

The Concept of Digital Entrepreneurial Ecosystem for SMEs in North Sulawesi, Indonesia

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Abstract

The digital economy comes with a sloping topography, is inclusive, and offers equal opportunities. This characteristic has the concept of competition which becomes the spirit of the industry that is easily lifted by SMEs players and Start-Ups who prioritize collaboration and synergy. Therefore, to face the challenges as well as opportunities that come simultaneously brought about by the presence of the digital economy and the pandemic situation, it is very important for SMEs to understand the environmental conditions and existing ecosystems, where a digital-based entrepreneurial ecosystem is something that is mandatory for the existence of SMEs. A new platform-based ecosystem framework, also known as the Digital Entrepreneurial Ecosystem (DEE) is proposed which integrates two separate but related ecosystem literature, namely the digital ecosystem and the entrepreneurial ecosystem. This new framework places platform-based ecosystems within the broader context of users, agents, infrastructure and institutions, so that two biotic entities (users and agents) drive individual agency, while two abiotic components (digital technology and digital institutions) make up the external environment. The purpose of writing this article is to get an overview of the concept of the Digital Entrepreneurial Ecosystem (DEE) by using a literature study research method. This article will be built and constructed based on empirical research that has been done, mapping articles and related studies to be able to provide an overview of the DEE concept for SMEs in North Sulawesi Province, Indonesia. The management of four sub-indexes of DEE, namely Digital Tech-

nology Infrastructure, Digital User Citizenship, Digital Multi-sided Platform, and Digital Technology Entrepreneurship, is the key to improving the SMEs in North Sulawesi, Indonesia.

Keywords

Digital Entrepreneurial Ecosystem, SMEs, North Sulawesi

1. Introduction

In line with the trend of the industrial revolution 4.0 and the challenges of the emergence of improbable conditions such as the Covid-19 pandemic, it can be seen that the sector that has the potential for decent work growth in Indonesia both now and in the future is the digital economy sector. Yet, the digital technology is considered as one of the main capital needed by industry players to develop their business lines. The presence of industry 4.0 is also proof that currently industrial development cannot be separated from technological developments. The development of the industrial sector along with technological developments can certainly have a positive impact on Indonesia, one of which is a positive impact on increasing the capitalization of the country's economy. With digital technology, a country can push its economy towards a digital economy.

The current Covid-19 pandemic has made us more aware of how digitalization of the economy really is a necessity in the industrial era 4.0. Restrictions on mass mobilization have hindered a number of potential economic activities such as SMEs, but economic growth can still be supported by the digital economy through e-commerce and financial technology (fintech). The digital economy comes with a sloping topography, is inclusive, and offers equal opportunities. This characteristic has the concept of competition which becomes the spirit of the industry that is easily lifted by SMEs players and Start-Ups who prioritize collaboration and synergy. Because of that, the digital economy is a "sharing economy" that raises many micro, small and medium enterprises to enter world business. This condition is good ecosystem leverage for Indonesia, which from the beginning dreamed of revitalizing the spirit of entrepreneurship and the creative economy as a catalyst for the nation's economy.

Google & Temasek (2018) in their research results, state that one of the things that support the development of the digital economy in Indonesia is a large number of internet users in Indonesia, which in 2018 the number of internet users in Indonesia reached 171.17 million users. According to the projections of McKinsey & Company (2018), Indonesia is estimated to have an online trading market of 5 billion for formal online trading, and more than 3 billion for informal online trading, with a contribution to Indonesia's GDP of 2.9%. The digital economy is also projected to generate up to 80% higher revenue growth for micro, small and medium enterprises.

One of the government's initiatives by The National Development Planning Agency (Bappenas) initiated the Integrated SMEs Management Major Project program. This program is a derivative of the Job Creation Law of 2020, concerning the Integrated Management of Micro and Small Businesses and the Government Regulation on the Ease, Protection, and Empowerment of Cooperatives and SMEs. The province of North Sulawesi was entrusted by the central government in this major project program for the integrated management of SMEs as a form of implementation of the Thematic, Holistic, Integrative, and Spatial (THIS) development concepts. North Sulawesi is a place to support the design of a major project for the development of business-to-business processes for cooperatives and SMEs. The SMEs integrated processing scheme is carried out with a cluster approach that is concentrated in an area using the concept of joint production space to create efficiency. This also encourages a strategic role in increasing the synergy and collaboration of the triple helix, namely academics, business actors, and the government. Facing the challenges caused by the pandemic situation, SMEs in North Sulawesi must build high awareness to be able to adapt to technological sophistication, especially digital technology, because the development of a digital-based entrepreneurial ecosystem is one of the strategies for economic recovery during the pandemic. A digital-based entrepreneurial ecosystem will provide easy, fast, cheap, and real-time transactions between sellers and buyers.

2. Literature Review

2.1. Entrepreneurial Ecosystem

Several studies have revealed that individual actors who are directly involved in developing micro and small business policies have long been neglected (Arshed et al., 2014); (Xheneti, 2017) in (Haratua & Wijaya, 2020). In addition, policy development for micro and small businesses was born from a political process that is not objective or neutral (Smallbone, 2016), which is actually driven by the dominance of certain individual actors such as government officials, researchers, and NGOs, who act in certain contexts. The political, legal and regulatory environment is very important to be able to support the birth and development of micro and small businesses, because many of the obstacles faced by these businesses stem from existing rules and regulations (Hobohm, 2001). In other words, the environment in which a business can do business must be conducive or favorable to their development.

Entrepreneurial ecosystem concept refers to the interactions that occur between various institutional and individual stakeholders so as to encourage entrepreneurship, innovation and the growth of SMEs (Isenberg, 2011). It consists of easy access market, labor, access to capital, support systems (such as mentors, consultants and incubators), policies and regulations, infrastructure, education and training systems, support from higher education institutions as well as socio-cultural support. Three main areas included, such as:

1) *Institutions*, in this term are economic institutions in society such as property rights structures and the presence of an effective market framework (North in (Sussan & Acs, 2017)).

2) *Agency*, that defines an entrepreneur as someone who specializes in making decisions about coordinating scarce resources to gain an advantage (Casson in (Sussan & Acs, 2017)).

3) *Activity*, or ways to create innovative high-growth enterprises, whereas not all markets are well established or clearly defined, and where the relative parts of the production function are not fully known.

2.2. Digital Ecosystem

Digital ecosystem (DE), a self-regulating, finite and sustainable system composed of heterogeneous digital entities and their interrelationships focused on interactions between entities to increase system utility, gain and share information, internal and interrelated cooperation, and system innovation (Korpela et al. in (Acs & Song, 2020)).

1) *Digital Infrastructure*, or facilities across the user to display new forms of learning by creating paths of innovation (Henfridsson & Bygstad, 2013).

2) *Users*, previously viewed as tech savvy who directly interact with digital technologies, have morphed to mean anyone who has access to digital technologies (Von Hippel, 2006).

2.3. Digital Entrepreneurial Ecosystem

The increasing era of disruption today, which shows the increasingly dynamic economic and social situation due to technological changes. Thus, business behavior will experience significant changes as well. One of them is the evolution of traditional economic governance to a platform economy. Therefore, a business ecosystem is required to adapt to a platform-based ecosystem. However, the entrepreneurial ecosystem appears to be a regional or local phenomenon as many would argue (Stam & Spiegel, 2016).

However, when one compares the entrepreneurial ecosystem with a platform-based ecosystem and incorporates the role of digital technology, the platform-based ecosystem is instantly global with billions of users and millions of agents (Sussan & Acs, 2017). Platform-based ecosystems are developed and maintained not by regions or governments, but by platform organizations. Ecosystem governance, the rules for who gets the platform and what rules of good behavior are determined by the platform company owners.

However, there is a significant gap in the conceptualization of entrepreneurship in the digital era precisely because it ignores the fundamental role of knowledge as a resource in the economy. To address this issue, a new platform-based ecosystem framework, also known as the Digital Entrepreneurial Ecosystem (DEE) is proposed which integrates two separate but related ecosystem literature, namely the digital ecosystem and the entrepreneurial ecosystem. This new framework

places platform-based ecosystems within the broader context of users, agents, infrastructure and institutions, so that two biotic entities (users and agents) drive individual agency, while two abiotic components (digital technology and digital institutions) make up the external environment. Song (2019) later refined the DEE framework and extended it to a multi-sided platform (Figure 1).

The complementary explanations of Digital Entrepreneurial Ecosystem will be pointed out as follow:

1) *Digital Technology Infrastructure (DTI)*, is a way of forming the coordination and governance needed to establish a common set of technology standards related to entrepreneurial activities (Sussan & Acs, 2017). The development concept includes several aspects, including: Digital Openness, Digital Freedom, and Digital Protection.

2) *Digital User Citizenship (DUC)*, that outlining the explicit legitimacy and implicit social norms that enable users to participate in a digital society (Sussan & Acs, 2017). It consists of Digital Literacy, Digital Access, and Digital Rights.

3) *Digital Multi-Sided Platform (DMSP)*, where users of digital technology and agents of the entrepreneurship ecosystem meet. It serves as an intermediary for transaction of goods and services, and also a medium for knowledge exchanges that enables and facilitates experimentation, entrepreneurial innovation, and value creation (Song, 2019). The components are The Networking Pillar, Matchmaking, and Financial Facilitation.

4) *Digital Technology Entrepreneurship (DTE)*, consists of various third-party agents that partake in experimentation, entrepreneurial innovation, and value creation using hardware/software to build products that connect to platforms (Song, 2019). It mainly concentrated on such components like, Digital Adaptation, The Technology Absorption, and The Technology Transfer.

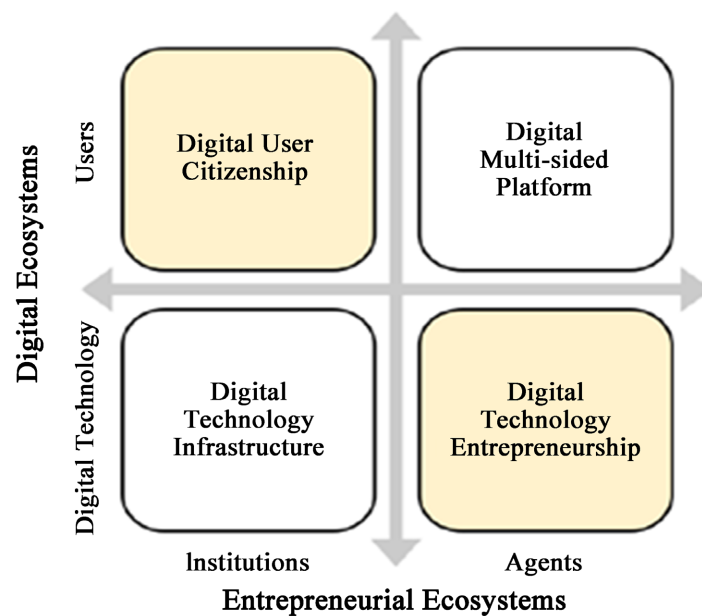


Figure 1. Digital Entrepreneurial Ecosystem (Song, 2019).

2.4. The Overview of North Sulawesi Province, Indonesia

From a regional and international perspective, North Sulawesi Province is in a strategic position because it is located on the Pacific Rim, which is directly opposite East Asian and Pacific countries. Such a position is advantageous for North Sulawesi, because geographically it will become a trade gateway in eastern Indonesia and in the Asia Pacific region.

Furthermore, from a macroeconomic perspective, North Sulawesi Province has a lot of economic potentials that needs to be developed in various fields, ranging from agriculture, plantations, marine products and tourism. All of these sectors are superior commodities offered by the Province of North Sulawesi. The agricultural sector of North Sulawesi Province has three leading commodities, namely, fruits, vegetables, and horticulture. For the plantation potential of North Sulawesi Province, where these plantation crops play an important role as well as involve the livelihoods of most people in the North Sulawesi Province. This commodity is also the main product of the province of North Sulawesi and about 70% of the population's livelihood and income comes from plantation crops. Among the crops are coconut, cloves, nutmeg, vanilla, and chocolate. Coconut is the most dominant commodity in the plantation product sector. It accounts for about 60% of the total plantation area, both large and small plantations.

Another leading sector is the Tourism Sector, a sector that has experienced significant development in recent years. This is marked by an increase in the number of foreign tourists which reached its peak in 2019 as well as efforts to empower and develop tourist areas by the North Sulawesi Provincial Government and the Central Government, one of which is the development of the Likupang Special Economic Zone (SEZ) which was launched by President Joko Widodo on December 10, 2019 through Government Regulation (PP) Number 84 year 2019.

3. Methodology

The purpose of writing this article is to get an overview of the concept of the digital entrepreneurial ecosystem (DEE) by using a literature study research method. The literature study used in writing this article is in the form of an assessment of relevant research journals, studies, dissertations, and mass media. This article will be built and constructed based on empirical research that has been done, mapping articles and related studies to be able to provide an overview of the DEE concept for SMEs in North Sulawesi Province, Indonesia.

4. Result & Discussion

The nature of the Internet has open access and open standards basically allow anyone to develop and share applications on the internet that assumes a reason for DEE forming. DEE or digital entrepreneurship ecosystem is integrated from the two existing ecosystem literature, namely the entrepreneurial ecosystem and the digital ecosystem. The entrepreneurial ecosystem focuses on agency and the

role of institutions with which the digital ecosystem focuses on digital infrastructure and users (**Figure 2**).

Conceptually, Song (2019) enhances the refinement of the DEE framework and its expansion to a multi-sided platform consisting of four concepts: a) Digital User Citizenship (DUC) covering both demand-side and supply-side users; b) Digital Technology Entrepreneurship (DTE) includes application developers and various agents that contribute to entrepreneurial innovation, experimentation and value creation on the platform; c) Digital Multi-sided Platform (DMP) which regulates social and economic activities between users and agents; d) Digital Technology Infrastructure (DTI) relates to all regulations governing the technical, social and economic activities of digital technology.

1) Digital Technology Infrastructure

Digital Technology Infrastructure enables an economic platform to operate. Digital infrastructure represents the technology of the digital era and the rules and regulations governing its use. This technology infrastructure is critical to sustaining the smooth operation of DPE, while also being responsible for keeping the digital economy open and secure.

The Government of North Sulawesi provides broad opportunities for the community to open a business with efforts such as providing stimulants to SMEs in North Sulawesi Province between 2010-2015 through various forms of assistance with a total amount of aid funds amounting to 29 trillion for the APBN and for APBD funds of Rp. 3 trillion (Dinas Koperasi, UKM Daerah Provinsi Sulawesi Utara, 2021). In addition, various forms or models of technical training, skills, management, entrepreneurship and motivation continue to be implemented. To encourage the growth of new entrepreneurs, the Regional Department of Cooperatives and SME will continue to carry out technical education and training on entrepreneurship and business skills for new entrepreneurs especially with regard to the undergraduate program of prospective new entrepreneurs. In addition, the partnership pattern with the school through the Business Skills Practice Place (PKBL) program which is currently being implemented in 8 schools spread evenly across districts/cities in North Sulawesi Province will continue to be developed. In addition, the government also facilitates the issuance of business permits which are free of charge and completed in minutes. To get a micro business

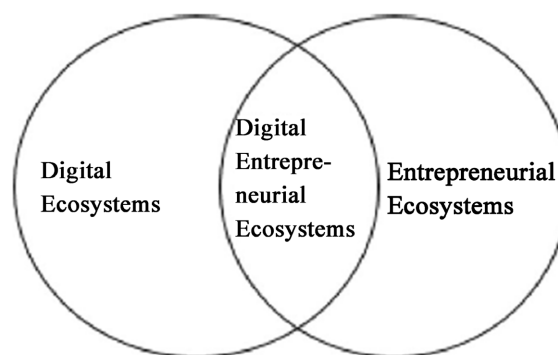


Figure 2. Integration of DEE (Sussan & Acs, 2017).

license and business registration number, business actors only bring at least a KTP, NPWP and a business certificate from the local government, free of charge and complete in 10 minutes.

Meanwhile, one of the evidence comes from the institution like Bank Indonesia continues to improve the quality of SMEs through the use of the Quick Response Code Indonesian Standard (QRIS) in North Sulawesi Province. This is an effort to form the central bank's support for the transition of business models for business actors, especially the micro, small and medium business segments. Bank Indonesia continues to encourage the use of QRIS throughout Indonesia. Moreover, in the midst of the COVID-19 pandemic, the use of QRIS continues to increase, given the number of mobility restrictions that the government has put in place to suppress the spread of the virus. In North Sulawesi, in particular, the number of people who use QRIS to conduct transactions may be small. Thus, Bank Indonesia continues to educate and invite the public to increase the use of QRIS, because there are so many merchants available. As of mid-October 2021, the number of merchants who have used QRIS in North Sulawesi is 102,979 based on information from Bank Indonesia. Merchants who use the most QRIS are in Manado City as many as 46,279, then followed by Minahasa Regency (10,304), North Minahasa Regency (8848), Bitung City (7796), Tomohon City (6281). Then, other city districts in North Sulawesi are still below 4000 merchants, but continue to increase.

2) Digital User Citizenship

Digital User Citizenship discusses the explicit legitimacy and implicit social norms that enable users to participate in a digital society (Sussan & Acs, 2017). Therefore the institution needs to ensure protection of user privacy.

The percentage of customers who can enjoy broadband fixed internet network services in 26 provinces is below the national average. In fact, there are 13 provinces where the percentage of subscribers served by fixed broadband internet networks is less than 1%, of which North Sulawesi Province is only 0.08% (Databooks, 2021). The fact shows the number of internet users in North Sulawesi Province is increasing from year to year. As reported by the Central Statistics Agency, the percentage of individual internet users increased to 46.7% in 2019, up 6% compared to 2018. This data represents the combination of internet users using mobile and broadband platforms (BPS Sulut, 2021).

For making a proportional digital user citizenship, the Indonesian government since 2018 has built a telecommunications infrastructure project for the Palapa Ring fiber optic network in North Sulawesi Province. This network will be the foundation of all telecommunications operators and users of telecommunications services in Indonesia and integrated with the existing network owned by telecommunications operators. This will also realize the availability of an integrated telecommunications infrastructure. Acceleration of growth and equitable distribution of socio-economic development through the availability of an integrated large-capacity telecommunications network infrastructure can guarantee

the quality of high-quality, safe, and inexpensive internet and communications.

Based on the digital literacy survey from [Kominfo \(2018\)](#), the Digital Literacy Status in Indonesia in 2020 has not yet achieved a “good” score (4.00); and only a few provinces have scores above “medium” (3.00). The Digital Literacy Status in Indonesia in 2020 is at 3.47 where this score has not been categorized as a “good” score (4.00); and only a few provinces have scores above “medium” (3.00). This weight is in accordance with “A Global Framework of Reference on Digital Literacy Skills” by UNESCO in 2018. This survey refers to 4 Sub-Indices, including Information and Data Literacy; Communication and Collaboration; Security; and Technology Capability. For North Sulawesi Province, it is located in the medium category in the range of scores of 3.00 - 4.00.

Several recommendations were issued by The Indonesian Ministry of Communication and Information including: Increasing Digital Literacy with the Information & Data Literacy sub-index, including critical thinking about media & data. Residents in urban (suburbs) can access the internet very intensively. The community has the ability to identify hoaxes that need to be strengthened. A campaign is needed to get rid of the habit of putting sensitive personal information on social media. Digital literacy needs to be packaged so that it becomes a topic to be discussed in family/relative circles, as well as capacity building for online media, especially in the regions to improve the quality of reporting and journalism data, so that information is clearer and more complete.

3) Digital Multi-Sided Platform

According to [Statista \(2021\)](#) in 2020, approximately 48.3 percent of the global population were social media users. This share is projected to increase to 56.7 percent of the global population in 2025. Social networking is one of the most popular online activities worldwide as of 2020, global social media audiences amounted to 3.6 billion users. According to [\(Kemp, 2021\)](#) <https://datareportal.com/reports/digital-2021-indonesia>, social media use continues to grow too, with global users reaching 4.55 billion in October 2021.

YouTube, Facebook and WhatsApp are the most popular social media channels in Indonesia [\(ASEAN UP, 2018\)](#). According to [Statcounter Global Stats \(2021\)](#), the social media market share in Indonesia from November 2020 to November 2021 was dominated by Facebook, which accounts for 72.49% share. WhatsApp itself is not considered a social media application, but a messenger service. According to [NapoleonCat \(2021\)](#), the total messenger users in Indonesia is 135,100,000, which is more than Instagram users (92,527,400). The use of professional social networks in Indonesia itself is still comparably low. LinkedIn, the largest professional social network service used in Indonesia, only has 20,461,000 users. According to [\(Morgan, 2019\)](#) Payments Trends report, the internet penetration in Indonesia is 32.3%, while the smartphone penetration is 48 (networking pillar).

In Indonesia, one example of successful matchmaker business is Gojek. Since the launch of its business in 2015, GO-JEK has become Indonesia’s leading

on-demand multiservice platform. Headquartered in Jakarta, GO-JEK allows residents of about 167 cities and districts in Indonesia to access more than 18 products ranging from transportation, food delivery, groceries, massage, and house cleaning to logistics and payments.

According to *Startup Ranking (2021)*, from the top 5 startup businesses in Indonesia, 3 of them (Traveloka, Ruang Guru, and Alodokter) are a matchmaking business. <https://www.traveloka.com/en-id/> is an Indonesian flight booking website, <https://www.ruangguru.com/> is an online matchmaking platform for students and private tutors, and <https://www.alodokter.com/> is a website that connects medical professionals and the healthcare community (matchmaking).

According to the Statista Research Department, in 2020, the value of credit card transactions in Indonesia amounted to 231.55 trillion Indonesian rupiah. The credit card transaction value in Indonesia decreased since the COVID-19 crisis. In 2019, before COVID-19 crisis, the credit card transactions were as high as 332.64 trillion Indonesian rupiah.

According to (*Morgan, 2019*) Payments Trends report, the mobile commerce market size in Indonesia is \$7.1 billion, making it one of the fastest-growing mobile commerce markets in the world, while the e-commerce market value is \$13.6 billion, meaning that mobile commerce accounts for 52% of e-commerce market size.

The report also stated that Cards are the dominant payment method in Indonesia when shopping online, taking a 34 percent share of the market. This is in spite of low card penetration, which sits at just 0.59 debit cards per capita and 0.07 credit cards per capita. Visa and Mastercard are both well-recognized and utilized brands, and cards will continue to hold the pre-eminent position in the marketplace, growing at a compound annual growth rate of 39 percent to 2021.

Sahay et al. (2020) defined fintech as a technology-enabled innovation in financial services that could result in new business models, applications, processes, or products with an associated material effect on the provision of financial services.

There are two fintech associations in Indonesia: the Indonesia Fintech Association (AFTECH) and the Indonesia Fintech Lenders Association (AFPI). According to the AFTECH, there are four main types of fintech products in Indonesia based on their respective business models: a) Digital payment; b) Online lending; c) Digital financial innovation (DFI) products (e.g., market aggregator, blockchain, and credit scoring); d) Equity crowdfunding (ECF). By the end of Q2-2020, 362 fintech startup companies had joined the association.

The activity of digital multi-sided platforms in North Sulawesi itself is still heavily relying on social media. Most people are using popular social media channels such as Facebook and Instagram to promote their products. Digital multi-sided platform is used heavily in the culinary, retail, tourism and service industry. North Sulawesi has abundant raw materials for food production, therefore the culinary industry is growing rapidly due to the use of multi-sided platforms. It was easy to make people aware of the existence of new cafes or restaurants. Retail stores such as fashion products are also using social media to promote the

sale of even used clothes. They also use digital services like online transportation such as Gojek and Grab in their daily lives. Digital multi-sided platforms also help the rise of local tourism. Likupang, one of the tourist regions in North Sulawesi, was decided to be a Special Economy Region (KEK) by Indonesian President, Joko Widodo. Likupang is famous for its tremendous amount of beautiful beaches. The use of digital multi-sided platforms helps to boost the awareness of such unique tourist places in North Sulawesi.

Although North Sulawesi people are already used to the use of digital multi-sided platforms, there is still a challenge of the lack of digital platform use for local production. Most online retail purchases in North Sulawesi are products produced from outside North Sulawesi, mostly Java. There needs to be a measure to manage this problem. An example of the solution would be a rapid training by the government to the local producers about digital multi-sided platforms. Government needs to encourage the use of digital multi-sided platforms for local B2B activities in order to boost local production.

4) Digital Technology Entrepreneurship

According to [MarketLine \(2021\)](#), the Indonesian software market had total revenues of \$4.9 bn in 2019, representing a compound annual growth rate (CAGR) of 9.5% between 2015 and 2019. The business process applications segment was the market's most lucrative in 2019, with total revenues of \$1.8 bn, equivalent to 37.4% of the market's overall value.

According to [AlphaBeta \(2021\)](#), digitally skilled workers in Indonesia contribute an estimated Rp. 908 trillion (US\$62.1 billion) to the country's GDP annually. This is equivalent to about 6 percent of Indonesia's GDP in 2019. Based on current digital skills trends, the value of digital skills in the country is projected to reach Rp.1965 trillion (US\$134.5 billion) in 2030. Digitally upskilling workers in Indonesia's hardest hit sectors will be a crucial part of the economic recovery process. In the sectors that are being hardest hit by the COVID-19 pandemic, hospitality, food services and retail, digitally skilled workers could account for up to 13 percent of these sectors' potential GDP contributions in 2030. This reflects that digitally upskilling individuals will be a crucial part of the economic recovery process.

According to [Mordor Intelligence \(2021\)](#), The Indonesia data center market was valued at USD 1.53 billion in 2020, and it is expected to reach a value of USD 3.07 billion by 2026, registering a CAGR of 12.95% over the forecast period 2021 - 2026. The demand for colocation from global cloud service providers drives the data center services revenue growth in Indonesia. The sector is expected to witness exponential growth due to the increase in the migration of OTT participants in Indonesia, increase in IT spending, and deployment of 5G, which will drive the data centers market. The colocation provider will provide the bandwidth, IP, and power necessary to run the server. Colocation hosting effectively makes a smaller business to have a large IT department's features without the set-up's high price tag. Not all companies are willing to move to the

public cloud in the region as they still want to have full control of their data without someone else's being in possession, due to which, colocation is still big despite strong interest by businesses to adopt cloud services (technology absorption).

According to *Startup Ranking (2021)*, Indonesia has 2322 startup businesses. The top rank startup in the country is Traveloka, which offers flight booking web service, with a startup score of 86,284 (rank 24 in the world). North Sulawesi itself only has one registered startup, which is Rumah Kayu Tumou Pratama, a trading company engaged in the production and sales of Wood Knock-Down House. Its startup score is 20,216 (ranked 639 in Indonesia).

The Global Innovation Index (GII) is co-published by Cornell University, INSEAD, and the World Intellectual Property Organization (WIPO), a specialized agency of the United Nations. In 2021, the GII presented its 14th edition devoted to the theme Tracking Innovation through the COVID-19 Crisis. It has 2 sub-indexes: Innovation Input Sub-Index (Institutions, Human Capital and Research, Infrastructure, Market Sophistication, and Business Sophistication) and Innovation Output Sub-Index (Knowledge and Technology Outputs, and Creative Outputs).

Indonesia was ranked 87th among 131 economies. Indonesia produces more innovation outputs relative to its level of innovation investments, which means that Indonesia is effective in its innovation investment. In Innovation Output Sub-Index, Indonesia has strong scores in software spending, ICTs organizational model creation and creative goods exports.

There are still many parts where Indonesia is still lacking. In the Institutions sub-index, Indonesia still has problems in the regulatory environment. In Human capital and research sub-index, Indonesia is still lacking in several parts such as education, tertiary education, and global corporate research and development investors. In the Business sophistication sub-index, Indonesia is still lacking in knowledge workers availability. In the Knowledge and technology outputs sub-index, Indonesia is still lacking in scientific and technical articles.

The lack of digital skill workers in North Sulawesi will be the problem that may hinder the advancement of the region. The government may try to invest in upskilling the local universities by providing tertiary skill training from the professionals. The universities and other educational institutions then may do a knowledge transfer to the local people or businesses.

Indonesia has an advantage of university and industry collaboration in research and development. North Sulawesi may take advantage of this by boosting the collaboration of local universities with national level industry or local industry and national level universities.

Government and local industries also need to be made aware of the importance of integrated data centers. In order to improve the digital technology in North Sulawesi, it is important to focus on creating more data warehouses. Government need to centralize the data center in order to provide faster and better

service for society. The local business also may integrate the data center in their businesses in order to help scale up their business and make better decisions.

According to [Statista \(2021\)](#) in 2020, approximately 48.3 percent of the global population were social media users. This share is projected to increase to 56.7 percent of the global population in 2025. Social networking is one of the most popular online activities worldwide as of 2020, global social media audiences amounted to 3.6 billion users. According to [Kemp \(2021\)](#), social media use continues to grow too, with global users reaching 4.55 billion in October 2021.

5. Conclusion

1) The nature of the Internet has open access and open standards basically allow anyone to develop and share applications on the internet that assumes a reason for DEE forming. DEE or digital entrepreneurship ecosystem is integrated from the two existing ecosystem literature, namely the entrepreneurial ecosystem and the digital ecosystem. The management of four sub-indexes of DEE is the key to improving the SMEs in North Sulawesi, Indonesia.

2) In Digital Technology Infrastructure, The Government of North Sulawesi provides broad opportunities for the community to open a business with efforts such as providing stimulants to SMEs in North Sulawesi Province, the Central Bank also made an effort to create QRIS to ease online transaction processes.

3) In Digital User Citizenship, the digital literacy of North Sulawesi Province is placed in the medium category in the range of scores of 3.00 - 4.00. It is important to create sustainable programs to improve this score.

4) In Digital Multi-sided Platform, the activity of digital multi-sided platforms in North Sulawesi itself is still heavily relying on social media. Most people are using popular social media channels such as Facebook and Instagram to promote their products. Digital multi-sided platform is used heavily in the culinary, retail, tourism and service industry. Although North Sulawesi people are already used to the use of digital multi-sided platforms, there is still a challenge of the lack of digital platform use for local production. Government needs to encourage the use of digital multi-sided platforms for local B2B activities in order to boost local production.

5) In Digital Technology Entrepreneurship, the lack of digital skill workers in North Sulawesi will be the problem that may hinder the advancement of the region. The government may try to invest in upskilling the local universities by providing tertiary skill training from the professionals. Government also needs to centralize the data center in order to provide faster and better service for society. The local business also may integrate the data center in their businesses in order to help scale up their business and make better decisions.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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