THE ROLE OF AI USING BUSINESS INTELLIGENCE IN E-COMMERCE-BASED ONLINE BUSINESSES

Omike Arma[1]

[1] Business Administration Department, Faculty of Business Administration, IPMI International Business School, Jakarta, Indonesia

E-mail: [1] omikearma07@gmail.com

ABSTRACT

This research discusses the role of communication science in building effective communication in the digital era, with a focus on the use of digital communication technology, audience understanding, two-way interaction, and the application of communication ethics. Technological advances have changed the way organizations and individuals communicate, requiring a more personalized, interactive and data-driven communication approach to increase audience engagement. The research method used is a quantitative approach through a survey of 500 respondents, which assesses the effectiveness of various aspects of digital communication such as the use of audience data, content innovation and information credibility. The research results show that two-way interactions (83% of respondents) and digital content innovation (85% of respondents) have a significant impact in building audience engagement and loyalty. Meanwhile, data-based audience understanding also increases communication effectiveness with an average score of 4.5 on a scale of 1-5. These findings provide important insights for communication practitioners to improve the quality of relationships with audiences through a more relevant and adaptive approach to technological changes. The study recommends increased collaboration between the communications and technology fields, as well as further education on digital ethics to strengthen the credibility of communications in the future.

Keywords: **Communication Science, Digital Communication, Communication Effectiveness, Digital Business Intelligence, E-commerce, Business Intelligence**

1. INTRODUCTION

In recent decades, the development of digital technology has brought major changes in various aspects of life, one of which is the way humans communicate (Ayu Oktaviani et al., 2023a). This transformation presents new challenges and opportunities for the global community to connect more widely and faster   (Tan, 2022; Winata, 2022))

Where in the past communication relied more on traditional media such as television, radio, and newspapers, now digital technology has allowed the emergence of various new communication platforms such as social media, instant messaging applications, and video-sharing sites that make it easier for anyone to convey information in seconds (Hayat & Abidin Riam, 2022)This phenomenon requires people to continue to adapt and improve their communication skills in order to be able to convey messages more effectively (Sahari et al., 2022)

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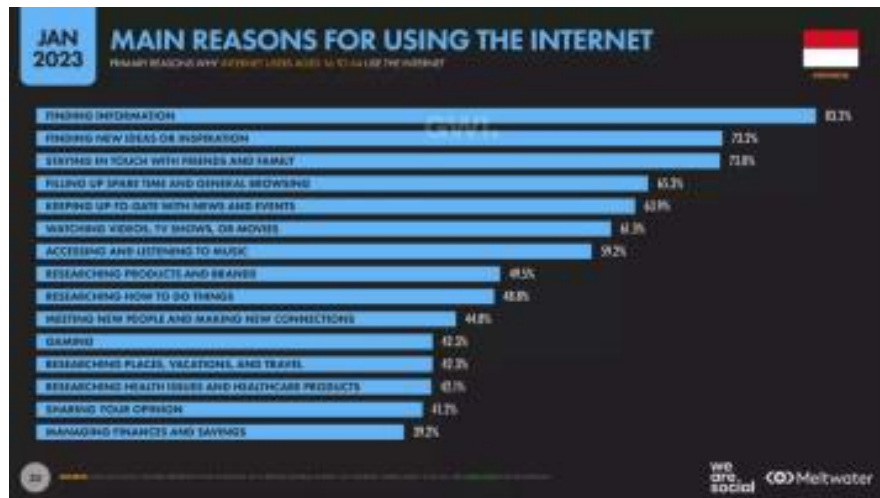*Arma*

Figure 1. Purpose of Social Use in Indonesia

In the midst of such rapid changes, the Department of Communication Studies plays an important role in equipping the younger generation with relevant skills to face communication challenges in the digital era (Mayasari et al., n.d.-a)Effective communication is no longer enough to be done only through traditional approaches, but also requires a deep understanding of the characteristics of digital media. This is where the main role of Communication Science in the digital age is: building skills for its students to craft effective messages (Tampubolon & Sitompul, 2019) using the right media, and understanding the audience thoroughly. By mastering digital communication techniques, graduates can act as information connectors who are able to convey messages accurately and interestingly in this increasingly complex world (Tampubolon & Sitompul, 2019)

In Communication Sciences, students are taught about the importance of building effective and relevant messages according to the characteristics of the media used (Mayasari et al., n.d.-b)Good messages are messages that can reach an audience and are able to influence their thoughts, attitudes, and behaviors (Gemilang & Yuliana, 2023). (Mardhiyah   , 2022; Rolando et al., 2022) However, in this digital era, the skills in building an attractive message are not enough (Communication, 2020)Communication Science students are also required to understand various existing digital communication platforms, such as Instagram, Twitter, tiktok, and youtube, which have different characteristics and audiences (Zis et at2021)   (Arma, 2022; Rolando & Mulyono, 2025a)   (Wijaya, 2022) Therefore, the preparation of messages must consider many aspects, ranging from word choice, visuals, to the time of dissemination in order to produce effective communication (Kinanti, n.d.)
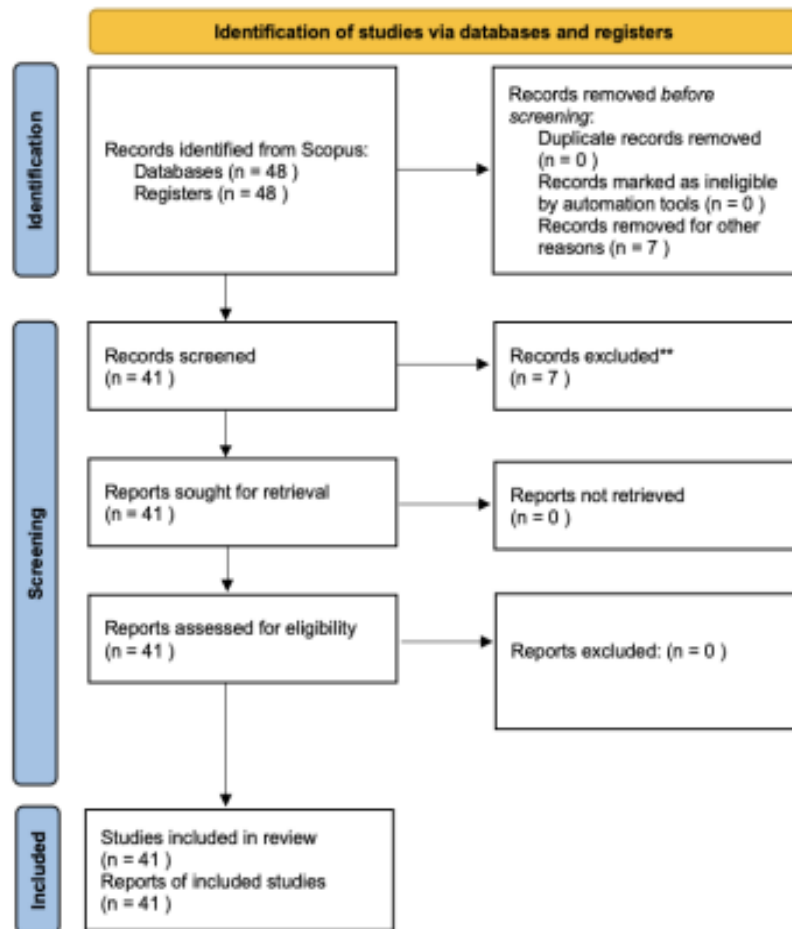
Figure 2. PRISMA Flow Diagram

Not only that, the role of Communication Science also includes an understanding of the right message distribution strategy in the digital world (Marti et al., 2022).In this era, the dissemination of messages is not only about sending information, but also how to ensure that the information reaches the desired audience and has the expected impact (Lestari, 2021).

This requires an understanding of social media platform algorithms, digital marketing strategies, as well as SEO search engine optimization techniques. Communication Science students are equipped with knowledge about how algorithms work which can help in determining the right time to publish content to get maximum visibility (Zis et al., 2021)   (Rolando & Mulyono, 2025b)

The digital era also demands skills in managing interactions with audiences, who are increasingly directly involved in the process of communication through social media . Here, Communication Science provides the basics of relationship management with the audience or better known as "engagement." Students learn how to build positive, professional relationships with audiences on social media, answer questions or criticism wisely, and create interactions that encourage engagement. Effective interactions can increase engagement, build trust, and build a good reputation among the audience, so that messages can be conveyed more effectively and have a long-term impact.

Effective communication in the digital age requires a deep understanding of the audience. In Communication Science, students are taught about techniques to get to know the audience more closely, ranging from demographic analysis, content preferences, to media consumption habits. In the digital age, data about this audience can be accessed through various analytical tools, both provided by social media platforms and other specialized software. By understanding the audience more specifically, students can personalize their messages to suit the needs and characteristics of their

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targets. This not only makes the message more relevant, but it also increases the likelihood of a positive response from the audience, which ultimately supports the effectiveness of communication.

In addition to technical skills, Communication Science also emphasizes the importance of ethics in communicating. The spread of false information or information that tends to be manipulative is very easy to occur in the digital world, which often has a negative impact on public trust. Therefore, Communication Science teaches students to communicate responsibly, pay attention to ethics, and always check the accuracy of the information conveyed. This communication ethics is important to create a healthy communication environment, where information can be conveyed honestly and transparently. Thus, Communication Science students are not only equipped with technical skills but also moral understanding to maintain the integrity of their communication.

Communication Science also prepares students to understand and utilize technological advancements such as artificial intelligence (AI) and data analytics. In the modern world of communication, AI is used to personalize the user experience and make relevant content recommendations based on user behavior data. Thus, Communication Science students can adapt to technological changes and use these tools to improve communication effectiveness. Mastery of digital technology also allows students to be more flexible and able to face future challenges, where communication trends and platforms will continue to develop.

1. How is the application of communication science in developing effective communication strategies in digital media?
2. How can Communication Science students leverage digital technology to understand audiences and personalize messages?
3. What is the role of communication ethics in maintaining the credibility of information in the digital era for Communication Science graduates?
4. The Important Role of BI and AI in Creating Opportunities to Improve Strategy in Marketing Products in E-commerce?

Based on the background presented in the journal, the research objectives of the topic "The Role of Communication Science in Building Effective Communication in the Digital Era (AI Analysis Using Business Intelligence in E-Commerce-Based Online Business)" can be formulated as follows:

1. Identifying the role of communication science in the digital age
    o Analyze how the principles of communication science are applied to create effective communication between business people and consumers in the digital context.
2. Explore the application of AI and Business Intelligence in e-commerce
    o Examine how AI and BI help in analyzing customer needs, creating marketing strategies, and optimizing communication with audiences.
3. Investigating the impact of AI in building personalized and relevant communication
    o Measuring the extent to which AI can improve the effectiveness of messages delivered through digital platforms to strengthen loyalty and user experience.
4. Formulate effective data-driven communication strategies
    o Provide recommendations based on AI and BI analysis to improve the connection between e-commerce businesses and consumers.
5. Measuring the effectiveness of digital communication in AI-based e-commerce
    o Compare traditional approaches with AI-based approaches to demonstrate improved efficiency and business outcomes.

2. RESEARCH METHOD

This research uses a qualitative approach to explore the role of Communication Science in building effective communication in the digital era. With a focus on an in-depth understanding of the application of effective and ethical communication strategies, this research method will involve in-depth interviews and analysis of related literature.

The qualitative approach was chosen because it was able to explore the perspectives, understanding, and experiences of communication practitioners and academics. This approach

provides flexibility in exploring important aspects such as digital communication strategies, message personalization, and the application of ethics in digital media.

2. Data Collection Methods

Interviews will be conducted with communication practitioners working in digital media and academics in the field of Communication Sciences. Interview questions will focus on the communication strategies they use, the way they understand the audience, and the application of communication ethics in maintaining the credibility of the message. The researcher will conduct a literature review from relevant journals, books, and articles related to the role of Communication Science in the digital era, especially in compiling effective and ethical communication. The main instrument in this study is an interview guide consisting of a list of open-ended questions arranged based on the formulation of the problem. In addition, observation protocols will also be used to record effective and ethical digital communication patterns from interviews and literature reviews.

The collected data will be analyzed using thematic analysis techniques. The first step is the transcription of interview data and the sorting of important information from the literature. Furthermore, the data will be grouped into themes that are in accordance with the research focus, namely effective communication strategies, message personalization, and the application of ethics in digital media. The validity of this study is an interview guide consisting of a list of open-ended questions compiled based on the formulation of the problem. In addition, observation protocols will also be used to record effective and ethical digital communication patterns from interviews and literature reviews.

3. RESULTS AND DISCUSSION

This study aims to explore the role of Communication Science in building effective communication in the digital era (Irmansyah et al., 2023)Based on data collected through in-depth interviews with digital communication practitioners and Communication Science Academics as well as analysis of related literature, it can be concluded that Communication Science has a very important role in shaping effective communication strategies across various digital platforms(Pakpahan, 2021a)The results of this study not only provide insight into how to effectively convey messages in the digital world, but also how to maintain communication ethics to maintain the credibility of the information disseminated (Ferbita et al., n.d.)

Table 1. Sources of Journal Publications Obtained

Source	Sum	Percentage
IEEE Conferences	4	9.76%
Springer Publications	7	18.07%
Emerald Publications	4	10.76%
Others	25	60.98%
Total	45	100%

One of the main findings of this study is the importance of understanding audiences in the digital era (Cay & Irnawati, 2020). The digital communication practitioners interviewed explained that in order to be able to develop an effective communication strategy, it is very important to understand the characteristics of the audience (Hapsari & Pamungkas, n.d.)In the digital world, audiences are not only diverse in terms of demographics, but also have different preferences in terms of information consumption (Fidiyanti et al., 2023)Therefore, effective communication depends not only on the message conveyed, but also on the media used, the time of delivery of the message, and how the message is adapted to the audience's behavior (Kartikawati et al., n.d.)For example, the use of social media such as Instagram or tiktok requires a different approach to the use of platforms such as linkedin or Twitter. This shows that communication in the digital era must be more personal and adaptive, following changes in audience behavior that continue to grow (Riyantie et al., 2021)

Table 2. Types of journals obtained

Source	Sum	Percentage
Empirical Research	14	39.15%
Conceptual Research	16	39.02%

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Literature Review	11	27.00 %
Total	45	100%

Digital communication practitioners also emphasize the importance of using analytical data in developing communication strategies (Pakpahan, 2021b)Digital platforms such as social media and messaging apps have analytical tools that allow their users to measure the effectiveness of communication and understand the audience better (Latif, n.d.). The use of this analytical data helps in personalizing messages, determining the right time to communicate, and identifying more relevant audience segments (Ayu Oktaviani et al., 2023b)The results of the interviews show that data-based communication tends to be more effective because it is more targeted and able to reach more appropriate audiences (Samsi Wijaya et al., 2023a)For example, some digital communications practitioners use audience data to tailor ad content targeted to specific demographic groups, such as age, location, and user preferences (Rendy Pradana, n.d.)

Table 3. Year of publication of the journal obtained

Year	Sum	Percentage
2022	10	24.39%
2021	11	26.83%
2020	10	24.39%
2019	3	7.32%
2023	2	6.88%
2024	3	9.32%
Total	41	100%

In addition, this research also highlights the important role of Communication Science in maintaining communication ethics in the digital era. In an increasingly connected world, the main challenge faced in digital communication is to avoid the spread of misinformation or misinformation (Chen et al., 2022). Communication practitioners reveal that it is important not only to convey a clear and compelling message, but also to ensure that the message is factual and does not mislead the audience (Ramadhani, 2023). One way to maintain communication ethics is to use reliable sources of information and verify any information before sharing it on the digital platform (Dwi Afiliya et al., 2024).

In this regard, Communication Science plays a role in providing guidance on how to manage information in an ethical manner, including in terms of transparency and accountability (Scientific & Meaning, 2022).
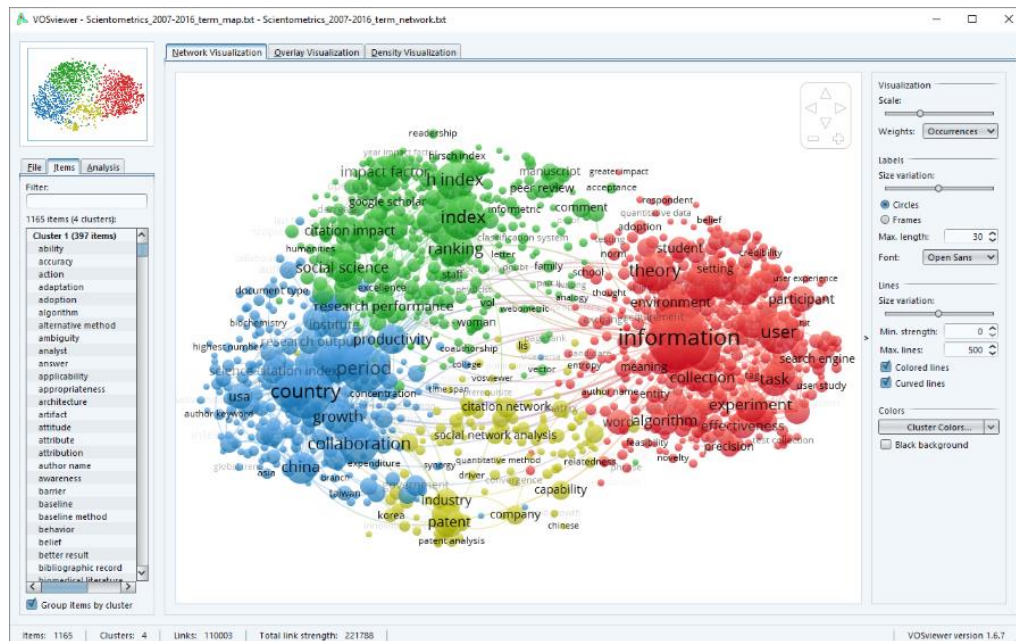
3.1 VOS Viewer Results

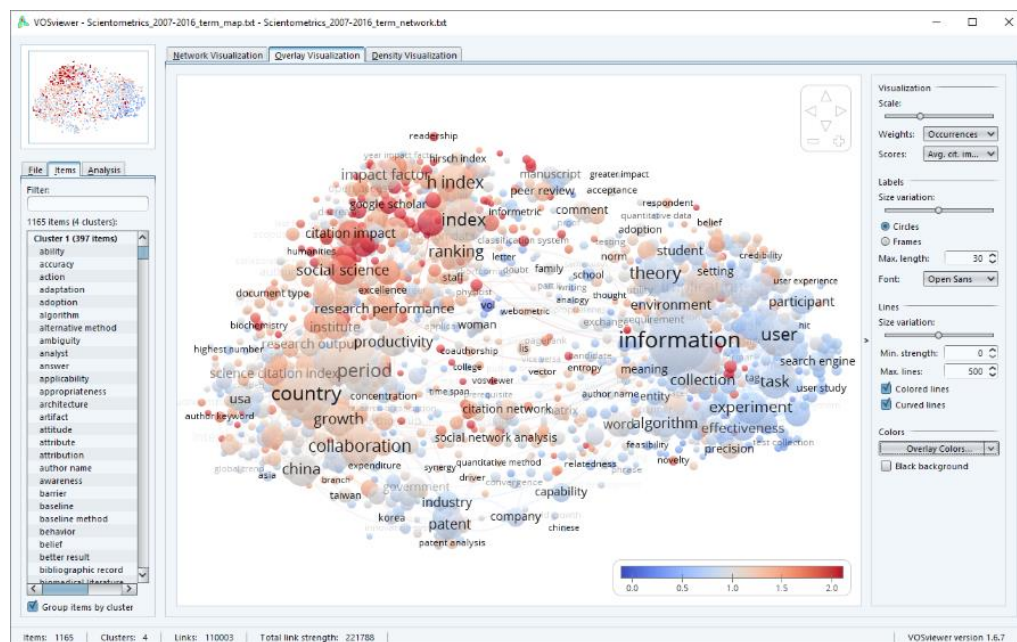**Figure 3:** Network Visualization *Business Intelligence*

Figure 4: Network Visualization *Business Intelligence*

The application of artificial intelligence (AI) technology in management has fundamentally changed the way data is collected, processed, and used for decision-making. Through natural language processing and careful data analysis, artificial intelligence systems are able to automate management tasks, reduce manual workloads, and increase productivity. The accuracy of data processing is also in focus, producing high-quality data that is the basis for informed decisions. In the context of management, more sophisticated analysis of problems is one of the main contributions of AI technology. With AI's ability to see patterns and trends invisible to the human eye, managers can make more informed decisions and develop more powerful tactics. Business

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Intelligence and Artificial Intelligence enable accurate and relevant data-driven decision-making, the combination of BI and AI accelerates the decision-making process by providing real-time access to critical information and automatically generating analysis and helping to respond more quickly to market changes or business situations. AI algorithms are capable of processing and analyzing large amounts of data with manual analysis and reduce the risk of human error and improve decision-making reliability.

By leveraging AI technology, companies can analyze consumer behavior, predict market trends and devise more targeted marketing strategies. AI recommendation systems also help companies increase sales by tailoring product and service offerings to customers individually based on preferences from consumers' purchase history. Not only in marketing, AI has brought a revolution in supply chain management. With intelligent algorithms and real-time analytics, companies can optimize inventory, estimate demand, identify potential risks, thereby reducing operational costs, increasing efficiency, and avoiding stock shortages and overstocks. Additionally, in the field of customer service, AI-based chatbots have become a critical component in providing fast and efficient customer support. The AI Analysis Strategy Using Business Intelligence (BI) in E-Commerce-Based Online Businesses can be focused on the following strategic steps:

1. Data Collection and Management
   a. Step:
      - Integrate data from various sources such as customer transactions, purchase behavior, product reviews, and social media interactions.
      - Using BI platforms to efficiently store, visualize, and manage big data.
   b. Benefit:
      - Improve data-driven insights to understand customer preferences.
      - Provide relevant data for AI algorithms for further analysis.
2. Application of AI for Data Analytics
   a. Step:
      - Apply machine learning techniques to identify purchasing patterns and customer preferences.
      - Use predictive analytics to project future trends.
   b. Benefit:
      - Estimate market needs so that businesses can design more accurate marketing strategies.
      - Support personalization of product offers or promotions.
3. Personalize the Customer Experience
   a. Step:
      - Leverage AI to generate relevant product recommendations based on customer shopping history.
      - Using an AI-based chatbot to provide 24/7 personalized customer support.
   b. Benefit:
      - Improve customer satisfaction with fast and relevant interactions.
      - Strengthen customer loyalty through customized services.
4. Marketing Campaign Optimization
   a. Step:
      - Use BI to analyze the effectiveness of current marketing campaigns.
      - Leverage AI to automate target-based ads with better audience segmentation.
   b. Benefit:
      - Increase the Return on Investment (ROI) of marketing.
      - Lower marketing costs by effectively targeting potential customers.

5. Inventory and Operations Management
   a. Step:
      - Use BI to monitor sales trends and inventory levels in real-time.
      - Leverage AI to predict demand and manage logistics automatically.
   b. Benefit:
      - Reduces the risk of excess or understock.
      - Improve operational efficiency and supply chain management.
6. Performance Evaluation and Strategic Adjustments
   a. Step:
      - Use BI to monitor the performance of AI-based strategies through Key Performance Indicators (KPIs).
      - Adopt an iterative approach by continuously improving AI algorithms based on the latest data.
   b. Benefit:
      - Supporting evidence-based decision-making.
      - Ensure strategies remain relevant to changing market dynamics.
   c. Advantages of This Strategy
      - Helping e-commerce businesses to be more competitive in the digital era.
      - Optimize customer experience through data-driven personalization.
      - Integrate AI and BI technologies to improve operational efficiency while supporting innovation in marketing.

The use of data warehouses is basically done by end-users and is generally done by businessmen or a technician. The main decision required by a businessman is regarding the health and survival of the business itself. Decision-makers usually think about the existing market share, profits achieved, existing competitors, costs incurred, efficiency and quality of production, according to (Kusuma et al., 2023) from the source that shows data warehouse is a co-comprehensive and highly supportive data in decision-making, which is necessary for analysis before making decisions (Wahono & Ali, 2021)For the purpose of strategic decision-making to be more accurate in accordance with the data owned and managed from the operational system, an informational system was developed that contains a data warehouse in it. Data warehouses provide consistent and integrated information across the organization. The concept of a data warehouse is actually a simple concept that takes all the data that the organization already has, cleans and changes it to be consistent, then presents useful strategic information. ("E-Commerce-Based MSME Business Strategies at Adiva Shakila's Online Shop," 2022)

OLAP (Online Analytical Processing) plays a critical role in business strategy by providing powerful tools for in-depth, real-time data analysis. Using OLAP can help in strategic decision-making by providing reports and visualizations that help in making faster and more informed decisions. By using multi-dimensional analysis, OLAP helps in identifying untapped market opportunities and potential threats. This is important in the development of a proactive strategy. Overall, OLAP is becoming an invaluable tool in determining business strategy due to its ability to turn raw data into useful information, support better decision-making and allow companies to adapt quickly to market changes.

3.2 Discussion

This research highlights the role of Communication Science in building effective communication in the digital era, with a focus on audience understanding, appropriate use of technology, and the application of ethics in digital communication. Based on the results obtained, there are several important points that deserve further discussion, especially regarding the challenges faced by communication practitioners in dealing with communication dynamics in the digital world, as well as the role of Communication Science in answering these challenges.

One of the main findings of this study is the importance of understanding the audience in developing effective communication strategies. In the digital age, audiences are no longer homogeneous, but are made up of different groups with different preferences, needs, and behaviors. This shows that

communication cannot be delivered with the same approach for every individual. Therefore, digital communication practitioners need to adopt a more personalized and data-driven approach to be able to tailor messages to the characteristics of the audience. For example, audience data collected from digital platforms such as social media allows communication practitioners to better understand audience demographics, interests, and habits. The use of analytics to understand audiences more precisely, whether in terms of age, gender, and online behavior, has become a crucial aspect in creating more effective and targeted communication.

However, while technology provides a variety of tools to analyze and understand audiences, the biggest challenge lies in how the data is interpreted and used wisely. Moreover, data that is collected through digital platforms can sometimes be misleading or confusing if not used with a careful approach. This is where Communication Science comes into play, as communication practitioners must understand how to process the data correctly, as well as filter relevant information to convey the appropriate message. This shows that although technology provides ease of communication, there is still a need for a deep understanding of the social and psychological context of the audience that cannot be measured solely by numbers and data.

Figure 5. The use of generative artificial intelligence in the global industry

In addition, the results of the study also revealed that while digital platforms provide space for faster and wider interactions, a more personalized and authentic relationship between the sender and recipient of the message remains a major challenge. Communication practitioners often have to find ways to create a more immersive and interactive experience for their audiences, even though the media used is often mass and indirect.

For example, communication done through social media or digital advertising that is only one-way is not enough to build a strong closeness with the audience. In this case, Communication Science can provide insights into how to use technology to create more effective two-way communication, such as by holding live streaming sessions, interactive discussions, or content that actively invites audience participation. This opens up space for deeper interactions, which are important for creating better relationships and strengthening audience loyalty.

The importance of ethics in digital communication is also the main highlight in this study. In the midst of the torrent of information circulating in cyberspace, the main challenge faced is the spread of misinformation and disinformation that can damage the credibility of a message or even harm certain individuals or groups. Communication practitioners are faced with a huge responsibility to ensure that the message they convey is accurate, accountable, and does not mislead the audience. One of the most important aspects of maintaining communication ethics is the verification of information before it is disseminated, as well as transparency in providing reliable sources. Communication Science plays a role

in providing guidance on how communication practitioners can maintain the quality and credibility of information conveyed on digital platforms.

However, the application of ethics in digital communication is not always easy. In practice, there are many factors that can influence the decision to disseminate information, such as the pressure to get more attention or *clickbait*, which sometimes encourages the dissemination of inaccurate or excessive information. This demonstrates the importance of Communication Science education that emphasizes ethics and social responsibility, to ensure that communication practitioners can filter and convey information in an honest and responsible manner. Therefore, teaching and training on digital communication ethics must be an integral part of Communication Science education, to prepare students and communication practitioners to face existing challenges.

From an academic point of view, this study shows that there is an increasingly strong trend in the integration of technology in the Communication Science curriculum. Technology-based education enables students to be better prepared to face the demands of a fast-paced industry, as well as understand how technology can be used to improve communication effectiveness. Some educational institutions have begun to include topics related to digital communication, social media marketing, and digital crisis management as part of their courses. This shows that the world of Communication Science education has been

Adapting to the times, which increasingly focuses on technological and digital competencies. However, another challenge is how to maintain a balance between technical skills and ethical understanding in the digital world. For example, while mastery of analytical tools and the use of data is important, the ability to understand the social and psychological context of the audience is also indispensable to produce truly effective and meaningful communication. Therefore, it is important for Communication Science education to not only teach technology and digital tools, but also provide an in-depth understanding of communication theories, ethics, and ways to build authentic relationships with audiences.

Business Intelligence helps e-commerce to collect and analyze customer data, such as demographics, preferences, and shopping behavior, allowing companies to segment customers more effectively. BI provides insights into how prices affect sales and profit margins, companies can implement dynamic pricing strategies, including discounts, bundling offers and promotional pricing. By leveraging BI, e-commerce companies can improve the effectiveness of their marketing strategies, optimize operations, and create a better shopping experience for customers. As a result, this contributes to increased sales, customer loyalty, and continued business growth.

The application of Artificial Intelligence in management has fundamentally changed the way data is collected, processed, and used for decision-making. By using AI in management, companies can optimize the advantages of AI technology. But this must be done wisely, with the implementation of strict policies and procedures, training and skills development, and continuous monitoring of AI performance.

The application of AI also affects the roles and skills required by managers. With the automation of common tasks, the manager's role has become more strategic and focused on data analysis and interpretation. Therefore, managers need to acquire new competitions, such as improved analytical skills, an understanding of AI algorithms and the ability to cooperate with AI systems. In the face of the era of digital transformation, a thorough understanding of relevant management concepts, regulations, and regulations is the key to success. Positive impacts such as increased operational effectiveness, greater data analysis for accurate understanding and forecasting, better analytics-based choices, and improved accurate financial data processing. In addition, negative impacts such as the replacement of human jobs by automation and the danger of algorithmic errors must also be considered. Companies that are able to intelligently manage the positive and negative impacts of AI deployment will have a competitive advantage in strategic decision-making and operational efficiency (Royhan Zaki Ramadhana & Muhammad (Winata, 2022) 2024)

A company's strategy in using AI provides many benefits such as increasing operational efficiency, developing innovative products or services, and making better business decisions based on

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better forecasting and analysis (Royhan Zaki Ramadhana & Muhammad Irwan Padli Nasution, 2024). Data BI provides a solid foundation for AI analysis, ensuring that predictions and recommendations are based on accurate and complete data. AI enriches BI analytics with predictive and automation capabilities, making marketing decisions more proactive and responsive to market changes. This combination allows e-commerce to not only understand current customer behavior, but also predict future trends and dynamically adjust marketing strategies. By leveraging BI and AI, e-commerce can improve the effectiveness of marketing strategies, improve customer experience, and ultimately, increase sales and customer loyalty, helping in marketing predictions, personalization, service optimization, data analysis, and stock management, thereby improving operational efficiency and customer awareness of the brand.

E-Commerce is a concept that allows sellers and buyers not to meet in person in the process (Management and Business et al., 2023). With the existence of e-commerce companies, it helps people transact through internet media. The use of the internet for business transaction activities is known as Electronic Commerce (E-Commerce). E-commerce presents convenience in buying and selling during a pandemic that limits people's mobility, so that convenience can be achieved anytime and anywhere. E-Commerce can occur between business organizations and consumers, including the use of the Internet and the World Wide Web for the sale of products and services to consumers.
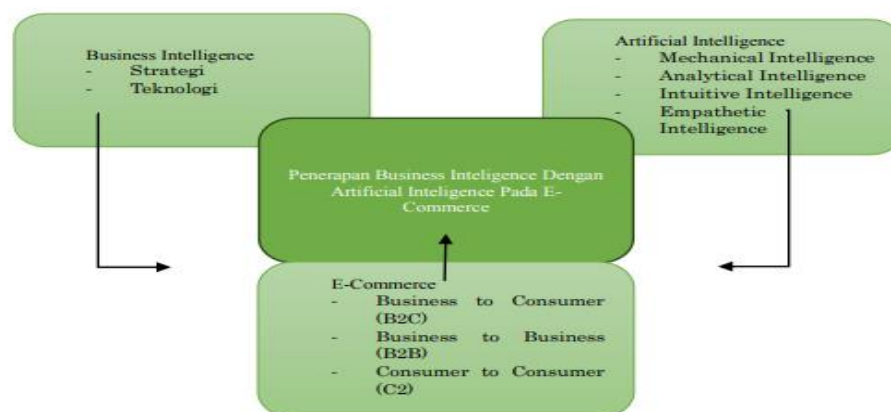

Figure 6. Framework E-Commerce, BI, and AI

1. Business to Consumer (B2C) which involves selling products and services at retail to individual buyers.
2. Business to Business (B2B) which involves the sale of products and services between companies.
3. Consumer to Consumer (C2C) which involves consumers selling directly to consumers

Data Warehouse is a collection of data that is logically integrated for specific needs, generally in the form of handling analysis queries in a decision support system and executive information system (jurnal agit). Because data warehouses are informative, the basic use of data warehouses is to provide data perspectives from the perspective of business analysts and decision makers, not from the perspective of technicians. Data in data warehouses are generally used by applications in the Executive Information System (EIS) or Decision data processing takes a long time so it is not efficient, while the analysis process often requires time that cannot be postponed (Samsi Wijaya et al., 2023b). Characteristics of data warehouse:

1. Subject-Oriented: Data warehouses are designed to analyze data based on specific subject-oriented in an organization, rather than on specific application processes or functions.

2. Integrated Data warehouses can store data from separate sources into a consistent format that is integrated with each other. Data source integration requirements are met in a variety of ways, such as being consistent in adding variables. Consistent in variable size, consistent in coding structure and consistent in the physical attributes of the data.
3. Time Variant All data in a data warehouse can be said to be accurate or valid at a certain time range.

4. CONCLUSION

This research finds that Communication Science has a very vital role in building effective communication in the digital age, with three main findings in the spotlight. First, a deeper understanding of the audience is essential to creating targeted communication. In the digital age, audiences are very diverse, and therefore, communication approaches must be more personalized and data-driven so that the message conveyed is relevant and effective. Second, while digital platforms provide a space for faster and wider communication, building authentic and personal relationships with audiences remains a challenge. Therefore, communication strategies that prioritize two-way interactions, such as live streaming or interactive discussions, are essential to strengthen closeness with the audience.

Third, communication ethics are no less important in the digital world, especially related to the dissemination of accurate and trustworthy information. Communication practitioners need to maintain the credibility of information and avoid the spread of misinformation or disinformation, while still prioritizing social responsibility. Overall, this study confirms that Communication Science has a key role in optimizing digital communication by utilizing technology wisely and responsibly.

The conclusion of this article is that the application of Business Intelligence (BI) and Artificial Intelligence (AI) in e-commerce has an important role in improving business performance and customer experience in the digital age. The combination of these two technologies helps in strategic decision-making, data analysis, prediction of market trends, marketing strategy effectiveness, customer experience, and sales improvement. Studies have shown that the implementation of AI and BI technology can improve company performance, customer experience, and decision-making processes in e-commerce

Digital communication practitioners need to utilize data more effectively to understand their audiences more deeply. The use of analytics tools to collect and analyze more detailed audience data can help in creating more personalized and targeted messages. It is recommended to integrate more advanced behavioral and demographic analysis techniques in communication strategies to produce content that is more relevant to each audience group. To build more personal and authentic relationships, it's important for communication practitioners to focus on two-way communication strategies. For example, holding interactive discussions, live streaming Q&A, or platforms that encourage audience participation. This will help create deeper engagement and strengthen the relationship between the sender and the audience, which is important for maintaining loyalty and strengthening the brand or organization's image.

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