

# Micro Small and Medium Enterprises Facing the Industry 4.0 Era in Semarang City

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**Abstract.** The MSMEs sector contributes significantly to the economy of Semarang City. Besides contributing to the Semarang City gross regional domestic product, it also absorbs a significant amount of labor. Along with the development of industry 4.0, which leads to high-tech and the use of the Internet of Things (IoT), the MSMEs sector in Semarang City must adjust and prepare for changes. This research is an explorative study that focuses on identifying internal and external conditions, assessing readiness, and recommended strategies to the MSMEs facing the industry 4.0 era in Semarang City. The data used are quantitative data and qualitative data. In this study, the samples taken following the sampling technique are 100 micro and small business units. Quantitative descriptive analysis and Assessment Tool developed by Warwick University in England are used in the analysis method of this study. The results show that from three aspects of assessment, namely aspects of products and services, aspects of business models, and aspects of strategy and organization, the results of the readiness analysis are at level 2 (intermediate). With details on each aspect, namely aspects of products and services has a value of (1,7). The business model aspect has a value of (2,6) and the strategic and organizational aspects have a value of (1,7).

**Keywords:** MSMEs, Industry 4.0, Semarang City, Economy, Aspects

## 1 Introduction

The evolution of the industry is developing rapidly over time. Prasetyo and Sutopo [1] state that the Industrial Revolution occurred four times, starting with the first industrial revolution in 1784. Industrial revolution 1.0 occurred in England with the invention of steam engines and manufacturing machines that replaced the role of human labor. Then, the 2.0 industrial revolution occurred when the use of electric power shifted to be the leading force driving production machines. The 3.0 industrial revolution occurred in the mid-1970s when the invention of computer technology affected the automation of the use of industrial machines. The industrial revolution 4.0 was first introduced in 2011 in Germany. The use of industrial technology in this era is more directed to the high-tech industry.

According to Marsudi and Wijaya [2], industrial revolution 4.0 has a significant impact on the results of the Mckinsey Global Institute study, specifically the use of robots and machines that impact the use of human labor. Regional governments have a strategic role in dealing with the development of industry 4.0, especially preparing industries in the region in order for them to continue having the strength to be competitive. One of them is Semarang City as a city based on trade and services following the initial plan of RPJMD of the Semarang City 2016-2021. With these development plans, it is expected that all stakeholders in the Semarang City,

especially industry players, can be more adaptive in adjusting the times, especially industrial evolution, that increasingly focuses on the use of technology and computerization.

Businesses in big cities in Indonesia, especially Semarang City, are increasingly aware of the power of the internet and digital devices in improving business performance [3]. However, in reality, business people presently using the internet are indeed solely medium and large industries. Although these industries also have not implemented 100% of the internet. Website, social media, and mobile messaging applications are crucial media for MSMEs in interacting with consumers [3]. These tools have a role in advancing MSMEs in the era of disruption, yet MSMEs players have not fully realized them. The number of MSMEs increases every year, of course, becoming an excellent opportunity to develop the application of industry 4.0. The increase in the number of MSMEs in Semarang City is presented in table 1.

**Table 1.** Number of MSMEs in Semarang City by Sub-District In 2015-2017

No	Sub-District	Year		
		2015	2016	2017
1	Banyumanik	79	328	206
2	Candisari	24	149	219
3	Gajahmungkur	27	235	171
4	Gayamsari	24	287	413
5	Genuk	31	325	271
6	Gunungpati	34	126	191
7	Mijen	18	79	144
8	Ngaliyan	56	123	187
9	Pedurungan	175	1.378	621
10	Semarang Barat	65	315	416
11	Semarang Selatan	155	185	368
12	Semarang Tengah	23	206	378
13	Semarang Timur	27	424	370
14	Semarang Utara	70	235	474
15	Tembalang	117	409	578
16	Tugu	71	102	145
<b>Total</b>		996	4.906	5.152

Source: Semarang in figure (2018).

Based on table 1, the number of MSMEs in Semarang City has increased every year, where the number of MSMEs in 2015 only amounted to 996, proceeded to increase to 4906 in 2016, and in 2017 to 5152 MSMEs. The existence of information and communication technology will create networking, thus minimizes the distance and time constraints and can be used to perform beneficial economic activities for its users. MSMEs can interact with consumers more easily if they utilize existing technology. Considering the many benefits that can be obtained from the existence of this technology, information, and communication, industries must implement it, especially in the Industry 4.0 Era. However, not all MSMEs can apply technology with a variety of obstacles encountered, such as the low level of human capital and performed innovations. In anticipating all of these problems, a study is necessary to assess the preparedness and strategies of MSMEs in Semarang City in facing the Industry 4.0 Era.

From the problem formulation, this study aims to determine the internal and external conditions of MSMEs in Semarang City in overlooking the development of the Industry 4.0 Era and strategies that can be recommended.

## 2 Research Methods

This research is a quantitative descriptive study and uses primary data. The primary data used is a sample of MSMEs in Semarang City. The number of samples for MSMEs is 99 respondents. The respondent will fill out a questionnaire regarding the readiness of MSMEs in industry 4.0. The sample is distributed in 16 sub-districts throughout Semarang City. The aspects of Semarang City's MSME readiness to be analyzed refer to the industry 4.0 readiness assessment tool (An Industry Assessment Tool) developed by Warwick University in England [4]. Of the ten aspects, only three aspects will be assessed, considering that the three aspects are common conditions of the MSMEs in Indonesia. The three aspects are:

### 2.1 Product and Services Aspect

This aspect has several sub-indicators and readiness levels categorized into four levels from beginner to expert, including:

**Table 2.** Sub Indicators and Readiness Levels of Product and Service Aspects

<b>Readiness Level</b>	<b>Level 1- Beginner</b>	<b>Level 2- Intermediate</b>	<b>Level 3- Experienced</b>	<b>Level 4- Expert</b>
Digital features of products	Only displaying products physically	A small number of products are displayed digitally	Most products are displayed digitally	All products are displayed digitally
Data-driven services	There is no data-based service	There are data-based services without integration with customers	There are data-based services with limited integration with customers	Data-based services which fully integrated with customers
Level of Product Data Usage	Product information is not displayed at all	The delivery level of product information is 0-20%	The delivery level of product information is >20 %-50%	The delivery level of product information is > 50%.

### 2.2 Strategy and Organization Aspect

This aspect has several sub-indicators and readiness levels which are categorized into four levels from beginner to expert, comprising:

**Table 3.** Sub Indicators and Level of Readiness for Strategic and Organizational Aspects

<b>Readiness Level</b>	<b>Level 1- Beginner</b>	<b>Level 2- Intermediate</b>	<b>Level 3- Experienced</b>	<b>Level 4- Expert</b>
Degree of Strategy Implementation	Industry 4.0 is still in discussion	Industry 4.0 is included in the strategy plan	Industry 4.0 has been applied and	Industry 4.0 has been applied and

		company's business	communicated in most parts/areas	communicated to all sections/areas
Investment	Investment of industry 4.0 is still restrained to planning	Investment of Industry 4.0 in one business area	Investment of Industry 4.0 in most of business area	Investment of industry 4.0 in the business area
People Capabilities	Employees do not possess the experience of and skills digital technology	A small proportion of employees possess experience and expertise in digital technology	Most employees possess digital technology experience and skills	All employees possess experience and digital technology skills
Leadership	Company leaders are not yet interested in Industry 4.0	Company leaders are conducting a study of the business	Company leaders are developing a development plan for industry 4.0	Company leaders support and implement industry 4.0

### 2.3 Business Model Aspect

This aspect has several sub-indicators and readiness levels which are categorized into four levels from beginner to expert comprising:

**Table 4.** Sub Indicators and Level of Readiness of the Business Model Aspects

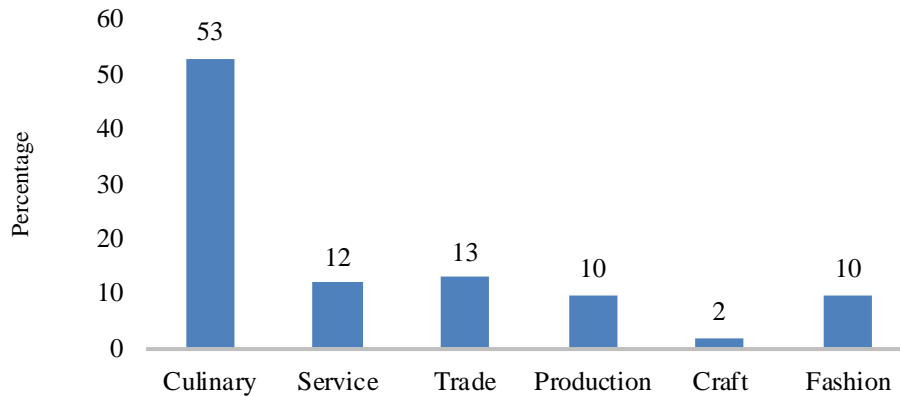
<b>Readiness Level</b>	<b>Level 1- Beginner</b>	<b>Level 2- Intermediate</b>	<b>Level 3- Experienced</b>	<b>Level 4- Expert</b>
Data-Driven Decision	Data is not analyzed	A small portion of data is analyzed	Most of the data is analyzed	All relevant data are analyzed and inform the company's business decisions
Real-time Tracking	Limited product tracking	Product tracking extends to the production process and	Product tracking extends to the market	Complete product tracking throughout the business cycle
IT-supported Business	IT systems do not yet support business processes	Business processes are supported by IT systems yet not integrated	Complete IT support for all processes yet not fully integrated	IT systems support all company business processes and are integrated

### 3 Results and Discussions

#### 3.1 The readiness of MSMEs of Semarang City in the Industry 4.0 Era

##### 3.1.1 Business Fields

The distribution of business fields for Semarang City MSMEs is as follows:



**Fig. 1.** MSMEs Business Fields in Semarang City.  
Source: Primarily data, 2020.

Based on the graph above, of the 100 MSMEs respondents in Semarang City, the majority or 53% are culinary businesses, then trading businesses, such as grocery stores as much as 13%. Service businesses such as laundry and salon services as much as 12%. Fashion businesses such as tailors and small clothing stores as much as 10%. Production business of 10% and handicraft business of 2%.

##### 3.1.2 Evaluation of MSMEs Readiness of Product and Service Aspects

Product and service aspects consist of four indicators, specifically (a) delivery of complete product information, (b) collaboration with large start-ups, (c) payment methods utilizing EDC (Electronic Data Capture), (d) payment methods through fintech. Based on the processing results, the following table shows the analysis of MSMEs' readiness in the aspects of products and services.

From the results Table 5 of primary data processing of respondents in Semarang City, from 100 MSMEs as many as 77% had submitted complete information about products to customers, while 23% of UMKM players had not submitted complete information. The next indicator is cooperation with big start-ups, only 25% of MSME players have collaborated, while the remaining 75% have not collaborated. The third indicator in the assessment of product and service aspects is the use of the EDC (Electronic Data Capture) payment method. The result shows only 22% of MSMEs in Semarang City have used the EDC payment method.

**Table 5.** Evaluation of MSMEs Readiness of Product and Service Aspects

No.	Product & Service Aspects	Percentage of Answer for Yes	Percentage of Answer for No
1.	Complete information delivery regarding the product to the customer	77%	23%
2.	Collaborate with big start-ups	23%	77%
3.	Payment methods utilize EDC (Electronic Data Capture)	16%	84%
4.	Payment methods through fintech	12%	84%

Source: Primary data, processed (2020).

The last indicator is the use of payment methods through fintech. From the results of the respondents' data, it is known that only 9% of MSME actors use the fin-tech method, while the remaining 81% have not used the fin-tech payment method. There are several fin-tech companies that offer payment services to retail or small and medium enterprises (SMEs) at low cost. Most of the MSME in Semarang City cannot take advantage of this due to limited knowledge, skills and abilities.

### 3.1.3 Evaluation of MSMEs Readiness from Business Models Aspect

The business model aspect consists of 10 indicators, such as (a) franchises, (b) computer use, (c) laptops, (d) internet network facilities, (e) websites, (f) automatic machinery and equipment, (g) report recordings of sales transactions, (h) bank accounts and (i) online banking facilities. Based on the processing results, the following table shows the analysis of MSMEs' readiness in the aspect of the business model presented in the following table 6.

**Table 6.** Evaluation of MSMEs Readiness of Business Models Aspect

No.	Business Models Aspect	Percentage of Answer for Yes	Percentage of Answer for No
1.	Franchise business	17%	83%
2.	Utilization of computer equipment	55%	45%
3.	Utilization of laptop equipment	64%	36%
4.	Internet network facilities	42%	58%
5.	Owning a personal website	5%	95%
6.	Utilization of automatic machinery and equipment	33%	67%
7.	Transaction report of recorded sales	66%	34%
8.	Business financial transaction reports have been presented periodically	88%	12%
9.	Owning a bank account	81%	19%
10.	Utilization of online banking facilities	64%	36%

Source: Primarily data, processed (2020).

Based on the results of processing, the following table shows the analysis of the readiness of MSMEs in the aspects of the business model shown in table 6. From primary data processing from respondents, it can be seen that most of the MSMEs in Semarang City do not yet have a franchise system, this of course will hamper the market expansion process of these MSMEs. However, most MSME also have computers/laptops, business financial transaction reports have

been made regularly, already have bank accounts, and use online banking facilities such as mobile banking or internet banking.

### 3.1.4 Evaluation of MSMEs Readiness from Strategic and Organizational Aspects

The aspects of strategy and organization include nine aspects, which are presented in the following table 7.

**Table 7.** Evaluation of MSMEs Readiness from Strategic and Organizational Aspects

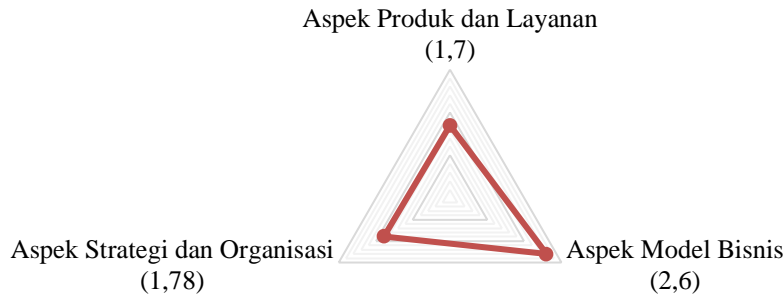
No.	Strategic and Organizational Aspects	Percentage of Answer for Yes	Percentage of Answer for No
1.	Business owners possess skills in utilizing technology	58%	42%
2.	Employees possess skills in utilizing technology	48%	52%
3.	Planning to invest in providing internet facilities	23%	77%
4.	Planning to purchase automated machinery and equipment	12%	88%
5.	Connected online with raw material suppliers	58%	42%
6.	Connected online with consumers	39%	61%
7.	Owning a personal social media account	48%	52%
8.	Utilization of non-cash transactions	22%	78%
9.	Employee's salary payout utilizing non-cash	20%	80%

Source: Primarily data, processed (2020).

Based on the table 7, it explains the readiness of MSMEs from the strategic and organizational aspects. Business owners have proficiency in the use of technology by 58% of the total respondents, while employees who have skills in the use of technology are slightly lower by only 48%. This shows that most actors and employees have not been able to properly utilize technology for the development of their business. In addition, non-cash payment of employee salaries was only 20% of the total respondents. This was also followed by the use of non-cash transactions, only 22% of the total respondents.

### 3.1.5 The Readiness of MSMEs in the Industrial Era 4.0

From the analysis of the MSME readiness assessment, seen from the aspects of products and services, aspects of business models, and aspects of strategy and organization, it can be concluded that the readiness of the MSMEs sector in facing the industrial era 4.0 is at level 2. As can be seen in Figure 2.



**Fig. 2.** The Readiness of MSMEs in the Industrial Era 4.0.  
Source: processed data, 2020.

From three aspects of assessment, namely aspects of products and services, aspects of business models, and aspects of strategy and organization, the results of the readiness analysis are at level 2 (intermediate). With details on each aspect, namely aspects of products and services has a value of (1,7). The business model aspect has a value of (2,6) and the strategic and organizational aspects have a value of (1,7).

#### 4 Conclusions

The readiness of the industrial sector of Semarang City in facing the Industry 4.0 Era is at level 2 or intermediate. With details on each aspect, namely aspects of products and services has a value of (1,7). The business model aspect has a value of (2,6) and the strategic and organizational aspects have a value of (1,7).

With details on each aspect, namely aspects of products and services has a value of 1.7. This means that most MSME respondents have not collaborated with large start-ups, and have not utilized EDC (Electronic Data Capture) or fin-tech payment methods. Most MSME are reluctant to collaborate with start-ups such as Gojek, Grab or other start-ups, this is because MSMEs do not have complete information about cooperation with start-ups, besides that there is a sharing of the profits from sales with start-up companies. ups if doing cooperation.

The business model aspect has a value of 2.6, this is indicated by most of the respondents of MSMEs already have a recorded sales transaction report, business financial transaction reports have been made periodically, besides that MSME also already have bank accounts and use online bank facilities such as mobile banking or Internet banking. However, most MSMEs do not have a franchise business, do not have their own website, and do not use automatic machines and equipment. This will make it difficult for MSME to develop if they want to expand their business.

The strategic and organizational aspects have a value of 1.7, this is indicated by more than 58% of the respondents of MSME business owners have proficiency in technology and are connected online with raw material suppliers. However, most MSME respondents have not used non-cash transactions either in running their business or for employee payroll, besides that,



MSMEs have not invested in purchasing automatic machines and equipment, and have not been connected online with customers.

## 5 Recommendations

1. It is necessary to socialize the concept of industry 4.0 more massively to MSME players in the city of Semarang.
2. Efforts should be made to increase investment in industry 4.0 by using more high-tech machines or tools. Provision of funds for investment can work with the banking sector.
3. There needs to be an increase in industrial literacy 4.0 to the people of Semarang City, such as the use of applications to help with daily activities, such as the use of electronic money or electronic wallets.

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