The Importance of Digital Technology and Clustering for Innovation in MSEs. Evidence from Secondary Data in Indonesia

Tulus Tambunan

Center for Industry, SME and Business Competition Studies Universitas Trisakti

ABSTRACT: This paper explores the relationship between innovation and these two determinants in micro and small enterprises (MSEs) in the manufacturing industry in Indonesia, using secondary data. The key question in this research: is there evidence of the importance of DT and clustering for innovation capability in MSEs in Indonesia? The paper analyzes secondary data from Indonesia's National Agency of Statistics and reviews key literature on innovation and digitalization in MSEs, and industrial cluster development in Indonesia. It is found that the number of industrial clusters of micro-, small-, and medium-sized enterprises (MSMEs) is concentrated on the island of Java, where more than 50% of the population is located, and is the most advanced region in economic development and industrialization in Indonesia. The majority of MSME clusters are in the food industry and woodworking industries. Only a very few of MSEs in the manufacturing industry use the Internet and do innovation. The type of innovation mostly is product innovation. Both relationships between MSEs doing innovation and MSEs using the internet and the total number of clusters are positive. But, statistically, only the relationship between the number of MSEs doing innovation and use of the internet is significant.

KEYWORDS: Cluster, Clustering, DT, Internet, Innovation, MSMEs, MSEs.

INTRODUCTION

In Indonesia, the definition of micro, small, and medium enterprises (MSMEs) is regulated in Law Number 20 of 2008. In this law, microenterprises (MIEs) are enterprises with an asset value of up to 50 Indonesian rupiahs (IDR), and an annual sales value of not more than 300 million IDR; small businesses (SEs) are enterprises whose asset value is between more than 50 million IDR to 500 million IDR, and annual sales value between more than 300 million IDR to a maximum of 2.5 billion IDR; and Medium Enterprises (MEs) are companies with a net worth of between more than 500 million IDR and a maximum of 10 billion IDR, and an annual sales value of more than 2.5 billion IDR to 50 billion IDR. Meanwhile, the National Statistics Agency (BPS) uses the number of workers as a criterion, namely as follows: MIE is a company without workers or with a maximum of 4 workers; SE is a company with several employees between 5 and 19 people; ME is a company that employs a minimum of 20 and a maximum of 99 people; and large companies (LE) are companies with more than 99 employees.

The Indonesian government recognizes that MSMEs have a very important role to play in the country's economy, not only because they dominate the number of enterprises but, more importantly, they are the largest generator of employment and also the largest contributor to GDP. These enterprises also have high resilience in the face of various previous crises, including the Covid-19 pandemic crisis. The high resilience of MSMEs has played a role as a cushion for the economy because of their ability to survive periods of pressure and grow back faster and higher after pressure. Unfortunately, even though their strategic role in the national economy is recognized by the government, they, particularly micro and small enterprises (MSEs), face various problems including the lack of access to bank loans and difficulties in the procurement of raw materials and in selling their products.

MSEs in Indonesia are seriously threatened with being pushed out of the market in the face of the increasing number of imported goods entering Indonesia amid globalization. Globalization is becoming an important issue for most businesses not only in Indonesia but in the world. With globalization, companies in developing countries are increasingly feeling the pressure of making innovations. All areas such as research and development (R&D), software, design, engineering, education, marketing, and management are increasingly taking significant roles in the production of goods and services (Dogan, 2016). Since globalization changes business trends and shortens product life cycles, it requires all companies, including MSEs, to be more innovative in developing new ideas, products, and processes. Many studies showed a strong and positive relationship between innovation and the

firm's growth, including MSEs, in many countries (e.g. Roper 1997; Regev 1998; Hughes, 2001; Cainelli et al 2004; Hsueh and Tu, 2004; Bhaskaran, 2006; Auken et al., 2008; Petrariu et al., 2013; Moen, et al., 2019).

In addition to access to hard technology (e.g. new machines) and soft technology (digital technology/ DT), capital, skilled manpower, and many other factors, clustering is also believed to be very effective for promoting innovation by facilitating the sharing of information and ideas between firms, attracting buyers and suppliers, and providing opportunities for joint training. Many researchers found that the proximity between companies facilitated collaboration and provided a more conducive environment for R&D and knowledge sharing which can develop a culture of entrepreneurship and innovation (e.g. Menshenina, 2008; Meyer-Stamer, and Harmes-Liedtke, 2009; Porter and Ketels, 2009; Magdalena, 2011; Koschatzky, 2012).

OBJECTIVE

With the above background, the main objective of this article is to explore the relationship between innovation and these two determinants in MSEs in the manufacturing industry in Indonesia, using secondary data. The key question in this research: is there evidence of the importance of DT and clustering for innovation capability in MSEs in Indonesia?

ORIGINALITY

In contrast to a large portion of the empirical literature based on primary data, this study used secondary data. So far, this is the only study on innovation in MSEs in the manufacturing industry, at least in Indonesia, based on a secondary data analysis that can contribute to the literature on MSMEs, especially concerning digitalization, innovation, and industrial cluster development.

METHODOLOGY

This study is based on descriptive analysis. It analyses national data on MSEs in the manufacturing industry from the 2022 National Survey on Micro and Small Industry and MSME industrial centers in Indonesia 2020 from the Directory of Indonesian Industrial Centers. It also reviews some empirical studies in some other countries and other relevant literature.

LITERATURE REVIEW

Innovation in MSMEs

Innovation has become a necessity for all companies in all sectors and of all sizes, including MSMEs, to not only survive but also continue to grow in a global market characterized by increasingly fierce competition, increasingly rapid technological change, and recurring crises that make The world's economy, including trade, is increasingly uncertain. There is no single definition of innovation that is generally accepted. However, according to Tornatzky et al (1990), the concept of innovation refers to the use of new technology or new management practices in an organization or company to achieve targeted performance improvements in its operations, such as a higher production growth rate or greater profits or a larger market share. than before. From the perspective of MSMEs, innovation usually takes the form of a new product or production process that meets buyers' needs more competitively or is cheaper and more practical or more efficient and profitable than existing products or processes (Zahra et al., 1999; O'Regan & Ghobadian, 2006). However, innovation carried out by MSMEs can also take the form of the effective application of new solutions to the challenges they face, which includes the effective application of new ideas related to products, services, or organizational processes; new ways of marketing; or new administrative practices for job improvement and performance enhancement (Johannessen et al., 2001; OECD/Eurostat, 2005).

Quite a lot of literature which include Gaynor (2002), Freeman (2004), Verhees & Meulenberg (2004), Lin and Chen (2007), Rosenbusch et al. (2011), Yıldız et al. (2014), Oura et al. (2016), and Zulu-Chisanga et al. (2016) shows the existence of a significant positive relationship between innovation and company performance, including MSMEs. Several other studies such as those from Roper (1997), Regev (1998), Hughes (2001), Cainelli et al (2004), Hsueh and Tu (2004), Bhaskaran (2006), and Auken et al. (2008) show a strong and positive relationship between innovation results and growth in sales or productivity or company profits. Cainelli et al (2004) and Regev (1998), for instance, compared the performance of companies that innovated with the performance of those that did not. In the case of MSMEs, the results may suggest that the MSMEs that innovate have a higher productivity and sales growth rate than those that do not innovate. Auken's (2008) study quoted a research report from the Cambridge Small Business Research Center which showed that around 80% of the number of companies, including MSMEs, in the UK who had innovated experienced an increase in profits, market share, and penetration of new markets.

According to Gaynor (2002), innovation is the core factor behind the survival of many MSMEs; this supports expansion and growth and enhances their future success. Freeman (2004) added that the different performance of MSMEs is the result of effective implementation of innovation. However, Lin and Chen (2007) argue that the impact of innovation in managers' practices on MSMEs' revenues is greater than the

impact of technological innovation or product innovation.

In general, however, innovation or R&D is more intensively carried out in large enterprises (LEs) and to some extent MSEs; whereas in MIEs it is proven that there are no R&D activities at all due to limitations in all supporting resources such as skilled manpower, funds, and advanced technologies. These tiny enterprises in developing countries face many obstacles to do innovation. These obstacles are primarily a lack of capital due to limited access to funding from banks and other formal sources of capital, skilled human resources, and advanced technologies. Many researchers such as Oerlemans et al. (2001), Marjolein and Romijn (2005); and Schoales (2006) found an effective way to innovate is through interaction in a regional cluster network. Their research results have identified many examples of companies that have successfully generated innovation and profits as a result of being part of a regional cluster network. The companies in this cluster support each other, for example, the interaction between a company that produces the final product and several companies that supply raw materials and inputs. It can also be between a company and its competitors. Apart from that, usually within a cluster, there are government offices and/or educational institutions that can support companies in the cluster.

The Importance of Clustering

There is quite a lot of literature on industrial clusters, including articles from Porter (1998), Porter and Ketels (2009), Rosenfeld (1997), Schmitz (1999), and Tambunan (2005, 2007, 2023). However, it seems difficult to get a single formal definition of the concept of the industrial cluster from them. The cluster concept offered in this literature is more complex than just a business network developed by several companies operating in the same market, which are part of the same industry and cooperate in many ways such as raw material procurement, marketing and distribution, and research and development (R&D). Many researchers agree that an industrial cluster consists of a large number of companies, mostly MSMEs, in the same industry or sector or carrying out related productive activities, located in the same geographic area. Several other authors argue that industrial clusters include institutions that interact with several firms making the same product influencing their level of competitiveness and performance (see literature review by Vargas-Hernández, 2020).

In Indonesia, industrial centers referred to by the BPS (2021) are locations for concentrated industrial activities that generally manufacture similar products, use similar raw materials, and/or carry out the same process of production, equipped with supporting facilities and infrastructure designed based on the development of regional resource potential, as well as managed by professional management or known to the surrounding community as an industrial center. The Sentra name is named with the name of the main product (specialization). Examples: Shoe Center, Batik Center, Pottery Center, Tempe Center, etc. The main product is the goods/services produced by the majority of businesses in the industrial center of its main activity The main activity is the type of business activity that is determined based on: (a) activities with the greatest production/revenue value; (b) if the value of production/income is the same, then the main activity is determined from the largest production/sales volume; (c) if the production/revenue value and production/sales volume are the same, then the main activity is taken from the most time used; and (d) if the value of production/revenue, volume, and time are the same, then the determination of the main activity is based on the statement of the respondent.

Whereas, according to the Indonesian Ministry of Cooperatives and SME, an industrial cluster is a group of production activities consisting of a variety of industrial groups, i.e. core industries (for instance, car assembly), related industries (e.g. firms producing components and spare parts), supporting industries (e.g. firms manufacturing auto glass and electrical equipment), and other supporting and related economic activities (e.g. advertising or marketing companies), whose activities will be interrelated and mutually supportive (Tambunan, 2023).

Grouping companies in an industrial cluster creates external benefits or economies (which are beyond the control of individual companies) that not only lower company costs but also increase the ability of companies in the cluster to innovate. The clustering or geographical proximity between companies is one of the ways to promote innovation by facilitating the sharing of information, knowledge, or ideas between firms, attracting buyers and suppliers, and providing opportunities for joint training and

conducting R&D activities that can develop a culture of entrepreneurship and innovation. (e.g. Schmitz; 1999; Pawitan and Gunawan, 2012; Tambunan, 2007, 2023).

Such as Menshenina (2008), Meyer-Stamer, and Harmes-Liedtke (2009), Porter and Ketels (2009), Magdalena (2011), Koschatzky (2012), Ketels (2011, 2019), and Stichhauerova et al (2020) found in their studied clusters the following characteristics: (i) a strong entrepreneurial culture that makes all firms in the cluster eager to produce the best possible performance to maximize their profits, and this is very positive for innovation activities that will generate greater company profits, *ceteris paribus*, (ii) interaction occurs between firms in the cluster in terms of e.g. market segments, the use of technology, and the share of information, and (iii) there is a strong innovation and skills base, with supporting R&D activities where appropriate inside the cluster.

According to some researchers including Baptista and Swann (1998), Hoen (2001, 2002), Jaklič et al. (2004), Gajšek and Kovač (2016), and Prognesti (2018), there are several determinants of the performance of a cluster, which include (i) the availability of skilled manpower; (ii) knowledge, information, and technological spillovers; and (iii) the availability of (specialized or non-traded) production factors (besides labor and capital) or a great variety of cheap intermediate inputs, (iv) the presence of a conceptual leader in the cluster development process (this can be played by the leading firm in the cluster), (v) active participation of companies in the cluster, (vi) creation of a joint development strategy, (vii) trust between companies and their willingness to cooperate; (viii) successful communication and inter-company partnerships; (ix) creating common information infrastructure such as uniform software, and websites as well as organizational infrastructure such as common procedures, organizational regulations, and work methodologies; and (x) clear division of roles for each company within the cluster. These factors may suggest that clustering of MSMEs is an effective way to encourage or support R&D activities in these enterprises.

In addition to those factors, the availability of local universities or R&D institutes and other key stakeholders such as banks or non-bank financial institutions to support financial R&D activities conducted independently by firms inside industrial clusters or in cooperation with local universities/R&D institutes are also very important determinants of innovation capabilities of firms inside clusters. Therefore, the cluster's linkages with various key government institutions such as the Ministry of Industry, Ministry of Trade, Ministry of SME (if any), Ministry of Technology, and Ministry of Education, and various other supporting organizations such as the Chamber of Commerce and Industry, sectoral associations, exporter associations, financial institutions, training/educational institutions, and business development service providers are crucial. There are many examples of the success of many private institutions in providing support to the MSMEs cluster in various Asian developing countries. For instance, in Pakistan the support of the Pakistan Association of Surgical Instrument Manufacturers in Sialkot and the Sialkot Chamber of Commerce and Industry, in India the Tirupur Exporters Association, and in Malaysia the Penang Skills Development Center (see e.g. Abonyi, 2007, 2008; and UNESCAP, 2009).

However, this does not mean that all MSME clusters do innovation. For instance, Simmi (2002, 2004) found that SMEs in local clusters in the United Kingdom do not appear to deliver innovation. In Indonesia, Sato (2000) found that the clustered MSMEs she studied had limited inter-firm specialization in production processes and no joint action in marketing, production, distribution, technology development, and innovation. Supratikno (2002a,b) examined the development of several MSME clusters on the island of Java, and the results showed that networks between companies in clusters were still limited and the specialization of individual companies in clusters was rare. Apart from that, no product or production process innovation or other forms of innovation were found. Pawitan and Gunawan (2012) found that in many MSME clusters, their innovations are still very low, and judging from the technology perspective, most of them have low levels of technology and remain in the underdeveloped stage.

To sum up, it can be concluded that MSEs in a cluster have greater innovation ability than those located separately from each other, assuming that there is close cooperation between companies in the cluster, have strong external networking with key stakeholders such as universities, banks and government institutions outside the cluster, skilled manpower is available, and other positive factors as discussed above are met.

The Importance of DT

As the competition faced by MSEs becomes increasingly tight, these enterprises need to use modern technologies, including DT, not only for production, distribution, and marketing but also for doing innovations. There are many indications from various sources that in the past decade more and more MSEs utilized DT including the internet; although still many more MSEs, especially microenterprises (MIEs), do not/have not (yet) utilized this technology for various reasons. With this development, Internet use, among these enterprises has recently become a popular topic for researchers not only in the fields of MSEs but also in electronic

business, information management, information systems, entrepreneurship, and innovation; although empirical studies investigating the importance of adopting DT or using the internet for innovation in MSEs are hard to find.

The literature on this issue can be grouped into two categories, i.e. studies focus on the main factors that influence the decision of MSMEs to utilize DT or the Internet, and studies that give more attention to the benefit of using DT in the form of e.g. profit increases, the market expands, or cost declines. From the first group (determinant factors), important articles including Blackburn and Athayde (2000), Fallon and Moran (2000), Matlay (2000), and Riquelme (2002) who lude that type of business or sector and size and characteristics of enterprises are the most decisive factors for a company to use the Internet. Others such as Poon and Swatman (2005), Chong and Pervan (2007), Shih (2008), Poorangi and Khin (2013), Ahmada, et al. (2015), and Rahayu and Day (2015) mention many factors that have strong influences a company's decision to utilize the internet or to adopt e-commerce in selling their products, which include perceived relative advantage, organizational compatibility, and benefits; firm owner's or manager's strategic vision; a company's level of innovativeness; DT knowledge, expertise, experience, and willingness of company leaders or managers to use DT as well as to adjust the way they do businesses to the requirements related to the use of DT; business planning; organizational complexity; government policies; availability of skilled labor; DT and software/hardware vendors; and pressures from trading partners, customers, and competitors.

Neale, et al. (2006), Saffu, et al. (2008), Azam and Quaddus (2009a,b), and Poorangi, et al. (2013) found that besides perceived organizational compatibility, relative advantages and organizational complexity, trialability, observability, and company's culture are also important determinant factors of e-commerce adoption by small businesses. Whereas, studies conducted by such as Migiro (2006), Jones, et al. (2011), and Zaied (2012), reveal that resources, i.e. capital to finance-related costs (e.g. training of employees, organizational change, investment in tools, and others), and human resources, especially technical know-how/expertise; and internet security or trust to use online transactions are the main decisive factors for a company to utilize the Internet in marketing its products and purchasing raw materials.

In Indonesia, from their survey finding of more than 200 owners/managers of MSMEs, Rahayua and Daya (2015) conclude that the adoption of e-commerce by MSMEs is affected by several factors which include perceived benefits, technology readiness, owners' innovativeness, owners' DT experience, and owners' DT ability. Their findings also show that individual factors play a significant role in the adoption of e-commerce technology by MSMEs in Indonesia. In their study, MSMEs refer to a business that has less than 100 employees, assets less than 10 billion rupiah, and total sales per year below 50 billion rupiahs. Based on their finding,

Media Indonesia, a newspaper, discussed several research reports from various research institutes in Jakarta regarding the penetration of DT in MSMEs. Delloite Access Economics, among the reports, shows that around 36% of MSMEs in Indonesia still use conventional marketing methods and only 18% of MSMEs can use social media and websites to promote their products. According to this report, low technological knowledge and an unskilled workforce are considered obstacles to digitizing MSMEs. The Center for Indonesian Policy Studies (CIPS) shows that as many as 37% of MSMEs are recorded as only being able to operate computers and the internet simply. The report confirms that digitalization can be accelerated if the competent authorities work together to provide and ensure sustainable and affordable internet connectivity. Meanwhile, the Danareksa Research Institute shows that around 41.67% of MSMEs in DKI Jakarta are already using social media and digital marketing in their activities. business operations. Meanwhile, only 29.18% of MSMEs on Java Island and 16.16% of MSMEs outside Java Island have utilized digital marketing (https://mediaindonesia.com/ekonomi/403910/literasi-digtal-umkm-jadi-kendala-dalam-transformasidigital).

In the second group (benefits), according to such as Daniel, et al. (2002), Migiro (2006), Lai (2007), Azam and Quaddus (2009a), Hunaiti, et al. (2009), Standing, et al. (2010), Farhad, et al. (2011), and Savrula, et al. (2014), using the Internet provides benefits for companies in various forms such as improves productivity, efficiency, and competitiveness; increases the ability to operate in international markets; provides a tool for providing cost-effective ways to market their products and launch new products; streamlining of business processes; market expansion; and creates value-added, new services and new business models. By using the Internet, a company also improves or accelerates its communications with suppliers, distributors, trading partners, consumers, creditors, and others. It also gathers information and identifies potential business partners, new suppliers, and new customers easier and faster. Additionally, others such as Neale, et al. (2006), and Poorangi, et al. (2013) found that using the Internet also provides internal and external process integration; makes closer relationships with customers, suppliers, trading partners, and other important stakeholders; and increases the expertise for growth and development of business.

From discussions in the literature, it can thus be formulated that the willingness or ability of MSMEs to adopt DT is influenced by many factors in a complex combination. These factors can be distinguished between demand-side factors and supply-side factors. Demand-side factors are from the company side so can be considered internal factors. These factors can be distinguished further into two categories, i.e. personal factors from the owner or manager and company factors. The supply-side factors are external factors consisting of supporting factors, policy factors, and market factors.

To sum up, it can be concluded that MSEs who adopt DT or use the internet have a greater ability to innovate than the opposite, assuming that there are other positive factors determining innovation activities such as skilled employees and business owners, spirit of entrepreneurship, and access to funding.

FINDINGS AND DISCUSSION

Findings from Secondary Data Analysis

The data from the State Ministry of Cooperatives and SMEs (Menegkop & UKM) show that there were 65.465.497 MSMEs in Indonesia which represents 99.99 percent of the total business establishments in the country in 2019. Of these, the majority are from the MSEs category, and most of them, especially MIEs, operate in the informal sector. Apart from that, most of these tiny and traditional enterprises are found in rural areas. In the manufacturing industry, MIEs are generally involved in simple production processes that are done by hand, such as in the food and beverage industry, ready-made clothing, furniture from wood, rattan and bamboo, footwear, children's toys and kitchen utensils from aluminum or copper. with a market reach that is not too wide. Most MIEs use family members as workers or workers with low education and low wages.

Table 1. Number of MSMEs and Their Workers by Sub-Category in Indonesia, 2016-2019

Description	unit of measure	2016		2018		2019	
		Total	Share (%)	Total	Share (%)	Total	Share (%)
MSMEs	Unit	61,651,177	99.99	64,194,057	99.99	65.465.497	99.99
-MIEs		60.863.578	98.71	63,350,222	98.68	64.601.352	98.67
-SEs		731,047	1.19	783,132	1.22	798.679	1.22
-MEs		56,551	0.09	60,702	0.09	65.465	0.10
LEs		5,370	0.01	5,550	0.01	5.637	0.01
Total companies		61,656,547	100.00	64,199,607	100,00	65.471.134	100.00

Notes: MSMEs=micro, small and medium enterprises; MIEs = microenterprises; SEs = small enterprises;

 MEs = medium emterprises; LEs = large enterprises

Source: Menegkop & UKM (http://www.depkop.go.id/)

Concerning clusters, until the 1970s, MSMEs that were geographically grouped were termed by the Ministry of Industry of the Republic of Indonesia as "industry centers". Only recently has the term cluster emerged, even though centers and clusters are different: MSME centers are usually the location of many MSMEs that make the same goods, while MSME clusters, as can be seen in Europe for example, are the location of not only of MSMEs that make the same goods, but also suppliers of raw materials and other inputs, repair shops for machines or production equipment, and there are even LEs who establish subcontracting with MSMEs. MSME centers or clusters in Indonesia are relatively well documented because they are a special target group for industrial MSME development policies.

Judging from their origins and age, most MSME clusters were formed naturally as traditional activities of local communities who have special skills in making certain items such as chairs and cupboards, batik, various kinds of children's toys from wood and plastic, shoes and sandals, various kinds of women's bags, simple kitchen utensils such as pans and plates, and this process has been going on for a long time. According to Tambunan (2005), based on the comparative advantage of the goods they produce, at least in terms of the abundance of local raw materials and the specialization of labor in the manufacture of these products, many of these clusters have great potential for development. For example, clusters of producers of batik, a traditional Indonesian textile, have long existed in various regencies on the island of Java, such as Yogyakarta, Pekalongan, Cirebon, Surakarta, and Tasikmalaya.

Most recent data from 2020 show that the number of MSME industrial centers is 13,762 with more than 75% being dominated by micro-scale processing industries. According to the industry group, the motor vehicle, trailer, and semi-trailer industries have relatively the same percentage of micro, small, medium, and mixed-scale industrial centers, namely 25% each. The industrial groups with the largest industrial centers on micro, small, and medium scales are woven products made of bamboo, rattan, and the like, the food processing industry, the non-metal mining industry, the wood industry, and industries producing a variety of goods from wood, and cork products (excluding furniture). The industrial groups that have only micro-scale industrial centers are the computer, electronic, and optical goods industries. Meanwhile, industrial groups with industrial centers only on micro and small scales are found in the paper and paper goods industry. Several industrial centers that have been established since the early 1900s include brick and pottery industry centers in North Sumatra Province, roof matting industry centers in Riau Province, bamboo woven industrial centers in Central Java Province, and silver industry centers in the Special Region of Yogyakarta Province (D.I.Y), the center of the pottery and blacksmith industry in East Java Province, the brown sugar industry center in North Sulawesi Province, and the center of the wine industry in East Nusa Tenggara Province.

As shown in Figure 1, based on regional distribution, the three regions with the highest number of industrial centers are the province of Central Java with the amount reached 3,460 centers, the province of East Java with 2,119 centers, and the province of West Java as a location for 1,538 centers. Meanwhile, the three provinces with the number of centers with the fewest industries are North Maluku Province, Papua Province, and North Kalimantan Province with 4 centers, 5 centers, and 12 centers respectively.
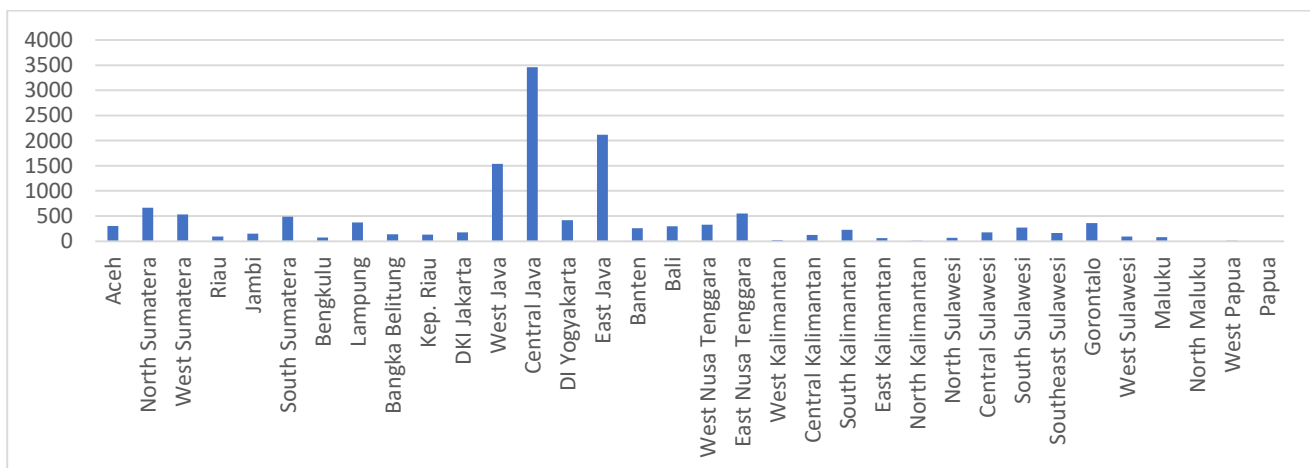

Figure 1. Number of MSME Industrial Centers/Clusters by Province, 2020
Source: BPS (2021a).

The most types of industrial centers were food industry centers (ISIC code 10), such as *tempe*/tofu industrial centers, chips industrial centers, and cake industrial centers, namely 41.29% or as many as 5,683 centers. The second largest number of centers were industrial centers for wood, wood, and cork products (not including furniture) and industries making woven products from rattan, bamboo, and the like (ISIC code 16) with 14.29% or 1,967 centers (Figure 2). The dominance of the two types of industry is in line with the 2020 Manufacturing MSEs Data Profile from BPS, where the food industry and the wood, wood and cork products and woven products from bamboo, rattan, and the like are the two most common types of industry, respectively, reaching 36.23% and 15.03% of the manufacturing MSME population. Meanwhile, the third largest was the center of the industry producing a variety of non-metal mineral goods (ISIC code 23), namely 11.05% or 1,521 centers. Unlike the two types of centers with the most numbers, the non-metal mineral goods industry (ISIC code 23) ranks fifth in the 2020 Profile data. The food industry centers (ISIC code 10) with the largest number of industrial centers in Indonesia are spread across all provinces. The largest number of food industry centers is in Central Java Province, which is 27.36% or 1,555 centers. Next is East Java Province with almost 13.8% or 783 food centers, followed by West Java Province which accounted for approximately 12.95% or 736 food centers.
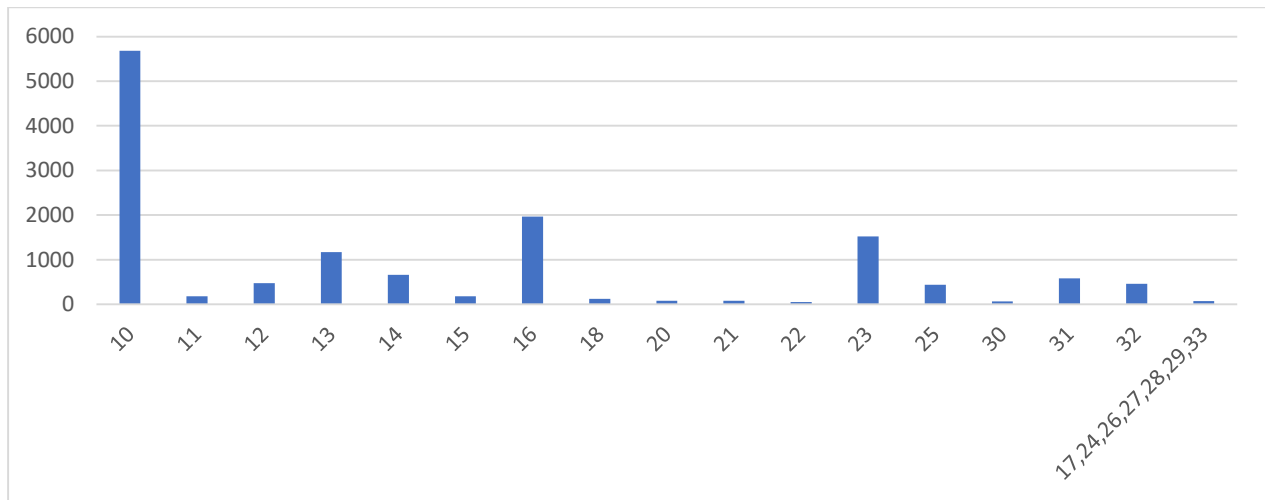
Figure 2. Number of MSME Industrial Centers/Clusters by Industry Group (KBLI), 2020.

Note: ISIC Code: 10: food, 11: beverages, 12: tobacco processing, 13: textiles, 14: apparel, 15: leather, leather goods, and footwear, 16: wood, wood products and cork (excluding furniture), woven articles from rattan, bamboo and the like, 17: paper and paper articles, 18: printing and reproduction of recorded media, 20: chemicals and articles of chemical substances, 21: pharmaceuticals, chemical medicinal products, and traditional medicine, 22: rubber, articles of rubber and plastics, 23: non-metal minerals, 24: base metals, 25: non-machined metal goods and their equipment, 26: computers, electronic and optical goods, 27: electrical equipment, 28: YTDL machinery and equipment (excluding others), 29: motor vehicles, trailers, and semi-trailers, 30: other means of transportation, 31: furniture; 32: other processing; 33: repair and installation of machinery and equipment

Source: BPS (2021a).

For DT, according to data from APJII (Yuniarto, 2022), the use of the Internet by MSMEs in Indonesia to support their business activities is quite high, reaching 87.4 percent. Most of the MSME owners interviewed (73.4 percent) stated that they had used the Internet for more than 2 years. As many as 85 percent of them stated that they are very dependent on the internet or it can be said that the internet is very useful for the smoothness and sustainability of their business. Furthermore, 73.4 percent of them also have sales accounts at local marketplaces such as Tokopedia and Shopee, to market their products. In addition to taking advantage of the existence of marketplaces, the majority of them (84.75 percent) use social media for marketing.

However, within the MSE category, internet usage is still relatively low. According to the 2016 Economic Census, there were only as many as 563 thousand enterprises or about 2.14 % of total MSEs in Indonesia have utilized Internet media for their business activities (BPS, 2017). This indicates that the number of MEs using the internet is much larger than the number of MSEs, especially concerning MIEs. The same fact is also shown by the findings from the 2021 National Survey on E-Commerce that of all businesses that do not carry out e-commerce activities in 2020, most of them (73.07%) said that it is more convenient to sell directly (offline). Around 17.55 percent said they lack knowledge or expertise; 33.47 percent are not interested in selling online; and the remaining 8.40 percent for various other reasons (BPS, 2021b).

Judging from the business field category, the economic activities carried out most by MSEs that use the internet for business in Indonesia are the wholesale and retail trade categories, car and motorbike repair and maintenance, which in 2016 was recorded at 39.64 percent. Other business activities that are also carried out by many MSEs that use the Internet for business are businesses in the information and communications sector (11.73 percent), processing industry (10.66 percent), and education (8.09 percent). Meanwhile, the fewest business activities carried out by MSEs that use the Internet for business are real estate businesses as well as human health activities and social activities (BPS, 2017).

Julianto (2016) states that there are various obstacles faced by the Indonesian government, in this case, the State Ministry of Cooperative and Small Medium Enterprise), in encouraging MSE owners to utilize the Internet The obstacles include their low understanding of this kind of technology, their mindset which is not in favor of using the Internet in doing their business, and their lack of knowledge on how to operate this technology. Especially MSEs located in rather isolated/rural areas; many of them are

unfamiliar with the online marketing system. Therefore, they prefer to do marketing with conventional methods, by utilizing the distribution networks that they have been using for a long time or involving many distributors who have long been their customers.

In 2022, based on the 2022 National Survey on MSEs in the manufacturing industry (from now on call micro and small industries or MSIs), the estimated number of MSIs is 4,339,228 establishments. Most of these enterprises are located in Java Island which is around 62.58 percent of the total MSIs. The three highest numbers are in the Central Java Province, the East Java Province, and the West Java Province, at 20,56 percent, 20,15 percent, and 15,39 percent respectively. On the contrary, the lowest number is in the eastern Indonesia region, which is only 1.62 percent. Whereas, the Province of North Kalimantan was the province with the smallest number of MSIs, about 0.12 percent of the total MSIs. The top five groups of industry of MSIs according to ISIC code (KBLI) are food products; wood and products of wood and cork, except furniture; articles of straw and plaiting materials; wearing apparels; textiles; and other products (BPS, 2022).

In 2022, around 27.97 percent of MSIs use the Internet to manage their business. The industry where the most MSIs use the Internet is the food industry, namely 436 thousand businesses (35.96 percent), followed by the apparel industry with 228 thousand businesses (18.79 percent), the wood industry, wood products, and cork (not including furniture), woven goods from rattan, bamboo and the like as many as 100 thousand businesses (8.23 percent). The furniture industry was 6.05 percent, the non-metallic mineral goods industry was 5.93 percent and the metal goods industry, non-machinery and other equipment was 5.35 percent. Meanwhile, industrial groups other than those mentioned above use the internet less than 5 percent.

MSIs in the printing and recording media reproduction industry group are the largest internet users. Meanwhile, the use of the Internet in business management is achieving more than 50 percent in the computer industry, electronic and optical goods industry, the motor vehicle, trailer and semi-trailer industry, the rubber industry, rubber and plastic goods industry, and the machinery and equipment n.e.c. industry (BPS, 2022).

Marketing/sales of products/services dominate MSI's business objectives in utilizing the Internet with 910,154 establishments or the share reached 41.62 percent, followed by promotion/advertising with 584,315 establishments or 26.72 percent. The use of the Internet to buy raw materials and to find information was 459,180 MSIs and 224,219 MSIs, or 21 percent and 10.25 percent, respectively. Meanwhile, only 0.41 percent use the internet as a means to make fintech loans (8,968 MSIs) (BPS, 2022).

As shown in Figure 3, the largest number of MSIs that use the Internet are on the island of Java, namely 67.75 percent. MSIs in the Province of East Java are the largest internet users, namely 268 thousand businesses (22.09 percent), then overall respectively, the Province of Central Java with 236 thousand businesses (19.41 percent), and the Province of West Java with 217 thousand businesses (17.92 percent). Meanwhile, the province where MSIs use the Internet the least is the Province of North Maluku with only 2,033 businesses (0.17 percent), the Province of West Papua as many as 2,253 businesses (0.19 percent), the Province of North Kalimantan as many as 2,448 businesses (0.2 percent) and the Province of Maluku with 2,569 businesses (0.21 percent).
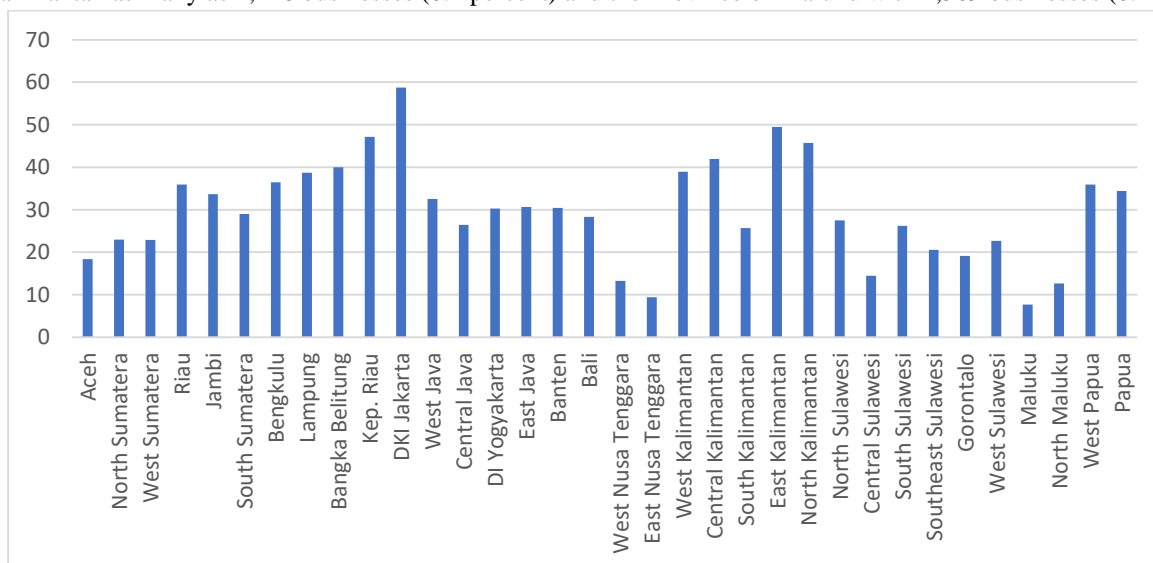

Figure 3. Percentage of MSIs using the Internet per province, Indonesia, 2022
Source: BPS (2022).

Finally, Table 2, reveals that in 2021 only around 22.89 percent of total MSIs use the Internet, and this increased to 27.97 percent in 2022, although the percentage varies by group of industry. The highest percentage is found in publishing, printing, and reproduction of recording media at almost 80 percent; followed by MSIs in industries manufacturing computers, electronic and optical goods at around 73.40 percent. There are four main purposes for using the internet according to this report, namely for advertising/promotion, product marketing, purchasing raw materials, and seeking information on such as government regulations, new machines and production tools, and cheaper raw materials. It reveals that most of the MSIs that use the internet use it mainly for product marketing (75.0%), and the types of platforms used are dominated by instant messaging, followed by media social, marketplace, e-mail, situs web, and e-katalog. What is even more interesting from this table is that the number of MSIs using the internet has increased significantly both in total and per industry group when compared to 2017 data.

Table 2. Percentage of MSIs Using the Internet by Group of Industry

ISIC	Group of industry	2017	2019	2021	2022
10	Food	4.85	9.39	21.4	27.41
11	Drinks	5.82	13.72	29.1	38.55
12	Tobacco processing	1.05	5.27	9.9	12.76
13	Textile,	6,83	9.60	15.3	15.41
14	Apparel	12.95	20.40	32.4	38.33
15	Leather, leather goods, and footwear	15.72	18.84	33.2	38.03
16	Wood and articles of wood and cork (excluding furniture), plaited goods of rattan, bamboo, and the like	3.10	5.84	13.0	16.41
17	Paper, paper items, and the like	17.84	16.78	28.5	42.48
18	Publishing, printing, and reproduction of recording media	51.06	63.21	71.9	79.90
20	Chemicals and chemicals	4.05	4.54	10.0	16.08
21	Pharmacy, chemical drug products, and traditional medicine	8.70	18.21	38.8	38.22
22	Rubber, rubber, and plastic goods	13.0	30.08	50.0	55.50
23	Non-metal excavation	4.84	7.44	20.9	33.02
24	Base metal	9.77	4.54	9.6	7.05
25	Metal goods, not machines and equipment	16.63	27.66	39.8	49.95
26	Computers, electronic and optical goods	28.81	60.10	33.8	73.40
27	Electrical equipment	11.57	32.68	46.7	30.58
28	YTD machines and equipment.	22.77	22.50	34.8	54.33
29	Motorized vehicles, trailers, and semi-trailers	23.07	22.73	70.4	65.22
30	Other transportation equipment	26.94	14.41	25.8	37.14
31	Furniture	13.76	23.26	40.4	49.39
32	Other processing	6.71	11.55	24.3	19.56
33	Repair and installation services for machines and equipment	6.89	29.15	41.4	44.37
	Total	7.38	11.94	22.89	27.97

Note: * Standard Classification of Indonesian Business Fields.

Source: BPS (2017b, 2019, 2021c, 2022)

Based on 2022 survey data, of 4,339,228 MSIs only 357477 businesses or only around 8.2 percent are carrying out innovation, although the percentage varies by industry group. The largest ratio is in the publishing, printing, and reproduction of recording media (ISIC 18) industry group which was recorded at around 28.2 percent, followed by the computers, electronic, and optical goods industry group (ISIC 26) which reached almost 26.8 percent, and in third place, YTD machines and equipment industry group (ISIC 28) which is almost 26.3 percent (Figure 4). Many factors can explain this variation, including the level of market competition which, if increasingly fierce, will provide a stronger impetus for companies in the market to innovate to stay ahead of

the competition, technological developments that make the innovation process easier, and changes in consumer tastes that also determine whether or not innovation is necessary.
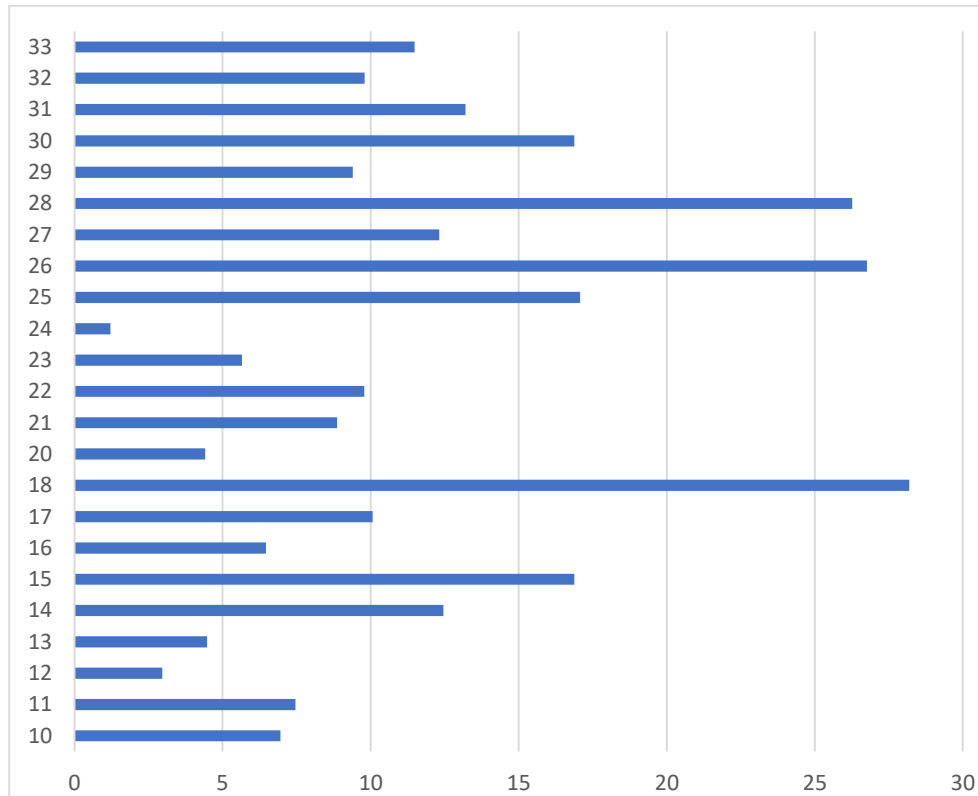

Figure 4. Percentage of MSIs that innovate by industry group
Source: BPS (2022)

Below, to illustrate the relationship between MSIs who innovate with the number of clusters and the number of MSIs who use the internet, a scatter diagram is carried out from provincial data from MSIs who innovate with the number of clusters and with MSIs who use the internet (Figure 5). As can be seen, in terms of total cluster (X), the relationship is positive with total MSIs who carry out innovation activities (Y) with a coefficient value of around 25 and $R^2 = 0.645$, although statistically is not significant as shown in Table 3. Meanwhile, for total MSIs who use the internet (X), the coefficient value is smaller around 2.3 and $R^2 = 0.45$, but the t statistical value suggests the relationship is significant.
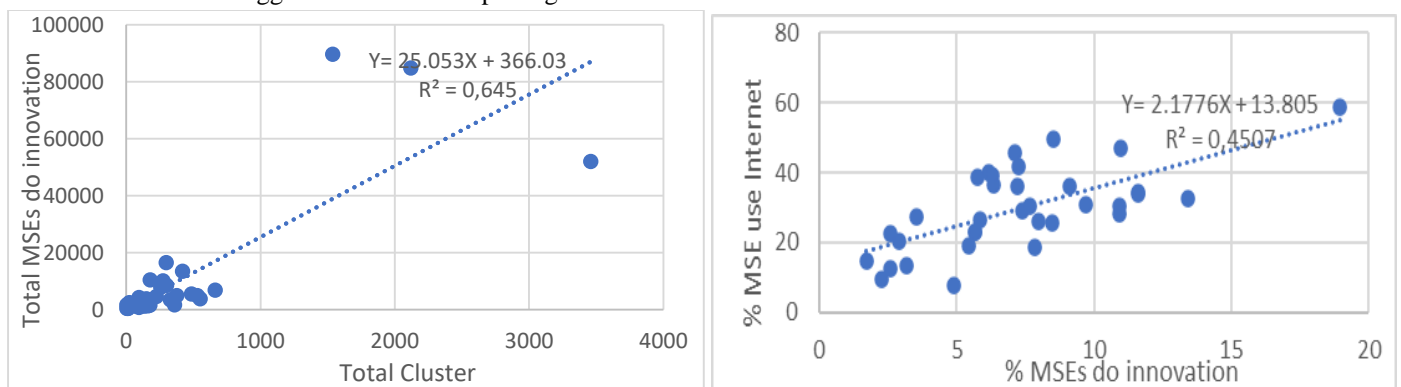

Figure 5. Scatter Diagram of Provincial Data from MSIs that Do Innovation by Number of Clusters and by MSEs that use the Internet
Source: BPS (2022)

Furthermore, Table 4 shows the results of regression analyses. R^2 (R-square) measures the variance described in each endogenous construct and is used to see the magnitude of the influence of all independent variables (in this case, cluster and internet used) on the dependent variable (innovation) (Hair et al. 2019). With its value ranging from 0 to 1, if the R^2 value of 0.75 is substantial; 0.50 means moderate, and 0.25 means weak (Hair et al. 2011). In this study, the value of R^2 is 0.473 (between 0.25 and 0.50), in the moderate category. This means that cluster and internet use have moderate impact on the dependent variable i.e., innovation. It also suggests that many other factors also determine the ability of MSEs to innovate, such as the quality of human resources, management, government support, access to funding, and access to technology. Other than DT. This is further research that needs to be done.

Table 3. Regression Analysis on Cluster and DT

	Coefficients	Standard Error	t Statistical Value	P-value
Intercept	0,679519653	1,343533702	0,505770456	0,616595518
Cluster	10,8226645	9,542620492	1,134139675	0,265430362
Internet	0,211763372	0,040432478	5,237457136	1,08709E-05

Table 4. Regression Statistics

Multiple R	0,687472014
R Square	0,47261777
Adjusted R Square	0,43859311
Standard Error	2,726828301
Observations	34

Findings from Some Case Studies

Although, at least in theory, an industrial cluster can be an important driving source for the innovation activities of companies within the cluster, in reality, many clusters do not enable the companies within the cluster to produce innovation. Pawitan and Gunawan (2012) found cases like this in, for example, the shoe cluster in Cibaduyut in West Java Province. Based on 2009 data, in this cluster, there are more than 800 shoe manufacturers. As they explained, the history of this shoe cluster began with several shoe workers who worked in shoe factories in Bandung. After having the skills to make shoes, they started opening their own small businesses near their homes. To run their business, they involve family and neighbors to become their workers.

Over the years, the skill of making shoes has spread to families and neighborhoods in Cibaduyut. In 1950 there were 250 shoe manufacturers, then in 2009, this increased by more than 200 percent to 844 shoe business units which absorbed 3,590 workers and in the same year produced 4 million pairs of shoes. When the business is established and looks promising, many supporting industries will also set up their businesses there.

Their findings show that in this cluster most of the innovations are product innovations in the form of new designs and materials. The new design was inspired by shoe designs on the internet, and then manufacturers in the cluster provided several modifications according to the styles chosen by local consumers. Apart from that, inspiration is also obtained from shoe catalogs published by shoe distributors who collect and publish shoe designs from many manufacturers in other places outside the cluster. Apart from that, they also get input from distributors and consumers for their new designs. In product innovation, they use new materials, which are offered by material stores, or which have been produced by factories.

Meanwhile, production process innovation is still limited in this cluster because producers have still used the same techniques and tools for years. They thought it would be better to connect several parts of the shoe using a sewing machine for shoes, but still used machine fabric stitching. As a result, some shoe seams break easily and the stitching is not neat. The results of their observations show that Cibaduyut shoe manufacturers rarely think about how to make shoes that are comfortable and long-lasting for customers. Also, a large proportion of manufacturers do not innovate marketing; they only depend entirely on existing

distributors to market their products. In other words, the ability of producers in the Cibaduyut Cluster to market their products is low because most of them only focus on producing shoes ordered by distributors.

One interesting thing from the findings of this research is that although the level of innovation in the Cibaduyut cluster can be said to be low, many manufacturers admit that being in the cluster helps them find out about the latest trends more quickly because they can hear, see and discuss shoe trends compared to others. if they are located outside the cluster. They also easily get information about new materials, popular design trends, and prices because they are located close to industrial supporting shoes. Pawitan and Gunawan (2012) found that interaction between networks within the cluster was low. Communication between producers is also low, as they spend little time discussing and learning from each other. Because interaction between producers is low, knowledge transfer between producers is also relatively low.

From this field research, it is known that the Shoe Cluster in Cibaduyut has a problem of lack of skilled human resources. Most of the formal education and business skills of shoe producers in the Cibaduyut cluster are low. The limited number of producers in the cluster who have their brands is also one of the factors preventing them from innovating. The absence of their brand forces most producers to only follow distributor requirements. This also hinders innovation as designs are selected by some suppliers because they will use the supplier's brand name. Also, the entrepreneurial spirit is low, even though this is very necessary because it will encourage entrepreneurs to continue to innovate

However, there are also quite a lot of clusters where the level of innovation is quite high; These clusters are called "advanced" clusters, including:

a) the roof tile manufacturing industry in rural Central Java: it is typical of grouped traditional industrial activities, which existed long before Indonesia became independent. The clusters that are generally dominated by MSEs can easily be found in all corners of Java Island, mainly in rural areas. They are located near rivers or irrigated rice fields which supply clay as the main raw material. Since the mid-1980s, as average per capita income has increased and economic development is accelerating, demand in both urban and rural areas has shifted from the much cheaper traditional roof tiles to pressed tiles made with presses and mixers. Presses are hand or power-operated and mixers are power-driven to prepare the clay. The increasing demand for pressed tile has driven the application of pressing technology in more and more traditional tile clusters throughout the villages on the island of Java. There are quite several pressed tile MSME clusters in rural Central Java that have developed well as a result of, among other things, the active support of the local government. The form of support that is often given by local governments is organizing study tours for selected pressed tile producers to other locations, usually in the same district or province, where press technology is widely used. The tour includes visits to equipment suppliers and on the occasion of a visit like this, the supplier use this opportunity to promote their products and open up new markets;

One of the distinguishing features of pressing technology is that the successful adoption of the innovation required the introduction of the power-driven clay mixer. The leading manufacturers in the tile press cluster purchased expensive mixers only with the guarantee that other manufacturers in the cluster would pay for the service. It is in this network that the smaller companies in the cluster that usually lack skilled workers, and managers with extensive knowledge, capital, and technology receive business development services from their larger partners. Major companies, and mixer owners, in turn, provide advice on tile molding and firing. In addition, they also encouraged small producers in the cluster to adopt press technology which led to increased demand for their mixer services.

b) Jepara furniture-making industry: this is the largest furniture cluster in Indonesia, which is located in the city of Jepara in the province of Central Java. This cluster, which is known for its fast and successful product line imitation in the West, makes a wide range of chairs, cabinets, beds, sculptures, and other wood-based products, and sells them in both domestic and foreign markets, especially in Europe. Initially, this cluster was not well known, but after several exhibitions were held both at home and abroad, Jepara furniture began to become well-known and in demand. Furniture marketing for the domestic market is usually based on contacts between a network of producers within the cluster and certain traders who are linked to furniture shops in various other cities, while for export purposes, marketing is carried out jointly between producers to facilitate mass export by containers to international markets.

Unlike most other MSMEs clusters, in this cluster, there are specialization practices and division of labor between MSMEs in the cluster and LEs and traders outside the cluster. MSMEs are mostly subcontractors involved in a production network managed by several LEs and traders. There are only a few independent producers who usually make furniture based on

orders from individual consumers. Under the subcontracting system, MSMEs hand over semi-finished products to LEs for final finishing before entering the market. Usually, MSMEs as subcontractors get advances to finance production. With this system, not only can LEs carry out quality control, but it is also possible for LEs to concentrate on certain stages of production while contracting out other stages to MSMEs. The advantage for MSMEs of this subcontracting system is that in addition to a guaranteed market, they as producers can concentrate on production and leave the management and risk of the market, with changing tastes and fashions, to LE as the leading company and trader. This subcontracting system also creates collective efficiency and reduces costs.

According to the research results of Sandee et al. (2000, 2002), in contrast to the 80s, by the early 2000s, subcontracting relationships were multi-layered in this cluster, and there were a large number of skilled itinerant furniture craftsmen offering services to the highest bidder and most were employed by joint ventures or foreign companies. which offers the highest wages.

Based on data from the local government of Jepara, in the mid-1990s, this cluster employed more than 40,000 permanent workers in more than 2,000 MSEs and 100 MEs and LEs spread across 80 villages. In their research, Sandee et al (2000, 2002) found that around 30% of the added value generated by this cluster came from sales to the domestic market, mainly supplied by MSEs where at that time the technology was still relatively simple.

Sandee et al. (2000, 2002) and Berry et al. (2002) have examined the development of this particular cluster for some years, and they have identified several important factors that determine the success of the development of furniture clusters in Jepara. First, the strong role of the local sector association which provides various kinds of support to furniture producers in Jepara, including training and market information, and also acts as a liaison with local and central government. Second, long exposure to foreign tastes brought by international tourism has made furniture from Jepara sell well abroad. Third, the amount of investment made by foreign immigrants who visited Jepara for the first time as tourists and after several visits finally settled in Jepara and married to Jepara women and opened furniture businesses. Fourth, the strong role of trade institutions in intermediary and export organization. In particular, Jepara's furniture exports appear to have benefited greatly from the traditional ties of several trading houses in Jepara and other locations in Central Java Province with China, which is one of the largest furniture markets in the world; and

c) Tegal metalworking industry: it is located on the north coast near the border of West Java province, and has a long history of metalworking industry. Tegal has been a metalworking center since the 19th century when it was the location of several sugar processing factories and related companies, including a Dutch locomotive workshop and a metal processing factory. In general, the technical ability of the Tegal people to produce items from metal comes from a long history of family experience in the field of metalworking or similar industries. During the New Order era (1969-1998), especially in the 70s and 80s, economic development took place rapidly, including massive infrastructure development, and this encouraged the Tegal metal industry to grow rapidly. In the early 1980s, subcontracting activities between the Tegal metal industry cluster and several car and engine companies in Indonesia began for the first time in the district, which prompted the central government to further develop the cluster.

Initially, the Tegal metal industry cluster was dominated by the plate forming business, and its comparative advantage was in fulfilling small orders for simple metal products or components, mostly for household appliances, especially kitchenware, various kinds of handicrafts, but also for chairs and tables in various fashions. With the accumulation of technical knowledge over more than 50 years since the first subcontracting activities began, many metal craftsmen in the cluster are now capable of producing various types of agricultural and industrial machinery as well as automotive and ship components. However, the quality of most of its products is still relatively low.

If measured by production volume and level of production sophistication, there are two types of workshops in the Tegal cluster, namely MEs which are called core, and MSEs which act as plasma. The core workshop accepts orders for metal components from companies outside the cluster. In particular, large-scale core workshops with up to 100 employees derive most of their income from subcontracting work.

The most important difference between core workshops and plasma workshops is that core workshops have direct subcontracting relationships with LEs from outside the cluster, including foreign-affiliated companies (FDI), whereas plasma workshops have subcontracting agreements with core workshops (or workshops that have indirect production links with LEs). Plasma workshops usually use low-paid, unskilled labor and often use family members (especially men) as

unpaid workers. The plasma owner passes on basic metalworking skills to his workers, and this makes the technical capacity of the workshop highly dependent on the technical capacity of the owner. Core workshops often subcontract part of their production, usually certain parts that are relatively easy to work on, to plasma workshops.

The existence of business linkages in the form of subcontracting with LE, especially FDI, is very important for the sustainable development of the Tegal metalworking industry because the main source of advanced technologies in metalworking comes from those transferred through subcontracting production relationships. But it's not easy to access such technologies from FDI. Companies in the cluster must first become subcontractors, and for this, the companies must prove that they have a certain level of technical and managerial capacity as highly competitive and efficient subcontractors. The companies must convince FDI that they can produce high-quality components or subcomponents and meet tight delivery times. In addition, audits are carried out to determine whether these companies that apply as subcontractors have the necessary machines, workforce, facilities, legal standing, and use of ISO standards. After that, in the final stage, these companies were asked to make component samples from the technical drawings provided to them.

CONCLUSION

By analyzing secondary data from official sources and reviewing the results of several previous studies regarding MSME industrial clusters, this descriptive study found that the number of MSME industrial clusters is centralized on the island of Java where more than half of Indonesia's population lives and the level of development is relatively more advanced than other regions in Indonesia, and in certain industrial groups such as the food industry and the wood industry.

Another important finding is that even though the development of MSME industrial clusters has so far been the focus of MSME development policies in Indonesia, it turns out that many clusters have not received guidance from the government. This could be due to limited government funds and the lack of proactivity of local governments. In the era of regional autonomy, the proactiveness of the local government, especially at the district level, will greatly determine the success of regional economic development, including its industry.

Even though it has been successful in many cases, nationally the policy of developing MSMEs through a clustering approach has not been completely successful. In general, MSME clusters in Indonesia are still more like centers that are only inhabited by companies that make the same goods. There are no related or supporting companies such as producers of components, and processed raw materials, as is usually the case with clusters found in Europe and the US. Most failures can be caused by the fact that one or more important factors for the successful development of an MSME industrial cluster are missing or not handled properly.

One thing for sure is that only MSME industrial clusters that have those critical success factors as discussed previously have more chances to survive or even sustain their growth in the course of trade liberalization. Unfortunately, at least based on official data and existing case studies, of the existing MSME industrial clusters in Indonesia, the majority are from the "artisanal" which is characterized by low competitiveness and stagnation.

RESEARCH LIMITATION

This research has one weakness, namely that the existing data does not describe a direct relationship between MSEs who innovate and those who use the internet or are located in a cluster. In other words, based on the secondary data used, it is not known how many of the MSEs who use the internet innovate. So, field research is needed using a survey, interview, or in-depth study approach. And the same research is also needed in sectors other than the manufacturing industry.

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