Financial Literacy: Study Based on Perceptions of E-wallet Users in Indonesia on Social Media

Helmi Adiningtyas[1,*] Tri Widarmanti[1], Aldilla Iradianty[1]

[1]*School of Economics and Business, Telkom University*
Jln. Telekomunikasi No 1, Terusan Buah Batu, Bandung, 42057, Jawa Barat, Indonesia

[*]*Corresponding author:* *helmyadi@student.telkomuniversity.ac.id*

ABSTRACT

Over the last several decades, technological advancement has resulted from a significant shift in customer habits and preferences, such as a cashless society. These tendencies support the massive growth of e-wallets such as ShopeePay and OVO. To communicate their services to the community of the two e-wallets in Indonesia, Instagram is one of the primary social media platforms and gives users freedom to express their perceptions. Public perception related to users of e-wallet applications on social media can reflect public awareness of their financial condition and financial awareness that can be attributed to financial literacy. This study captures customer perception by mining their Instagram comments about their e-wallet experience and relating it to financial literacy. About 24.722 rows of comments from January to June 2021 are processed and analyzed using topic modeling - Latent Dirichlet Allocation (LDA) approach. The outcome demonstrates that Indonesian society on Instagram has reflected five characteristics related to financial literacy, which consist of how customers gather financial information, how customers learn about available resources for assistance, how customers improve their financial situation, how they improve their knowledge and confidence about financial services institutions and products (including financial products and services' features, benefits and risks, rights and obligations), and how they improve their skills in using financial products and services. Public perception about e-wallets on social media platforms paints an image of financial literacy.

Keywords: *E-wallet, Financial Literacy, Topic Modeling, Latent Dirichlet Allocation*

1. INTRODUCTION

A dramatic shift in customer habits and preferences, such as the cashless society, has fueled technical innovation over the previous several decades [1][2]. A cashless society uses digital payment to conduct transactions, which could increase sellers' and service providers' quality of life and performance [3]. The e-wallet is one of the most widely used forms of digital payment. An e-wallet can store credit card numbers and other data [4]. The transaction value of the Indonesian e-wallet reached US$ 28 billion with a 1.7 billion transaction value in 2020 [5]. Three surveys by Snapcart, MarkPlus Inc., and Yougov in 2020 found that ShopeePay and OVO have the highest growth rate since early 2020, the most users based on June 2020 respondents' responses, and the largest market share of transactions and

the total value of e-wallet transactions in Indonesia [6-7-8]. Indonesia currently has 99.15 million active Instagram users, ranking fourth globally [9]. So, to communicate and promote their services, both e-wallets use Instagram as one of their primary media. In addition, Instagram allows users to produce their own User Generated Content (UGC). "UGC" encompasses all forms of content or media created by users of online services such as social media platforms [10]. UGC represents direct user perception [11]. Public perception related to ShopeePay and OVO, especially on Instagram, can reflect users' awareness of their financial condition, where financial awareness can be attributed to financial literacy [12]. This study aims to capture customer perception by mining their Instagram comments about their e-wallet experience and relating it to financial literacy and

also want to see whether the data can provide the most important financial literacy characteristics.

In recent years, the low levels of financial literacy among their inhabitants has become a growing concern for many nations. The central idea is that the financial world has become more complex, and the average citizen is less equipped to deal with these changes and make optimal decisions due to a lack of basic financial tools and knowledge. This can cause them to make mistakes when making crucial economic and financial decisions throughout their lives [13]. Further according to the "2019 National Survey of Financial Literacy and Inclusion (SNLIK)", Indonesia is known to have a low financial literacy index with a total score is 38.03% out of 100 [14]. Low financial literacy will have an impact on a higher level of consumption, the low saving ratio, low level of investment, people are prone to fraud, and high levels of corruption [15]-16-17]. Then Chernovita [18] indicates that e-wallet users who take financial literacy tend to be more careful, not easily tempted, and always evaluate decisions so it will not cause harm in the future. Financial literacy is essential for individuals to equip them in choosing and making decisions on various offerings, especially financial instruments such as e-wallets [19]. E-wallet users who are increasingly developing must be aligned with an adequate literacy among the Indonesian people [14].

Internet is used to exchange information, communicate across large or small distances or answer almost any question in a moment, in the form of text, voice, video, or pictures that Internet users create. The user-generated content happens when previous customers share their experiences or preferences, similar to this, users of e-wallets also post about their experiences on social media, which enables researchers to examine their preferences or find another hidden insight from their posts. User-generated content is unstructured data, hence it is necessary to use software and technique to extract the information from text [20]. To solve this problem, researchers chose topic modeling as the primary method. Topic modeling is a subcategory of text mining techniques that have been used to investigate a collection of texts' "hidden" thematic structure [21]. The topic modeling approach used in this study is Latent Dirichlet Allocation (LDA). One of the most popular topic models, LDA, represents every document as a probability distribution of each topic. Every topic is composed of words [22][23].

2. LITERATURE REVIEW

2.1. Financial Literacy and E-Wallet

Due to the complexity of the financial instruments available to society, individuals must take advantage of their opportunities and recognize the inherent risks and uncertainties associated with their choices [24]. As a result, financial literacy has developed into a necessary skill for full participation in society [24]. Financial literacy is an essential skill in the twenty-first century, and initiatives to increase financial literacy are necessary to support global economic growth (25). Despite its relevance, numerous studies conducted worldwide reveal that most of the world's population remains financially illiterate, necessitating immediate effort to address this issue [25]-26]. Financial literacy is how customers gather financial information, develop financial knowledge and skills, become aware of the potential risks and advantages, learn about available resources for assistance, and improve their financial situation [27].

Furthermore, financial literacy is a body of knowledge regarding personal finance and the ability to implement that knowledge [28]. According to OJK [29], an individual has four levels of financial literacy. At the first level, well-literate individuals have knowledge and confidence about financial services institutions and products, including features, benefits, and risks; rights and obligations related to financial products and services; and skills in using financial products and services. The second level is sufficient literate, in which individuals have knowledge and confidence about financial services institutions and financial products and services, including features, benefits and risks, rights and obligations related to financial products and services. The third level is less literate, in which individuals only have knowledge about financial services institutions and financial products and services. The final level is not literate, in which individuals do not have knowledge about financial services institutions and financial products and services.

From several financial literacy topics previously presented, the data in this study show five characteristics related to financial literacy, among others: first is how customers gather financial information, second is how customers learn about available resources for assistance, third is how customers improve their financial situation, forth the knowledge and confidence about financial services institutions and products (including financial products and services' features, benefits and risks, rights

and obligations) last are skills of customers in using financial products and services.E-wallet is one of the financial innovations. It is a virtual service used for transactions as a substitute for cash [30]. E-wallets can be in software, portable devices, or money-saving cards. Some of the advantages of using an e-wallet are that it can be used to send and receive payments anywhere. Transfer and payment are simple, which can aid and enhance the convenience of online purchases. In addition, users can access and customize their accounts through a mobile phone, making them safer to use than credit cards [31]. Some of e-wallet in Indonesia are OVO, Grab-Pay, Doku Wallet, Go-Pay, ShopeePay, DANA, and T-Cash.

Financial literacy is needed to optimize the use of e-wallets. Using e-wallets supports increasing financial literacy in terms of plans and decisions to use their money [32-33]. The main reasons for using e-wallets were found to be time savings and ease of use; the safety of money transacted remained a major concern [34], and customers who have used digital payment can be classified as well-literate [12].

2.2. Topic Modelling

The internet's growth has allowed all users to comment on their financial experiences, and numerous studies see this as a source of data that can be utilized to enhance financial literacy research. Taylor & Keseli [35] extracted textual data from field text-based market provisioning using sentiment analysis. They found that financial literacy affects NLP-based investment management, risk tolerance in an investment portfolio. Agrani and Rikumahu [12] try to capture users' sentiment toward e-wallet applications from user-generated content (UGC). The result is that, although the sentiment is mostly negative, they found that users understand and have the skill to use the apps in their experience and financial literacy. Finally, Sabri and Aw [32] investigate customers' preferences for different financial information sources and their impact on financial literacy. Understanding customers' financial behaviors results in different levels of financial literacy. These studies demonstrate the feasibility of using the UGC as textual data to be processed as a data source for the financial literacy field. Data text can be processed by a text mining method using sentiment analysis, social text networks or topic modelling. The term "topic modeling" refers to a statistical technique used in text mining that identifies latent (hidden) patterns within a corpus of data [36]. In other words, topic modeling is a statistical model for automatically extracting

clusters of words hidden in a document collection or corpus. The cluster words represent the fundamental concepts of a single cluster, which are interpreted as a topic or problem in the document set. The topic model can extract some clusters to divide and categorize documents probabilistically [37]. This research uses one of the most well-known topic modeling approaches, LDA. Each document in LDA can be viewed as a collection of various topics, each topic representing a distribution over a vocabulary of terms [38]. This study aims to capture customer perception by mining their Instagram comments about their e-wallet experience and relating it to financial literacy and also wants to see whether the data can provide the most important financial literacy.

3. RESEARCH METHOD

The research is divided into four stages: data collection, preprocessing, topic modeling, and results and analysis. First, data collection describes the process of data scraping. Furthermore, data preprocessing describes the process of preparing data. Next, the topic modeling process is where the data extraction occurs. The last stage is the result and analysis process. The steps process of this research is shown in the following Figure 1.

FIGURE 1. Research Workflow

This study scrapping user perception on the official Instagram accounts ShopeePay (@shopeepay_id) and OVO (ovo_id) using IGCommentExport tools. The data collection period runs from January to June 2021, with a total of 24.722 data points collected, consisting of 14.668 data for ShopeePay and 10.054 for OVO. Then the next step is to do data preprocessing. Data preprocessing is a critical step before performing data analysis, as it works to transform data samples into more meaningful information [39-40]. Data preprocessing starts in several steps. Converting uppercase to lowercase letters (transform case). Cleaning and removing non-alphabetic characters from the dataset, such as numbers, symbols. Divide the input data format, which is still a long text, into small units called tokens. Token in the context of a document can be a word, number, or punctuation (Tokenize). Eliminate unnecessary words (Stopword removal), convert words in sentences to their root words, and eliminate word additions (Stemming).

Table 1 shows examples of each process in the data preprocessing procedure.

TABLE 2. Data Preprocessing Example

Procedure	Data text
Raw Data	Aman, mudah, ada cukup banyak promo kalau pake shopeepay. Terimakasih shopeepay
Transform case	aman, mudah, ada cukup banyak promo kalau pake shopeepay. terimakasih shopeepay
Cleaning	aman mudah ada cukup banyak promo kalau pake shopeepay terimakasih shopeepay
Tokenize	|aman| |mudah| |ada| |cukup| |banyak| |promo| |kalau| |pake| |shopeepay| |terimakasih| |shopeepay|
Stopword Removal	aman mudah promo shopeepay terimakasih shopeepay
Stemming	aman mudah promo shopeepay terimakasih shopeepay

The next step is grouping ShopeePay and OVO e-wallet users' perceptions. We operate Latent Dirichlet Allocation (LDA) models for topic modeling. To explore the relationships between topic and term flexibly, we apply pyLDAvis package in Python language. LDA algorithms automatically discover latent topics in documents corpus. However, evaluating such assumptions is challenging due to its unsupervised techniques [41]. Evaluation of topic models helps estimate the quality of the topics generated by the model [42]-43]. One way to measure the quality of topic models is the topic coherence metric [44-45]. In this research, topic models have been evaluated using a coherence score. The coherence score measures the degree of semantic similarity between words on the topic [46]. The coherence score represents whether the topics model is good or not, and the higher value indicates the good topics.

4. RESULT AND DISCUSSION

4.1. ShopeePay Topic Modeling

In LDA modeling, determining many topics is essential to the analysis process. Determination of topics to be used in LDA modeling, based on topic coherence score as shown in Figure 3. According to Figure 3, the result of the topic coherence score shows that the optimal number of topics is nine. The topic coherence score achieved maximum values that were quite close to the global maximum on nine topics. Therefore, the number of topics used on the ShopeePay dataset is nine.
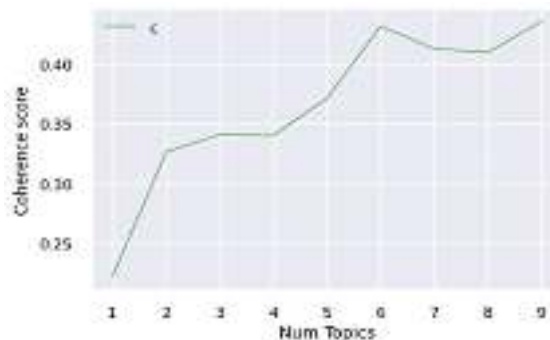

FIGURE 3. Optimal Number of Topics for ShopeePay LDA Model

The results of topic modeling have the visualization in Figure 4. On the left side of Figure 4, circles denote various topics. Table 2 shows how many topics are in each circle. The larger the circle, the more well-known the topic. On the right is a list of the 30 most frequent keywords. Therefore, it can be concluded that topic 1 is the most common. Additionally, the distance between topics created by the topic model is presented in the left panel. Based on the nine topics formed, it appears that topics 1 and 3 are related. Therefore, it indicates the closeness and similarities of the discussed objects between the two groups of topics. As for other topics, 2, 3, 4, 5, 7, 8, and 9 seem far apart, indicating no topic closeness and similarity.
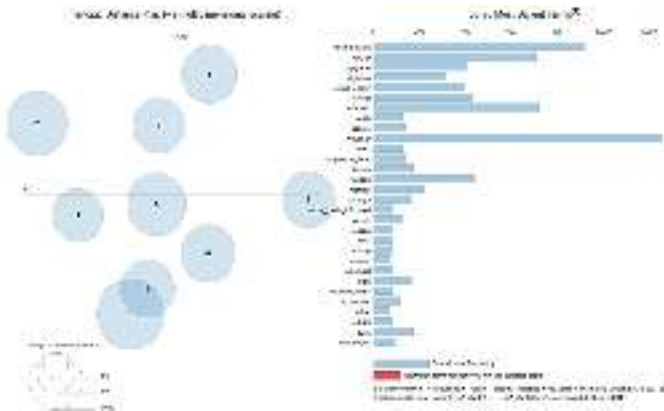
Furthermore, we discuss the meaning of the formed nine topic models. As shown in Table 2, the meaning of a topic is interpreted based on the six most frequently occurring and dominant words.

FIGURE 4. Topic Visualization for ShopeePay

TABLE 2. Topic Model ShopeePay Result

Topic No.	Topic Label	Top Words
1.	Use shopping vouchers	Voucher, seribu, pakai, menang, belanja, merchant
2.	Alfamart vouchers are out of stock	Voucher, Shopeetanam, alfamart, stok, susah, restok
3.	Promos and vouchers run out in a short time	Promo, tarik, habis, menit, voucher, gimana
4.	Alfamart and Telkomsel vouchers are profitable	Voucher, alfamart, untung, telkomsel, hemat, benar
5.	Using a free shipping voucher	Gratis ongkir, cepat, mantap, pastinya, voucher, meluncur
6.	Voucher and cashback after a transaction	ShopeePaylater, suka, bayar, voucher, cashback, gratis ongkir
7.	Ease of top-up at Indomaret	Isi saldo, jadi, indomaret, mudah, tambah, langsung
8.	Failed to upgrade	Upgrade, tolong, tunggu, terus, coba, tips
9.	Voucher not applicable	ShopeePay, belanja, free ongkir, sayang, voucher

First, based on Table 2, ShopeePay users **have gathered financial information**. This is shown in 1,5,6,7, which discusses money inflow and outflow. The inflow of money, in this case, is topic 7 because it is related to ShopeePay balance topping up. Meanwhile, topics 1,5 and 6 concern the outflow of money from transactions involving vouchers and cashback. Then, ShopeePay users were able to **learn about available resources for assistance**, as reflected in topics 2, 8, and 9, because users were able to use existing resources such as "smartphones," "internet connections", and "Instagram" to submit complaints to ShopeePay.

Further, ShopeePay users **have knowledge and confidence in this e-wallet**, as shown in all the topics formed, because they understand its features, such as cashback, top-ups, and promos that are highlighted with the words "cashback", "isi saldo", "promo. Also, they

understand ShopeePay users' rights and obligations. This is evident from the complaints of users who assert their rights after executing their obligations. For example, in topic 1, users must play the game to obtain alfamart vouchers from shopeetanam games. Although the game had been completed and the user had received an Alfamart voucher, the voucher could not be used. This point is made clear by the words "voucher", "shopeetanam", "alfamart", and "susah". Furthermore, they know the benefits and risks associated with the offered features, such as in Topic 3, where many users search for vouchers because they believe it will be profitable. However, the stock is limited, so they must act quickly to claim the voucher.

Additionally, ShopeePay users **have also improved their financial situation,** as seen in topics 8 and 9, because the user who filed the complaint understands that his financial situation is incorrect. Therefore, it indicates that

users have been concerned and aware of their financial condition because they have asked ShopeePay to help improve it. Finally, ShopeePay users also **have the skills to use the e-wallet** reflected in topics 1,4,5,6. Because they can transact with ShopeePay partner merchants offline (Alfamart & Indomaret) and online (Telkomsel). Further, users can also claim ShopeePay's vouchers, promotions, and cashback.

4.2. OVO Topic Modeling

According to Figure 5, the result of the topic coherence score shows that the optimal number of topics is nine. Therefore, the number of topics used on the OVO dataset is nine.
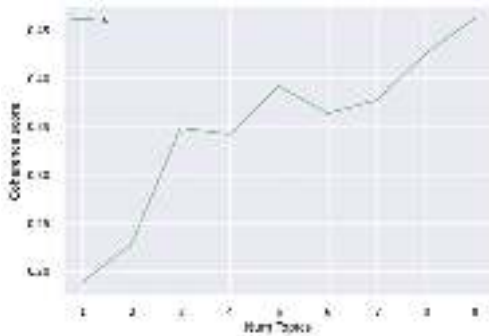
FIGURE 5. `Optimal Number of Topics for OVO LDA Model`

The results of topic modeling have the visualization in Figure 6. Therefore, it can be concluded that topic 1 is the most common. Furthermore, based on the nine topics formed, it appears that topics 5 and 9 are related. Therefore, it shows similarities and closeness of the topic objects discussed between the two groups of topics. As for other topics, topics 1, 2, 3, 4, 6, 7, and 8 seem far apart, indicating no topic closeness and similarity.
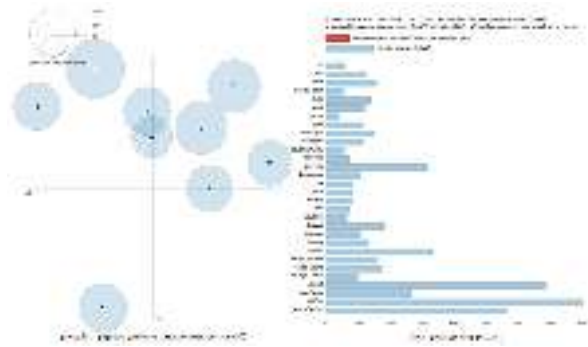

FIGURE.6 Topic Visualization of OVO

We also discuss the meaning of the nine topic models obtained in Table 3.

TABLE 3. Topic Model OVO Result

Topic No.	Topic Label	Top Words
1.	OVO balance top-up failed	Respon, terimakasih, saldo, tolong, masuk, gimana
2.	Process of investing in OVO Syariah features	Proses, investasi, syariah, nomor baru, check, tanya
3.	Transfer transaction failed	Tolong, transfer, perbaikan, respon, gimana, gagal
4.	Solution to top-up problem	Top-up, gagal terus, baca, tolong, tidak bisa, terus
5.	Refund requests	Kembali, uang, tolong, urgent, top-up, transaksi, saldo
6.	Top-up OVO balance via BRI Bank transfer feature error	Top-up, transfer bank, error, tolong, bri, bank
7.	Use OVO promos to top up credit	Promo, hari, punya, pulsa, saldo, beli pulsa
8.	Get cashback after upgrading to OVO Premier	Cashback, punya, baru, akun, pakai, premier
9.	Upgrade to OVO Premier failed	Terimakasih, keluhan, perbaiki, upgrade premier, tolong, ikut

First, based on Table 2, OVO users **have gathered financial information**. This can be seen from topic 7 because it concerns the outflow of money for purchasing

credit using promos. Then OVO users **have also learned about available resources for assistance,** as reflected in topics 1,2,3,4,5,6,7 and 9. Because users were able to use

existing resources such as "smartphones," "internet connections", and "Instagram" to inquire about the procedure for investing in OVO Syariah features and submit their complaints to OVO.

Next, it is evident that OVO users **have knowledge and confidence in this e-wallet**, as evidenced by topics 1, 3, 4, 5, 6, 7, and 8. Because they are already familiar with OVO's features, such as cashback, top-ups, promos, and upgrades to OVO Premier, illustrated in within words "cashback", "top-up", "promo", "premier", "investasi", dan "syariah". In addition, they understand OVO users' rights and obligations. This is evident from the complaints of users who assert their rights after executing their obligations. For example, in topic 6, a user who tops up via bank transfer must pay an administration fee. However, after topping up and paying administrative fees, the OVO balance does not increase. This point is made clear by the words "top-up", "error", "bank", "transfer bank" dan "tolong".

Further, OVO users **have also improved their financial situation** as seen in topics 1,3,4,5,6 and 9, because the user who filed the complaint understands that his financial situation is incorrect. Therefore, it indicates that users have been concerned and aware of their financial condition because they have asked OVO to help improve it. Finally, OVO users also **have the skills to use the e-wallet** as seen in 7 and 8 because they can use OVO to make payments, this point is made clear by the words "pulsa", "saldo", "promo", dan "Telkomsel". Further, users can also claim OVO's cashback and promos that are highlighted with the words "cashback" dan "promo". Furthermore, they have been able to increase their membership in OVO Premier, as indicated by the word "premier", "akun", and "baru".

CONCLUSION

According to five characteristics related to financial literacy, which consist of how customers gather financial information, how customers learn about available resources for assistance, how customers improve their financial situation, how they improve their knowledge and confidence about financial services institutions and products (including financial products and services' features, benefits and risks, rights and obligations), and how they improve their skills in using financial products and services. This study demonstrates the public perception/comments of the user e-wallets and relating it to financial literacy.

The result is for both (ShopeePay and OVO) public perception on Instagram. It can be concluded by analyzing the topics and top words, that their users understand how to acquire financial information about incoming and exiting cash flows, which is especially useful when acquiring credit with promotional offers. They may also use the function to file complaints if their transactions are hindered. They also learn about various aid services. They understand the existing features, users understand their rights and duties as e-wallet users and have trust in e-wallet products. The complaints of users who seek their rights after performing their commitments demonstrate this. They also know the advantages and disadvantages of the features available. When a user files a complaint, it means that he or she recognizes that something is wrong with their financial situation; they are concerned and aware of their financial situation because they have attempted to improve it; the user is skilled at using apps and is familiar with their features; and they are familiar with making payments at e-wallet partners' merchants. This demonstrates how is Indonesian society using e-wallets and adequately describe financial literacy. Public perception about e-wallets on social media platforms paints an image of financial literacy.

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