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Comparison of Social Media as a Platform for Financial Literacy Source

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Abstrak

Literasi keuangan telah menjadi aspek penting dari inklusi keuangan. Salah satu pendorong literasi keuangan yang baru-baru ini dieksplorasi adalah media sosial. Media sosial telah menyita sebagian besar waktu pengguna dan dengan demikian menjadi salah satu sumber utama pengetahuan dalam masyarakat modern. Studi ini bersifat deskriptif dengan menggunakan pendekatan tinjauan pustaka terstruktur untuk menyikapi media sosial dalam konteks literasi keuangan dan membedakan kategori media sosial dan atributnya terkait penerapan literasi keuangan dan kegunaannya sebagai platform program literasi keuangan. Setiap kategori media sosial memiliki kegunaan yang berbeda-beda dalam konteks literasi keuangan dan ada yang lebih cocok untuk program literasi keuangan tertentu. Batasan studi ini adalah tidak mengukur efektivitas program literasi keuangan. Namun, penelitian ini memberikan kontribusi kepada peneliti dan praktisi untuk lebih memahami dinamika program literasi keuangan melalui platform media sosial.
Kata Kunci : Sosial Media, Literasi Keuangan, Atribut, Implementasi

Abstract

Financial literacy has been an essential aspect of financial inclusion. One of the recently explored drivers of financial literacy is social media. Social media has occupied most of the user's attention and thus become one of the primary sources of knowledge in modern society. This study's purpose was to examine the context of social media in applying financial literacy planning and program. This study is descriptive by using a structured literature review approach to address social media in the context of financial literacy and distinguish the category of social media and its attribute regarding the application of financial literacy. This study found that social media has been categorized to put perspective on its usefulness as a financial literacy program platform. Every social media category has different uses; some are better suited for a specific financial literacy program. This study's limitation was that it does not measure the effectiveness of the financial literacy program based on its social media platform. However, this study contributes to researchers and practitioners to better understand the dynamic of the financial literacy program through social media platforms.
Keywords: Social Media, Financial iteracy, Attribute, Implementation

Background

Social media has been dominating people's active time. On average, people spend 2 hours and 27 minutes on social media daily, while the highest time spent was 4 to 7 minutes per day, and the average time spent grew by approximately 67% compared to ten years ago (Buchholz, 2022). Today social media has occupied a fifth of the average person's uptime. Social media has been wildly popular due to its role and nature. Social media plays a vital role in sharing information and conveying different types of data (i.e., sensitive, sensational, political, and casual information) (Osatuyi, 2013). Besides its vast amount of information, social media has an advantage in which the information rate is real-time and up-to-date. Several research has found that the reasons for using social media as an information-seeking tool are diverse and include social interaction, information seeking, passing the time, entertainment, relaxation, expression of opinion, information sharing, and surveillance/knowledge about others (Lin & Lu, 2011; Osatuyi, 2013; Whiting & Williams, 2013). While social media have shortcomings, such as its reliability in the information and the provider (Osatuyi, 2013), the advantage far outweigh its shortcoming, making it popular in nature foran an information source.

The emergence of social media and financial literacy have intertwined one another. Financial literacy, a crucial instrument to enhance financial inclusivity and society's long-term financial goals, was in sync with the inclusivity nature of social media, where everyone, notwithstanding their background, could access every information provided. Social media emergence brings new opportunities compared to traditional media, where financial knowledge and education are limited through newspapers and literature. Traditional media get barriers to inclusivity due to their price and physical limitation. Social media tear the wall and enable everyone to access financial information and knowledge. While presenting the opportunity, social media as a means of financial information is famous among millennial and Gen Z age groups (Moon, 2022). According to Pinterest, search terms related to financial literacy, such as investment tips, passive income tips, financial education, and financial planning, increased by 90%-155% in

2022 (Pinterest, 2022). There is growing evidence of financial education, counselling, and planning programs in social media. Financial education accounts such as financial diet garnered around 800 thousand followers. There are also several financial education-related subreddit on Reddit that primarily discuss financial education. This shows that social media has been acknowledged as a media for delivering financial education media to improve financial education and a place for financial education seeking.

However, research regarding social media characteristics and their attribute to financial literacy has not been thoroughly explored. Social media is an umbrella term for any application media. Every social media component has distinct characteristics that overlap or complement each other. Consequently, in delivering financial information and knowledge, mainly social media will have an advantage over another in one context and vice versa. For example, Twitter, with its actual time speed of information, is suitable for the recent market update, while Facebook, with its structured content, is suitable for storing financial education material. This trait or attribute of social media is rarely documented regarding financial knowledge delivery suitability.

This research addresses those problems and proposes guidance for researchers and practitioners regarding various social media types and its advantage and disadvantage in the context of financial education. The finding of this research could be used as a researcher, practitioner, and policy maker to assist in devising financial literacy education, counseling, and planning programs.

Literature Review

Social Media

There have been several emerging definitions of social media within the communication field and other areas. Social media are often defined as digital technologies that strongly emphasize user-generated content or interaction (Terry, 2009; Kaplan & Haenlein, 2010;). Alternatively, social media is often defined by its message directionality and channel characteristics (Kent, 2010) or by utilizing particular tools, such as Twitter or Facebook, to illustrate interactional situations (Howard & Parks, 2012). Some

currently used definitions are pretty straightforward and focus on how messages are constructed via social media. Social media, for instance, are "those that allow online contact, networking, and collaboration," according to Russo, Watkins, Kelly, and Chan (2008). Similarly, he succinctly defines social media as "a series of Internet-based applications that build on the conceptual and technological roots of Web 2.0 and enable the creation and exchange of User Generated Content," Kaplan and Haenlein (2010) provide a definition. Lewis (2010) stated that "social media" is only a "label for digital tools that enable individuals to connect, create, make, and share content."

While definitions of social media vary based on the perspective, discipline, and context, user-generated content is the red line of purpose that has been mentioned compared to other internet technology such as web 2.0. Social media refers to a collection of different two-way communication venues allowing free exchange of ideas,

knowledge, and values online. Therefore, we utilize social media as a singular noun and refer to social media as a collective term that encompasses various sorts of applications. After identifying the phenomenon, we can describe the different social media tool kinds. The common misconception is that social media can be reduced to a few of its concrete manifestations, such as Facebook, Twitter, or blogs (Fields, 2012; Hershberger, 2012; Quinn, 2011), or that using these tools is relatively simple (Bottles & Sherlock, 2011; Lee, 2010; Uzelac, 2011), is likely the result of practitioners' strategic myopia as looking at the components of social media as a whole are complex. This strategic myopia causes difficulties in differentiating various types, aims, or usage of potential social media tools, especially in financial education. Csordás et al. (2014) built a conceptual model to characterize social media based on its type. The model gives context to the social media category based on its function and attribute.
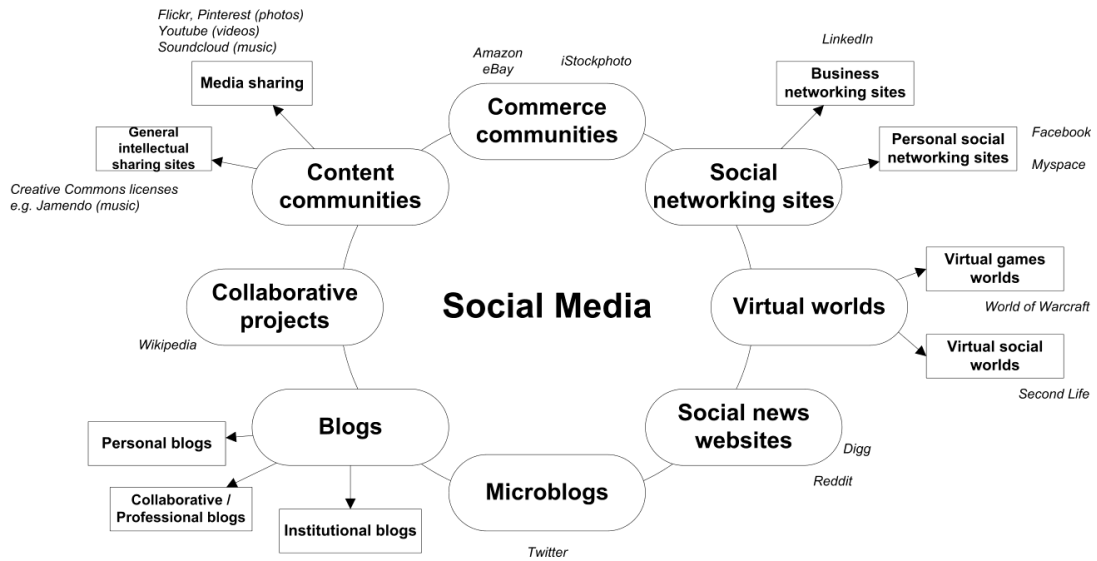
Figure 1. The components of SM—A conceptual framework. Source: Csordás et al. (2014) based on Mangold and Faulds (2009), Botha, Farshid, and Pitt (2011), and Kaplan and Haenlein (2010).

The primary subcategories of social media can be described in several different ways. Csordás et al. (2014) model group social media in this article based on the literature: blogs, microblogs, collaborative projects, content communities, social networking sites, social news websites, and virtual worlds (see Figure 1). These tools can and should be used with varying degrees of effectiveness for various goals in financial education (for instance, professional networking sites like LinkedIn are excellent for promoting professional financial training education, while creating or maintaining blogs is more appropriate for storing financial education material).

Financial Literacy

There has been much research that tried to define financial literacy. Financial literacy is the capacity to use and manage wealth and money in an informed and efficient manner, according to Gale and Levine (2010). Financial literacy is a set of awareness, information, skills, attitudes, and behaviors that are important to make wise decisions to achieve individual economic success, according to Atkinson and Messy (2012). According to Lusardi and Mitchell (2014), financial literacy is the capacity to organize one's finances, accumulate and manage wealth, make wise choices regarding debt and retirement, and use economic knowledge. Financial literacy is the capacity to use information and

skills to manage financial resources throughout life for financial security, according to the Jump$tart Coalition for Personal Financial Literacy (2015). In a different perspective from the previous definition, some put air into financial literacy in the program context. Financial literacy is an educational program for financial service managers to provide a set of knowledge that can improve the skills of service users in making effective financial decisions through the use of available information sources (Kuchciak & Wiktorowicz, 2021).

There is a plethora of research that explores factors that contribute to financial literacy. Internal and external factors could categorize financial literacy determinants. Age, gender, education, income, nature of employment, work experience, and place of work plays a significant role (Bhushan, 2013) (Vieira, 2012). Furthermore, numerical capabilities, such as understanding numbers and the attitude towards numbers, affect financial literacy (Skagerlund, 2018). From the experience perspective, economic decision-making and exposure also play a critical role (Bartley, 2011). Responsibility toward

financial fulfillment also enhances one's financial literacy, such as having a family or children (Bharucha, 2019). External factors such as exposure to financial socialization help to improve financial literacy (Rahim et al., 2022)

Method

This research is qualitative research using descriptive approach that aims to explore and understand phenomenon (Sugiyono, 2017) . In this context the aims of research is to understand social media types, attribute and the context of its utility. This research conducted at Septermber 2022. This research using structured literature approach from Weber and Watson (2002) that include : (i) search using relevant keywords on well-known journal/news sites; (ii) selecting publications/data that match the criteria; (iii) quickly scan publications/articles through titles, abstracts, and content relevant to the research problem and; (iv) study and analyze in detail the selected publications/articles. After relevant literature are found then it categorized into relevant categories; (i) Literature review regarding financial literacy and social media, (ii) information regarding

social media attribute, (iii) information regarding financial literacy determinant. After that the relevant information synthesized to answer the research question.

Result

Social media and Financial Literacy

Numerous studies have underlined the expanding role of social network platforms in the growth of financial markets and their expanding influence on financial consumers (Cazzoli, 2016; Smith, 2015; Zheludev, 2014). The traditional media has fallen behind social networks, which convey news more quickly and frequently include comments, opinions, and viewpoints on economic activity (Slavko et al., 2020). Today's financial institutions are increasingly establishing a particular policy about social networks because there are significant factors to take into account, including the ability to uphold a positive company reputation, respond to customer needs promptly and appropriately, and monitor any client complaints that might surface online.

Researchers have observed that the financial community acts like a small-world network when examining a social network (Twitter). They have identified groups of crucial nodes and evaluated their importance inside the financial community using a variety of network centrality measures. They created a weighted sentiment measure utilizing tweets from these critical nodes and a unique sentiment analysis method. They found that it is highly connected with the returns of the major financial market indices. The relationship between social sentiment and financial market movement is proxied by prominent Twitter users within the financial world. As a result, the financial community's crucial nodes' weighted emotion, rather than overall societal mood, offers a more reliable predictor of financial markets.

Because social media has become a significant predictor of choice in the financial market and environment, society has been considering social media as a prominent source of information, knowledge, and information. Social media has shaped people's perceptions and become a source for financial activity decision-making. For example, managers who alter consumer behavior through social media make poorer decisions (Power, 2011). The same

study also shows that a manager relying heavily on social media information leads to a biased conclusion. This indicates that social media is an effective tool to alter behaviour as it tears down the physical limitation border of the group thinking behaviour and herding mentality. On the other hand, proper use of social media for managers and policymakers to lead consumers to better financial decision-making is possible.

Characteristics of Social Media and its Attribute Toward Financial Literacy

Given the widespread use of social media in today's world (Dixon, 2022), it is possible to use this form of social media to provide the general public with new perspectives on financial services and products and helpful first-hand experience. To implement social media as a tool to improve financial literacy, Csordas's model of social media categorization puts social media in perspective. Categorization is essential to understand social media's position in the tools' views. As with other devices, each has proper use for specific cases and problems.

Table 1. Comparison of social media category and its attribute

Category of Social Media	Example	Distinct Characteristic	Financial Education content suitability
Microblogs	Twitter	Real-time and fast	The latest financial information, bite-sized financial content.
Blogs	BlogSpot, WordPress	Store large amount of information	Financial education through blogging content
Social News Website	Reddit	Information and comprehensive content crowdsourcing	Financial topic discourse
Social Networking Sites	Facebook, Linkedin, myspace	Close relationship circle gathering	"Word of mouth" education content through sharing and reposting
Commerce Communities	Tokopedia, shopee	Business/selling product oriented	Financial product selling education (Investment, mutual fund, etc.)
Content communities	Youtube	Wide range of short to long video content	Multimedia financial education content
Collaborative Projects	Wikipedia	Anonymous content collaboration	Repository of financial education content

Microblogs

Micro-blogs are social networking platforms that allow users to write and read extremely brief messages, typically limited by the message's character count. The most well-known of these is Twitter, where users can send messages known as "tweets"—text posts of up to 140 characters—that are shown on the author's profile page and sent to the author's followers. Senders can limit delivery to friends only or, by default, permit open access. Users can send and receive Tweets via the Twitter website, mobile text messaging, or third-party applications. Twitter's limited character gives an advantage over other social media in terms of speed and actuality.

The latest news from user-generated content could be available in mere seconds. Microblog actuality was suitable for bite-sized financial education information that leverages actual latest issues, such as education regarding inflation in the read – collections of tweets by single users – to give people perspective on the current issue. Due to its "hotness," financial education/information through Twitter may garner more user attention.

Blogs

Blogs, often known as "weblogs," are websites owned and authored by people who keep regular commentaries and diaries on them. These diaries may contain text, pictures, videos, and connections to other blogs and websites, and they are typically organized in reverse chronological order. Rudimentary blogs serve only as online journals for individuals. Still, more sophisticated blogs focus on commenting on various phenomena with news and opinions on specific topics, spanning a wide range of sectors, products, services, and unique hobbies.

Blogs were suitable for storing large amounts of financial education material. Due to their journal type, blogs could be used as a repository and collection of materials such as books, documents, etc. Regarding financial literacy program planning, the manager should consider a blog as a media if the financial education program is not dependent on the recency of the issue. For example, material regarding the type of financial securities. Blogs might be similar to web 2.0, but the difference is in the two ways of communication of blogs.

Social Networking Website

Users can search and add friends and connections on social networking websites, communicate with them, and update their profiles to inform friends, acquaintances, or co-workers about themselves. Users can also join networks organized by employment, school, or college on various social networking platforms. Facebook and MySpace are the most well-known "friendship" social networking sites, and LinkedIn and Plaxo are the most popular for professionals. There are more than 2.934 billion active Facebook members globally (Datareportal, 2022).

Social networking sites have advantages over social media types as they mainly consist of a circle of users known to each other. Consequently, its often used to interact socially compared to other social media. Due to its nature, social networking websites often become sources of viral information as they enable easy sharing of content through the share feature. The manager should consider social network for financial content and program that is easy and compelling to share among a group of friends, such as how to avoid debt pitfalls, manage money in your 20s,

etc. "word of mouth" strategy works well in social networking website.

Commerce Communities

Online mall/ marketplace that acts as an intermediary between buyer and seller in the virtual world was categorized into commerce communities. It comprises available products and space for buyer and seller platforms to enable two-way reciprocal communication. Examples of commerce communities are eBay, Tokopedia, Shopee, and Amazon. Today's online marketplace also provides compelling content and entertainment aside from its primary function to encourage buyers to buy behavior and sellers to be more active in their business.

Commerce communities are suitable for financial education embedded in the product. Today's online marketplace sells physical products, services, and financial products. For example, Tokopedia sells bill payment services, electronic gold, and mutual funds. Financial literacy campaigns through commerce communities should be embedded in the product. It means strict regulations should ensure buyers understand the risk embedded in financial products.

This can be done by signing the terms of the agreement and required information for the customer before they push the buy button. Managers may use commerce communities to plan a financial literacy program through partnership and by holding live events regarding financial socialization. They have solid customers who bought the financial products and potential customers that have not yet purchased but have already become their customers.

Content communities

Heavily focused on multimedia content was the distinct characteristic of this category. Most popular were video and image sharing websites/apps. Users can upload and share videos on video-sharing websites. Unregistered individuals can typically only view the videos; however, registered users can publish an infinite number of videos. YouTube is the most well-known of the video-sharing websites. Instagram was the market leader for image-sharing websites, but lately, it also introduced short videos consisting of several seconds or even longer, called reels. They were making the border of video and image sharing websites blur and best categorized as content communities.

Multimedia content is interesting, and numerous research proves that students learn more deeply from well-designed multimedia messages containing words and pictures than traditional word-only statements (Mayer, 2003). For financial literacy programs that rely on the user's longer attention span and deep comprehension learning requirement, content communities are a great place to use because of their reputation as a source of learning material and popular education user-generated content. It also captures a broader audience, especially on Instagram. Celebrity accounts - influencers- could be used as an agent to deliver financial education messages.

Conclusion

In the contemporary digital era, financial literacy on the internet is gradually becoming an essential component of education. Consumers of financial services are frequently more vulnerable when using products and services related to financial technology. This and the other situations discussed in this study emphasize the necessity of

promoting financial literacy via social media and its context associated with the type of program and social media to use. It is to be considered that each social media category is different in nature and its use. Therefore suitable approach regarding the promotion of financial literacy should be exercised carefully, considering the difference in attributes of social media and its proper use for specific financial literacy programs. Understanding this difference and context should put financial literacy programs in a better spotlight and help to raise awareness of financial inclusion. This study's limitation is that it does not quantitatively test the suitableness of the message type in each social media category. However, this study serves as the foundation for the researcher to further understand the dynamics of financial literacy in the context of social media. This study also helps managers and policymakers to give a starting point for planning financial literacy programs involving social media as its media of delivery.

References

Atkinson, A., & Messy, F.-A. (2012). *Measuring financial literacy: Results of the OECD/International Network on Financial Education (INFE) pilot study*.

Bartley, J. (2011). What drives financial literacy among the young? *Undergraduate Economic Review*, *7*(1), 23.

Bharucha, J. P. (2019). Determinants of financial literacy among Indian youth. In *Dynamic Perspectives on Globalization and Sustainable Business in Asia* (pp. 154–167). IGI Global.

Bhushan, P., & Medury, Y. (2013). Financial literacy and its determinants. *International Journal of Engineering, Business and Enterprise Applications*, *4*(2), 155–160.

Botha, E., Farshid, M., & Pitt, L. (2011). How sociable? An exploratory study of university brand visibility in social media. *South African Journal of Business Management*, *42*(2), 43–51.

Bottles, K., & Sherlock, T. (2011). Who should manage your social media strategy. *Physician Executive*, *37*(2), 68–72.

Buchholz, K. (2022). *Which countries spend the most time on social media?* World Economic Forum. https://www.weforum.org/agenda/2022/04/social-media-internet-connectivity/

Cazzoli, L., Sharma, R., Treccani, M., & Lillo, F. (2016). A large scale study to understand the relation between twitter and financial market. *2016 Third European Network Intelligence Conference (ENIC)*, 98–105.

Csordás, T., Markos-Kujbus, É., & Gáti, M. (2014). The attributes of social media as a strategic marketing communication tool. *Journalism and Mass Communication*, *4*(1), 48–71.

Datareportal. (2022). *The Latest Facebook Statistics: Everything You Need to Know*. https://datareportal.com/essential-facebook-stats

Dixon, S. (2022). *Social media—Statistics & Facts*. Statista. https://www.statista.com/topics/1164/social-networks/

Fields, N. (2012). Starting Up Social Media-Don't expect the process to be a sprint. It's more like a marathon. *ABA Bank Marketing*, *44*(1), 14.

Gale, W. G., & Levine, R. (2010). Financial literacy: What works? How could it be more effective? *How Could It Be More Effective*.

Hershberger, T. (2012). Oh No! Someone Posted a Negative Comment-Common social media start-up challenges and how to cope with them. *ABA Bank Marketing*, *44*(1), 20.

Howard, P. N., & Parks, M. R. (2012). Social media and political change: Capacity, constraint, and consequence. In *Journal of*

communication (Vol. 62, Issue 2, pp. 359–362). Oxford University Press.

Jump$tart Coalition for Personal Financial Literacy. (2015). *National standards in K-12 personal finance education, Fourth Edition.* http://www.jumpstart.org/assets/files/2015_NationalStandardsBook.pdf

Kaplan, A. M., & Haenlein, M. (2012). Social media: Back to the roots and back to the future. *Journal of Systems and Information Technology*.

Kent, M. L. (2010). Directions in social media for professionals and scholars. *Handbook of Public Relations*, *2*, 643–656.

Kingsford-Smith, D., & Dixon, O. (2015). *The consumer interest and the financial markets.*

Kuchciak, I., & Wiktorowicz, J. (2021). Empowering Financial Education by Banks—Social Media as a Modern Channel. *Journal of Risk and Financial Management*, *14*(3), 118.

Lee, D. H. (2010). Growing Popularity of Social Media and Business Strategy. *SERI Quarterly*.

Lewis, S., Pea, R., & Rosen, J. (2010). Beyond participation to co-creation of meaning: Mobile social media in generative learning communities. *Social Science Information*, *49*(3), 351–369.

Lin, K.-Y., & Lu, H.-P. (2011). Why people use social networking sites: An empirical study integrating network externalities and motivation theory. *Computers in Human Behavior*, *27*(3), 1152–1161.

Lusardi, A., & Mitchell, O. S. (2014). The economic importance of financial literacy: Theory and evidence. *Journal of Economic Literature*, *52*(1), 5–44.

Mangold, W. G., & Faulds, D. J. (2009). Social media: The new hybrid element of the promotion mix. *Business Horizons*, *52*(4), 357–365.

Mayer, R. E. (2003). The promise of multimedia learning: Using the same instructional design methods across different media. *Learning and Instruction*, *13*(2), 125–139.

Moon, A. (2022, June 2). Social Media and Financial Literacy: Where Millennials and Gen Z are learning about money. *Chartwell Agency*. https://chartwell-agency.com/social-media-and-financial-literacy-where-millennials-and-gen-z-are-learning-about-money/

Moon, S., & Iacobucci, D. (2022). Social Media Analytics and Its Applications in Marketing.

Foundations and Trends® in Marketing, *15*(4), 213–292.

Osatuyi, B. (2013). Information sharing on social media sites. *Computers in Human Behavior*, *29*(6), 2622–2631.

Pinterest. (2022). *Finpowerment | Pinterest Predicts 2022 | Pinterest Business*. Pinterest. https://business.pinterest.com/en/pinterest-predicts/2022/finpowerment/

Power, D. J., & Phillips-Wren, G. (2011). Impact of social media and Web 2.0 on decision-making. *Journal of Decision Systems*, *20*(3), 249–261.

Quinn, R. (2011). Social media Do's and Don'ts. *Inventor's Digest*.

Rahim, N., & Ali, N. (2022). The Role of Financial Socialisation as the Driver of Financial Literacy: A Pilot Study in Malaysia. *Undefined*. https://www.semanticscholar.org/paper/The-Role-of-Financial-Socialisation-as-the-Driver-A-Rahim-Ali/6ce17f15fbfde33ed53d0d5ae24fe8d7b5b769e2

Rahim, N., Ismail, N., & Karmawan, K. (2022). Financial Literacy And Financial Behaviour: An Overview of Key Drivers. *Proceedings of the 1st International Conference on Social, Science, and Technology, ICSST 2021, 25 November 2021, Tangerang, Indonesia*.

Russo, A., Watkins, J., Kelly, L., & Chan, S. (2008). Participatory communication with social media. *Curator: The Museum Journal*, *51*(1), 21–31.

Skagerlund, K., Lind, T., Strömbäck, C., Tinghög, G., & Västfjäll, D. (2018). Financial literacy and the role of numeracy–How individuals' attitude and affinity with numbers influence financial literacy. *Journal of Behavioral and Experimental Economics*, *74*, 18–25.

Slavko, A. S., Zavhorodnia, V. M., & Shevchenko, N. A. (2020). *Protection of One's Honor, Dignity, and Business Reputation on Social Networks: Issues and Ways to Resolve Them*.

Sugiyono, P. D. (2017). Metode penelitian bisnis: Pendekatan kuantitatif, kualitatif, kombinasi, dan R&D. *Penerbit CV. Alfabeta: Bandung*, *225*

Terry, M. (2009). Twittering healthcare: Social media and medicine. *Telemedicine and E-Health*, *15*(6), 507–510.

Uzelac, E. (2011). Mastering social media. *Research*, *34*(8), 44–47.

Vieira, E. F. S. (2012). What do we know about financial literacy? A literature review.

Marmara Journal of European Studies, *20*(2).

Webster, J., & Watson, R. T. (2002). Analyzing the past to prepare for the future: Writing a literature review. *MIS Quarterly*, xiii–xxiii

Whiting, A., & Williams, D. (2013). Why people use social media: A uses and gratifications approach. *Qualitative Market Research: An International Journal*.

Zheludev, I., Smith, R., & Aste, T. (2014). When can social media lead financial markets? *Scientific Reports*, *4*(1), 1–12.