Digital Economy and Virality Products of Startup Users Informal Sector in Palembang: An Analysis of Spatial Distribution-Based Study

MONANISA[1], SUKMANIAR[1,*], PUJIANTO[2], WAHYU SAPUTRA[1], KIKI ARYANINGRUM[1]
[1]Geography Education Study Program,
Universitas PGRI Palembang,
Palembang City, 30116,
INDONESIA

[2]Informatics Study Program,
Universitas Baturaja,
Ogan Komering Ulu, South Sumatra, 32115,
INDONESIA

[*]*Corresponding Author*

Abstract: - This study aimed to examine the existence of startup users in the informal sector amid the digital economy era in Palembang City, Indonesia. The type of research is quantitative. This research method uses a survey approach to obtain data from a collection of panels or respondents. The sampling technique is proportional random area sampling. The population of the informal sector workforce was 329,392 respondents and the number of samples was 384. The research analysis used frequency distribution and cross-tabulation. The spatial analysis used geometric interval calculations. The results of this study found that product modification was the most widely used strategy, with 98 respondents or 25.5% of the total respondents. The high viral product category contained two products, namely food and beverage products, with a percentage of 87.2%, and clothing products, with a percentage of 4.4%. In products with a moderate viral category, several products included a percentage range of 1.3% - 1.6% of 384 respondents. The moderate viral product category included laundry service, printing service, gadget counter, skincare, and household appliances. The viral product promotion model's highest percentage results were advertising goods at 64.8 percent, which could be categorized through product advertising online, offline, and/or both. Spatial analysis revealed that the distribution of startups used varies across regions of Palembang City, with the highest concentration in areas with better infrastructure and business support.

Key-Words: - Digital Economy, Viral, Informal Sector, Startup, Spatial, Distribution, Product.

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1 Introduction

Nowadays, startups crucially act as engines of innovation and economic growth amid the rapid development of the digital economy. Startups can displace long-standing economic rulers because they have created fierce competition caused by innovation and rapid growth in the informal sector, [1]. This informal sector is often neglected in formal economic studies; thus, startups act as catalysts for social and economic transformation. Historically, this sector has limited access to capital, technology, and markets. Due to the adoption of digital technology, this sector has gained momentum. Digital technology has shown globalization and the current shift in economic power, [2].

The digital economy offers new opportunities for startup users in the informal sector to increase their presence and competitiveness. Using digital platforms, startup users can reduce barriers faced to date, expand customer reach, and increase operational efficiency. Online trading platforms can integrate or connect sellers and buyers, [3]. Another benefit is the phenomenon of virality in the digital world, where information about products and services can spread quickly on social media and e-commerce platforms. The use of platforms has a powerful impact on networks that can connect people quickly, [4]. New economic opportunities in the business world can be created from e-commerce, [5]. It allows startup users to grow faster, even with limited resources.

However, the success of the digital economy depends not only on the adoption of technology but also on startup users' ability to innovate and adapt to rapidly changing market needs. Innovation is one of the startup users' characteristics, [6]. Although many startup users in the formal sector have successfully used digital technology to achieve significant growth, startup users in the informal sector often face significant challenges, including limitations in digital skills, infrastructure, and access to capital.

The economic ecosystem can change into a digital economy especially in developing countries. Members of the economic ecosystem community produce goods and services for customers. Certain services prepared by companies that cater to specific consumer demands are a hallmark of the digital economy. Indonesian e-commerce business actors share the same desire as the government to realize a digital economy market because, in the past twenty years, the development of e-commerce in the world has been very rapid, [7]. The digital economy has integrated with the Internet of Things (IoT). The current technology that connects the physical world and the digital world, and has the concept of anytime, anywhere, and any media, is called the Internet of Things. Industry 4.0 is greatly aided by the rapid development of IoT technology. Various methods employed by entrepreneurs to scale their businesses in the digital economy include creating platforms that can foster innovation in products and services, as well as network effects that can increase the number of customers. The current development of the digital economy requires individuals to have the ability to formulate survival strategies in order to compete. Survival strategies, consolidation strategies, and accumulation strategies are three forms of survival strategies. Many factors determine a person's choice of livelihood strategy, such as personal decisions and sustainability aspects, [8]. To improve someone's livelihood, technology plays a crucial role because we are currently in the era of the digital economy. The technology used in the digital economy is widely utilized by those working in the informal sector, as their attitudes and behaviors have led towards digitalization, [9]. The city of Palembang, the capital of South Sumatra Province, has the highest number of informal sector workers compared to other urban areas, as can be seen in Table 1.

From Table 1, it can be assumed that some informal sector workers in the city of Palembang utilize technology to conduct digital transactions in the services and trade sectors they are involved in. This is because the exchange of goods and services is currently facilitated by IoT based on the global internet, and being competent in the digital field can build an individual's resilience, as well as enhance the performance of local entrepreneurs. Therefore, it is necessary to find the spatial distribution patterns of the viral digital economy among startup users in the informal sector in Palembang. This research aims to explore the existence and conditions of startup users in the informal sector amid the digital economy era in Palembang City, Indonesia.

Table 1. Labor Force Conditions in South Sumatra Province 2021

No.	City	Number of Informal Sector Workers	Percentage
1	Palembang	329392	67,21
2	Prabumulih	51.124	10,44
3	Pagar Alam	56.930	11,61
4	Lubuk Linggau	52.603	10,74
		490.049	100,00

2 Literature Review

2.1 Digital Economy

The role of the digital economy for Indonesia is critical and can provide new hope for economic transformation over time, which is expected to continue. Digital economic progress needs to be supported by essential elements, especially in the informal sector, [10]. Economic activities such as buying and selling will never be separated from human activities. Humans always need many things to meet their needs, which cannot be obtained without exchanging with others. The exchange process will continue in any circumstances and condition, [11].

It implies that in a rapidly developing digital environment, word-of-mouth communication spreads because it is attractive to the first recipient, who then sends it to others through technological communication channels, such as email, SMS, instant messaging, and personal digital assistants. Due to the popularity of social media, the older generation now also uses social networks. Women aged 55 years and over represent one of the largest demographics of Facebook users; notably, its ability to expand interpersonal interactions and relationships, she added that word-of-mouth promotion can be done among acquaintances, such as family, friends/ colleagues, and even among strangers, [12].

The digital economy enabling is a natural motive for people to communicate and inform others

through networks about things they find interesting or valuable. The digital process of economy is communicated in a planned and directed manner, creating content for a specific target audience most effectively and easily using communication channels. Interactive applications, especially videos, advergames, images, audio files, presentations, and even text content tools, are the most crucial digital economy applications in the viral marketing process, [13].

Social media makes buying and selling easier and offers potentially lucrative opportunities in new forms of communication and commerce between marketers and consumers. Sellers usually advertise to find ways to target sales; thus, many new media opportunities are presented to advertisers with a wide selection of applications that can be chosen by their customers, [14]. Technological advances are essential to daily life, where technological innovation can drive revolutionary changes in human life. The importance of digital economic transformation is driven by the need to increase operational efficiency and strengthen global and comprehensive competitiveness to achieve dynamic changes in community needs.

Furthermore, the movement of the strategic domestic economic sector in the Industry 4.0 era cannot be separated from digitalization or the digital economy. The digital economy is associated with the perspective of economic independence and national resilience for the independence and competitiveness of the nation's economy. Information technology enables someone to carry out various activities quickly, concisely, and accurately, and can be done anytime and anywhere; it is prospective to improve the efficiency and productivity of the community's economic progress, [15]. Changes in consumer behavior regarding information collection patterns and buying and selling transactions must continue and always be observed to obtain accurate and precise information about consumer needs. It prospectively affects the development of technological progress in the world. Technological developments can occur in various fields, especially in the development of the digital economy. The advancement of the digital economy can affect the pattern of economic activity in both positive and negative ways. The development of the digital economy is closely related to the behavior of transaction users and social network users, and the rapid development of information and telecommunications technology, which significantly impact global consumer behavior, [16].

Economic transactions have become more accessible through various conveniences, from easy communication, finding information, making transactions, getting an education, and entertainment to even the most crucial needs that can be served with increasingly advanced and sophisticated technology. Changes in individual activities begin with the influence of the transaction process carried out. Each individual no longer relies on traditional money but can use payments through applications, and in time, all transactions can be done easily. The activities are digital and electronic, with data as the primary role. Individual activities are no longer limited to space and time, but transactions can be carried out electronically anywhere, anytime, and with anyone, [17]. Digital money plays an important role, and wages can be paid digitally. Shopping and transactions also involve digital means. Even transaction activities can be transferred digitally because they are much faster, more effective, and efficient, [18].

2.2 Virality Product

Product virality is a phenomenon where a product, service, or information gains widespread attention in a short period through social networks. In the context of spatial distribution, this spread is not only influenced by the characteristics of the product or message but also by geographical, demographic, and social dynamics in a region. The spatial distribution of product virality can be analyzed through theories such as the diffusion of innovation, which is explains how innovations spread through social groups from early adopters to the late majority, as well as Network Theory, which highlights the role of social connections in accelerating dissemination, [19].

The spread of viral products often begins at the local level, where face-to-face interactions or local communities play a crucial role. At this stage, geographical proximity and strong social connections become dominant factors. The spread then develops to the regional level through inter-regional connections and individual mobility, for example, through travel or migration, [20]. At the next stage, social media acts as a connector that overcomes geographical boundaries, allowing for national or even global dissemination. The role of digital platform algorithms, such as geotagging and location-based promotions, becomes crucial in efficiently expanding product reach to various regions, [21].

This spatial dynamics is also influenced by urbanization, where urban areas tend to have a faster spread rate due to a higher density of social networks compared to rural areas. Additionally, local preferences and cultural characteristics in

various locations also determine the success of a product's spread. For example, a food product with certain traditional values may go viral in areas with similar cultures, but it requires adaptation to be accepted in regions with different preferences, [22].

To measure the effectiveness of the spatial spread of a viral product, several indicators can be used, such as spatial spread rate (the rate of spread between regions), adoption density (the penetration rate in certain areas), and hotspot analysis to identify locations with the highest adoption, [23]. By understanding these spatial distribution patterns, companies can design more effective marketing strategies, such as using local opinion leaders, increasing community engagement through location-based events, and leveraging geospatial data to target marketing campaigns. Ultimately, the combination of spatial-based strategies and digital technology can significantly accelerate product virality, creating exponential growth with widespread impact, [24].

2.3 Startup User Existence Informal Sector

The number and existence of startups worldwide continue to increase, along with the increasing use of technology and the internet. It encourages startup newcomers to compete and survive to attract consumer attention. One of the determining factors for the success of a startup is its business model, especially those related to technology. The use of a suitable business model will have an impact on consumer or user trust in startups. Theoretically, it relates to several technology-based business model trends that a startup can use to start and determine a proper business model, [25].

Digital startups can produce quality companies and positively impact society, which can solve societal problems. Not only that, digital startups also play an essential role in achieving and creating new jobs for many people. People should appreciate and strive to increase the number of startups; hence, varied startups could grow, develop, and be utilized optimally, [26].

The most essential thing in the startup process is the company's control, i.e., companies' methods related to sustainable growth and innovation to survive. One of these strategies is through collaboration with other companies. The existence of good innovation and exploration in a startup will certainly produce a good business model so that global investors are expected to be interested and consider investing in the startup. Theoretical studies on the existence of startup users in the informal sector involve a deep understanding of how startups can operate and develop in the context of the informal economy. Informal sector workers are trying to adapt to technological developments and breakthroughs regularly, [27]. The informal economy significantly contributes to overcoming socio-economic problems faced by many countries in the world, [28]. Hence, some key points can be used as a theoretical basis:

a. Definition and Characteristics of the Informal Sector

Informal Sector: An economic sector that is not regulated by the government and not recorded in official statistics. It often includes small and micro businesses, informal contracts on jobs, and transactions without formal documentation. It can also be categorized as independent informal, [29].
Characteristics: Flexibility, lack of formal regulation, and easier accessibility for low-income communities. It aligned with research results stating that the informal sector has economically categorized characteristics, [30].

b. The Startups' Role

The role of startups often brings innovative solutions that can overcome challenges in the informal sector, such as digital technology that facilitates transactions and market access. Startups can empower individuals and small businesses by providing access to financial services, marketing, and broader networks. The startups' role in the informal sector is critical because they can help improve efficiency, transparency, and inclusion in an often unorganized and underserved economy. There are some ways startups contribute to the informal sector. It is also supported by research results stating that the role of startups in the informal sector was unquestionable, [31]. Meanwhile, regarding *startup digitalization* in the informal sector, Startups often introduce technological solutions that enable informal business actors to conduct transactions digitally. It can increase efficiency, reduce dependence on cash, and facilitate tracking income and expenses. Research results also supported the idea that digitalization development in the informal sector was one form of digitalization, [32]. The functions of digitalization include:

a. Access to Finance

Many fintech startups offer micro-lending and digital payment services accessible to informal business owners who may not have access to traditional banking services. It helps them get the capital they need to grow their businesses.

b. Increased Market Access

E-commerce platforms and other applications enable informal businesses to reach broader markets locally

and internationally. It allows them to increase sales and revenue.

c. Training and Education

Startups can provide training and education programs that help informal entrepreneurs improve their business skills, such as financial management, marketing, and technology.

d. Job Creation

Startups provide direct jobs through their operations and encourage the creation of new jobs within their ecosystem, such as online motorcycle taxi drivers, couriers, or sales agents.

e. Encouraging Innovation

By leveraging new technologies and business models, startups can inspire informal entrepreneurs to adopt innovative business operations.

f. Improving Social Welfare

By helping informal entrepreneurs increase their income and economic stability, startups improve social welfare and reduce poverty.

g. Data Collection and Analysis

Startups can collect valuable data on informal markets, which can be used to develop better policies and strategies to support the sector.

Therefore, startups play a crucial role in transforming the informal sector into a more integrated and productive part of the economy. It not only benefits entrepreneurs but also drives economic growth in general.

2.4 Spatial Distribution

Spatial distribution is a concept that describes how objects, phenomena, or information are spread across a specific geographical space. In academic literature, spatial distribution is often defined based on various theoretical approaches related to geography, economics, sociology, and spatial data science. In the study of economic geography highlights that the spatial distribution of economic phenomena, such as trade or investment, is influenced by economic agglomeration, economies of scale, and geographical accessibility, [33].

The spatial distribution of products or services is often concentrated in areas with good infrastructure and large populations, creating uneven distribution patterns. Spatial distribution is a multidimensional concept that encompasses various theories and approaches. Both in the context of the spread of innovation, social interactions, and economic activities, spatial distribution is influenced by geographical, demographic, technological, and social relationship factors, [34]. A deep understanding of spatial distribution theories allows for a more accurate analysis of the spread patterns of a phenomenon, which can ultimately be used to support planning, decision-making, or region-based marketing strategies, [35].

3 Methods

This research uses a mixed-methods approach with a concurrent triangulation strategy to provide a comprehensive overview of mapping the digital economy viral of startup users in the informal sector in Palembang based on spatial distribution. The approach in the quantitative method uses a quantitative analysis and spatial analysis approach. In the qualitative method, a case study approach is used; both approaches are employed to explore the digital economy viral of startup users in the informal sector in Palembang city. The instruments used in the quantitative method are questionnaires and spatial tools (GPS essentials, topographic imagery, and base maps), while in the qualitative method, the instrument is the researcher themselves. The questionnaire is structured based on variables that address the research problem, specifically variables related to the engineering of the digital informal economy ecosystem, [36].

The researcher themselves as an instrument means that the researcher is the key instrument for addressing the research problems through observation, interviews, and documentation. Data collection in quantitative and qualitative methods. The data collection techniques used in the quantitative method are surveys and spatial data collection, while in the qualitative method, they are observation, interviews, and documentation. The sampling technique used in the quantitative method is accidental sampling, and in the qualitative method, it is purposive sampling. The sample for the survey consisted of 384 respondents, and for in-depth interviews, it involved 25 informants; however, the number of informants may change according to the achievement of the research objectives, which is a characteristic of the qualitative method.

The respondents and informants in this study are informal sector workers spread across all sub-districts in the city of Palembang, who use digital transactions in their jobs in the service or trade sectors. Data analysis in the quantitative method uses ArcGIS (spatial analysis) and Expert Choice (Analytical Hierarchy Process). In the qualitative method, all data is collected from (observation, interviews, and documentation) which is then (reviewed, transcribed, given meaning), and subsequently processed into themes that cross data sources.

4 Results and Discussion

4.1 Sales Strategies of Informal Sector Startup Users

A survey was conducted to identify informal sector startup users' strategies to increase their sales and business growth. The following data presents the frequency and percentage of use of each strategy by respondents' surveys. This can be seen in Table 2.

Table 2. Sales strategies of informal sector startup users

No	The sales strategy of informal sector startup users	Frequency	Percent
1	Product modification	98	25.5
2	Increasing product variety	60	15.6
3	Improving business quality	49	12.8
4	*Nusantara* characteristic products	15	3.9
5	Contemporary products	33	8.6
6	Improving sales skills	35	9.1
7	Independent business	56	14.6
8	Business opportunities	18	4.7
9	Increasing insight or business network	19	4.9
10	Religious elements in business	1	.3
	Total	384	100.0

Based on Table 2 explains that product modification was the most widely used strategy, with 98 respondents, or 25.5% of the total respondents. It showed that many startups in the informal sector focused on changing or adapting their products to meet market needs and preferences better. Product modification could include design, function, or product quality changes to make it more attractive and competitive in the market. Only one respondent, or 0.3%, chose religious elements in the business. This strategy was the least used, perhaps because the main focus of startups in the informal sector was more on profitability and business growth than on religious aspects. However, for some businesses, integrating religious values can be a competitive advantage in attracting customers. Based on the data above, it can be implied that informal sector startup users used various strategies to increase their sales and business growth. Sales strategies could also be business plans and develop business models, [37].

Product modification, increasing product variety, and improving business quality were the most commonly used strategies. On the other hand, religious elements in business, typical Indonesian products, and business opportunities were not widely used strategies. It showed that startup users in the informal sector tended to focus more on product innovation and quality improvement rather than more specific aspects. Innovation is a strategy in a business to market products in the long term, [38].

Users who innovate will be able to develop their businesses. Sales strategies can come from quality products. Sales strategies can come from quality products. In the future, startup users in this sector can consider optimizing the most widely used strategies while exploring the potential of less widely used strategies, [39]. Digital platforms are significant for business users in managing their businesses. Startups strategically serve their user. Long-term success can be achieved by businesses that consider sustainability, namely those that can adapt to changes in the market or consumers, [40].

4.2 Viral Product Type

Viral Products are products that experience organic growth resulting from user recommendations at a rate of more than one new user per existing user (often quantified with a k-factor of more than or equal to 1) – are usually conceived from the earliest stages of development to be viral. Below can be seen data of viral product type in Table 2.

Table 3. Data of Viral Product Type

Viral Product Types	Frequency	Percent
Food and Drink	335	87.2
Fashion Products	17	4.4
Laundry Services	5	1.3
Perfume	3	0.8
Printing Service	4	1.0
Counter Gadget	6	1.6
Service of Small Party Decoration	1	0.3
Skincare	6	1.6
Household Appliances	5	1.3
Pet Shop	2	0.5
Total	384	100.0

Based on Table 2 regarding viral product criteria in the informal economic sector, researchers surveyed 384 respondents in Palembang, and the results are displayed in Table 1. Viral products in Palembang City were divided into three parts: high viral categories, medium viral, and low viral. The high viral product category contained two products, namely food and beverage products, with a percentage of 87.2%, and clothing products, with a

percentage of 4.4%. In contrast, products in the medium viral category contain four products: laundry service, printing service, gadget counter, skincare, and household appliances. Meanwhile, viral products in the low category contained three products: perfume, small party decoration services, and pet shops.

This type of food and beverage has become viral because food and beverages are easy to make by anyone, easy to obtain, and needed by many people, especially youth. To make delicious and valuable food, prospective sellers can also attend workshops held by training providers or food-making workshops, [41]. Furthermore, food and beverage businesses do not require complicated strategies. Marketing food and beverage products is also more accessible through influencer services or social media. Food and beverage products are easy to combine and innovate. Local food and beverage businesses are easy to optimize in terms of costs incurred . Clothing is also included in the viral product category because clothing provides information to someone about various social and cultural functions in a society, [42].

In products with a moderate viral category, several products included a percentage range of 1.3% - 1.6% of 384 respondents. The moderate viral product category included laundry service, printing service, gadget counter, skincare, and household appliances. In this category, laundry started going viral because the community needed this service. Meanwhile, printing services were starting to develop because printing services were also starting to be easy to use using online promotions. The need for gadget counters or stores was also included in the moderate category because every professional requires tools to use gadgets. To introduce *skincare* products, business actors used figures through social media so that their products were trusted, [43].

4.3 Promotion Model of Viral Product

Style of promotion that relies on an audience to organically generate and push the message of a product or service. On social media, marketing is considered “viral” when it's being shared rapidly by the public at large (with a compounding effect) rather than just its target audience. Below can be seen data of the promotion model of viral products in Table 3.

Based on the data Table 3 results of the viral product promotion model Table 3, the highest percentage results were advertising goods at 64.8 percent, which could be categorized through product advertising online, offline, and/or both. The research findings revealed that the most marketed products were done by sellers online. Its activities developed throughout Indonesia because there were various ways of conducting online transactions, such as a marketplace, a combination of several online stores sold in one place, [44]. Meanwhile, the lowest was advertising goods, price discounts, and bonus goods of 0.3 percent. It showed that in the viral product promotion model, a business person must know the promotion model; thus, the product could go viral as a step to market the product. By examining this phenomenon, sellers can determine a suitable model to promote their products better.

Table 4. Promotion Model of Viral Product

Promotion Model of Viral Product	Frequency	Percent
Goods Price Discounts	54	14.1
Free Shipping	8	2.1
Bonus Items	45	11.7
Advertise Goods	249	64.8
Payment Flexibility	2	5
None	11	2.9
Price Discounts and Bonus Items	10	2.6
Bonus and advertisement Items	2	0.5
Price Discounts and Advertising of goods	2	0.5
Advertise goods, price discounts, and bonus goods	1	0.3
Total	384	100.0

In the viral product promotion model, the price discount category of goods based on the research results of 14.1% indicated that purchases could be made impulsively, in other words, an act of shopping carried out by buyers without a planned basic premise, or spontaneously when getting a promotion the seller offered, [45]. The sophistication of technology with internet networks facilitates directed interaction between consumers and business actors. Furthermore, along with the increasingly sophisticated and widespread development of the internet, business people are now choosing a marketing strategy by utilizing the Internet to communicate, provide information, and promote their business to the public or consumers, [46].

Based on the research findings on the viral product promotion model, several things needed to be considered, namely recognizing and understanding the product to be sold, preparing the right marketing tools to introduce the product or

advertise the product through email marketing that could be accessed on the website in online stores, blogs, social media such as Facebook, Twitter, YouTube, Instagram or Tiktok, and landing pages. Social media trends were moving very fast. Every brand competes to create content that always looks attractive daily. Hence, the informal sector seller should be more creative in using different ways to convey messages on social media, in the sense that the advertisements made tend to be more demanding on the type of content that must be provided sequentially to attract the buyers' attention and interest, [47]. Content creators made various efforts so that their promotional videos could be seen by as many people as possible in their target audience. It included the quantity and quality of the videos they uploaded and being involved in price wars and discounts between sellers in the market, [48].

By modifying products and business processes and restructuring economic patterns and business models, digital technology is changing the boundaries and ways of dealing with the uncertainty inherent in entrepreneurial activity, [49]. Viral marketing is to get customers to pass on a message to others. When the virus takes over, the company has little control over the message by influencing the message right at the beginning of the campaign. Consumers will express their opinions about the brand, either with or without the company's knowledge. The strength of negative or positive opinions about a brand is essential. Therefore, companies are interested in influencing the advertised message positively through an integrated viral marketing strategy. Things that influenced purchase interest in terms of discounts, live streaming, and free shipping for products that price cuts, free shipping, and live streaming positively or significantly affected consumer purchase interest, [50].

4.4 Business Cooperation Strategy

Cooperation Strategy is the attempt by organizations to realize their objectives through cooperation with other organizations, rather than in competition with them. It focuses on the benefits that can be gained through cooperation and how the management of cooperation can realize these benefits. Below can be seen data on business cooperation strategy in Table 4.

Table 4 displays the cooperation strategy of businesses run in the informal sector. The data interpretation results are *Collaboration with partners*: from 384 cases, only 46 showed collaboration with business partners, 12% of the total. Establishing cooperation with partners was part of the management strategy, [51]. Cooperation was developed by building various partners, such as cooperation with Pertamina, Indomart, Alfamart, Mitra Buka Lapak, and family and friends, [52]. A strategic business approach for informal small businesses that aims to increase productivity and competitiveness in the partnership company structure has been accepted as the primary means of venture capital, usually chosen by small and medium businesses, [53]. It was in line with the research results that explained the importance of a successful cooperation strategy. Small businesses were often advised to develop relationships with external partners that could contribute to the business's development, survival, and growth, [54]. Business strategies in partnerships can build partners with various parties. In developing a business, it is necessary to build relationships with partners in a structured manner, [55].

Table 5. Data of Business Cooperation Strategy

Partner	Frequency	Percent
Collaboration with Partners	46	12.0
Lack of Cooperation with Partners	338	88.0
Total	384	100.0

Thus, the partnership is a collaboration in implementing business activities and a business strategy for broader business development. Competitive advantage has become a primary requirement for companies operating in an increasingly dynamic global market, [56]. There are several forms of partnership, such as general partnership, limited partnership, and incorporated limited partnership. Innovative partnership forms can support business development, [57]. Hence, it is essential for the informal economy business environment. It was in line with the research results stating that creating a business environment supports the establishment and growth of companies, [58]. The Table 5 shows the lack of collaboration with partners: Most, namely 338 cases or 88%, showed a lack of collaboration with partners. It emphasized that organizations were often not involved in collaboration or cooperation with their business partners.

Generally, these data showed that in most cases, collaboration with partners was not used as a primary strategy in the organizations analyzed. There might be various reasons, including organizational culture, internal policies, or other strategic considerations.

4.5 Cross-Tabulation of Sales Strategy and Type of Viral Product

Sales strategy and type of viral product analysis are vital to understanding how the strategy implemented can influence the product's success in the digital market. In this case, cross-tabulation between sales strategy and type of viral product would provide deeper insight into the relationship between these two variables and help formulate more effective strategies to achieve success in the market. It's presents a cross-tabulation that illustrates the relationship between the sales strategy used by startup users and the type of product that successfully achieved viral status. The cross-tabulation data in the Table 4 showed the relationship between various sales strategies used by startup users in the informal sector and the types of products that had gone viral. This analysis provided essential insights into how specific strategies played a role in the success of products in various categories. The product modification strategy was the most widely used, especially in the food and beverage category, with 94 respondents (28.1 percent). Startup users in the informal sector tended to focus on product modification to increase the appeal and relevance of their products in the market. However, this strategy seemed less applicable to other product categories, such as laundry services, with zero respondents. The fact that food and beverage products dominated the use of product modification strategies might be related to the flexible nature of this category, which allowed for various innovations in taste, packaging, and presentation. Not widely used strategies, such as Business opportunities, increasing insight or business networks, and religious elements, indicated low value. Overall, this analysis revealed that sales strategies in the informal sector highly depended on the type of product offered. Startups in this sector seemed to choose the strategy that best suited the characteristics of their products to maximize the potential for virality in the digital market. It emphasized that a deep understanding of the product and target market was vital to determining an effective sales strategy.

4.6 Geometrical Interval

Geometric intervals are an important analytical approach to understanding uneven data distribution patterns, especially those that grow exponentially. The distribution of startup users using geometrical interval analysis, could imply that startup users in Palembang City were divided into three regional categories: high, medium, and low. The areas with the highest number of startup users could be the Seberang Ulu I, Seberang Ilu II, Jakabaring, Sako, Kalidoni, and Ilir Barat I Districts. The areas with moderate distribution were in the Ilir Barat Ilir II, Ilir Timur II, Ilir Timur III, Kemuning, Sukarami, and Alang Alang Lebar Districts. The areas with the lowest distribution were the Kertapati, Gandus, Bukit Kecil, Ilir Timur I, Plaju, and Sematang Borang Districts.

Microeconomic actors who used startup applications in this area have been literate with technology and utilize technological advances well. The areas where these startup users have been around for a long time and were established before 2020 had a high similarity in distribution, such as the Jakabaring, Kalidoni, and Seberang Ulu I Districts, [59]. Startup users in this area had good social values. They could interact with each other and with anyone, [60]. The startup user community in this area could also see good business opportunities in utilizing technology so that they gathered in an area with many industry variations from various types of startups]. It was in contrast to suburban areas, which seemed difficult to develop and advance the businesses of startup users because of the lack of consumers, [61]. It caused a lack of increase in suburban startup users because they still needed modernization, [62]. Young people in the suburbs could contribute to increasing startup users in developing their businesses. They could also innovate and become social change leaders by instilling a sense of belonging to the surrounding area to form a civilized suburban startup social community, [63]. Below can be seen the geometrical interval in Figure 1.

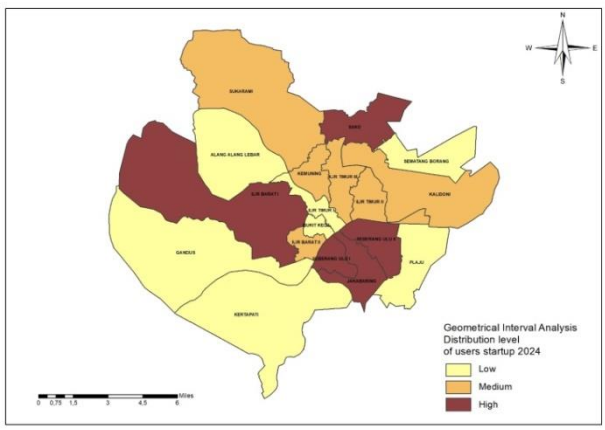

Fig. 1: Distribution of startup users using geometrical interval analysis

4.7 Quantile

Quantiles are very useful statistical tools for analyzing and understanding data distribution. By dividing data into smaller and more structured parts,

quantiles provide information about how data is distributed, how consistent the data is, and whether there are significant imbalances or variations in the dataset. The data of startup users in Palembang City showed the distribution of startup users.

Based on the map showing the level of distribution of startup users in Palembang City, the results of data in 2023-2024, using the Quantile classification in arcgis, explained that: Areas with High Usage Levels were Sako, Kalidoni, Seberang Ulu II, Jakabaring, Seberang Ulu Iilir Barat I Sub-districts. High usage in these areas might indicate a concentration of business or better-supporting infrastructure for startups. Areas with a moderate usage and medium color indicated a medium usage level. It included Alang-alang Lebar, Sukarami, Kemuning, Ilir Timur II, and Ilir Timur III Sub-districts. These areas might indicate the potential for growth in startup users that could be increased with further support. Meanwhile, areas with low usage levels, such as Gandus, Kertapati, Bukit Kecil, Ilir Timur I, Plaju, and Sematang Borang Districts, might be due to various factors, including limited technology accessibility or lack of awareness and adoption of startups.

Driving Factors to High Usage in Certain Areas, i.e., *Infrastructure Availability*: High-usage areas such as Sako, Kalidoni, and Jakabaring would likely have better internet infrastructure, including higher network speeds and stability. It supported easy access to digital and online services. *Business Concentration*: A growing business center or commercial area could increase startup adoption, as many companies and entrepreneurs are more likely to use technology to advance their businesses. *Access to Education*: areas with better access to higher education institutions often had a more tech-savvy population, which supported the use of startup services. It was in line with research results stating that high startup users were also influenced by several important factors that could impact business development for startup users, [64].

Challenges in Low Usage Areas, i.e., *Technology Accessibility*: Areas such as Gandus and Kertapati might face challenges regarding technology accessibility in terms of hardware and internet connectivity. *Low Awareness and Education*: Lack of awareness about the benefits of startups and how technology could be used to improve daily life and hinder adoption. *Socioeconomic Factors*: Income level, education, and employment could influence people's ability and willingness to use startup services. The recommended strategies for increasing startup usage that could be done include improving infrastructure: Investing in technology infrastructure in areas with low usage to ensure more equitable access. *Training and Education Programs*: Providing training focused on the use of technology and startups, especially for people less familiar with technology. *Collaboration with Government and Private Sector*: Working with local and private sectors to build a supportive and inclusive startup ecosystem. *Providing Incentives*: providing incentives for small and medium enterprises to adopt startup technology. With the right strategy, startup usage in Palembang City could be significantly increased, supporting economic growth and innovation in the region. It was in line with the research results that stated that one of the strategies that could be implemented to increase startup users was having competent skills in social networks to build individuals into entrepreneurs in the digital era, [65]. Below can be seen the quantile in Figure 2.

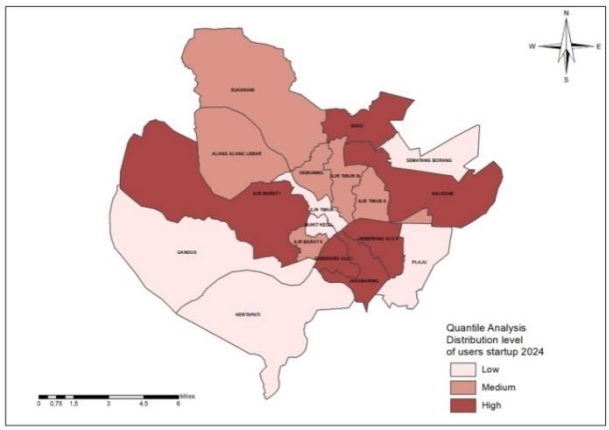

Fig. 2: Data of startup users in palembang city showed the distribution of startup users

4.8 Defined Interval

Classification of the defined interval of startup users can be seen from population density and economic activity. Trade and services were the dominant economic activities in every district of Palembang City in 2023-2024, and startup users understood this situation as a potential opportunity to open or establish a business. In addition, the population density also impacted the place of business. The distribution of population density from the highest to the lowest was described as follows: Ilir Barat I, SAKO, Seberang Ulu II, Seberang Ulu I, Jakabaring. Kalidoni, Sukarame, Kemuning, Ilir Timur III, Ilir Barat II, Alang-alang Lebar, Kertapati, Ilir Timur II, Plaju, Gandus, Bukit Kecil, Ilir Timur I, and Sematang borang.

Based on the data, startup users were dominated by Startup users 2023-2024 (spread across 18 districts). In areas indicated as very high startup

users were Ilir Barat I, SAKO, Seberang Ulu II, Seberang Ulu I, and Jakabaring. In this region, users extensively utilized the development of existing technology and startup innovations so that the existence of startups could be well accepted in society because society adapts quickly to that progress. Young people enthusiastically welcome startups because they encourage them, business actors, to adapt to today's challenges by utilizing technology efficiently, [66]. Different from areas where startup users were very low in the Gandus, Bukit Kecil, Ilir Timur I, and Sematang Borang because, in this area, digital startup technology had not yet enabled particular providers to reach primary customer targets, and the use of startups was still minimum, [67]. Below can be seen the defined interval in Figure 3.

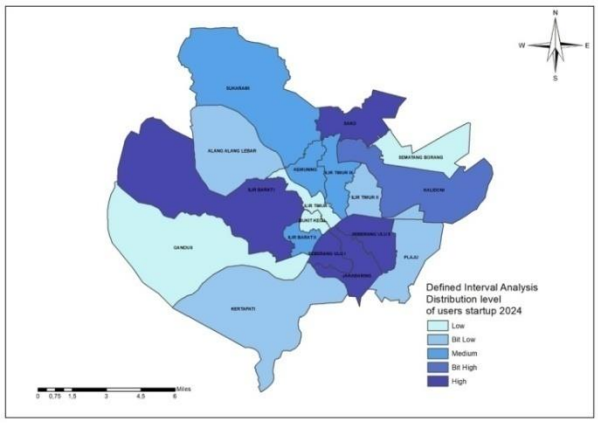

Fig. 3: Classification of the defined interval of startup users can be seen from population density and economic activity

4.9 Natural Breaks (Jenks)

This map displayed the analysis of the distribution classification of startup users in 2024 using the "Natural Breaks" or Jenks method. This method was used to group data into categories based on the natural variations of the data. The description of the map: *Low Category*: Marked in light green. Areas with this color had a relatively small number of startup users. The sub-districts were Plaju, Sematang Borang, Kertapati, Gandus, Alang-Alang Lebar, Ilir Timur I, and Bukit Kecil. *Medium category*: Marked in medium green. Areas with this color had several startup users at the middle level, including Kemuning, Ilir Timur, Ilir Timur II, Kalidoni, and Sukaramai sub-districts. Meanwhile, the *high category* is marked in dark green. This area showed a high concentration of startup users in the Ilir Barat I, Seberang Ulu I, Jakabaring, Seberang Ulu II, and SAKO sub-districts.

Distribution Category: Low (light green) indicates an area with relatively small startup users. This area might have these characteristics: (*low number of users*) the number of users using startup products or services in this area was small compared to others. *Low concern and awareness*: people in this area might not be fully aware of or interested in the services offered by startups. *Limited access*: there might be limitations in access to technology or infrastructure that could affect the adoption of startup services. *Special Needs*: This area might have different needs not fully accommodated by startup products or services. It was also supported by the research results that one of the factors causing low startup usage was mobile Internet markets, [68]. In addition, lack of information on social media usage was also a factor, [69]. More intensive and targeted marketing strategies were needed to increase market penetration. Then, *growth potential*: although the number of users was currently low, there was potential for growth if the right approach was taken to increase awareness and access.

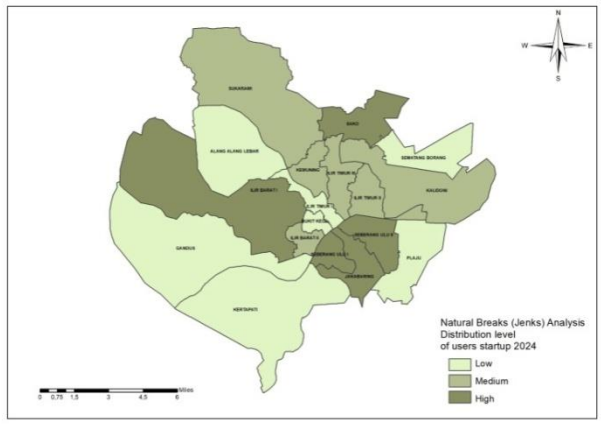

Fig. 4: Distribution classification of startup users 2024 using the "Natural Breaks" or Jenks Method

The High category, marked with dark green, indicated that the area had a higher concentration of startup users than others. Several factors, including good technology infrastructure, could cause it. Areas with adequate technology infrastructure tend to attract more startup users. It included fast and stable internet access and the presence of data centers. *Strong Startup Community and Ecosystem*: The presence of an active startup community and support from various parties, such as incubators, accelerators, and investors, could encourage the growth of startup users. The strategy was an action plan to achieve the desired goals; it is recommended that these goals be appropriately measured, [70]. Below can be seen the Natural Breaks (Jenks) in Figure 4.

5 Future Research

This research is expected to serve as a starting point for understanding the role of the digital economy in enhancing the competitiveness of the informal sector and promoting the equitable distribution of spatially-based products in urban areas such as Palembang.

6 Conclusions

The research showed that product modification was the primary strategy, especially for food and beverage products with high viral potential. Spatial analysis revealed that the distribution of startups used varies across regions of Palembang City, with the highest concentration in areas with better infrastructure and business support. Sales strategies and types of viral products would provide deeper insight into formulating more effective strategies to achieve market success for startup business actors in the informal sector. The existence of startup users in the informal sector involved an in-depth understanding of how startups could operate and develop in the context of the informal economy. This research also significantly contributed to the digital economy literature by offering insight into the dynamics of startups in the informal sector and providing practical recommendations for policymakers to support economic growth by developing an inclusive startup ecosystem.

In addition, the government's role is needed to support business actors in developing startup use in the informal sector. The relationship between the digital economy and viral products generated by startup users in the informal sector in Palembang, with a spatial distribution analysis approach. The analysis results show that the development of the digital economy in Palembang has a significant impact on the spread and success of viral products among informal sector entrepreneurs. The spatial distribution of startups using viral products tends to be concentrated in certain areas with better digital infrastructure and broader market access. This shows that the digital economy can be a major driver of growth for the informal sector, with the use of digital technology facilitating the promotion and distribution of products. However, challenges related to infrastructure and technology adoption in some areas still need to be addressed to achieve the equitable distribution of digital economic potential across the region.

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The authors wrote, reviewed and edited the content as needed and they have not utilised artificial intelligence (AI) tools. The authors take full responsibility for the content of the publication.

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