

Strategy Development of MSMEs in Order to Face of Industrial Revolution 4.0

Egabetha Amirah Yudhaputri¹ and Dadan Umar Daihani²

¹Faculty of Economics and Business, Trisakti University, Kyai Tapa, Jakarta Barat, Grogol, Indonesia

²Faculty of Industrial Technology, Industrial Engineering Department, Trisakti University, Kyai Tapa, Jakarta Barat, Grogol, Indonesia

Keywords: MSMEs (Micro, Small, and Medium Enterprise), Industrial Revolution 4.0, IoT (Internet of Things), AI (Artificial Intelligence).

Abstract: Today we are facing the industrial revolution 4.0, the stage where the problems cannot be solve without internet. The Internet of things (IoT) and Artificial Intelligence are coloring the way of conducting a company. Therefore, entering this era, every company including Micro, Small and Medium Enterprises (MSMEs) is required to have the ability to change and adapt to technological developments. Considering this situation, some interesting question are, is the MSMEs in Indonesia are ready to adapt and take advantage of this technological change? What is the appropriate strategy for enhancement the MSMEs in order to survive and developed in this circumstance? The MSMEs have a significant role in the national economy. This can be seen by the amount of business unit that reached more than 55.6 million units in 2011-2012, which involves more than 107 million workers. Meanwhile, the Big company has only 5 thousand business units and involves about 3 million workers. The MSMEs can penetrate to the wider market, more flexible, can provide income sources for broaden communities, and has more resilience to the economic crisis, as proven in year 1998. Considering these characteristics, the government must pay attention to such issues. By fostering the MSMEs, Indonesia can create small, strong and advanced entrepreneurs who have technological capabilities. This paper temps to analyze and discuss the various strategies needed to build MSMEs in order to have adaptability in this era of industrial revolution.

1 INTRODUCTION

1.1 Backgrounds

One expert who first pointed out the concept of 4.0 industrial revolution was Prof. Schwab. According him, in this era there has been a change in the way humans work based on physical systems into cyber systems dramatically (Schwab, 2016). The first generation of industrial revolution took place in the late 18th century. At that time the principle of manual work was replaced by work based on mechanical equipment. Human power began to be replaced by steam and water-powered machines. At this era, humans began to find mechanical weaving machine (1784). With the discovery of mechanical devices, the concepts of efficiency and productivity were introduced.

The impact of changes in work characteristics is felt by the entire business communities. Both for big

and small companies including MSME's. Automation starts running throughout all business activities. Computers used as a driving force for industrial activities, from the production process to distribution is now increasingly inaccessible. Almost every steps of industrial activities are all driven by computers (Daihani, 2017). Even according to Issac Assimov, we have now entered into a period where all problems cannot be solved without computers. Therefore, the most important thing is how we can adapt to the development of computers continuously. (Asimov).

The Computer, more and more, has a very strategic role. Thanks to the development of an increasingly sophisticated internets, many business activities now have been carried out virtually. Online stores grow everywhere like mushrooms in the rain, hotel reservations, ticket orders and even food order is done through the electronic equipment. In the government sector, there are many

administrative processes that have now been carried out using electronic systems. We currently know e_proquement, e_gouvernement, and others. It's no exaggeration to say that the e_anything era has coming.

Changes that occurred not only hit the big companies. This change must also be adapted by various MSMEs. Otherwise they may not be able to compete. Moreover, competition that occurs not only at the domestic, but also they must compete globally.

The number of MSMEs in Indonesia is very large and has a strategic role in Indonesian economic development. According data from the Ministry of Cooperatives, MSMEs in Indonesia in years 2017 reached 62,922,617. Consisting of micro businesses as many as 62,106,900, small businesses amounting to 757,090 and medium categories amounting to 58,627. This amount is very large compared to big companies with only 5,460. As mentioned in the paragraph above, MSMEs have a strategic role for Indonesian economic. In 1998 when there was an economic crisis, MSMEs saved the Indonesian nation. At that time almost all large companies collapsed and caused a lot of unemployment. But MSMEs with a workforce of 65 million can survive.

Now in the industrial revolution era 4.0, with the inclusion of various technologies, what strategies should be implemented by MSMEs? So, they can still exist and are able to compete with various companies based on Information Technology. This interesting issue will be the main subject of this paper.

1.2 Approach



Figure 1: The 5 steps of study.

This paper is based on a literature review of various

studies. The method used is the qualitative approach consisting of five steps as in figure 5 (Arbnor, 1997).

The first step is to describe the phenomenon that occurs. At this stage the data sources are taken from various documents and literature. The second step is to analyze the causes of the phenomenon. At this stage, various possible causes of the phenomenon will be seen. The next step is to try to look ahead, what will happen and what must be done by the object of study to be able to answer the challenges of the future. Next step 4 and 5 is the preparation of strategic recommendations that must be formulated so that the UMKN could continue to develop.

2 LITERATURE REVIEW

Three things will be described in this section, first about understanding and development of the industrial revolution 4.0. Second is the description of various forms of business in the cyber era and its impact on the business community, especially the MSMEs. The third part will describe the characteristics and development of MSMEs in Indonesia.

2.1 Notion of Revolution Industry 4.0

Currently production management in various manufacturing sectors has gradually used computers. This development is strongly supported by the creation of various innovations, especially in the field of information technology. As stated by Morrar Rabeh (Morrar, 2017) that the internet is already a part of daily life for both individual and business activities. That's what is called as IoT or Internet of Thing.

Berger even added, that to increase efficiency and work productivity, we cannot leave the computer. The internet and computers become a whole unit to support the current work system (Berger, 2014). The information and communication technology revolution has helped the development of the industry and encourage high economic growth. Thus it can be said that the use of technology in the industry has a positive impact on improving human welfare. Information technology has also fostered better production of goods and services sectors.

The first Industrial Revolution started at the end of the 18th century. At that time the principle of work based on mechanical equipment was introduced. Steam and water power begin to replace human and animal power. In this era humans began to find

mechanical weaving machine (in 1784). With the discovery of mechanical tools, the concepts of efficiency and productivity were introduced.

Based on the concepts of efficiency, effectiveness and productivity, experts began to develop various work methods. At the beginning of the 20th month, a pattern of mass production work was found. This method is based on a system of division of labor and specialization. One application of this concept was carried out on the slaughterhouse production line on the Cincinnati in 1870. (Daihani, 2017)

In this era, the discovery of various work methods developed very rapidly. The principles of scientific management introduced by Taylor color the era of the 2nd industrial revolution. In 1909, Taylor published "The Principles of Scientific Management". In his opinion, by improving the system and work procedures towards a simpler and more optimum way, it will increase productivity. With a simpler system all work can be done easily. Likewise, by optimizing all resources used, very high efficiency will be realized. One famous experiment is designing a spade that allows workers to optimize the way it works. Likewise other experiments were carried out on masons who finally found optimal working patterns for masons in laying piles of stone. Taylor argues that by calculating the time of movement (elements of work) needed for various activities, it can be found "best" to complete the task. The timing principles of this movement came to be known as "Taylorism".

The era of the 2nd industrial revolution went on long enough until finally found various electronic equipment. Starting with the use of electronics equipment and information technology in the production system. The automatization are build in this era. The debut of the third generation industrial revolution was marked by the emergence of the first programmed logic controller (PLC), the modem 084-969. This computer-based automation system makes industrial machines no longer controlled by humans, but has been controlled by computers. In this era, namely in the 1970s, it was known as "Digital Manufacturing", but later developed the concept of Computer Integrated Manufacturing (CIM). This system has integrated the physical system (production line) with its management system. Therefore, the whole process is controlled by system, various computers, from product activity, production planning, production process to cost calculation. Data communication is combined with a new managerial philosophy that increases organizational and personnel efficiency.

After the CIM concept and computer became an industrial tool, now the era of industrial revolution 4.0 is approaching which is marked by the cyber-physical system. Today the industry is beginning to touch the virtual world, in the form of human, machine and data connectivity, everything is everywhere. The use of computers as a driving force for industrial activities, from the production process to distribution is now increasingly in accessible, almost every step of industrial activity is all driven by computers.

From the various descriptions above, the 4th industrial revolution can be said as an accumulation of integration of technological innovation from the discovery of mechanical, electronic, robotic devices to the development of internet-based information technology. (Morral et al, 2017) (Yonsin, et al 2018).

According to Schimitt (Schimitt, 2015) there are 5 reasons why the 4.0 industrial revolution is something that can encourage increased productivity and open a broad market and can also improve the quality of human life.

1. First, this technology allows companies to work more flexibly. Thus various consumer needs can be met easily. In addition, with the availability of internet facilities, it will create a wider network, so that supply chains can be made better.
2. Second, with robotic technology, product diversification can be easily done. Various innovations will be created, this will encourage increased productivity. Besides that the value chain and partnerships can be made easy.
3. Third, with the availability of communication facilities through the internet, the relationship between producers and consumers will be well established, even consumers in this case can be considered an inseparable part of the producer.
4. Fourth, workers can be easily coordinated, and have the opportunity to facilitate it well in this business process. Of the four benefits as stated above.
5. Finally all of these will provide benefits for the realization of the welfare and quality of human life.

2.2 Business Models of Industry 4.0

The development of information and communication technology has influenced in behaviours and business patterns. The entrepreneurs who initially used conventional methods are now migrating to systems based on information technology, such as e_procurement, e_marketing, etc. Even the

government uses the same method, for example by creating e_gouvernement and e_identity to serve the community. So it's not excessive, if it is said that today we had entered to the e_anything era. Internet allows humans to interact with many parties more faster.

Nowadays people can work from anywhere and are not physically bound. Houses can be used as an office, work space can be used by anyone as long as this is connected to the internet. It is the internet that is a medium of work and not physical space anymore. This workspace is then called the cyber office or cyber workspace. By using cyber work space, work is more productive and efficient because it does not depend on place and time anymore.

Today we have entered an era of very tight and complex competition. One alternative to be able to compete is to build a network as wide as possible. The bigger our network, the stronger our position will be. In the partnerships model, companies are not required to have large assets, because the strength of the company will lie in the accumulation of the strength of the entire network.

The form of organization based on work networks is called the Virtual Corporation (Kurtz et al, 2010) (Kluber R et al, 1999). This form can be realized and work well due to internet technology. Virtual Corporation in principle is like the form of a cooperative. An example, one form of Virtual Corporation that is now developing is a travel agent. This company can offer all the needs of travellers, from airplane tickets, hotels, restaurants and various other facilities. All of these facilities do not belong to this travel agent. All of these facilities are actually connected by the internet network. From point of view customers, the company can be considered as one company. But in reality VC consists of hundreds or even thousands of companies connected via the internet. This is where the strength of the competitiveness of the company, by having many working partners, the various facilities as if owned by the company. So basically the Virtual Corporation for consumers feels like a real company, even though the company is physically not real. Each member of the Virtual Corporation can join and separate depending on the context and type of work involved.

In general it can be said that there are four basic characters from a virtual corporation namely: Differentiation, Configuration, Integration and Technology (Bauer R et al, 2003), (Bultje R and et al, 1998).

1. The First Character is Differentiation.

This character emphasizes the principle of

heterogeneity and modularity. To deal with increasingly complex competitive situations, companies are required to have various functions (modular) that have specific expertise and specific competencies (Balint S, et al, 1998)

2. The Second Character is Configuration.

This character is related to the form of a temporary network, this can mean that the relationship between network members is not too rigid (loosely coupled). As stated above, that from the viewpoint of consumers, a VC company is seen as a single company, but actually consists of many companies. They join only related to one particular project. The overall structure of VC is determined by network configuration and changes that are tailored to customer demand. Byrne, Brandt et al. for example, argues, that VC is "a group of collaborators who quickly unite to take advantage of certain opportunities. Once there is an opportunity, a network can be formed which can be dissolved when it is finished if it is not needed. (Ulrich J et al, 1999)

3. The Third Character is Integration.

This character is related to a coordination mechanism that is based more on the mechanism of trust than contractual relations. Heterogeneity and dynamic reconfiguration of various core competencies combine to become a mission to fulfil customer needs. Every member of the organization who joins must have the desire and commitment to work in an integrated manner on the basis of responsibility and trust. This is important because the achievement of the required value of the consumer can be achieved so that all the components work equally well and with one another. A single juncture failure can cause failure of all jobs. Because this level of trust is a prerequisite for the formation of a VC. (IshayaT et al, 1999)

4. The Other Factor is Technology.

This character consist of Information and Communication Technology. One other character of VC is the existence of Technology, especially Information and Communication Technology. Networking between independent VC-forming corporations is possible because it is woven by Computer Technology. Without intelligent technology from computers this form of network would not be possible to materialize well. Therefore technology is an important element in the formation of VC. (Amant K et al, 2005)

2.3 Notion of MSME

Referring to Law No. 20 of 2008, MSME

Companies can be defined as follows:

Micro businesses are individual productive businesses whose assets are no more than 50 million rupiah and turnover is around 300 million rupiah. Whereas those included in the category of small businesses are around 50 to 500 million individual businesses and their turnover can reach 300 million to 2.5 billion. Meanwhile, what is meant by medium business is an individual company that is not a branch of another company with assets of around 500 million to 10 billion. While the amount of turnover from medium-sized companies ranges from 2.5 billion to 50 billion rupiah

The Indonesian government is very interested in continuing to empower MSMEs, because MSMEs are the national economic backbone. It is revealed that during the economic and financial crisis, MSMEs were the ones who saved the national economy. Therefore, the government continues to launch MSME development programs including:

1. The Government continuously organizes programs to improve entrepreneurship and cooperation spirit between them.
2. The government continues to simplify licensing and protection procedures and mechanisms for MSMEs.
3. Open access for MSMEs to enter the broadest market and create easy access for capital.
4. Fostering an independent and competitive organization.

From the perspective of the guidance and characteristics of MSMEs, MSMEs can be categorized into four forms, as follows:

1. Livelihood Activities. This type of MSMEs is MSMEs which are used as job opportunities to earn a living everyday. This MSME is known as the informal sector. An example is food street vendors.
2. The Micro Enterprise consists of craftsmen but does not yet have a clear institutional form.
3. Another form is Micro Enterprise, but already has a good entrepreneurial attitude. MSMEs in this category can already become subcontracts from other companies even though they have produced products for export.
4. The fourth form is MSMEs that are more dynamic and fast developing. MSMEs in this category generally have high entrepreneurial characteristics and are ready to transform into large companies.

3 ANALYSIS AND DISCUSSION

As mentioned earlier, MSME has a very important and strategic role for the national economy. In 1998, at the time of the monetary crisis, MSMEs were still able to mobilize Indonesia's economic wheels. At that time almost all large companies were collapse due to the increase of the dollar exchange rate (six times), from which the exchange rate of 2000 rupiah per dollar then increased dramatically to 15 thousand rupiahs, even touching the figure of 20,000 rupiah. In that condition, of course, many big companies are bankrupt, because they are exposed to huge foreign debt burden and also the burden of importing raw materials to be paid in dollars. In addition, many large companies with foreign debts have entered due date, requiring huge dollars. Another problem faced by large companies is the debt repayment period. At that time many large companies used short-term debt but were used for investment. As a result, interest charges and short repayment periods are very burdensome.

Whereas MSMEs, whose scale of business is not too large and does not depend on foreign debt, are able to survive. MSMEs are capable of replacing the domestic market which was once the market of big companies. MSMEs are very flexible, and have the ability to diversify products quickly. They can switch from one product to another. Flexibility, adaptability and speed of reacting to change are unique characteristics of MSMEs. That is the basic capital of UMKM to remain survive in the economic crisis situation.

The existence of cooperatives and MSMEs that are dominant as national economic players are also strategic subjects in community empowerment. In the business profile book published by BNI in 2015, it was stated that in the post-1997-1998 economic crisis the number of MSMEs is relatively stable. Until 2012 MSMEs increased steadily and able to absorb 85 million to 107 million workers. In that period, the number of business players continues to increase until it reaches more or less 56,539,560 units, consist of 56,534,592 units of Micro, Small and Medium Enterprises (MSMEs) or 99.99%. Only, around 0.01% or 4,968 units is a big business. This figures proves that MSMEs are a very potential market for the banking industry, especially financial institution to channel financing. Because around 60 - 70% of MSMEs do not have access to bank financing. (LPPI, BI, 2015)

Realizing this, the government through Cooperative Empowerment and Micro, Small and Medium Enterprises (KUMKM) continues to

provide guidance. MSMEs should be seen as an integral part of national economic development. This program in line with the mission of the National Government to create a just and prosperous society, in accordance with the mandate of the 1945 Constitution of the Republic of Indonesia. In the 1945 Constitution (article 33 paragraph 1), explicitly emphasizes the implementation of the principle of family in the implementation of a national economy based on economic democracy (Article 33 paragraph 4).

Refer to the role and function of MSMEs, the government enforces an affirmative policy towards Cooperatives and MSMEs. In this case the empowerment of Cooperatives and MSMEs is directly related to life and improving welfare for most of the Indonesian people (**pro poor**), in particular in the context of expanding business opportunities for new entrepreneurs and employment and reducing the unemployment rate (**pro jobs**). The development approach aimed at economic actors, especially in cooperatives and MSMEs, is very important. This step is at the same time to reinforce the structuring of the structure of national economic actors, which had been in a dualistic and lame condition. Development aimed at Cooperatives and MSMEs is expected to deliver a more unified and balanced structuring of the structure of national economic actors, both in the business scale, strata and sector, so that the structure of national economic actors is solid and independent. By paying attention to the role and potential of the national economy, the existence of cooperatives and MSMEs has proven to be independent, strong and flexible business actors even in normal and crisis conditions. It cannot even be denied by anyone that Cooperatives and MSMEs are the leaders of the Indonesian economy. It became the heart of the people's economy, and the pioneer of the growth of popular economy.

Regarding with the issues of Industrial Revolution 4.0, some strategic questions are: Can MSME's Indonesia:

- Adapt to this situation?
- Transform into an IT-based business?
- Compete with start-ups?
- Etc.

When referring to the experience of the economic crisis in 1998 and also in mid-2009, it was seen that MSMEs was able to survive and continue to grow. Thus it can be said that MSME's has very good elasticity. They have proactive abilities. In this case proactive is defined as the capacity, ability and sensitivity of a business organization to follow,

anticipate and simultaneously adopt changes that occur in their environment. In proactive terms, there is an understanding of the dimensions of time.

Another ability possessed by MSME is adaptability. This key concept can be interpreted as the ability to adapt a business organization to the development of its environment. If the proactive concept contains an understanding of the dimensions of time, then the concept of adaptability emphasizes the dimensions of space. Besides being Proactive and able to adapt, MSME also has other internal capabilities, namely Flexibility. This capability is the capacity of the business organization in terms of changing itself in accordance with the demands of the environment, both related to management structures, business patterns and even the types of products.

Referring to the change management method proposed by Kurt Lewin (see Figure 1), these MSMEs have the ability to unfreezing, changing process and very fast refreezing (Murthy, 2007). Unfreezing is an initial process of change. This step is an important step to change the perceptions of all members of the organization to be open minded to new perspective. Basically all members of the organization want to get better conditions compared to current conditions, but they are usually reluctant to change. Therefore it takes a hard effort to convince all members of the organization to make changes. We must open their horizons to jointly look far ahead and achieve a better future. After forming the same view and awareness to change from the members of the organization, the process of new changes can begin to be implemented. The process of change usually takes a long time, even need to go through a transition period. Not all stages can be done easily, it requires patience and awareness from all parties. After the members of the organization can leave the old ways and begin to be able to accept new ways, then the process of stability of the working mechanism must be re-established, that is what is called the refreezing.

From the description above, it can be said that MSME has proven to be able to change rapidly. Because the scale of the company is very small and consists of only a few people, various hurricanes that forge themselves can be immediately overcome. Technological developments can also be regarded as a factor that disturbs stability and as an initial trigger of change. With a very thin organizational structure and short hierarchy, the unfreezing process is usually easy to do. In contrast to big companies whose structures and numbers of people are very large, then if there are changes that come from the

environment, then the company will be difficult to change. From the perspective of company characteristics based on organizational virtual principles, MSME basically can quickly change and adjust to the conditions of the industrial revolution 4.0

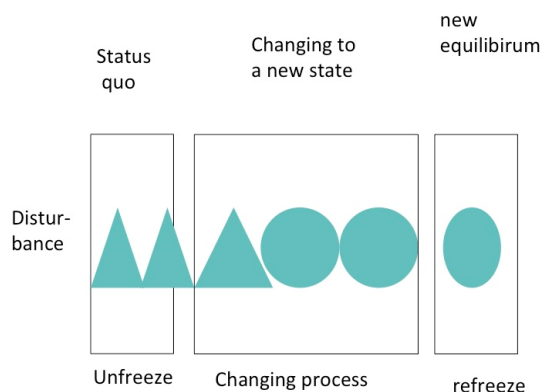


Figure 2: Kurt Lewin Change Model.

From the perspective of company characteristics based on organizational virtual principles, MSME basically can quickly change and adjust to the conditions of the industrial revolution 4.0. This is in accordance with the concept proposed by Bauer Roland, namely Differentiation, Configuration, Integration and Technology.

First the concept of differentiation, In general, micro, small and medium businesses have specific expertise, but they have the ability to join other fields so that they can produce new products that have high competitiveness. By combining these skills, a new business entity is formed. In the era of industrial revolution 4.0, where part of the work was automated, the modular nature was very important. For example, now it has developed and is present in our midst, one of the three-dimensional printing technology. For large companies this can be a threat, but for this small industry it can be an opportunity.

Another important character is configuration. In the era 4.0 it was characterized in the form of a very loose working partnership. For micro, small and medium enterprises, the work pattern and network building are very flexible. The network formed by MSME is very loose, each member can join or separate depending on the work he is doing. So the network bond is not in the form of a very rigid network. One of the advantages is that each member can work in their respective rhythms. So that the working relationship does not prevent him from developing and building networks with other partners. This pattern of work is usually very difficult to do for large companies.

The third concept is Integration which is built through trust mechanism. This concept is in line with the previous concept, namely the concept of modular and differentiation. Because the partnership network is very loose, the way to maintain the commitment of its members is trust. Thus each member has the opportunity to be able to join and can also separate at any time. However, the mechanism of relations between members of the network must be bound by a strong commitment, namely mutual trust. In fact, often in the work relationship between network members there is no need to do a very rigid employment contract. For small entrepreneurs, this trust mechanism has been established for a long time. Therefore they can easily cooperate without having to go through negotiations and contract-based work agreements. But of course for large companies this is often impossible. They must work based on clear and very detailed contracts.

Another important factor is Integration. Relationships between work partners can now be easily woven thanks to the development of information technology. Especially now that internet technology is available that can connect anyone anywhere. Therefore the era is now referred to as IoT (Internet of Thing). Internet of things common definition is defining as: Internet of things (IOT) is a network of physical objects. Internet of Thing in general can be defined as the formation of various networks through the internet. The network formed not only consists of companies or institutions but also individuals. IoT is not just a network of computers, but all equipment including smart phones, medical devices, household appliances, office equipment and others can be connected to one network. Thus various activities can be carried out and organized in one network. That is one of the technological advancements that encourage changes in work patterns and even thinking patterns. (Patel Keyur at all, 2016). A terms of the use of technology, it is not only monopolized by small companies, but even large companies have used it. Even before internet technology was discovered as it is today, it is big companies that have used this information technology.

However, technology is developing rapidly and requires a lot of money, this is where the handicap is owned by MSMEs. Costs are needed not only to buy technology but also to develop human resources. Good cooperation is needed between the government, universities and researchers. From the description above it is clear that the MSME group has enormous potential to be able to utilize or have

readiness to enter the era of industrial revolution 4.0. They have the ability to easily adapt and to be able to form a large network. They have the flexibility to diversify their products by joining others, they can combine core competens to form a strong production network and supply chain relationship.

That is the strategy that must be built by Indonesia so that small business actors can participate and become the foundation of the national economic development based on freedom and justice.

4 CONCLUSIONS

Based on the description and analysis above, there are some interesting notes to be put forward at this conclusion including:

At present we are entering the industrial era 4.0, where all processes are carried out based on Information Technology, especially the internet and Artificial Intelligence. In this condition there is no other way but we must adapt to the development of technology. Technological development cannot be ignored, so there are two choices, to drive technology or we are driven by technology.

MSME's in Indonesia has a very large number and has a very important role for the national economy. During the economic crisis in 1998, they saved the Indonesian economy. Besides its contribution to GDP, MSME's is also able to accommodate a very large number of workers and even more than the workforce that can be accommodated by big companies. But they often get obstacles in terms of capital. Therefore the government should continues to carry out affirmative policies to foster them including providing capital facilities.

It is clear that the MSME's has enormous potential to be able to utilize or have readiness to enter the era of industrial revolution 4.0. They have the ability to easily adapt and to be able to form a large network. They have the flexibility to diversify their products by joining others, they can combine core competency to form a strong production network and supply chain relationship.

To improve MSME's competitiveness and capabilities in the industrial revolution 4.0 era, the strategies that need to be built are : 1) Encouraging the development of networks between different expertise, 2) Helping to build human resource capabilities, 3) Opening the path of global trade, 4) Formulating simple regulations and encouraging the growth of IT-based MSME's, 5) Translating the

results of research institutions for practical purposes, 6) Building information technology infrastructure for the public interest, 7) Creating various capital schemes for MSME's.

Based on those conclusions, this strategy can be applied by practitioners or professionals in the field of MSME's in order to follow the development of today's business world.

REFERENCES

- Amant K and Pavel Z, 2005, *Internet-Based Workplace Communications: Industry & Academic Application*, Information Science Publishing, Hershey • London • Melbourne • Singapore.
- Arbnor I and Bjerke B, 1997, *Methodology for creating business knowledge*, 2ndedition, SAGE Publications.
- Balint S. and Kourouklis A, 1998, *The Management of Organisational Core Competencies in Organizational Virtualness*, P. Sieber and J. Griese, Eds. Bern: Simowa Verlag, pp. 165-172.
- Bauer Roland, Koszegy Sabine, 2003, *Measuring the degree of Virtualisastion, Organizational Virtualness and Electronic Commerce Proceedings of the 2nd International, VoNet, 2nd Edition*
- Berger, R. 2014, *Think Act, Industry 4.0: The New Industrial Revolution—How Europe Will Succeed*; Roland Berger Strategy Consultants: Munich, Germany pp. 1–24. Available online: https://www.rolandberger.com/publications/publication_pdf/ro (accessed on 24 February 2019).
- Bremer C, Walz M, Molina A and Eversheim W, 1999, *Global Virtual Business- A Systematic Approach For Exploiting Business Opportunities in DynamicMarkets.International Journal of Agile Manufacturing*.Vol. 2, Issue 1.
- Bultje R and van Wijk J, 1998, *Taxonomy of Virtual Organisations, based on definitions, characteristics and typology. VoNet: The Netwsletter @ http://www.virtual-organization.net*, 2(3), 7-20
- C.S.V. Murthy, 2007, *Change Management*, Himalaya Publishing House, First Edition, ISBN 978-81-8488-145-5,
- Daihani Dadan Umar, 2017, *Implementation of virtual corporation: the challenge of future business in Indonesia*, ISIEM
- Ishaya T and Macaulay L, 1999, *The Role of Trust in Virtual Teams* , Department of Computation, University of Manchester Institute of Science and Technology, England. {mcaigt3, lindam}@co.umist.ac.uk
- Klüber R, Alt R and Österle H *Emerging Electronic Services for Virtual Organizations - Concepts and Framework*, 1999, Institute for Information Management, University of St. Gallen, Switzerland. {roland.klueber; rainer.alt; hubert.oesterle}@unisg.ch

- Kurtz, David L, 2010, Contemporary Business, John Wiley and Son, Inc. USA13thed.
- Liao Yongxin, Loures Eduardo Rocha, Deshamps Fernando, Brezinski Guilherme, Venâncio André, 2018, The impact of the fourth industrial revolution: a cross-country/region comparison, Production, ISSN 1980-5411 (On-line version).
- LPPI, BI, 2015, Profile Bisnis Usaha Mikro, Kecil dan Menengah (UMKM)
- Morarr Rabeih, Arman Husam, and Mousa Saeed, November 2017, The Fourth Industrial Revolution (Industry 4.0): A Social Innovation Perspective, Technology Innovation Management Review, Volume 7, Issue 11.
- Patel Keyur, Patel Sunil M, 2016, Internet of Things-IOT: Definition, Characteristics, Architecture, Enabling Technologies, Application & Future Challenges, DOI 10.4010/2016.1482, ISSN 2321 3361 © 2016 IJESC, Volume 6 issues no 5.(<http://ijesc.org/> (accessed on 22 Februari 2019)
- Schmitt, K. 2015. Top 5 Reasons Why Industry 4.0 Is Real And Important. Digitalist Magazine, October 15, 2013. Accessed February 21, 2019: <https://www.digitalistmag.com/industries/manufacturingindustries/2013/10/15/top-5-reasons-industry-4-0-realimportant-0833970>
- Smith, J., 1998, *The book*, The publishing company. London, 2nd edition.
- Ulrich J and Franke BA, 1999, Organizational Virtualness and Electronic Commerce Proceedings of the 2nd International, VoNet- Workshop Zurich The Concept of Virtual Web Organizations of Virtual WebSeptember 23-24, Simowa Verlag Bern
- Schwab Klaus, 2016, The Forth Industrial Revolution, World Economic Forum, ISBN-13: 978-1-944835-01-9 ISBN-10: 1944835016 REF: 231215.