhao, and H. Rong, "Toward secure distributed data storage with error locating in blockchain enabled edge computing," Comput Stand Interfaces, vol. 79, p. 103560, 2022.

[18] Dinesh Kumar. (2022). Style and Stylistic in Linguistic A Critical Overview. Journal of Language and Linguistics in Society(JLLS) ISSN 2815-0961, 2(05), 57–63. https://doi.org/10.55529/jlls.25.57.63

[19] Dr. Meghna Jain. (2022). Sentiment Classification of Hindi Language using Natural Language Processing Techniques. Journal of Language and Linguistics in Society(JLLS) ISSN 2815-0961, 2(06), 7–10. https://doi.org/10.55529/jlls.26.7.10

[20] Dr. Chokio Taku. (2021). "Deversifications Growth Of Health Care Services": An Empirical Analysis In Arunachal Pradesh. Journal of Mental Health Issues and Behavior(JMHIB) ISSN: 2799-1261, 2(01), 1–29. https://doi.org/10.55529/jmhib21.1.29

[21] Devi NR, M. M. ., & Sharma, M. R. . (2022). Knowledge of the GNM Students Regarding Suicide Prevention in the Govt. AMT School, GMCH Jammu J&K UT India: A Survey. Journal of Nursing Research,Patient Safety and Practise(JNRPSP) 2799-1210, 2(06), 6–16. https://doi.org/10.55529/jnrpsp.26.6.16

[22] E. Ahmed and M. H. Rehmani, "Mobile edge computing: opportunities, solutions, and challenges," Future Generation Computer Systems, vol. 70. Elsevier, pp. 59–63, 2017.

[23] F. P. Knebel, R. Trevisan, G. S. do Nascimento, M. Abel, and J. A. Wickboldt, "A study on cloud and edge computing for the implementation of digital twins in the Oil & Gas industries," Comput Ind Eng, vol. 182, p. 109363, 2023.

[24] FentahunGebrie. (2021). Study On Types Of Gender-Based Violence Against Female Health Extension Workers: The Case Of Paweworeda, Benishangulgumuz Regional State. Journal of Women Empowerment and Studies (JWES) ISSN:2799-1253, 1(01), 1–16. https://doi.org/10.55529/jwes.11.1.16

[25] G. A. Negoro and I. A. K. R. K, "Pengaruh Kepemimpinan Transformasional, Lingkungan Kerja, dan Kesiapan Untuk Berubah Terhadap Kinerja Karyawan Collection PT. Bank BTN KC Solo di Masa Pandemi COVID-19," Jurnal Kelola: Jurnal Ilmu Sosial, vol. 6, no. 1, Mar. 2023, doi: 10.54783/jk.v6i1.667.

[26] G. Nain, K. K. Pattanaik, and G. K. Sharma, "Towards edge computing in intelligent manufacturing: Past, present and future," J Manuf Syst, vol. 62, pp. 588–611, 2022.

[27] Girish Shanbhogue. (2021). Role Of Self Help Group In Building The Women Entrepreneurship: A Case Study Of ADARSHA. Journal of Women Empowerment and Studies (JWES) ISSN:2799-1253, 1(01), 22–26. https://doi.org/10.55529/jwes.11.22.26

[28] H. Abbas, S. Shaheen, M. Elhoseny, A. K. Singh, and M. Alkhambashi, "Systems thinking for developing sustainable complex smart cities based on self-regulated agent systems and fog computing," Sustainable Computing: Informatics and Systems, vol. 19, pp. 204–213, 2018.

[29] H. Zhang, S. Ren, X. Li, H. Baharin, A. Alghamdi, and O. A. Alghamdi, "Developing scalable management information system with big financial data using data mart and mining architecture," Inf Process Manag, vol. 60, no. 3, p. 103326, 2023.

[30] Halyal, U. A. ., & Poleshi, S. (2022). The Significance of Non-Drug Correction of Carbohydrate Metabolism Disorders. Journal of Nursing Research,Patient Safety and Practise(JNRPSP) 2799-1210, 2(05), 1–14. https://doi.org/10.55529/jnrpsp.25.1.14

[31] Haneen Ali Haleem. (2021). From the "Other" to Matriarch: The Transcending Role of Black Women in Hansberry's A Raisin in the Sun. Journal of Women Empowerment and Studies (JWES) ISSN:2799-1253, 1(01), 32–39. https://doi.org/10.55529/jwes.11.32.39

[32] I. Sittón-Candanedo, R. S. Alonso, J. M. Corchado, S. Rodríguez-González, and R. Casado-Vara, "A review of edge computing reference architectures and a new global edge proposal," Future Generation Computer Systems, vol. 99, pp. 278–294, 2019

[33] J. Wang, P. Zheng, Y. Lv, J. Bao, and J. Zhang, "Fog-IBDIS: Industrial big data integration and sharing with fog computing for manufacturing systems," Engineering, vol. 5, no. 4, pp. 662–670, 2019.

[34] J. Zhang, C. Deng, P. Zheng, X. Xu, and Z. Ma, "Development of an edge computing-based cyber-physical machine tool," Robot Comput Integr Manuf, vol. 67, p. 102042, 2021.

[35] J. Liu, B. Pan, X. Zhang, and D. Li, "Mobile E-commerce information system based on industry cluster under edge computing," Mobile Information Systems, vol. 2021, pp. 1–11, 2021.

[36] J. Tatemura and W.-P. Hsiung, "Web service decomposition: Edge computing architecture for cache-friendly e-commerce applications," Electron Commer Res Appl, vol. 5, no. 1, pp. 57–65, 2006.

[37] Jagdeep Kaur, & Dr. DJ Singh. (2021). Study The Level Of Depression, Anxiety And Stress Among Working And Non Working Married Women In Ludhiana. Journal of Mental Health Issues and Behavior(JMHIB) ISSN: 2799-1261, 1(02), 1–8. https://doi.org/10.55529/jmhib12.1.8

[38] Khushpreet Kaur. (2021). Role Of Family Environment And School Environment In Depression Among Adolescents. Journal of Mental Health Issues and Behavior(JMHIB) ISSN: 2799-1261, 1(02), 9–14. https://doi.org/10.55529/jmhib12.9.14

[39] L. Hu, Y. Miao, G. Wu, M. M. Hassan, and I. Humar, "iRobot-Factory: An intelligent robot factory based on cognitive manufacturing and edge computing," Future Generation Computer Systems, vol. 90, pp. 569–577, 2019.

[40] L. Kuang, T. Gong, S. OuYang, H. Gao, and S. Deng, "Offloading decision methods for multiple users with structured tasks in edge computing for smart cities," Future Generation Computer Systems, vol. 105, pp. 717–729, 2020.

[41] L. Wang and Y. Wang, "Supply chain financial service management system based on block chain IoT data sharing and edge computing," Alexandria engineering journal, vol. 61, no. 1, pp. 147–158, 2022.

[42] Leonard C. Manuel. (2022). Peer Leadership Skills and Practices in Reducing Bullying Cases. Journal of Mental Health Issues and Behavior(JMHIB) ISSN: 2799-1261, 2(03), 7–17. https://doi.org/10.55529/jmhib.23.7.17

[43] M. D. Thamarai Selvi, & Dr. P. Saranya. (2022). The Difficulties Encountered by English Professors when Attempting to Teach Writing Skills to Freshman Engineering Students. Journal of Language and Linguistics in Society(JLLS) ISSN 2815-0961, 2(05), 30–47. https://doi.org/10.55529/jlls.25.30.47

[44] M.D.Thamarai Selvi, & Dr. P. Saranya. (2022). Meliorating Engineering Students' Writing Skills through Practicing Storyboard in the Classroom. Journal of Language and Linguistics in Society(JLLS) ISSN 2815-0961, 2(06), 1–6. https://doi.org/10.55529/jlls.26.1.6

[45] Manzoor Ahmad Malla. (2021). Substance Abuse And Mental Health Disorder Among The Youth Living In Conflict Environment. Journal of Mental Health Issues and Behavior(JMHIB) ISSN: 2799-1261, 1(01), 12–22. https://doi.org/10.55529/jmhib11.12.22

[46] Mohd Nazrul Azizi, Nurashikin Binti Ibrahim, & Firdaus Hilmi. (2022). Factors Affecting Mental Health among Youth Post COVID-19. Journal of Mental Health Issues and Behavior(JMHIB) ISSN: 2799-1261, 2(03), 1–6. https://doi.org/10.55529/jmhib23.1.6

[47] Madem Nosheen Muzamil, & Muhammad Muzamil. (2022). The Incidence of Suicide in Pakistan Day by Day, Especially the Educated Youth Trying to Commit Suicide in 2022 2023. Journal of Mental Health Issues and Behavior(JMHIB) ISSN: 2799-1261, 2(05), 12–20. https://doi.org/10.55529/jmhib.25.12.20

[48] Miss. Priyanka Mallinath Tadlagi, Miss. Vaishnavi Padmakar Deshpande, Miss. Alfiya Abdul Gaffar Chanda, Miss.Pradnya Ramakant Kakade, & Dr. Kazi Kutubuddin Sayyad Liyakat. (2022). Depression Detection. Journal of Mental Health Issues and Behavior(JMHIB) ISSN: 2799-1261, 2(06), 1–7. https://doi.org/10.55529/jmhib.26.1.7

[49] Md. Moshiur Rahman, Israth Jahan Tama, Nazmul Hasan, Rashed Ullah Rana, Sharmin Chowdhury, Afrin Jahan Dola, & Moustaq Karim Khan Rony. (2021). Addressing Nurses as Sister or Brother: What Should You Say?. Journal of Nursing Research,Patient Safety and Practise(JNRPSP) 2799-1210, 1(01), 5–7. https://doi.org/10.55529/jnrpsp11.5.7

[50] Nazmul Hasan, Rashed Ullah Rana, Sharmin Chowdhury, Afrin Jahan Dola, & Moustaq Karim Khan Rony. (2021). Ethical Considerations In Research. Journal of Nursing Research,Patient Safety and Practise(JNRPSP) 2799-1210, 1(01), 1–4. https://doi.org/10.55529/jnrpsp11.1.4

[51] Olatunde O. Solaja, Abiodun S. Abiodun, Helen. N. Adetoyi, Obafemi. A. Solesi, Tolulope, & G. Daini. (2022). Comparative Assessment of the Knowledge

and Prevalence of Health Related Disorder Associated with Living around the Abattoir Waste Dumpsite in Ogun-State, Nigeria. (A study of Ijebu-Ode and Ijebu-Igbo Local Government Area of Ogun-State, Nigeria). Journal of Mental Health Issues and Behavior(JMHIB) ISSN: 2799-1261, 2(04), 1–8. https://doi.org/10.55529/jmhib.24.1.8

[52] Purna Laxmi Jamatia. (2022). The Role of Youth in Combating Social Inequality: Empowering the Next Generation. Journal of Language and Linguistics in Society(JLLS) ISSN 2815-0961, 2(06), 11–20. https://doi.org/10.55529/jlls.26.11.20

[53] Q. Qu, C. Liu, and X. Bao, "E-commerce enterprise supply chain financing risk assessment based on linked data mining and edge computing," Mobile Information Systems, vol. 2021, pp. 1–9, 2021.

[54] R. E. Sulistyowati, I. Rachmawati, and D. Meigawati, "Implementasi Kebijakan Penyelenggaraan Kesejahteraan Sosial di Kota Sukabumi: Studi Kasus Pemberdayaan Wanita Rawan Sosial Ekonomi," PAPATUNG: Jurnal Ilmu Administrasi Publik, Pemerintahan dan Politik, vol. 2, no. 2, Aug. 2019, doi: 10.54783/japp.v2i2.1.

[55] R. D. Anvari and D. Norouzi, "The impact of e-commerce and R&D on economic development in some selected countries," Procedia-Social and Behavioral Sciences, vol. 229, pp. 354–362, 2016.

[56] Rahul Chauhan, & Andino Maseleno. (2022). Effects of Digital Technology on Mental Health of Children. Journal of Mental Health Issues and Behavior(JMHIB) ISSN: 2799-1261, 2(05), 1–11. https://doi.org/10.55529/jmhib.25.1.11

[57] Rashed Ullah Rana, Mst. Rina Parvin, & Nazmul Hasan. (2022). Future Challenges Related To The Bangladeshi Health Sector Through The Impact Of Various Factors. Journal of Nursing Research,Patient Safety and Practise(JNRPSP) 2799-1210, 2(02), 1–4. https://doi.org/10.55529/jnrpsp.22.1.4

[58] Ramana, T.. (2022). A Deep Learning Model for Detection Cancer in Breast. Journal of Nursing Research,Patient Safety and Practise(JNRPSP) 2799-1210, 2(03), 1–7. https://doi.org/10.55529/jnrpsp.23.1.7

[59] S. Anggara and Z. Cao, "E-Commerce in Singapore and Indonesia: Comparison of Policies," International Journal of Science and Society, vol. 1, no. 1, Jun. 2019, doi: 10.54783/ijsoc.v1i1.6.

[60] S. Escursell, P. Llorach-Massana, and M. B. Roncero, "Sustainability in E-Commerce Packaging: A Review," J Clean Prod, vol. 280, p. 124314, 2021.

[61] S. Liu, C. Guo, F. Al-Turjman, K. Muhammad, and V. H. C. de Albuquerque, "Reliability of response region: a novel mechanism in visual tracking by edge computing for IIoT environments," Mech Syst Signal Process, vol. 138, p. 106537, 2020.

[62] S. Hu, S. Huang, J. Huang, and J. Su, "Blockchain and edge computing technology enabling organic agricultural supply chain: A framework solution to trust crisis," Comput Ind Eng, vol. 153, p. 107079, 2021.

[63] S. Wang, Y. Zhao, J. Xu, J. Yuan, and C.-H. Hsu, "Edge server placement in mobile edge computing," J Parallel Distrib Comput, vol. 127, pp. 160–168, 2019.

[64] Samiul Biswas, & Dr. Anshu Narad. (2021). Psychological And Social Problems Among Higher Secondary School Female Teachers In West Bengal. Journal of Mental Health Issues and Behavior(JMHIB) ISSN: 2799-1261, 2(01), 30–37. https://doi.org/10.55529/jmhib21.30.37

[65] Swapan Banerjee. (2022). Overcoming Challenges and Achieving Higher Recovery in Coordination with Nurses Employed in Psychiatric Wards. Journal of Nursing Research,Patient Safety and Practise(JNRPSP) 2799-1210, 2(04), 1–5. https://doi.org/10.55529/jnrpsp.24.1.5

[66] W. Z. Khan, E. Ahmed, S. Hakak, I. Yaqoob, and A. Ahmed, "Edge computing: A survey," Future Generation Computer Systems, vol. 97, pp. 219–235, 2019.

[67] X. Xu et al., "A computation offloading method over big data for IoT-enabled cloud-edge computing," Future Generation Computer Systems, vol. 95, pp. 522–533, 2019.

[68] Y. Shao, C. Li, Z. Fu, L. Jia, and Y. Luo, "Cost-effective replication management and scheduling in edge computing," Journal of Network and Computer Applications, vol. 129, pp. 46–61, 2019.

[69] Y. Ai, M. Peng, and K. Zhang, "Edge computing technologies for Internet of Things: a primer," Digital Communications and Networks, vol. 4, no. 2, pp. 77–86, 2018.

[70] Z. Huang, M. Wiesch, M. Fey, and C. Brecher, "Edge computing-based virtual measuring machine for process-parallel prediction of workpiece quality in metal cutting," Procedia CIRP, vol. 107, pp. 363–368, 2022.

[71] Z. Zhao, P. Lin, L. Shen, M. Zhang, and G. Q. Huang, "IoT edge computing-enabled collaborative tracking system for manufacturing resources in industrial park," Advanced Engineering Informatics, vol. 43, p. 101044, 2020.