SOCIAL NETWORK ANALYSIS: A COMPETITION IN INDONESIA'S FASTEST GROWING FINTECH

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Abstract

This study aimed to analyze how effective the use of social media was to maximize recognition and sales. On social media, users had tried to reveal information they already knew about financial technology startup businesses. User Generated Content (UGC) information, which was a track record left by users on social media, can be used as a mapping for users who communicate on social media. This study itself had used this phenomenon to measure the performance of companies (through brands) that were popular on social media, namely Gopay and DANA, in an effort to measure a person's awareness and interest. The method used was Social Network Analysis (SNA). This qualitative research aimed to describe the results of a phenomenon that were occurs. The results of this study indicated that DANA had advantages in the community and it was easy for users to communicate because there were few accounts that must be passed in conveying information. Meanwhile, Gopay had the advantage of having a large number of users and being have many relationships between users.

Keywords: Social network analysis, DANA, gopay, fintech, startup business.

Introduction

Along with the development of increasingly massive technology. The use of technology certainly cannot be denied. That is why change is always there and develops in line with time itself. The change itself belongs to the entrepreneurial sector. Entrepreneurship is lined up as a solution to a country's economic problems. With the existence of entrepreneurs, the country's monetary resilience becomes strong. Therefore they are known as the cornerstone of the country's economy. Mutiarasari (2018) said that entrepreneurship affected economic growth and reduced unemployment in Indonesia. So it is hoped that the growth of new entrepreneurs can always be increased.

There are various entrepreneurship that emerged in Indonesia. However, if it is based on ownership, it is divided into Micro, Small and Medium Enterprises (Law no. 20 of 2008). Based on the sector, it can be divided into seven sectors: trade, processing industry, agriculture, plantation, animal husbandry, fishery, and services (LPPI & BI, 2015). One of the businesses that is growing rapidly in Indonesia is the startup business. Harris (2016) explained that startup businesses can be included as MSMEs at first. Both are small companies founded to meet market needs. They also focus on profit, growth and survival. However, the obvious difference is that startup businesses want fast growth using their innovation. Uniqueness, distinctiveness and standing out from other businesses is the key idea

behind the startup business itself. So it is able to adapt and change at any time.

Advances in information, communication and technology (ICT) trigger the emergence of the startup business itself. There is a term cybertopia which is synonymous with the emergence of startups because these businesses are juxtaposed with everything related to technology, the web, the internet and the like (Ayu, 2017). Startup business is very thriving in Indonesia. Muslim (2020) informed that startup businesses in Indonesia were ranked fifth in the world with 2,193 startups in 2019. In addition, Indonesia has also started to have four unicorns, which are valued at more than US$ 1 billion. For this reason, the government encourages the growth of new startups through the 1000 startup movement program.

However, in Indonesia many startup businesses fail to thrive. This happens because many startup businesses in Indonesia focus more on technology and forget about the market. That is why the success rate of startups in the world is only 5% (Yadika, 2019). Even according to the founder of Unicorn, Go-Jek, Nadiem Makarim, the number of failed startups in Indonesia is 92-95% (Yasra, 2019). Even though the startup business itself has been able to absorb 55,903 workers from 992 startups in 2018 (Wijanarko, 2019).

CBInsights (2019) provided an explanation of failures in the startup business, the first was that the market was not needed; the second was running out of capital, the next was an unsuitable work team, unable

to compete, cost issues, marketing problems, to the loss of the axis of the startup business itself. Therefore, it is necessary for strategy maturation in the face of tight business competition in the startup business. Especially after seeing the establishment of a startups' impact in Indonesia. In addition, many startup businesses so as not to experience failure need to be guided by larger startup businesses and the government as a regulator.

Meanwhile, a startup can be described as a company managed by less than 20 employees where the business is operated digitally with a fast movement (Suwarno & Silvianita, 2017). So that startups can be recognized as small companies (by looking at the number of employees). However, the main purpose of establishing a startup is not the size, but the value (valuation) of the company.

Valuation is very important for investors because it determines the proportion of shares they will receive in return for the investment that has been disbursed, manages the profit and also affects their relationship as backers of the fund. In addition, they regulate the motivation and assign value to existing businesses and resources to be included in the new venture (Miloud, Aspelund, & Cabrol, 2012).

However, because many startup business people 'cover' their finances just to get a high valuation value. Sudarningsih, Estiyanti, and Satwika (2019) suggested using the Dave Berkus method which is used to determine the value of startup companies on Bromberries.com., by analyzing non-financial factors that affect the value of the company both qualitatively and quantitatively. That is why startup business people need to understand the startup life cycle itself (see Figure 1).

In the *bootstrapping* stage, the founder must fund his own startup business. Furthermore, at the *seed* stage, startup founders have started looking for additional funding (investment), either through angel investors or ventures. Upon reaching the *creation* stage, the founder and his team began to create the value of the business. This is often known as value creation.
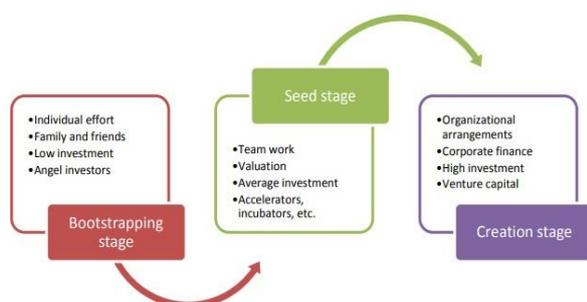
Figure 1. The startup lifecycle
Source: Salamzadeh and Kawamorita (2015)

Although it looks promising, in fact the startup business is very high risk. So it is necessary to have a mature strategy in order to survive in the swift current of business competition in the domestic market or to enter the international market.

This promising hope is what makes startups that enter the realm of financial technology (or fintech) appear. According to the Indonesian FinTech Association or AFTECH, during 2020, 362 fintech startups have joined. This is not a small amount, but it is quite massive considering that in less than 5 years, AFTECH members from the startup sector have increased significantly and it is possible that there are still many other fintech startups that have not joined. Interestingly, IDC Financial Insights noted that there are 10 fast-growing fintech startups from Indonesia (Kunjana, 2020) in the Asia Pacific area. This is an example of the success of a fintech startup from Indonesia.

Yudaruddin (2019) who collected data on the performance of fintech startups on bank performance from 2009 to 2018 found that fintech startups did not reduce bank performance, only that small banks had impaired performance in their lending business considering that they were seized by the fintech startup, especially from the innovation factor. Even small startups will always innovate by producing value, obtaining new and significant changes by constantly evolving and collaborating with academics to carry out research (Gomber, Kauffman, Parker, & Weber, 2018).

Unfortunately, in its marketing strategy, fintech startups are like other startups. They always use social media to introduce their products. Especially when they reach the stage of crowdfunding, which is used for business development. Most startups experience this. However, the rapid development of technology and the ease of accessing information and transactions make the platform easy to do (Nugroho & Rachmaniyah, 2019). This is also highlighted by Lynn, Rosati, Nair, and Mac an Bhaird (2017) with the use of twitter media during the crowdfunding period.

If they are able to go through that stage, these startups will be able to continue. Meanwhile, when they were difficult to raise capital, then stop the business. By analyzing twitter using the Social Network Analysis (SNA) approach, it will be known how fast the startup can grow and be known to the public or market. The faster the capital raised, the faster the startup will develop, by conducting research and evaluation on an ongoing basis. So this is the main key in the journey of a startup.

In this study, twitter was chosen (compared to other social media, such as: Facebook or Instagram) because of the abundance of data created (otherwise

known as tweets). Smith (2021) lists as many as 500 million tweets generated in a day. Of course, this is more than Instagram, which only uploads 95 million photos a day, and also 480 million photo uploads a day on Facebook. In particular, twitter has a wider range of posts because it is not limited by a specific group (eg. friends or followers), so the messages posted are public property (Bruns & Stieglitz, 2012).

SNA, which was introduced by Otte and Rousseau (2002) and is still valid for use today, is actually the same as structural analysis. Not as a theory, but rather as a broad strategy for investigating social structures. This SNA is widely used to analyze the use of social media in viewing a dimension. SNA means analyzing various distribution patterns of relational ties and drawing conclusions about the network as a whole or about the people belonging to it are considered individuals or groups (Bandyopadhyay, Rao, & Kumar, 2011).

SNA studies the structure of relationships that link individuals or other social units and dependencies in behavior or attitudes related to the arrangement of social relationships. The relationship is described by nodes, or can be called vertices which symbolize actors or users and ties or also called edges, links or connections which symbolize the relationship between actors. There are five network properties in social networks as shown in Table 1.

Table 1
SNA Network Properties

Network Properties	Definition
Size	It shows the number of nodes in a network, which represents the number of interacting users and also shows the number of edges, which represents the number of relationships that occur in the social network.
Modularity	It shows how the relationships that exist in social networks can form different groups in a social network.
Diameter	The maximum closest path in a network or can be called the largest distance between a pair of nodes.
Average Degree	It shows the average number of relationships owned by actors (nodes) in a social network.
Average Path Length	The average distance between one node and another node in a network.

Source: Otte and Rousseau (2002)

Therefore, this study aims to analyze business competition in the fintech startup business by comparing two businesses that are market leaders in Indonesia, namely Gopay and DANA. Maulana (2020) noted that public awareness of fintech was focused on Gopay with 97.2% and followed by DANA with 96.3%. While consecutively inhabited by OVO, LinkAja, Shopeepay, and Jenius. So this is a solution to see how the marketing strategies built by successful startup businesses can be developed by new startup business actors.

Research Methods

Research that utilizes Social Network Analysis (SNA) includes descriptive and qualitative research types. Descriptive research is research with the aim of describing the characteristics of an object, person, group, organization or environment that describes a particular situation or event. While research that uses a qualitative approach is often used to look deeper into a social phenomenon, including studies of education, business management and administration, public policy, development or law. SNA tries to describe social relationships consisting of nodes, actors or individuals in the network under study, and links, the relationships between these actors (Koçak, 2014).

The research subjects in this study were twitter social media users in Indonesia who talked about DANA and Gopay. The procedure for selecting research subjects can be described briefly by using the Gephi analysis tool by crawling data on social media. After that, the researchers compared the fintech as research subjects.

Meanwhile, data collection is in the form of User Generated Content (UGC) or also called Mining UGC on social media. UGC Mining uses the Gephi application to crawl tweets containing the keywords "DANA" and "Gopay". The results of crawling tweets are pre-processed data to remove irrelevant tweets to make the analysis process easier. Next, determine the users who interact on each tweet to serve as nodes in the social network. After pre-processing the data, social network modeling was carried out using the SNA method. Network visualization is done with the Gephi application so that nodes that symbolize users will be seen and edges that symbolize relationships between actors in social networks. In the social network that has been modeled, it can be seen the properties of social networks to compare social networks between businesses.

The analytical technique used in this research is SNA. In simple terms, SNA can be referred to as a study that studies the relationship between humans which is described in the form of maps and pictures. SNA describes social relationships in network theory consisting of nodes and ties (or also called edges, links

or connections) where nodes are users/ actors/individuals in a network and ties are relationships between users/actors (Passmore, 2011).

User-generated content on social media is open and accessible to many people. This can be said as UGC (Moens *et al*., 2014). Furthermore, Olmedilla, Martínez-Torres, and Toral (2016) explained that online UGC data plays an important role as a source of information for companies to seek value mining. So companies can manage large UGC data (or big data) as business intelligence. Furthermore, UGC data collection or also called UGC Mining is carried out on social media. This UGC Mining uses the Gephi application to crawl tweets, which contain keywords that researchers want. The results of the crawled tweets will be pre-processed data to remove irrelevant tweets to make the analysis process easier.

After pre-processing the data, the social network modeling was carried out using the SNA method. Network visualization is also done with the Gephi application. So it will be seen nodes that symbolize users and edges that symbolize the relationship between actors in the social network. Through the modeled social network, we can see the properties of social networks that compare social networks between businesses. The next researcher conducts an analysis of the properties, including: size, modularity, diameter, average degree, and average path length. The steps in analyzing the data are illustrated in Figure 2.
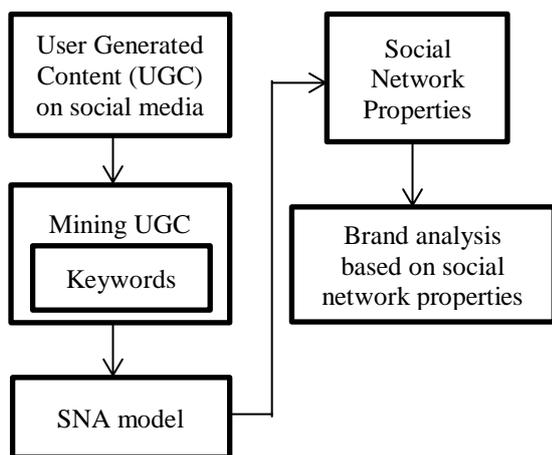
Figure 2. Research flow

Results and Discussion

Data crawling was carried out by researchers on twitter for one day on May 30, 2021 using the Gephi programming application. Researchers entered the keywords "Gopay" and "DANA" separately. Tweets that have been crawled on user interactions on Twitter

regarding DANA are 8,990 tweets, while interacting tweets about Gopay are 18,140 tweets posted by actors. This shows that twitter users interact more in discussing Gopay than DANA (see Table 2).

Table 2
Data Crawl Results

Startup Brand	Number of Crawled Tweets
DANA	8,992
Gopay	18,140

Source: Gephi Analysis

Gephi was chosen, according to Pavlopoulos, Paez-Espino, Kyrpides, and Iliopoulos (2017), because it is open source software, with visualization and exploration that can be used on all types of software network. This tool aims to help find patterns and filter dynamic repetitive visualizations in creating a hypothesis. It can also be used to analyze exploratory data, links, social networks, or biological networks. Withdrawing data through Gephi was chosen because it has convenience and results that can describe conditions based on incoming social media data. Although the withdrawal process carried out at different times may lead to slightly different results, the differences are trivial and the overall structure remains the same (Ji, Machiraju, Ritter, & Yen, 2015).

DANA Network

The results of the social network modeling of user conversations about DANA can be seen in Figure 3, where the modeling results describe the social network formed from user interactions regarding DANA. Seen in the picture nodes (dots) which symbolize the actor/user and the edge (line) which symbolizes the relationship between actors/users. After modeling the social network, the network properties analysis is carried out to determine the value of the social network.

Furthermore, if examined again in Figure 3, an assessment related to social networks regarding DANA can be obtained. Size indicates the number of components in the system. The size of the DANA social network has 8,992 actors and 11,842 relationships between actors.

Modularity shows how actors can form different groups in a network. The value of modularity on the DANA social network is 0.951. Diameter is the shortest distance between the two farthest nodes. The value of the diameter of the DANA social network is 10 so that the shortest distance between the two furthest actors on the DANA social network is 10.
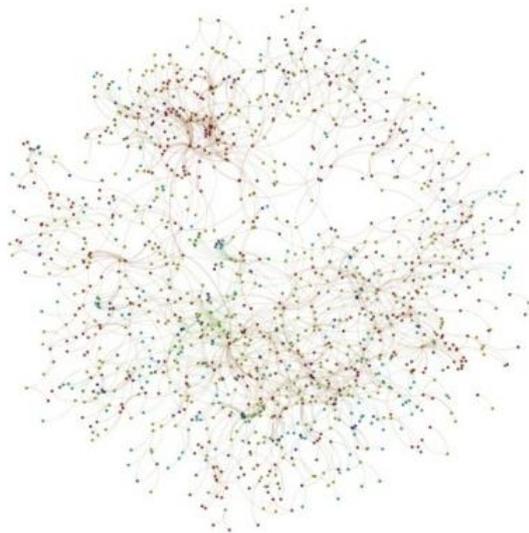
Figure 3. DANA social network view (Gephi Analysis)

Next, the average degree indicates the average degree of the number of links connecting one node to another. While the average degree value on the DANA social network is 1,317. Average path length is translated as the average number of accounts or nodes that an account must pass to reach a certain account and the average path length value on the DANA social network is 1,806 (see Table 3).

Table 3
DANA Social Properties Results

Network Properties	Results
Size	Nodes: 8,992
	Edges: 11,842
Modularity	0.951
Diameter	10
Average Degree	1.317
Average Path Length	1.806

Source: Gephi Analysis

Gopay Network

After going through data pre-processing and network modeling, the results of the social network regarding Gopay on twitter look like in Figure 4. The modeling results that describe the social network formed from user interactions about Gopay (see Figure 4), show nodes (dots) that represent actors and edges (lines) that symbolize relationships between actors.

After doing the modeling, then an analysis of the network properties is carried out to determine the value of the social network. The results of the assessment of the social network formed about Gopay are recorded as in Table 4. The size which shows the number of components in the system, has 18,140 actors and 31,573 relationships between actors. Modularity which

shows how actors can form different groups in a network has a value of 0.884. Then the diameter as an illustration of the shortest distance between the two farthest actors on the Gopay social network, has a value of 21. Meanwhile, the average degree shows the average degree of the number of links connecting one node to another node. The average degree value on the Gopay social network is 1.741. The last is the average path length. This translates as the average number of accounts or nodes that an account must pass to reach a certain account. The average path length value on the Gopay social network is 5.064.
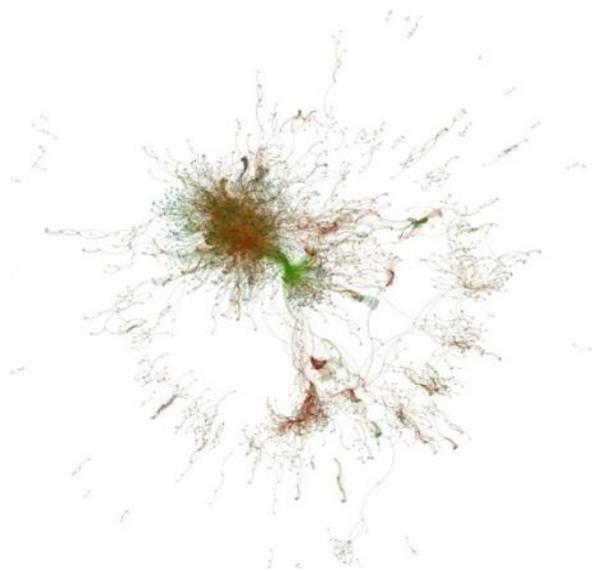
Figure 4. Gopay social network view (Gephi Analysis)

Table 4
Gopay Social Properties Results

Network Properties	Results
Size	Nodes: 18,140
	Edges: 31,573
Modularity	0.884
Diameter	21
Average Degree	1.741
Average Path Length	5.064

Source: Gephi Analysis

Discussion

Related on each network property on the user's social network regarding DANA and Gopay, ranking can be done as an alternative to determine the advantages and disadvantages of each startup business. This can be used as an illustration of the strategies that have been carried out by the two fintechs in managing social media, especially twitter.

In Table 5, the first network property value is size. A good and active network is having a large size. The

results of the crawling data show that the Gopay social network has a larger size with more actors and relationships, which is 18,140. The second network property is modularity. The greater the value of modularity, the clearer the group formed. Each group that is formed can become a different community. So it takes more specifications for products in each community. It turns out that DANA has the highest value compared to Gopay, which is 0.951.

Table 5
Comparison of Fintech Startup Business Analysis Results

Network Properties	Results		Ranking
	DANA	**Gopay**	
Size	N: 8,992	N: 18,140	1. Gopay
	E: 11,842	E: 31,573	2. DANA
Modularity	0.951	0.884	1. DANA
			2. Gopay
Diameter	10	21	1. DANA
			2. Gopay
Average Degree	1.317	1.741	1. Gopay
			2. DANA
Average Path Length	1.806	5.064	1. DANA
			2. Gopay

Next network property is diameter. The smaller the diameter it will be easier for nodes to communicate with each other because of the short distance. The DANA social network has a smaller diameter of 10 compared to the Gopay social network which is 21. Furthermore, the fourth network property is average degree. The more links (edges) that connect between nodes, the faster and easier the dissemination of information. The social network that has the most average degree will excel, namely Gopay with an average degree value of 1,741. The last network property is average path length. The fewer accounts that are skipped, the better. DANA has 1,086 and much less than Gopay.

So overall, DANA has an advantage in the community and it is easy between accounts or users to be able to communicate due to the few accounts that must be passed to convey information. These results can support Safira, Goenawan, and Monica (2019) if DANA users have more confidence in their fellow users, including at the stage of using DANA for transactions. Meanwhile, Gopay has advantages in the large number of accounts or users and the many relationships between these accounts, which has an impact on the easy and fast dissemination of information. This is also what according to Anifa, Anisa, Fadhila, and Prawira (2020) as a result of the merging of Gopay

with Gojek, which already has many users before. So finally during 2020, Burhan (2021) noted that Gopay outperformed DANA in its use as a fintech.

Conclusions and Implication

The overall advantage of Gopay can be concluded that through analysis of the startup business network on social media it can be used as a brand strategy by looking at social networks on twitter. The analysis results of favorite brands with social networks conclude that the social network formed on twitter about Gopay is superior to DANA. The implication is that the startup business sector needs to increase the number of sizes (representing accounts or users) by being more active on twitter and inviting users or customers to tweet, post or repost on twitter related to their brand. So this can be used as a strategy to develop their business.

Meanwhile, to increase the average grade, companies can hold campaigns by inviting users or customers to mention and tag their friends (Dwivedi *et al.*, 2021). In the future, startup businesses need to be able to collaborate by following companies that already have a lot of followers and hold campaigns that involve the two companies.

However, it must be admitted that this study has limitations related to data analysis that only uses twitter social media. With its advantages, twitter is only one of several social media that many people are interested in. So it is recommended that further research can take a quantitative approach using other social media.

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