

# POST-COVID-19 MSME BUSINESS INCUBATION MODEL DEVELOPMENT IN MADURA

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#### **Abstract**

Business competition is getting tougher with the arrival of the industrial revolution 4.0. MSMEs increasingly need business incubators, because information technology disrupts the business sector. One thing that is quite influential is the emergence of the COVID-19 pandemic which has changed the social behavior and economic activities of the community, thus having an impact on changes in consumer behavior and the way they choose and buy products. MSMEs try to catch up with industrial technology developments by relying on business incubators to find alternative solutions. This study aims to identify the internal and external potential characteristics in order to formulate a strategy model for developing business incubation. The research was conducted in the cities of Bangkalan and Sumenep with 19 tenants of university-based business incubators as respondents. The analytical methods include environmental analysis (EFE & IFE), Strategic Advantage Profile (SAP) and Environment Threat And Opportunity Profile (ETOP).

The results found are that business incubators have more opportunities and strengths, so business incubators must implement an aggressive strategy.

Keywords: Business Incubators, MSME, business model strategy

#### INTRODUCTION

A strong introduction engages the reader in the problem of interest and provides a context for the study at hand. In introducing the research concern, the writer should provide a clear rationale for why the problem deserves new research, placing the study in the context of current knowledge and prior theoretical and empirical work on the topic. Moreover, the novelty of the research should explained in the paragraph (Times New Roman, 12 pts, single space, justify alignment.)

Micro, small and medium enterprises in Indonesia have great potential to be developed because of the wide market, easily available raw materials and large human resources are variables supporting the development of these small businesses, but several things need to be observed along with the development of



small home-based businesses such as: business development must be followed by good management, good planning will minimize failure, mastery of knowledge will support the sustainability of the business, managing an efficient and effective production system, as well as making breakthroughs and innovations that make the difference from competitors is a step towards success in manage the business.

The empowerment of MSMEs is very important and strategic in anticipating the future economy, especially in strengthening the structure of the Indonesian economy. The current national economic crisis has greatly affected national, economic and political stability, the impact of which has affected the activities of large businesses which are getting worse, while MSMEs are still relatively able to maintain their business activities.

In general, the target is the creation of strong and independent MSMEs that have high competitiveness and play a major role in the production and distribution of basic needs, raw materials, as well as in capital to face free competition.

This is where the role of business incubator institutions comes in. The business incubator is designed as a forum to form or transform the characteristics, abilities and skills of entrepreneurial human resources, especially in the aspects of motivation, creativity, innovation, productivity and cooperation in order to produce entrepreneurs who have competitive and comparative advantages and have a vision and mission.

However, MSMEs still have several weaknesses, such as limited human resource capabilities, product marketing constraints, the tendency of consumers who do not trust the quality of MSME products, capital and the absence of monitoring and overlapping programs.

The ultimate goals to be achieved by business incubators are job creation, investment opportunities for universities to transmit knowledge to entrepreneurs, increase revenue for the government from the tax sector, accelerate the transfer of new technology, fill the gap between capital owners and business owners and create business continuity. newly established micro, small and medium enterprises.

Kadarisman (2017) stated that the involvement of experts, scientists, researchers, professional managers, economists and academics is very meaningful in improving the professional abilities of MSME entrepreneurs.

Business incubation has been proven successful in creating reliable new entrepreneurs in developed countries. Some of these are Massachusetts' Roue 128 and Texas' Silicon Corridor. 80 percent of start-up entrepreneurs in the United States who do not participate in business incubation experience business failure within five years. Although there are still novice entrepreneurs who experience business failure after participating in business incubation, only 20 percent of the total business incubation participants.

The purpose of this research is to identify the business model of the incubation system used by the incubator, analyze the performance of each business model of the incubation system applied by the incubator and formulate a new business incubation model.



#### **METHOD**

The research was conducted in the cities of Bangkalan and Sumenep with 19 tenants of university-based business incubators as respondents. The methods used in this research are:

- 1) Environment Analysis, is a process to identify all external and internal elements, which can affect organizational performance. This analysis includes an assessment of the level of threats or opportunities that may arise from these factors. Data were obtained through observations and interviews regarding the business incubation process. Environment analysis used is Internal Factors Evaluation (IFE) and External Factors Evaluation (EFE). Oreski (in Hatta, et.al. 2018) states that the evaluation of internal factors includes the identification of strengths and weaknesses, and the evaluation of external factors includes the identification of opportunities and threats. The potential characteristics of the 'key internal factors' (strengths and weaknesses) were analyzed through the 'internal factor evaluation matrix (IFE-matrix)' and the 'key external factors' (opportunities and threats) were analyzed through the 'external factor evaluation matrix (EFE-matrix)'.
- 2) Stakeholder Analysis, is the process of identifying both individuals and groups who will influence or be affected by an action to be taken and classify them according to the impact of the action to be taken. In this case, the stakeholders studied are the tenants. Data were obtained through observations and interviews regarding the business incubation process. In this study, Stakeholder Analysis was carried out using SWOT analysis and SWOT Interaction. SWOT analysis systematically identifies internal factors (strengths and weaknesses) and external factors (opportunities and threats), and identifies strategies that describe the best fit among other factors (Salusu, in Royani 2019). The grand strategy matrix with four quadrants of alternative strategy choices is a form of SWOT interaction (Soesilo, 2000:4-6). The result of this interaction raises 4 positioning strategy options, namely: SO strategy, WO strategy, ST strategy, and WT strategy.
- 3) Business Mode; Strategy Improvement, which is a document that describes the best route to achieve a goal and becomes a guide in the implementation of long-term goals or projects. BMS acquired by integrating the Environment Analysis and Stakeholder Analysis.

#### **RESULTS AND DISCUSSION**

#### The Existing of Business Incubator's Business Model Strategy

The general purpose of establishing a business incubator is to produce successful entrepreneurs through financially viable independent programs. To achieve this goal, each business incubator has specific missions, but in general the true mission of a business incubator is to support MSME sand to accelerate the transfer of science and technology research results from universities /research institutes to society.

In general, the types of services offered by business incubators include:

1) Evaluate the feasibility of the business idea.

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- 2) Making business plans for the prospective tenants.
- 3) Facilitating investment for prospective tenants.
- 4) Coaching for prospective tenants in developing their business independently.
- 5) Create business networking.
- 6) Monitoring and evaluating.
- 7) Developing an entrepreneurial culture.

Business Incubators provided may provide additional services such as:

- 1) Managemerial Incubation
  - ➤ Coaching & Consulting

Business incubators coached and consulting services in terms of business development, problem solving, practical managerial and technology application.

> Research

Some business incubators may provide market research, business prospects, employer performance, employee placement, finance and product development.

Networking

Some business incubators may facilitate marketing, product development, management, human resources and finance networking.

Business Information

Some business incubators may shares information on market information, technology information, information on production management, network information and others.

2) Technical Incubation

Business incubators can help tenants to select suitable technology model for use thier businesses, such as determining production systems and techniques and technology development.

3) Access to Capital

Business incubators facilitate tenants to funding sources, assisting capital distribution and being a loan guarantor.

#### **COVID-19 pandemic**

The Covid-19 pandemic that has occurred since the first quarter of 2020 has hit various economic and social sectors in Indonesia, including the tourism and manufacturing sectors, resulting in various social problems starting as of May 2020 from 1.7 million workers being temporarily laid off to 749 ,4 thousand workers affected by layoffs. Even 282 thousand informal workers have their business disrupted.

This pandemic has directly created a series of economic downturns starting with the strict Large-Scale Social Restrictions (PSBB) which caused people not to be allowed to leave their homes if they were not forced to, resulting in decreased purchases of goods and services -even though demand and public purchasing power were still relatively high-. This has an impact on MSMEs whose sales have decreased, which causes their inability to pay loans/financing. This makes some MSMEs -especially in the food industry- digitize, they collaborate with several online services to offer their products.



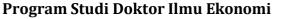
On the other hand, the millennial generation seems to have taken advantage of this pandemic condition as a foothold in economic development. This can be seen with the increasing number of cloud kitchens and the increasing number of online sellers. These millennial online sellers are targeting people who are busy at home and are more active online, including online shopping activities. This is evidenced by the recognition of the Director General of Postal and Information Administration of the Ministry of Communication and Information, Ahmad M. Ramli in Tourism Recovery Committee meeting at Commission 10 of the House of Representatives who noted that online shopping activities increased by 400 percent during the Covid-19 pandemic.

# Internal Factor Evaluation Matrix (IFE) and External Factor Evaluation Matrix (EFE) Analysis

Table 1. Internal Factors Evaluation

| No  | Instantal Et   | Strength (+) |       |       | Weakness ( - ) |       |       |
|-----|--|--------------|-------|-------|----------------|-------|-------|
| 140 | Insternal Factors  | Weight       | Scale | Value | Weight         | Scale | Value |
| 1   | Commitment to create business independence for tenants.                                | 0,15         | 4     | 0,60  |                |       |       |
| 2   | Role in providing business expertise to tenants.                                       | 0,15         | 4     | 0,60  |                |       |       |
| 3   | <b>Human Resources experts in the business sector and entrepreneurship.</b>            | 0,12         | 3     | 0,36  |                |       |       |
| 4   | Tenants who have a commitment to sustainable business                                  | 0,12         | 4     | 0,28  |                |       |       |
| 5   | Connections with financial and capital institutions                                    | 0,10         | 3     | 0,30  |                |       |       |
| 6   | Cooperation with government and private institutions                                   | 0,08         | 2     | 0,16  |                |       |       |
| 7   | Share knowledge and skills, both formally and informally as widely as                  | 0,09         | 3     | 0,27  |                |       |       |
| 8   | possible   | 0,08         | 2     | 0,16  |                |       |       |
| 9   | Almuni tenant who has been successful  | 0,11         | 3     | 0,33  |                |       |       |
|     | Support research funding sources.  |              |       |       |                |       |       |
| 1   | Some facilities are out of date due to rapid and expensive technological developments. |              |       |       | 0,15           | 2     | 0,30  |
| 2   | Changes in government regulations and programs.  |              |       |       | 0,12           | 3     | 0,36  |
| 3   | It does not yet have a full service<br>program because the Business                    |              |       |       | 0,1            | 2     | 0,20  |
| 4   | Incubator only fosters tenants on an outwall basis.                                    |              |       |       | 0,20           | 1     | 0,20  |
| 5   | Limited and short-term sources of funds  |              |       |       | 0,25           | 1     | 0,25  |
| 6   | Lack of professional and full time   |              |       |       |                |       |       |

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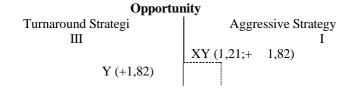


|   | human resources  |      |      | 0,1  | 3 | 0,30 |
|---|--|------|------|------|---|------|
| 7 | Limited physical facilities and infrastructure in the implementation of the incubator function |      |      | 0,08 | 3 | 0,24 |
|   | Not all effective innovations produced have been widely disseminated.                          |      |      |      |   |      |
|   | Total  | 1,00 | 3,06 | 1,00 |   | 1,85 |

Table 1. Exernal Factors Evaluation

| No | Eksternal Factors   | Opportunity (+) |       |       | Threat ( - ) |       |       |
|----|---|-----------------|-------|-------|--------------|-------|-------|
|    |   | Weight          | Scale | Value | Weight       | Scale | Value |
| 1  | Sources of private sector funds have not been absorbed.   | 0,20            | 4     | 0,80  |              |       |       |
| 2  | There is support from the community even though it is still small.                                    | 0,07            | 2     | 0,14  |              |       |       |
| 3  | The business network can be expanded to partner with tenant businesses.                               | 0,13            | 3     | 0,39  |              |       |       |
| 4  | Opportunity to expand network with various financial institutions.                                    | 0,10            | 3     | 0,30  |              |       |       |
| 5  | Creating economic diversification,  | 0,10            | 2     | 0,20  |              |       |       |
| 6  | Help create jobs for long-term sustainable economic development.                                      | 0,14            | 4     | 0,56  |              |       |       |
| 7  | Establish a network of alumni tenant cooperation to support each other.                               | 0,11            | 3     | 0,33  |              |       |       |
| 8  | Products produced in innovation-based incubators.   | 0,15            | 4     | 0,60  |              |       |       |
| 1  | Entrepreneurs still think they don't need a<br>Business Incubator                                     |                 |       |       | 0,35         | 2     | 0,70  |
| 2  | As a result, the Indonesian Business<br>Incubator still lags behind neighboring                       |                 |       |       | 0,10         | 1     | 0,10  |
| 3  | countries.  The condition of the national economy   |                 |       |       | 0,15         | 2     | 0,30  |
| 4  | prioritizes maintaining economic stability rather than encouraging the growth of the tenant industry. |                 |       |       | 0,40         | 1     | 0,40  |
| 7  | The emergence of the COVID-19 pandemic  |                 |       |       |              |       |       |
|    | Total   | 1,00            |       | 3,32  | 1,00         |       | 1,50  |

Based on the the IFE & EFE analysis, the Internal Factor Value =+3.06 + (-1.85) = +1.21 and External factor value = (+3.32) + (-1.5) = 1.82.



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| Weakness           | Strength                 |
|--------------------|--------------------------|
|                    | X (1 21)                 |
| Defensive Strategy | Diversifikation Strategy |
| IV                 | II                       |
| Thre               | at                       |

Based on the results of the IFE & EFE analysis translated in the coordinate diagram above, the condition of the business incubator is in quadrant I. This is a good situation because there are still many opportunities for further development and there are still strength factors to seize these opportunities. So the business incubator must use an aggressive strategy.

#### **SWOT Analysis**

Business incubators are inseparable from their tenants because their successful performance is measured by the success of alumni tenants. The success of alumni tenants depends not only on good mentors and training but especially on the materials provided.

Because Business Incubation training is not based on a curriculum system, but is specifically designed to suit the character and needs of each tenant, so to determine the first business incubator strategy model, it is necessary to know and analyze the SWOT of the tenants.

#### SWOT Analysis

#### Strategic Advantage Profile Tenant

#### > Tenant's Strength

- 1. Business incubator support
- 2. Conducive work environment
- 3. Hard work ability
- **4.** Entrepreneurship spirit empowerment

#### > Tenant's Weakness

- 1. Market driven ideas. Business failures often occur because there is no potential market that absorbs the business ideas offered.
- 2. Management skills. Many businesses fail because the perpetrators lack the knowledge and skills to carry out their business plans and don't have planning skills.
- 3. Access to capital. Businesses fail because they don't understand how to use the capital they have or fail to raise enough capital at critical times.
- 4. Unstable income in the early and growth stages.
- 5. Losses due to loss of investment capital.
- 6. It takes hard work and a long time.
- 7. Quality of life that remains low even though the business is running smoothly.

#### Environment Threat and Opportunity Profile

#### > Tenant's Opportunity

1. Turning inventions into innovations for value creation

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- 2. Supporting economic development in the form of creating new jobs
- 3. Profitable investment
- 4. Generate and give birth to new sustainable businesses
- 5. Give a good economic impact to the community

#### > Tenant's Threat

- 1. Consumer sentiment towards local products
- 2. Lack of customer loyalty
- 3. The response of existing competitors to aggressively defend their market share.

#### **SWOT Interaction Analysis**

Based on the interaction of internal and external environmental factors between business incubators and tenants, a business incubator development strategy model can be formulated as follows:

#### Strength-Opportunity (SO) Strategy

- 1. Adequate human resources are need in order to turn inventions into innovations so that they have value creation.
- 2. Creating a conducive mentoring environment in order to produce new sustainable business units with the aim of opening new job opportunities.
- 3. Empowering the entrepreneurial spirit and hard work ethic to produce profitable investments that will ultimately have a good economic impact on the community.

#### Weakness-Opportunity (WO) Strategy

- 1. Produce innovative inventions that have value creation so as to attract investors.
- 2. The importance of understanding the principles of hard work, patience and innovation in entrepreneurship in order to produce profitable investments.
- 3. Have a vision of profitable investments so that entrepreneurs do not complain when their income is still unstable in the early stages or in growth
- 4. Understanding that the level of personal quality of life of entrepreneurs is not the only benchmark for business success, but also contributes to economic development in the form of opening new jobs (quality of life for the community).

#### Strength-Threat (ST) Strategy

- 1. Turning inventions into innovations so that the value of the product perceived by consumers is greater than the switching cost.
- 2. Empowerment of entrepreneurial spirit and hard work ethic in order to anticipate the response of existing competitors who will aggressively defend their market share.

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#### Weakness-Threat (WT) Strategy

1. Anticipating business failures that occur due to not getting a potential market that absorbs the business ideas offered by studying customer attitudes and habits towards products, switching costs and how competitors respond to trying to maintain their market share.

#### **CONCLUSION**

Based on the results of data analysis and criticism, the business incubator's business model strategy can be formulated as follows:

- 1) The business model system used by both business incubators can explained as follows:
  - In order to obtain potential tenants, business incubators tend to use "goalkeeper" strategy, where business incubator just sit and wait for MSMEs that enrolled because they interested in using the business incubator's services. They use this strategy after failed on several attempt to encourage residents around campus to start entrepreneuring. Even though a small number of residents were interested to be entrepreneurs, the opportunity to get excellent entrepreneurs is very low because basically it wasn't their own intention, so when they encounter obstacles, they would give up easily.
  - ➤ The incubation process focused on fostering prospective tenants who are analytically potential to develop. In the incubation process, both business incubators foster and direct tenants according to their interests and potential, with very little effort to develop product differentiation. So the idea or innovation that tenants proposed will be developed with no effort to implement the innovation into other products or create alternative innovations that related to the same product. In the other hand, many tenants chose to do business conventionally. It made business incubators less hassle to train information technology skills, such as online marketing and sales, financial software, digital payments, etc. This can hinder the alumni tenants' future development because they only focused on their own innovation ideas.
  - During incubation period, business incubators maintain communication with the alumni tenants but the mentoring process is just a formality. When the alumni tenants encountered new obstacles that they didn't encountered during the incubation period, they didn't consult with the business incubators. Several alumni tenants closed their business because of their selfishness. They want to be considered as self-sustained entrepreneurs, or worse, their ego to keep business incubators away from their business' management strategy.
- 2) The business incubators's BMS performance can be stated as good, because it has been tested many times, indicated by the number of tenants who have passed. But the problem is that many amumni tenants' business didn't last long, especially when they faced new situations, such as information technology disruption and the arise of COVID-19 pandemic. When

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technology and digitalization are starting to disrupt, they didn't have information technology skills?

- 3) Several models for Business Incubator's BMS Development
  - ➤ To attract interest of potential tenants, business incubators should disseminate information that there are big opportunities in entrepreneuring through low-cost webinars that can facilitate large number of participants.
  - ➤ To grow entrepreneurial skills, special traits and treatments need to be carried out to bring out creativity and optimism in tenants and overcome self-weaknesses to create an entrepreneurial mindset. It is very important to cultivate an entrepreneurial mindset in the tenant's soul, so that all thoughts, feelings, actions, speech, discussions, daily life behaviors, and the whole process of activities in all forms of activity are always business-oriented. One of the traits can be in the form of success stories from successful entrepreneurs including alumni tenants.
  - ➤ Networking and negotiation skills must be taught. This method is more effective and easier to apply.
  - ➤ Building a social network through several action sets, looking for partners to build continuous self-ability, and as the core process is building a good perception, discovering new interesting things, develop innovations that can generate profits. When this has been created, it remains only to develop (development) and its strengths and weaknesses, to be developed in the form of which will be better in the future (future formation) by taking into account the various types of opportunities that exist.
  - ➤ The right business incubator model for developing soft skills is to provide more practical knowledge than theory. By developing an entrepreneurial strategy, determining new opportunities that can be done to start a business, and executing those opportunities in the form of business exploitation that is believed to be profitable.
  - ➤ Learning from the current pandemic period, monitoring can be done online using several related software. For example, direct face-to-face meetings can be replaced by using video calls, while evaluation of inventory and sales can use POS (Point of Sales) software and evaluation of financial records through cash book applications that are publicly available and free of charge.
- 4) From a theoretical study of the business incubator model using SWOT analysis, it was found that business incubators owned by universities in Surabaya tend to have strengths and opportunities so that the chosen business strategy should be a Growth Strategy (Aggressive Strategy).
  - ➤ The Aggressive Strategy used by Inbis should be focused on solving the obstacles and obstacles encountered. This can be done through three approaches, namely:
  - ➤ Cost Leadership: Through a set of functional policies aimed at the main objective of efficient and effective cost control.
  - ➤ Differentiation: Differentiation of products and services offered by creating something new and perceived as a whole as unique. Focus: Always focus on the segment or customer.



- 5) Entrepreneurship Education Model This model has the following process:
  - ➤ Entrepreneurship workshop: Business incubators and tenants collaborate to develop a common understanding about the concepts of entrepreneur, entrepreneurship and entrepreneurial competence.
  - Thematic workshops: Business incubators present relevant topics and views on these topics while tenants conduct research about the topic.
  - ➤ Idea workshop: Business incubators and tenants collaborate to create as many ideas as they can come up.
  - ➤ Project workshop: The best ideas are selected for further development. Tenants carry out specific project planning.
  - ➤ Tools and knowledge workshops: Tenants learn the necessary knowledge for project implementation.
  - ➤ Production workshop: Tenants develop their ideas, services, concepts or products and produce prototypes.
  - ➤ Presentation workshop: Tenants present their products and future perspectives to be applied in the market.
  - ➤ Evaluation: Tenants evaluate their own processes, competencies and achieve goals.

#### **REFERENCES**

- Bank Indonesia. (2020). *Kajian Inkubator Bisnis dalam rangka Pengembangan UMKM*. Diakses 31 November 2020 melalui <a href="https://www.bi.go.id/id/umkm/penelitian/nasional/kajian/Pages/riil6.aspx">https://www.bi.go.id/id/umkm/penelitian/nasional/kajian/Pages/riil6.aspx</a>
- Hamdan. (2018). Industri 4.0: Pengaruh Reolusi Industri pada Kewirausahaan demi Kemandirian Ekonomi. *Jurnal Nusamba* (3)2. 1-8.
- Hatta, I. H., Riskarini, D. and Ichwani, T. (2018). SME Business Develompment Strategy: SWOT and EFE-EFI Analysis. *Journal of Applied Management* (*JAM*). (16)3.537-543.
- Hecklau, F., Galeitzkel, M., Flachs, S and Kohl, H. (2016). Holistic Approach for Human Resource Management in Industry 4.0. *Procedia CIRP*, 1-6.
- Hermann, M., Pentek, T. and Otto, B. (2016). Design Principles for Industry 4.0 Scenarios. 49<sup>th</sup> Hawaiian International Conference on Systems Science.
- Kadarisman. M. (2017). *Manajemen Pengembangan Sumber Daya Manusia*. Jakarta: Rajagrafindo Persada.
- Jayani, D.H., (2020). *Wabah PHK Akibat Covid-19*. Diakses 31 November 2020 melalui
  <a href="https://katadata.co.id/ariayudhistira/infografik/5e9a66d0e897f/wabah-phk-akibat-covid-19">https://katadata.co.id/ariayudhistira/infografik/5e9a66d0e897f/wabah-phk-akibat-covid-19</a>
- Kohler, D. and Weisz, J. D. (2016). *Industry 4.0: The Challenges of The Transforming Manufacturing*. Germany: BPIFrance.



- Mahani, S. A. E. (2019). Kinerja Pendampingan Usaha Rintis Binaan pada Orangenest Incubiz. *Performa* (16)1. 16-28.
- Mardani, N. (2019). Analisa Strategi Bisnis Industri Printer dalam Menghadapi Pasar Bebas. *Jurnal Ekonomi dan Bisnis*. (6)1. 46-61.
- McKinsey & Company. (2020). Survey: Food retail in Indonesia during the COVID-19 pandemic. Diakses 31 November 2020 melalui <a href="https://www.mckinsey.com/industries">https://www.mckinsey.com/industries</a> /retail/our-insights/survey-food-retail-in-indonesia-during-the-covid-19-pandemic#
- Royani. (2019). Faktor-Faktor yang Memepengaruhi Inovasi Produk UMKM Kerajinan Buket. *Skripsi*. Universitas Islam Negeri Sumatera Utara.
- Sung, T. K. (2018). Industry 4.0: Lorea Perspectiva. *Technological Forecasting and Social Change Journal*, Elsevier 132(C). 40-45.
- Tjandrawinata, R. R. (2016). Industri 4.0: Revolusi Industri Abad Ini dan Pengaruhnya pada Bidang Kesehatan dan Bioteknologi. *Jurnal Medicinus* (29)1. 31-39.