Improving Customer Education: Study Of Customer Engagement Of Tokopedia And Shopee On Twitter Using Social Network Analysis

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Article Info	ABSTRACT
	Customer education is one type of customer engagement. Through the active involvement of customers in the value creation process, customer education can give a business a competitive advantage. Using social network analysis (SNA) and text analysis, this study examines user interaction and information sharing about two Indonesian e-commerce sites on Twitter in relation to customer engagement and customer education. Text data was scraped from Twitter from November 1 to December 31, 2022 and processed using Gephi and Orange software. This study found that the data successfully shows that both official accounts of two Indonesia e-commerce become the most influential accounts that share information about products and services and also play a role in educating their customers regarding the buying process, promotions, and solutions on their social networks. SNA and text analytics can be used as tools to see customer engagement and improve customer education strategies for e-commerce to reach a competitive advantage. For further research, it is recommended to examine the same or different objects but use data sources from different social media, such as from Instagram and Facebook.

1. INTRODUCTION

Customer engagement is a new form of marketing that creates direct and continuous customer involvement in shaping brand conversations, brand experiences, and communities (Kotler & Armstrong, 2018). Customer engagement helps create and maintain customer relationships that may be leveraged to enhance and sustain business performance in the future. (Harrigan et al., 2017). Social media is acknowledged as a medium that may be leveraged to increase customer engagement (Gligor et al., 2019). E-WOM on social media encourages customer engagement activities that permit various forms of interactive contacts, which can have a substantial positive impact on the connection between the business and its customers (Gvili and Levy, 2018).

Customer education is one type of customer engagement. Customer education is the active participation of the customer in developing human resources (Suh et al., 2015), and it affects customer loyalty directly or indirectly through service quality (Tjahyadi et al., 2021). Customers must learn skills and behaviors relevant to purchasing, producing, and using goods

or services in order to effectively participate in and contribute to creating value. Customer education can create a competitive advantage for an organization through the active involvement of customers in the value creation process (Suh et al., 2015). The active involvement of customers in customer education shows their engagement.

The research on customer engagement at Tokopedia and Shopee through social media analysis has the potential to impact customer education in several ways. Tokopedia and Shopee are active in educating their customers and solving their problems on social media, especially their blogs and Twitter accounts. The interaction that a business has with its customers is also called customer engagement. As e-commerce continues to grow in Indonesia, businesses may benefit from understanding the role of digital technology in business and the importance of engaging with customers through social media (Lestari, 2019). The research highlights the impact of negative feedback on customer loyalty, which can be incorporated into discussions on customer service and reputation management. As technology continues to shape the business landscape in Indonesia, it is important for businesses to understand the implications of these changes and how they can adapt and succeed in a digital environment (Jukes et al., 2010).

The research using social network analysis (SNA) to describe customer engagement at Tokopedia and Shopee on social media, particularly Twitter, can have an impact on education in several ways (Rumapea et al., 2022). Firstly, it can provide valuable insights into how social media can be used to engage customers on e-commerce platforms, which can be useful for businesses to educate their customers. The results of this study can be used by companies to conduct customer education and customer engagement on social media. Moreover, the results of this study can be used by companies to know that customer education is important to increase customer loyalty (Tjahyadi et al., 2021).

2.   METHODS

This study uses a quantitative method and tries to see phenomena regarding user interaction and dissemination of information about two e-commerce sites in Indonesia on the social media site Twitter that relate to customer engagement and customer education using social network analysis (SNA). Supported by literature and previous research in fields user generated content, e-commerce, customer engagement, customer education, and SNA. We follow the research stages; see Figure 2.1.

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│      Problem Identification      │
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│      Determine the research      │
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│        Literature Review         │
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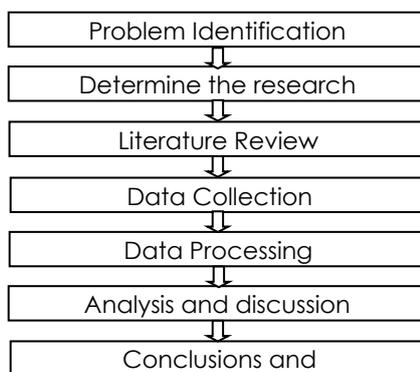
Figure 2. 1 Research Stages

Source: Processed by the Author

This study scraped the data using the SocialX platform with the keywords "Tokopedia" and "Shopeeid", for about 121.891 rows of text, from November 1st to December 31st, 2022. For preprocessing data, we select and eliminate irrelevant text and noise, which makes it easier to perform data analysis. The results of the data obtained for the two e-commerce sites are as follows:

Table 2.2. Data Processing

Ecommerce	*Scarping Result*	*After Prepocessing*
Tokopedia	46.003	9.755
Shopee	75.888	24.327

Source: Processed by the Author

This study scrapes data that consist of the following: user account, time of post, tweet text, tweet type, and reply_to. For SNA processing, this study only uses the columns of user account and reply_to. To view the network models (SNA), the preprocessed data is next processed using the Gephi software version 0.10. The process of making this social network model applies the Fruchterman-Reingold layout.

Network properties are also used to see how people interact on social media (Utami & Alamsyah, 2018). Centrality is used to determine the actors who have the most important role in a social network (Bratawisnu & Alamsyah, 2018). So based on that, this study tries to see the interaction from the property and centrality of the network. An analysis of the results of data processing is carried out based on previous research in Tables 2.3 and 2.4.

Table 2.3. The Network Property

Property	Definition	Source	Interpretation
Nodes	The actor or the individual in the network.	Clifton dan Webster, 2017(as cited in Rabbani et al., 2020)	Nodes are used to describe people, groups, or communities; the more nodes there are, the more probable it is that people will interact and form relationships.
Edges	Represent the relationship between nodes in the network. 2020)	Clifton dan Webster, 2017(as cited in Rabbani et al.,2020)	the network's edges have greater value, indicating that there are more interactions involving themes.
Average Degree	The average number of connections from one node to another	Barabasi, 2012 (as cited in Utami and Alamsyah, 2018)	A network with more link will have a higher average degree since information is spread more quickly.
Diameter	The longest distance between a pair of nodes on the network	Barabasi, 2012 (as cited in Utami and Alamsyah, 2018)	The shorter the diameter, the faster information moves through the network.
Average path length	Average distance between a pair of nodes on the network	Barabasi, 2012 (as cited in Alamsyah and Utami, 2018)	The average path length value indicates that speed of information circulating in social network.

Source: Processed by the Author

Table 2.4. The Network Centrality

Centrality	Definition	Source	Interpretation
Degree Centrality	Degree centrality is the number of edges (relationships) associated with nodes (actors)	Alhajj and Rokne (2018)	Degree Centrality is often used to see the level of connectedness between nodes which shows popularity.
Betweenness Centrality	Betweenness Centrality identifies nodes that connect communication paths for other nodes	Cheliotis, 2010 (as cited in Alamsyah and Utami, 2018)0	Betweenness Centrality is used to identify actors who control information because they become intermediaries for other actors.

Centrality	Definition	Source	Interpretation
Degree Centrality	Degree centrality is the number of edges (relationships) associated with nodes (actors)	Alhajj and Rokne (2018)	Degree Centrality is often used to see the level of connectedness between nodes which shows popularity.
Closeness Centrality	Closeness Centrality calculates the average length of all shortest paths from nodes to all nodes in the network	Cheliotis, 2010 (as cited in Alamsyah and Utami, 2018)	The higher the value of closeness centrality, it indicates that the actor is getting closer to other actors so that the dissemination of information is faster.
Eigenvector Centrality	Eigenvector centrality calculates the weight to represent how important a node is in the network.	Faroq, Akram et al (2018)	Eigenvector Centrality shows important actors because they relate to many other important actors in the network.

Source: Processed by the Author

Another analysis method used in this research is text analytics, which involves processing 9,755 rows of texts in conversations on the Tokopedia network and 24,327 texts in conversations on the Shopee network. This analysis is done by visualizing using word clouds and only looking at words that often appear in conversations between the official Tokopedia and Shopee social media accounts and their consumers on each e-commerce social network. This method is used to determine whether the customer engagement formed has reflected consumer education or not.

3.   RESULTS AND DISCUSSION

RESULTS

From the results of data preprocessing, all the relevant data is processed using Gephi software to create a network visualization of each e-commerce. The social network model formed is as follows:

(Tokopedia)   (Shopee)
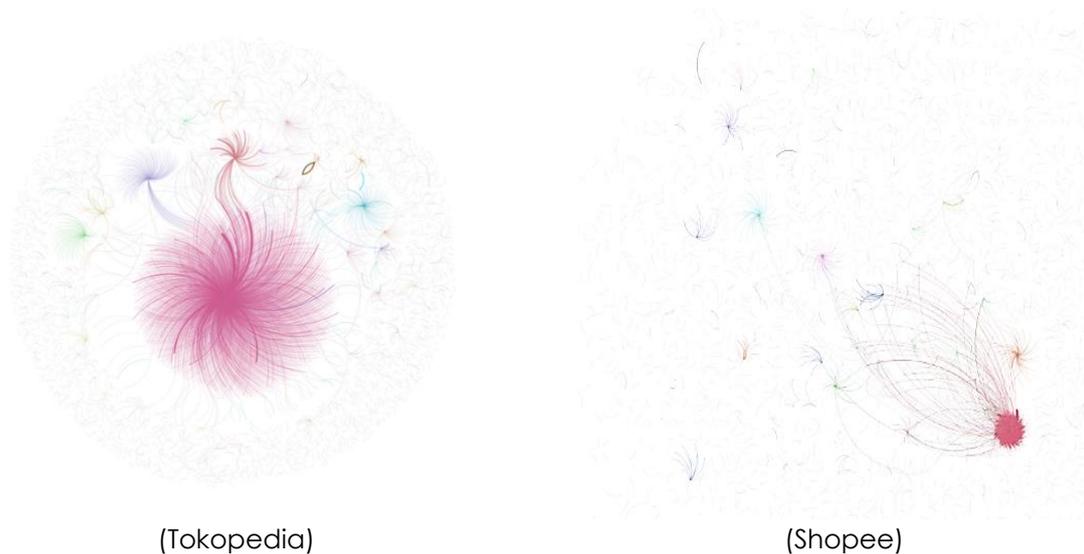
Figure 3.1. Visualization of the Tokopedia Social Network

Source: Processed by Gephi 0.10

The result of network properties of Tokopedia that produces information about nodes, edges, average degree, diameter, and average path length (see Table 3.2)

**Table 3.1.** Calculation results of Tokopedia Network Properties

No.	Network Property	Tokopedia (9.755)	Shopee (24.327)
1	Node	7.517	12.751
2	Edges	6.069	11.046
3	Average Degree	1,615	1,733
4	Diameter	16	18
5	Average Path Length	3,336	2,418

Source: Processed by the Author

The network of Tokopedia consists of 7,517 nodes and 6,069 edges, indicating a large number of actors and interactions. The average degree is 1.615, indicating that on average one node is connected to 1.615 other nodes. The diameter value is 16, meaning the longest path in the network is 16, and the average path length value is 3.336, indicating the average distance between actors in the network.

The network of Shopee consists of 12.751 nodes and 11.046 edges, indicating a large number of actors and interactions. The average degree is 1,733 , indicating that on average one node is connected to 1,733 other nodes. The diameter value is 18, meaning the longest path in the network is 18, and the average path length value is 2,41, indicating the average distance between actors in the network.

Centrality that consists of degree centrality, betweenness centrality, closeness centrality, and eigenvector centrality are uses to see the main actors (user of Twitter) in e-commerce social networks.
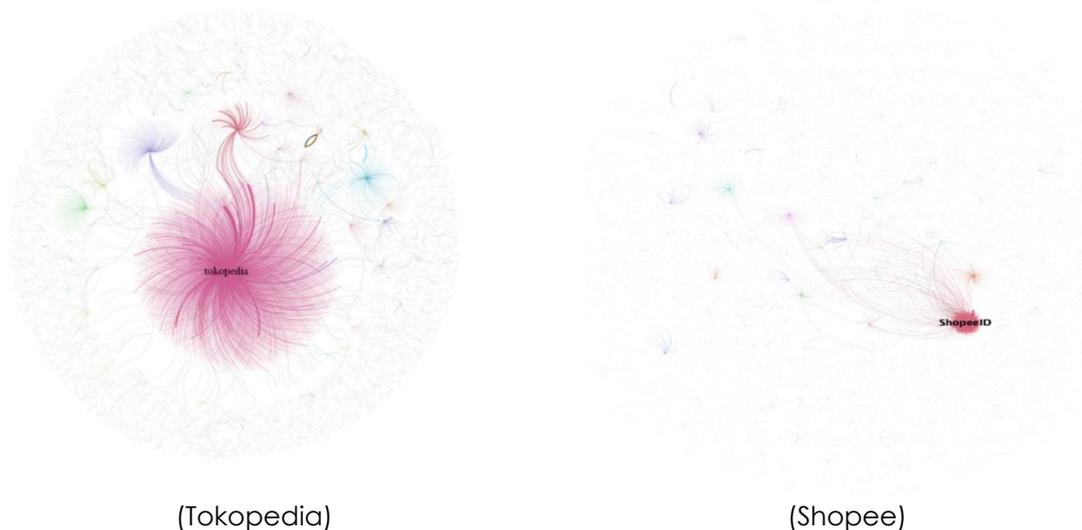
(Tokopedia)   (Shopee)

Figure 3.2. Network Visualization Based on Tokopedia and Shopee Centrality Metrics

Source: Processed by Gephi

The first centrality analysis is degree centrality. Degree centrality is used to see the level of connectedness between nodes, which shows popularity (Cheliotis, 2010). Degree centrality serves to assess and determine the central node, namely actors with a good degree of centrality who have a role in disseminating information and influencing others in social networks. The following is a calculation of degree centrality in the Tokopedia network.

Table 3. 2. The five actors with the highest Degree Centrality in the Tokopedia and Shopee network

No.	Tokopedia		Shopee	
	Username	Degree Centrality	Username	Degree Centrality
1	Tokopedia	2.789	ShopeeID	7.827
2	BTS_tweet	237	felixsandian	149
3	TokopediaCare	162	mardiasih	97
4	Re_aruni	147	tanyarlfes	65
5	Ex_AnakLolina	93	fakhri_depe	41

Source: Processed by the Author

Table 3.2 shows that Tokopedia and Shopee have succeeded in becoming the largest players in their own social network. The higher the degree centrality value indicates that the actor has many relationships so that it can influence other accounts (Bratawisnu & Alamsyah, 2018). This means that, based on degree centrality analysis, Tokopedia and Shopee have succeeded in becoming the largest players in their own social network.

Betweenness centrality identifies nodes that mediate information in the network (Stephenson Zelen, 1989 as cited in Mbaru & Barnes, 2017). The higher the betweenness

centrality value indicates that the account is an intermediary for other accounts. Table 3.3 is the result of betweenness centrality calculations in the Tokopedia and Shopee social networks.

Table 3.3. The five actors with the highest betweenness value in the Tokopedia and Shopee network

No.	Tokopedia		Shopee	
	Username	**Betweenness Centrality Value**	**Username**	**Betweenness Centrality Value**
1	Tokopedia	7.859.325	ShopeeID	38.640.706
2	BTS_tweet	814.331	felixsandian	1.554.486
3	TokopediaCare	743.487	mardiasih	1.047.959
4	bliblidotcom	735.055	tanyarlfes	635.021
5	ilda_nurida	656.527	clingiy	524.777

Source: Processed by the Author

The higher the value of betweenness centrality, the more the account acts as a mediator between other accounts. Table 3.3 shows that the Twitter accounts @Tokopedia and @ShopeeID play a significant role as mediators with many other accounts.

The determination of key players can also be seen based on the calculation of closeness centrality, which measures the shortest path from one actor to another in a network. In the social network of Tokopedia on Twitter, there are many accounts with a closeness centrality value of 1, indicating that many key players can be used for information dissemination. Finally, the eigenvector centrality calculation is used to determine the most influential actor in the social network of Tokopedia. Eigenvector centrality is used to determine the most influential actors in social networks (Cheliotis, 2010, as citied Alamsyah & Utami, 2018). Table 3.4 shows the result of calculating eigenvector centrality on the Shopee social network.

Table 3.4. The five actors with the highest eigenvector value in the Tokopedia and Shopee network

No.	Tokopedia		Shopee	
	Username	**Eigenvector Value**	**Username**	**Eigenvector Value**
1	Tokopedia	1	ShopeeID	1
2	BTS_tweet	0.06	felixsandian	0.013
3	TokopediaCare	0,05	T4ier1	0,0099
4	re_aruni	0,027	jnliuyy	0,0098
5	ArgentianaA	0.021	SunooKim10	0,0095

Source: Processed by the Author

Based on Table 3.4, the results of the calculation of eigenvector centrality for @Tokopedia and @ShopeeID become the account with the highest value, which is worth 1. This means that the account has relationships with many important actors in social networks. So, Tokopedia and Shopee accounts managed to be the biggest influences on their respective social networks.

(Tokopedia)   (Shopee)

Figure 3.3. World Cloud Visualization Based on Frequently Occurring Words of Tokopedia and

Shopee Network

Source: Processed by Orange

The world cloud visualization shows the words that often appear in customer conversations with the official account (Figure 3.3). Tokopedia's official account communication with consumers is mostly done to discuss shipping costs (ongkir), solutions, info, tips, belanja, promos, etc., similar to Shopee official account, which discusses application, information, shopping orders, guarantees, and shopping constraints, all related to purchasing activities and how to use Tokopedia and E-Commerce services.

DISCUSSIONS

Customer education is the active participation of the customer in developing human resources (Suh et al., 2015). Customers must learn skills and behaviors relevant to purchasing, producing, and using goods or services in order to effectively participate in and contribute to creating value. Customer education can create a competitive advantage for an organization through the active involvement of customers in the value creation process (Suh et al., 2015). Customer engagement is not just about selling brands to consumers, but with the aim of making the brand a meaningful part of the customer's conversation and life, which can be done by the way businesses educate their customers (Kotler & Armstrong, 2018). Customer engagement is a new form of marketing that creates direct and continuous customer involvement in shaping brand conversations, brand experiences, and communities (Kotler & Armstrong, 2018). Therefore, the analysis of customer education can be done in the same way as customer engagement, namely by analyzing the network using the SNA method. We

identify network properties, determine the main actors in the network, and visualize them using Gephi software.

Good customer education is an important part of the strategy for customer engagement. Customer education is a learning activity about the products or services of a business that can help customers develop attitudes, knowledge, and expertise (Bonfanti & Brunetti, 2015). That way, customers can take full advantage of a business's product or service. Companies can embrace new customers and teach them how to use products or services so customers can solve problems and meet customer needs (Bauer, 2010). Therefore, companies need to engage customers consistently using educational content designed to help customers solve problems, achieve the desired results, and recognize the value of business products or services.

Centrality is used to determine the actor who has the largest role in the social network (Bratawisnu & Alamsyah, 2018). Based on measurements of degree centrality from November 1 to December 31, the two official e-commerce accounts were able to engage consumers well, as evidenced by the highest degree centrality values in each network. Both of them showed their appearance in conveying information to customers; this was shown by the highest betweeness value in their network, and from the eigenvector 2 score, this official account succeeded in becoming an actor who has the most influence on each of the social networks it has. As the most influential accounts in their social networks, the two official accounts, @Tokopedia and @ShopeeID, actively educate by providing information about products and always responding to customers who purchase and use products, such as helping customers if they experience problems with their e-commerce.

Based on the measurement results of its network properties, many customer accounts are aware of the Tokopedia and Shopee businesses because, based on nodes and edges, many accounts are involved in the social networks of each business. From the average degree value, information dissemination for customer education on the Shopee network is wider than Tokopedia. Based on the diameter and average path length, the information dissemination or customer education process on the Shopee and Tokopedia networks is fast.

This study shows the role of two official accounts on the social media network Twitter. Both can interact with consumers well and show their role in conveying information to their consumers, as well as being the most influential account in each of their networks. Official accounts are social media accounts used to communicate products and services with the public or consumers to increase customer education. Official accounts must be the most influential accounts in their networks and be able to interact with and convey information to their networks quickly and well. By using SNA, we can see whether the official social media account of the business being run has engaged well or not and has also educated its consumers or not. It can be seen from the property and centrality values and also from the information content submitted.

4.   CONCLUSSION

Active participation with e-commerce and consumers contributing to the business, such as learning skills and behaviors relevant to the purchase, production, and use of goods or services, will improve customer education and engagement. The results of the analysis show that the official Twitter accounts @Tokopedia and @ShopeeID managed to become the most influential accounts on their respective social networks. Both @Tokopedia and @Shopee official accounts help their customers solve problems in each of these e-commerce sites. Engagement by Tokopedia and Shopee is successful, and they also educate their customers.

Social networks, network properties, and centrality metrics can be used by businesses to learn and understand customer needs that can be used as business decisions in achieving their goals, which is one way to do customer education. Customers and businesses can learn about the importance of analyzing interactions on social media and how to use social media data to conduct engagement and customer education. By using social network analysis and text analysis, businesess can improve customer engagement through customer education by optimizing property value and centrality on their network of social media. Businesses can learn about different strategies that businesses can use to increase customer engagement on social media and how these strategies can be evaluated using SNA techniques.

The analysis carried out is only based on data from Twitter social media, so this data analysis allows it to be compared with other social media data that is often used in Indonesia, such as Instagram and Facebook to see customer engagement and customer engagement of the two e-commerce on other social media platforms. Therefore, it is suggested that future researchers can examine the same or different objects but use data sources from different social media, such as from Facebook and Instagram.

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