Human Resources of Industrial Entrepreneurs in Industrial Revolution Era 4.0 (Study in Semarang Regency, Central Java Province, Indonesia)

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Abstract - The industrial revolution has occurred since the early 18th century until now, this is in accordance with the improvement of human civilization, and the implementation of its distribution to all regions. The population is increasing in number with very diverse and complex qualities. The research aims to analyze the human resources involved in the processing industry. The population of this research is industry in Semarang Regency, the total is 30,644. Research variables are the quality of human resources and the use of information technology. Data analysis uses descriptive statistics, frequency and percentage tables. The results showed that, the quality of human resources of industrial entrepreneurs was low. The education level of industrial entrepreneurs is mostly elementary school education. The education level of employers varies based on the scale of the industry. Entrepreneurs in the large medium scale industries mostly have undergraduate education, reaching 77.04 percent, while small and medium scale industry entrepreneurs with tertiary education are only 3.41 percent. Large medium scale industries that use information technology are supported by computer devices 92.35 percent and and internet, 88.78 percent. The internet is used for means of communication, finding information, marketing / advertising facilities, sales and and marketing facilities.

Keywords: human resources, education level, industrial revolution 4.0, information technology

I. INTRODUCTION

Globalization in the world begins from the previous stage, and there have been four stages (Shwab, 2018), namely the industrial revolution 1.0; industrial revolution 2.0, industrial revolution 3.0, and what is happening now is the industrial revolution 4.0. Industrialization takes place as long as humans try to improve their civilization. The first industrial revolution took place in England, in 1784, carried out in order to meet the needs of the agricultural sector which was still conventional in nature. The invention of the machine became one of the drivers of increasing human quality, in addition to new problems. The invention of machinery in this era continued and a second industrial revolution took place, in Germany, with the discovery of electricity. The third industrial revolution, in the 1970s was marked by the use of computers for industrial automation. The fourth industrial revolution occurred at the beginning of the 21st century, with the discovery of digital information technology (Shwab, 2018, Presetyo, 2018).

The fourth industrial revolution, known as the 4.0 industrial revolution, or digital revolution, is marked by advances in information technology (Shwab, 2016; Prasetyo, 2018). Industry 4.0 has six design principles, namely interoperability, virtualization, decentralization, real time, service oriented, and modular (Hermann at.all; 2015; Prasetyo, 2018). All human needs are fulfilled with internet support. Means of human interaction using digital technology. The industrial revolution 4.0 will continue to the industrial revolution 5.0 or known as the era of society 5.0, which is a society in its activities always prioritizing humans in balancing economy and technology, by resolving problems through cyberspace systems and physical spaces that are integrated, or super smart societies (Martani, 2019, Abe, 2019).

Changes occur in every event of the industrial revolution, and always have an impact on changes in human systems and behavior. During this time there has been world progressivity, starting from the agricultural era, the industrial era, the computerization era, and the era of information

technology or digitalization (Toffler, 1980), and going to the era of super smart societies (Abe, 2019).

The conditions that exist in human resources, there are still gaps between interpersonal skills and intrapersonal skills, in addition to science and technology skills (science and technology). Future industrial entrepreneurs must possess complex problem solving skills, social skills, process skills, system skills, cognitive abilities (Martani, 2019).

The worlds populations reached 7.7 billiton in med year 2019. The global population is expected to reace 8,5 billion in 2030, 9,7 billion in 2050, and 10,9 billion in 2100 (UN, 2019). Human resources are a key role in controlling processes and using industrial output. Various threats to the world of work, in the era of digital industrialization saves labor, human work is replaced by machines, so that it is estimated that during the 2015-2025 period there will be a reduction of work of 1-1.5 billion (Leonhard, 2018). Even so, the 4.0 industry era or the digitalization era is predicted to be able to provide opportunities to increase employment to 2.1 million jobs by 2025, and potentially reduce carbon emissions by 26 billion metric tons from industry (Abe, 2019).

This study aims to examine human resources in the processing industry, from the level of education and information technology used. The results of the study are expected to be used to understand the description of the condition of human resources in the industrial era 4.0. The processing industry is able to absorb labor, contribute to state revenue through taxes, foreign exchange, increase gross domestic product (Badan Pusat Statistik, 2019, Martani, 2019).

II. METHODS

The location of the study was conducted in Semarang Regency, Central Java Province, Indonesia. Semarang Regency is one of the locations of industrial development expansion in Central Java. During the last ten years, there has been a development in the number of industries.

This study uses a quantitative approach. The research population is the processing industry in Semarang Regency. This study is a population study, because all populations are analyzed. The data used are secondary data from the Central Statistics Agency, the results of the Advanced Social Economic Survey of Central Java Province in 2018. The variable used is the quality of human resources of industrial entrepreneurs. The indicators are the level of education and the use of information technology. Education can be divided into 3 levels, namely basic education: not completing primary school and completing primary school; secondary education: graduated junior high school, graduated senior high school, graduated vocational high school; Higher education: graduated diploma and bachelor degree.

Data analysis using simple descriptive, frequency and percentage table analysis.

III. RESULTS AND DISCUSSION

Semarang Regency General Overview

Semarang Regency is one of 35 regencies / cities in the province of Central Java. Geographically it is located at 1100 14 54.75 up to 1100 39 3 East Longitude and 70 3 57 up to 7 30 South Latitude. Morphologically, it has a rough, wavy stretch. The height of the place varies, starting from 144 m above sea level, up to 1086 meters above sea level. Administratively, it is located between 8 regencies / cities. To the north, bordering the Semarang City area; in the East of Grobogan and Demak Regencies; in the south bordering Boyolali Regency; and in the west bordering Temanggung, Magelang and Kendal Regencies. In the middle there is the City of Salatiga. The area has high accessibility, because it is crossed by a highway that connects the city of Semarang with the city of Surakarta and Yogyakarta.

The total area of about 95.02 hectares, with the dominant land use (63 percent) is for agriculture. Variations in types of agriculture include: paddy fields, tegal / yard, plantations / gardens, community forests, ponds, paddembala, and others. Non-agricultural land is around 37 percent of the total area, is used for yards (including housing / housing), state forests, swamps, and others (roads, rivers, cemeteries).

There are 1,027,489 people living in Semarang Regency, consisting of 49.13 percent male and 50.83 percent female, or sex ratio 97. During the last 5 years the population has changed. In 2013 the population was 974,115 people, so that for 5 years there was a growth in the population of 53,374 people. The population is spread in 19 subdistricts and 235 rural / urban areas. The largest number of residents is in Bergas District, and the least is in Bancak District. Population density is 1,081 people per square kilometer, the area with the lowest population density in Bancak District and the most densely populated in the District of West Ungaran. Bergas District is one of the regions with the most processing industry activities in Semarang Regency, while Ungaran Barat District is the center of government and economic activity, besides that it is bordered by Semarang City (the Capital of Central Java Province).

The number of people entering the workforce is 62.53 percent, comprising a 94.49 percent workforce and 5.51 percent non-workforce. The working population number is 92.81 percent of the workforce, or 75.01 percent of the workforce, so that there are still working-age population who enter the workforce but are not yet employed or open unemployed, even though the number is only 1.68 percent.

The dominant business field that is occupied by the population that works is in other fields (various types of activities) the amount reaches 37.66 percent. The number of people working in the processing industry is 21.15 percent. Even so, the contribution of gross regional domestic product at current prices, for the manufacturing industry has the highest value, reaching 39.22 percent (Badan Pusat Statistik, 2018).

Table 1. Population and Industrial Business Field by Area Scale

Aspek	Area Scale	
	Semarang Regency	Centrali Java Province
Population	1.027.489	34.257.865
Population Dencity	1.081	
Workforce	794.959	26.062.003
Industry	30.644	1.014.942
MSE	30.448	1.009.717
MLE	196	5.225

Source: Central Bureau of Statistics, and Analysis

Human Resources Processing Industry

Human resources working in the processing industry business sector is a decisive part in contributing to an area. This is shown by the large contribution of gross regional domestic product, so that the quality of human resources working in the processing industry must have excellent skills.

Quality human resources, reflected in the level of education possessed by manufacturing industry entrepreneurs. Based on the business scale, the education level of the manufacturing industry varies. The education level of the Macro and Large Establishment (MLE) businessman is different from the Micro and Small Establishment (MSE) businessman. Both of these industrial scales are all important because they both have the same contribution in different sectors.

Table 2. Education Level of Manufacturing Industry

Education Level	Scale		MSE and MLE
	MSE	MLE	
Not Completed Elementary Scool and Elementary Scool Equivalent	62,76	7,14	62,40
Junior Hight School, Senior Hight School, Vocational Hight School	33,83	15,82	33,62
Bachelor, Master and Doctoral	3,41	77,04	3,88

Source: Central Bureau of Statistics, 2018 and Analysis

The level of education of industrial entrepreneurs is still relatively low, because some of them have not completed primary school education, those who are educated (Not Completed Elementary Scool and Equivalent Scool Equivalent) amount to 62.40 percent. Whereas the manufacturing industry entrepreneurs with university education (Bachelor Degree, Master and Doctoral Degree), only 3.88 percent. The education level of small and medium scale processing industry entrepreneurs (MSEs) with Not Completed Elementary Scool and Elementary Scool Equivalent education reached 62.76 percent and only 3.41 percent had tertiary education. On the other hand, for middle and large manufacturing industry entrepreneurs (MLE), who have a Bachelor's degree, Master's and Doctoral Degree education level, only 3.88 percent. This condition must be anticipated to face the unstoppable scour of the industrial revolution. The level of education has a significant contribution to the progress of the development of the industry it leads. The higher level of education is expected to have a pregnancy in using information technology. At the stage of the industrial revolution 4.0, the skills to use technology are very important.

Use of Information Technology in Industrial Activities

The main activity of the industry is producing raw goods into finished and or semi-finished goods. Industrial output is expected to be used to meet the needs of all people, both at the local (Indonesia) and foreign (export) level, the sustainability of an industry is largely determined by the quality of human resources, so the quality of human resources needs to be improved in their abilities and skills. In the industrial era 4.0, as now, the ability to use information technology is crucial for the sustainability of the industry.

Table 3. Information Technology for Industrial Activities in Semarang Regency

Technology Facility Ownership	Industrial Scale		MSE and MLE
	MSE	MLE	
Using Computer	4,55	92,35	5,11
Not Using Computer	95,45	7,65	94,89
Using Internet	10,11	88,78	10,62
Not Using Inernet	89,89	11,22	89,38
Internet use	Communication, Seeking information, Marketing/advertisement, Sales and/or purchase, and other		

Source: Central Bureau of Statistics, and Analysis

Ownership of infrastructure and information technology used in industrial processes greatly supports the sustainability of the industry itself. Not

all of the processing industries in Semarang Regency have computer facilities in supporting the activities of the processing industry, because the industry that uses computers only amounts to 5.11 percent. However, there are already those who use the internet, the number is only 10.62 percent. The use of the internet is mainly to support activities in means of communication, finding information, marketing / advertising facilities, and others.

Reliable and sustainable processing industries must keep abreast of technological developments. Most of the existing industries are small and medium enterprises (MSEs), the number reaches 99.36 percent, while the large medium industries, the number is only 0.64 percent, but is able to absorb 64.07 percent of the number of industrial workers. The results of this study are somewhat different from studies conducted in Hungary (Nagy, at.all, 2018) that several companies have implemented Cyber Physical Systems (SFC) and Big Data Technology, so they have a higher level of logistical services. , more efficient processes and increased partner collaboration.

IV. CONCLUSION

The quality of human resources who become entrepreneurs in the manufacturing industry is low. The education level of industrial entrepreneurs differs based on the scale of the industry. The education level of medium and large scale industrial entrepreneurs is high and the level of education of small and medium scale industrial entrepreneurs is low. Ownership of information technology facilities that are used to support industrial activities, such as computers and the internet is still limited. Almost all large and medium scale industries use information technology, while small and medium scale industries use a small portion of information technology. Industries that have internet, are used for means of communication, finding information, marketing / advertising facilities, means of selling and / or purchasing, and others. Small and medium scale industries are numerous but have not been managed with the infrastructure of digital information technology as characterized by the industrial revolution 4.0.

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