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The Principal's Strategy In Preparing Students Ready For The Industrial Revolution 4.0

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Abstract: In this qualitative paper, we investigated in-depth about the strategy of the principal in preparing the students ready for the industrial revolution 4.0. The objects of research were State Vocational School 2 Palembang, State Vocational School 6 Palembang, Vocational School 2 Muara Enim, State Vocational School 1 Gelumbang, and Vocational School YTK Kimia Palembang. The data were carried out by interview, observation, and documentation. We found that some strategies used by 5 (five) Vocational Schools in South Sumatra in aligning education with the demands of the Industrial Revolution 4.0 era were improving the quality of facilities and infrastructure based on industrial needs (link and match). They upgraded teachers' competence appropriate with the era of industrial revolution 4.0 and then created competent and ready graduates in harmony with the program Making Indonesia 4.0 launched by the Ministry of Industry.

Keywords: Principal's Strategy, Industrial Revolution 4.0, Vocational School Students, Industrial Needs, Link and Match

1. Introduction

At the launching of the "Making Indonesia 4.0" program that the phenomenon of industrial revolution 4.0 provided an opportunity to revitalize the Indonesian manufacturing sector and become a way to accelerate the realization of Indonesia's vision to become the 10 largest economies in the world (Hartanto, 2018). Until 2016, the manufacturing industry contributed 20% of Indonesia's Gross Domestic Product (GDP) and opened more than 14 million jobs. Through our strong consumer spending, by contributing up to 50% of GDP, the Indonesian economy has grown sixfold in 17 years vulnerable and reached more than the US \$ 1 trillion in 2017, and has succeeded in changing from a natural resource-based economy (SDA) becomes a more value-added sector-based economy (Ministry of Industry, 2018).

The enactment of the ASEAN Economic Community (MEA) starting at the end of 2015 led to an improvement in the needs of skilled

workers as well as reducing the need for unskilled workers. The MEA is expected to be a driver for skill-intensive economies because many ASEAN members have begun to move towards production and exports whose work and technology require high skills and productivity. From 2010 to 2025, it is estimated that there will be an increase in demand for skilled workers in the ASEAN region, which is around 41% or around 14 million people.

Rosyadi (2018) mentions that the development of science and technology which is rapidly increasing in the early 20th century has created information technology and production processes that are automatically controlled. Industrial machines are no longer controlled by human hands but use Programmable Logic Controllers (PLCs) and computer-based automated systems. The impact is that production costs are becoming cheaper, and information technology is also advancing.

Information technology in the 21st century has connected millions of people throughout the world and is the basis for massive online trade and transportation transactions, namely internet technology. The presence of the online transportation business shows that the integration of human activities with information technology is very fast, even to buy food already using internet services. This is the industrial revolution 4.0 that promotes automation systems in all processes of human activity (Rosyadi, 2018). Smart factories, virtual copies of the physical world and decentralized decision making that can be developed (Buhr, 2015). The industrial revolution 4.0 is defined as an industrial era where all entities within it can communicate with each other in real-time at any time based on the use of the internet and CPS technology to achieve the goal of creating new values or other existing optimizations from every process in the industry (Prasetyo and Sutopo, 2018). Merkel (2014) argues that industrial revolution 4.0 is a comprehensive transformation of all aspects of production in the industrial world through connecting/combining digital and internet technology with conventional industries that are more comprehensive and faster. Schlehtendahl et al (2015) emphasized the definition of RI 4.0 into the element of the speed of information availability, the namely industrial environment in which all entities are always connected quickly and can share information.

Liao et al (2018) mentioned that industrial revolution 4.0 stimulates the advances of science and technology, which is the Internet of Things (IoT) and its supporting technologies as the backbone for Cyber-Physical Systems (CPS), smart machines are used as the promoters to optimize production chains. Furthermore, (Liao et al, 2018) added that such advances transcend organizational and territorial boundaries, which consist of agility, intelligence, and networking.

President Joko Widodo (CNBN Indonesia, 2018) asserted that Indonesia must quickly adapt, not to be left behind from other countries that are in a race, fighting speed, to fix their respective countries in the digital era with changes in civilization. Facing and responding to changes in human civilization, President Joko Widodo thinks that it cannot be done with pessimism and excessive worry. Must be optimistic and confident of strong social capital and national energy to jump forward. That is proof that Indonesia does not need to worry and worry about the 4.0 Industrial Revolution, no need to worry about the future. We should take advantage of existing developments to bring Indonesia forward. Indonesia must be nimble and quick to take advantage of the opportunities that are in sight because the current formula is no longer a big one that defeats the small, but which quickly beats the slow.

According to Lee et al (2013) the changes in the industrial revolution 4.0 were marked by an increase in digitalization of manufacturing driven by four factors, namely 1) increased data volume, computational power, and connectivity; 2) the emergence of analysis of business capabilities and intelligence; 3) new interactions between humans and machines, and 4) improvement of digital transfer instructions to the physical world, such as robotics and 3D printing.

Schawab (2017) explains that industrial revolution 4.0 has fundamentally changed human life and work. Unlike the previous industrial revolution, this industrial revolution 4.0 has a scale or scope of complexity and wider. The advancement of new technology has integrated all aspects, namely the physical, digital and biological world has influenced various scientific disciplines, economics, industry, and government. Fields that experienced breakthroughs thanks to new technological advancements include (1) artificial intelligence robots; (2) Nanotechnology; (3) biotechnology; (4) quantum computer technology; (5) blockchain

(like bitcoin); (6) internet-based technology, and (7) 3D printers.

Along with the very significant changes, the Minister of Research, Technology and Higher Education (Mohammad Nasir) on the official website of Ristekdikti 2018 said that the challenge of the industrial revolution 4.0 must be responded quickly and accurately by all stakeholders to increase the competitiveness of the Indonesian nation amid competition. The Minister of Education and Culture (Muhajir Efendy) also conveyed the same thing that the capital needed to enter the 21st century and control the industrial revolution 4.0. is 1) students have critical thinking skills; 2) students have the creativity and have innovative abilities; 3) students have the ability and communication skills; 4) students can cooperate and collaborate, and 5) students have self-confidence (Republika, 2018).

Changes in the era of disruption according to Kasali (2017) are essentially not only changes in methods or strategies but also in the aspects of business fundamentals. The domain of the era of disruption extends from the cost structure, culture to industrial ideology. The implication is that business management is no longer centered on individual ownership, but becomes a division of roles or collaboration or cooperation. In the world of higher education, this disruption phenomenon can be seen from the development of collaborative research among researchers from various disciplines and universities. Research is no longer oriented to problem-solving but is encouraged to find potential problems and potential economic values that can help people anticipate various socio-economic and political problems in the future.

Vocational School is secondary education that focuses on preparing students to be ready to work in certain fields. Vocational education has the general goal of increasing the faith and piety of students to the Almighty God and developing the potential of students to have noble character,

noble knowledge, and insight into nationalism; and has a specific goal, namely to prepare students with knowledge, competence, technology, and art to become productive human beings, as well as work independently, fill job vacancies in the business world and industry as middle-level workforce by competencies (Hadam et al., 2017).

According to Law Number 20 of 2003, the purpose of vocational secondary education is divided into two, namely general objectives and special objectives. The general objectives of vocational secondary education that have been formulated by the government are (a) increasing the faith and piety of students or students to the Almighty God; (b) developing the potential of students to become the nation's successors who are noble, healthy, knowledgeable, capable, creative, independent, democratic and responsible; (c) develop the potential of students to have national insight, understand and be able to appreciate the diversity of Indonesian national culture; and (d) develop the potential of students to have concern for the environment by actively participating in maintaining and preserving the environment, as well as utilizing natural resources effectively and efficiently.

Today, it is time to revitalize Vocational Schools by collaborating between industry, university practitioners, and schools to organize the curriculum, teachers, facilities, absorption, and management to become a superior institution is facing change. Technology must make Vocational School capable of preparing everything in the face of this transition. Schools are currently required to improve quality, to be able to face an increasingly competitive climate, and the participation of people who expect low costs but with high demands.

The phenomenon described above finally issued Presidential Instruction No. 9 of 2016 concerning Revitalization of Vocational Schools. Revitalization of Education is a more careful, more persistent and more responsible

effort to realize the goal of national education development by the mandate of Law Number 20 of 2003 concerning the National Education system. Revitalization in the context of education is intended to maximize all elements of education (Central Government, Local Government, BUMN, BUMD, and Private Companies) that are related to care in real terms in the process of vocational education. Noble moral aspects, morals, and character need to be included in the development of policies, programs and indicators of educational success through Revitalization of Vocational Schools.

Following up on Presidential Instruction No. 9 of 2016, the Minister of Education and Culture explicitly instructed to perfect and harmonize the Vocational curriculum by the competencies of graduate users (link and match). "Link" and "match" implies that graduates have competitive insight or attitudes, such as work ethics, motivation achievement (achievement motivation), mastery (mastery), competitiveness, understanding of the meaning of money (money beliefs), and attitudes to saving. "Link" and "match" require a change in the mindset of all education executives both educational institutions and teaching staff must be pro-active in developing "link" and "match" with the world of work.

In the realization of revitalization as outlined in the ten steps of revitalization of Vocational Schools, a revitalization model can be formulated as a support for the implementation of ten steps to revitalize SMK. The reorientation of vocational revitalization is very important in several aspects, with the aim that vocational secondary schools can provide skilled workers who are ready to work in various economic sectors such as agriculture, industry, tourism, and even the creative economy. It is expected that the success of the revitalization of SMK can also increase the productivity of Indonesian workers and can reduce the problem of productive age unemployment. The ten steps of revitalization are 1) revitalization of human

resources; 2) build SIM-based SAS; 3) Link and match with industry; 4) industry based curriculum; 5) teaching factory; 6) the use of video tutorial and portfolio media based on e-Report Skill videos; 7) professional certification test; 8) fulfillment of facilities and infrastructure; 9) develop local wisdom, and 10) the role of SMK as a driver of the local economy. In this study there are three strategies that researchers will use in looking at the strategy of the head of the Vocational School in South Sumatra Province in preparing vocational students who are ready to face the industrial revolution 4.0, these three strategies include a) human resources; b) link and match with industry; and c) fulfillment of facilities and infrastructure.

Ready for the challenges of the 4.0 industrial revolution, SMK must continue to develop dynamically and be able to organize competency-based education. Therefore, a high commitment is needed so that Vocational Schools can produce graduates who are competent in the fields of data literacy, technology literacy and human literacy as productive and professional workforce recognized nationally and internationally. Answering the challenge of industry 4.0, Bukit (2014) explains that vocational education as an educational institution that is different from other types of education, vocational education must have characteristics 1) oriented to individual performance in the world of work; 2) special justification on real needs in the field; 3) curriculum focus on psychomotor, affective, and cognitive aspects; 4) the benchmark for success is not limited to school; 5) sensitivity to the development of the world of work; 6) need adequate facilities and infrastructure; and 7) community support.

The implementation of the industrial revolution 4.0 requires new skills so that the preparation of Human Resources with competencies by the development of technology is a necessity that cannot be negotiable. Therefore the Ministry of Industry is also servicing with Presidential Instruction

No. 9 of 2016 by issuing Minister of Industry Regulation Number: 03/M-IND/PER/1/2017 concerning Guidelines for Guidance and Development of Industrial-Based Vocational Middle Schools that Link and Match with Industry.

With this regulation, the Minister of Industry is committed to supporting the competency-based learning practice. The vocational curriculum is based on competency-based on SKKNI in Industry, national standards, productive teacher internships, student internships, guest teachers or instructors from the industrial world, Vocational Competency Exams. It is expected that vocational students can accelerate the steps to harmonize school programs with government policies. In 2018, the Minister of Industry launched the Making Indonesia 4.0 program which focused on Indonesia's targets in the industrial revolution era 4.0 through five sectors, namely food and beverage, automotive, textile, electronic and chemical.



Figure 1. Food and Beverage (Ministry of Industry, 2018)

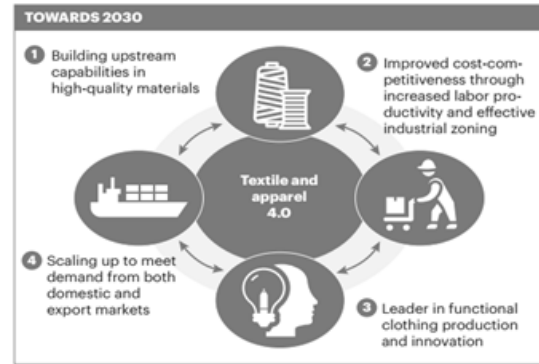


Figure 2. Textile and Apparel (Ministry of Industry, 2018)

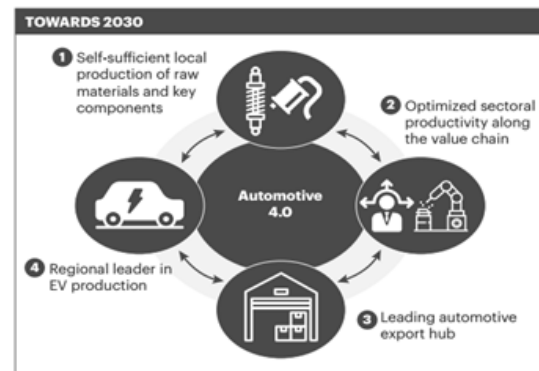


Figure 3. Automotive (Ministry of Industry, 2018)

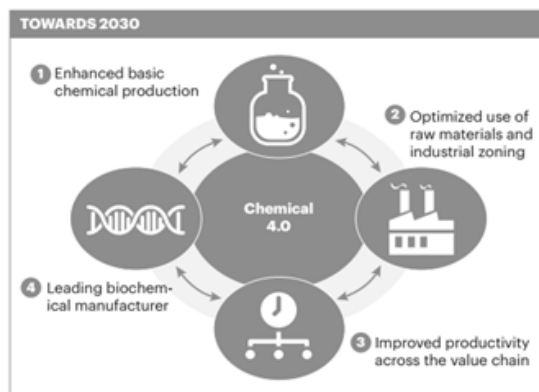


Figure 4. Chemical (Ministry of Industry, 2018)

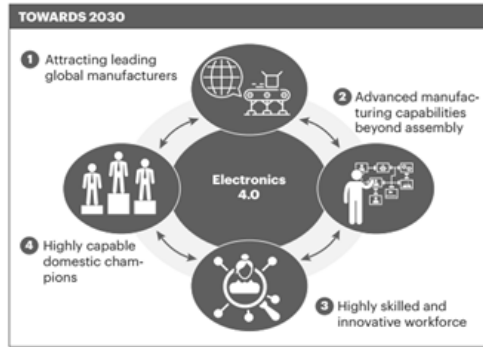


Figure 5. Electronics 4.0 (Ministry of Industry, 2018)

Many vocational school graduates who should be able to work immediately end up being threatened with unemployment. Vocational students must be able to adapt to all changes. Do not let graduates produced by Vocational Schools not be needed by the world of work and industry. Vocational Schools as a formal education institution is expected to be able to sustain the acceleration of national development that is sensitive to its potential. Vocational and curriculum adjustments are necessary so that education is relevant in vocational schools and the field of work. Therefore there must be a guide and a driver so that Vocational Schools can map challenges and future needs.

Brown et al (2007) added that vocational training and skills acquisition greatly influenced the development of a person's identity related to work. Furthermore, (Lomovtseva, 2014), (Edmond and Oluyi, 2014) explains that vocational education is a place to forge one's maturity and skills so that it cannot only be charged to a group but is a shared responsibility. Vocational education and vocational training have the same goal, namely the development of knowledge, abilities, skills and the formation of one's competence.

Furthermore, Kennedy (2011) states that vocational education is also directed at increasing the independence of individuals to entrepreneurship by their competencies. That

the preparation of several competencies must be carried out through vocational education as a secondary education institution that prepares students to work in certain fields (Sudira, 2012). The similarity of opinion was also conveyed by (Usman, 2016) and (Yahya, 2015) Vocational Schools must prepare graduates who are able and willing to work following their fields of expertise.

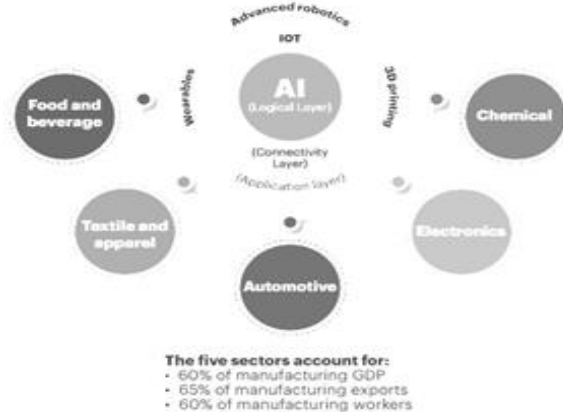


Figure 6. Sectors Focus on "Making Indonesia 4.0" (Ministry of Industry of the Republic of Indonesia, 2018)

On September 6, 2018, which took place at the Ministry of Industry building, Airlangga Hartanto (Minister of Industry) launched the "Making Indonesia 4.0" program. The program implements the strategy and road map of the Fourth Industrial Revolution (4IR) in Indonesia involving various stakeholders, namely government institutions, industry associations, business actors, technology providers, research and education institutions (Ministry of Industry, 2018). (Hartanto, 2018) also revealed that in the "Making Indonesia 4.0" program which became the focal point of development there were five manufacturing sectors with regional competitiveness. The five main sectors for the initial application of the technology of the revolutionary revolution are namely (1) food and beverages; (2) textiles and clothing; (3) automotive; (4) chemistry; and (5) electronics.

The "Making Indonesia 4.0" program is very synergistic with the Minister of Industry Regulation Number 3 of 2017 concerning the Guidelines and Development of Link and Match Competency-Based Vocational Middle Schools with the industrial world. These regulations serve as guidelines for Vocational Schools in organizing vocational education that links and matches industry.

In line with the programs and policies announced by the central government. The South Sumatra Province through the Education Office also welcomed the challenges and programs by mapping secondary schools, especially Vocational Schools, which had the potential and learning process that had answered the challenges of industrial revolution 4.0.

2. Research Method

This study investigated in-depth about the strategy of the principal in preparing the students who are ready to face the industrial revolution 4.0. According to Creswell (2012) research is a process of steps used to collect and analyze information to improve our understanding of a topic or problem. The study was conducted using a qualitative approach that aims to obtain a full picture of a matter according to the human perspective studied.

Creswell (2012) mentions that in qualitative research the purpose of the statement is the single phenomenon of interest and state this phenomenon in purpose statement. (Moelong, 2011) says that "a qualitative approach is an activity in social science that is based on the results of human observations in the region itself that relate to those who exist in their language and terms". Furthermore, (Sugiyono, 2010) suggests that qualitative research is carried out when 1) research problems are not yet clear; 2) understand the meaning behind the visible data; 3) the existence of social interaction; 4) must know the feelings studied; 5) function to develop theory; 6)

data correctness, and 7) examine the history of development.

The objects of research examined were State Vocational School 2 Palembang, State Vocational School 6 Palembang, Vocational School 2 Muara Enim, State Vocational School 1 Gelumbang, and Vocational School YTK Kimia Palembang. Data collection techniques were conducted through interviews, observation, and documentation. The data analysis technique used by researchers is (Miles and Huberman, 2014). This is done by researchers in triangulation including observation data, interviews and document studies that are related to one another.

3. Results and Discussion

As stated in the objective analysis technique in this study to describe the strategy of 5 Principals in dispensing vocational graduates who are ready for the 4.0 industrial revolution. To analyze the data, some steps need to be done, namely, classification, filtering and then concluding the data received. Therefore, the author analyzes the five Vocational Schools according to the method used, namely qualitative descriptive analysis.

The strategy for food and beverage 4.0 includes the first to encourage productivity in the upstream sector, namely agriculture, livestock, and fisheries, through the application and investment of advanced technologies such as automatic monitoring systems and autopilot drones. Salaries with the Making Indonesia 4.0 Ministry of Industry program for the food and beverage sector that builds the food and beverage industry three SMKs have expertise competencies that are engaged in the food, beverage and agriculture sectors, namely 1) State Vocational School 1 Gelumbang; 2) State Vocational School 2 Muara Enim, and 3) State Vocational School 6 Palembang.

Mukhadis et al (2017) classify that South Sumatra has 4 regional potentials including mining, plantations, industry, agriculture, and mining. After synchronizing,

there are 3 priority potentials for South Sumatra province, namely agriculture, services, and industry. The findings of Rachmad et al (2016) state that food and beverage companies are one of the business sectors that continue to experience growth. Along with the increasing growth of the population in Indonesia, the volume of needs for food and beverages continues to increase as well. The tendency of Indonesian people to enjoy ready-to-eat food has caused many new companies to emerge in the food and beverage sector because they consider the food and beverage industry sector to have favorable prospects both now and in the future.

This is emphasized by Hadam et al (2017) mentioning another reason why the agricultural sector is a gambling estuary for VOC output because most schools in rural areas 90% of student guardians are farmers. Ground students at the root of the economic tradition in which they were born and raised. Seeing this situation, Vocational Schools can explore and preserve various elements of local wisdom that function effectively in character education so that they can conduct studies with new wisdom. State Vocational High School 1 Gelumbang is a Vocational High School that has a Plant Production Agribusiness Expertise Program, Animal Production Agribusiness, and Agricultural Product Agribusiness. As an SMK aimed at supporting government policies towards national food security by creating competent output in the fields of agriculture, management of agricultural products, and livestock. The Principal optimizes all aspects that support the Ministry of Education and Culture of the Republic of Indonesia program that links and matches the Industrial World as programmed by the Ministry of Industry of the Republic of Indonesia.

For Palembang State Vocational High School 6 and Muara Enim 2 which has a department of Catering also has a superior production unit that is engaged in catering, both main dishes, and pastries or bread,

which are often also sold in the school environment. Especially during the days of celebrations such as Eid, New Year, weddings, orders for pastries or other food are quite a lot, either from the school environment or from the general public. Of course, this must be a great opportunity for the school to make students who can compete in the Tata Boga compete with the food and beverage market.

The findings of Zuwita et al (2013) regarding the benefits of learning the patisserie business as bakery business readiness. This research is motivated by the narrowing of employment opportunities so that the Culinary Education Students are expected to be able to anticipate by creating new jobs by opening a bakery business. The purpose of this study is to obtain an overview of the benefits of the learning outcomes of the Patisserie Business as the readiness of the bakery business related to the making of planning, implementing and evaluating the business of the patisserie. Setyorini et al, (2013) and Apriana et al (2019) added to the results of researching the learning outcomes of Catering Business Management (PUJB) which are expected to provide benefits to the readiness of vocational students to become entrepreneurs. The research objective is to obtain an overview of the benefits of PUJB learning outcomes related to aspects of planning, implementation aspects, and evaluation aspects of food stall entrepreneurial readiness. The results of the study can be concluded that students can understand PUJB subjects that are useful in food stall entrepreneurial readiness.

To make students with graduates who are ready to face the industrial revolution 4.0, Principals continue to develop the existing teaching factory in Vocational Schools (Apriana et al, 2019). Teaching Factory (TEFA) is a business and production-oriented learning. A process of expertise or life skill is designed and carried out based on actual procedures and working standards to produce products that are following the market or

consumer demands (Sarina et al, 2019). The purpose of TEFA is as a training forum and direct production-based practices for market-oriented SMK students. Tobari et al (2018) convey to compete in the ASEAN market, Indonesia as one of the ASEAN countries is a challenge to improve the quality of human resources. Improving the quality of Indonesian human resources to build products to compete with ASEAN countries. One of the most important efforts in improving the quality of human resources is through the education sector (Irmayani et al, 2018; Lian et al, 2018).

Vocational schools that have agriculture and plantations that after graduating from the Vocational School they can immediately work and practice their knowledge to improve and develop modern agricultural businesses and can minimize the number of professions and agricultural businesses left behind. In the era of the industrial revolution, HR graduates were required to master the modern technology transfer system in agricultural management. Vocational students are equipped with knowledge and experience in using advanced technology equipment. The agricultural sector is a major factor in making the Indonesian nation more advanced and prosperous. The role of the government is very necessary to provide support to vocational education especially in agriculture and plantations to advance the agricultural sector in the era of industrial revolution 4.0. one of them is State Vocational School 1 Gelumbang to be a big supporter with competent graduates in agricultural midwives, especially for the South Sumatra Province.

The textile industry in Indonesia for 10 (ten) years is known as the sunset industry, and even banks as intermediary institutions reduce their work in channeling funds into the textile industry. This further aggravated the textile financial condition of the company at that time, even now its influence is still felt, where the company is difficult to get the trust of the stakeholders concerned. The occurrence of this condition made it difficult

for the company to develop current ownership assets, which at present the condition of working capital is still relatively difficult to obtain, which greatly disrupts the stability of the existing capital structure.

In the textile and clothing sector in this study, there is State Vocational School 6 Palembang which is engaged in the field of dress competency. This department is often sought after by female students. Market demand in the digital era has been faster and more diverse, as we already know sales of clothing and other needs are all easily accessible and fast to have. This is all because of technological developments in the era of industrial revolution 4.0. Based on textile characteristic chain values, the more downstream the textile industry (Garment and other textile products), the more labor and working capital turnover is required. On the upstream side, the process requires substantial capital investment, greater energy consumption, and more advanced technology. Apparel manufacturing industry (garment) involves the process of cutting, sewing, washing and finishing the ready-made garment (Jubaedah et al., 2016).

According to Hidayah (2014), creative action is imposing one's whole personality on the environment in a unique character way. Creative actions or expressions arise from the uniqueness of individuals in their interactions with their environment. Creative expressions are those that reflect the originality of the individual (Fitria et al, 2019; Kristiawan et al, 2019).

From this unique personal expression, new ideas and innovative products arise. Changes in learning outcomes include three aspects, namely cognitive aspects including changes in the development of skills needed to use that knowledge and aspects of mastery of knowledge. Second, effective aspects include changes in terms of mental attitudes, feelings and awareness. Third, psychomotor aspects include changes in terms of forms of motor action.

There is a textile and clothing strategy that is the focus of the Ministry of Industry and Trade which is the industrial revolution 4.0, among others (1) increasing capacity in the upstream sector, focusing on the production of high-quality chemical fiber and clothing materials to increase competitiveness in the global market; (2) building functional clothing production capabilities; (3) increasing manufacturing and labor productivity through the application of technology, optimizing factory location and improving skills. Along with the shift in demand from basic clothing to functional clothing and economic growth; and (4) increasing economies of scale to fulfill functional clothing demand that continues to grow, both in the domestic and export markets. Khurniawan et al (2016) explained that the Clothing Program could make students independent in their efforts, because they do not require a large capital. Besides being a practitioner in the field of convection, this department can produce professional designers and models. This program equips students with skills, knowledge, and attitudes to be competent in making fashion patterns according to construction techniques, making children's clothing, adolescents and adults, drawing fashion designs, making decorations on clothing, and cutting out fashion materials.

Satria and Wakid (2016) put forward the results of his research Implementation of the 2013 curriculum prioritizing the scientific approach that focuses on practice requires complete infrastructure including practical equipment. The completeness of learning media and infrastructure becomes important when associated with the effectiveness and efficiency of learning. The basis of vocational schools that form skilled workers certainly requires a lot of practice rather than theory. Meanwhile, several sub-competencies in Vocational Schools, especially the Light Vehicle Engineering expertise program require quite a lot of learning media and infrastructure. One of them is in chassis maintenance subjects and the transfer of light vehicle power. There are 3 new basic

competencies in the chassis syllabus and the transfer of light vehicle power in the implementation of the 2013 curriculum, which previously did not yet exist in the syllabus of the KTSP curriculum, namely (1) Understanding and maintaining an automatic transmission system, (2) Understanding and maintaining the system ABS, (3) Understanding and maintaining the electric power steering (EPS) system. These results are following what is explained by (Siswanto, 2011) that one of the objectives of the teaching factory program is to improve the competence of vocational school graduates. Besides, when there are new findings in the factory teaching regarding problems and new technology in the vehicle, the teacher will also get the information. Information obtained by the teacher about new technological developments and problems in the improvement activities can be used as references and new knowledge that can be taught in the learning process in the classroom.

The chemical industry sector is the basis of the manufacturing industry because its products are widely used by other manufacturing sectors, such as electronics, pharmaceuticals and automotive. Strengthening the chemical industry sector is very important to be able to build manufacturing industries that can compete globally. Indonesia is currently at the stage of importing basic chemicals but wants to expand its capacity and build its ability to become a net exporter and producer of specialist chemicals. Indonesia will use its abundant agricultural resources as one of the capital to build a competitive advantage in the production of biochemical products. The chemical industry strategy 4.0 includes (1) encouraging the development of domestic petrochemical supply capacity to reduce import dependence (2) building a competitive cost chemical industry by utilizing oil and gas resources and optimizing the location of industrial zones, including the construction of chemical production sites closer to extraction

locations natural gas, besides adopting RI 4.0 technology to develop and accelerate research activities; (3) developing the next generation of chemical production capabilities in the production of biofuels and bioplastics; and (4) encourage productivity.

The quality of teachers has always been the top priority of Vocational Schools in the Province of South Sumatra. Therefore, the Education Office always supports teacher competency improvement programs by providing opportunities for teachers, to take part in technical guidance activities, whether held by the Center or the Province. This opportunity is always there every year for all teachers of Palembang State Vocational School 2. The teacher is also motivated to be active in the Subject Teachers' Consultation (MGMP). According to Prayogi et al (2018) Internet of Things or IoT is an architecture consisting of hardware components, software systems, Web APIs, protocols that jointly carry out certain tasks with an internet connection, for example, sensor data can be accessed and the control system can be moved through the internet order to promote or introduce the school profile to industrial world, one of the school's strategies is to invite business people or industry to school. This moment is used to present the school, including what departments are in the school along with their respective potentials, what benefits can be created through the collaboration between the school and industrial world, as well as what forms of cooperation can be utilized. Do not stop there, the school team must prepare a follow-up, namely by visiting the industrial world to strengthen relations and strengthen the implementation of the MoU of cooperation. The MoU period between the school and the industrial world is usually valid for 2 years, and will subsequently be synchronized again.

Fulfillment of practical facilities and infrastructure following the Competency Test is expected to be able to produce vocational graduates who are competent and ready to enter the workforce. In addition to paying

attention to the completeness criteria of facilities and infrastructure that must be in the practice room of each department, space management, and practical tools are also needed. Japan has implemented space management and practical tools known as 5S (*Seiri, Seiton, Seiso, Seiketsu, Shitsuke*) or in Indonesian 5R (*Ringkas/Concise, Rapi/Neat, Resik/clean, Rawat/protect, Rajin/Diligent*). This 5R management will have a direct effect on productivity in printing vocational graduates because every job must be carried out and completed on time according to schedule, so it does not cause a waste of money. If it is not on time, the completion of the work will be hampered and cause losses. Concerning process factors, in creating an atmosphere of learning the teacher becomes the main factor. Teacher competence is required in carrying out their duties professionally. The study of teacher education in the late 20th century and the beginning of the 21st century shows a phenomenon that increasingly places teachers as a profession. In countries that have advanced, the position of teacher is recognized as truly a profession that has the same rights and conditions as other professions, so that people do not hesitate or think for a long time to choose the position of teacher. Real conditions now see that the teacher as a profession is no longer considered an ordinary (vocational) job that requires a certain education.

According to Salim (2017) vocational school teachers are teachers who teach at vocational schools that have pedagogical competence, personality, vocational teachers in productive programs have specific characteristics and professional requirements 1) have adequate practical expertise in all productive fields of study; 2) able to organize learning (training) that is relevant to the competencies needed by the world of work; 3) able to design learning (education and training) in schools and the business world or industry. In addition to the special requirements as mentioned above, that must be possessed by vocational school teachers,

the existence of vocational school teachers is currently faced with problems namely the diversity of vocational expertise programs.

The Indonesian electronics industry is still dependent and developing on component imports and local production from global players. Local production is still concentrated in a simple assembly and has not been much involved in value-added processes. Electronic strategy 4.0 is (1) attracting leading global players with attractive incentive packages and (2) developing capabilities in producing value-added electronic components; (3) developing superior domestic industry players who are competent to encourage continued innovation and accelerate technology transfer; and (4) Developing the capacity of domestic workers through intensive training and attracting foreign workers in certain fields needed.

Quality education is not only seen from the quality of graduates, but also how schools can meet internal needs (educational staff) following applicable quality standards so that external satisfaction such as students, parents, and the community can generally be felt. Researchers see 5 (five) vocational principals having their strategies in school management, ranging from student admissions to promotions outside of school or in schools, involving all school members, foundations, supporting institutions, and parents.

School promotion, of course, people are more selective in choosing what they need. The school seeks to fulfill the wishes of the community by introducing its programs in promotion. Then in managing the fulfillment of the program, the school involves all school members, starting from the Principal, teachers and education staff, students and the community such as educational institutions, District Education Offices and cities, parents and the community. Schools are well aware that they are institutions that serve the community in the education sector. so that the products produced are not in the form of goods but individuals who have behaviors and actions influenced by science

and skills based on faith and piety that are needed for graduates to move towards the wider community environment.

We also saw that the Principal as a leader had an important role to play in improving the quality of education. The Principal functions the administration well. Evidenced by the existence of a neat administration of correspondence in the general administration, finance, libraries that run well and systematic curriculum management. This activity is carried out by collaborating as a professional, creative and innovative work team. The results of the study are relevant to the findings of (Rosyadi and Pardjono, 2015) that the Principal has a big contribution in the success of the school program, where the task of a Principal to implement a strategy to improve quality is done by planning programs, creating organizational structures, giving good examples, giving opportunities to take part in training especially for senior teachers to maintain professionalism, motivate and supervise output, starting from the admission of new students to the completion of education.

Small-scale Vocational Schools can collaborate with the five Vocational Schools that have been described by researchers as one of the Vocational Schools that can be invited to share about school management, learning models, learning materials, collaboration with the Business/Industrial World, student practice sites, industrial classes, recruitment of employees by companies, workshop facilities, workshop laboratories, especially those with advanced technology, website links, human resource development, replicas of learning models, marketing outlets and product realization in the Teaching Factory, vocational competency test places, and promotion of student acceptance and graduate placement.

The five Vocational Schools have competent competencies in their respective fields. Some of them have become Referral Vocational Schools, so they not only educate

their students but also have to become an alliance for other schools. Alliance schools may utilize existing resources in Referral Vocational Schools such as State Vocational School 2 Palembang, State Vocational School 1 Gelumbang, and State Vocational School 6 Palembang as a Vocational School that is engaged in Tourism with facilities and practice tools that are already standardized in the Industrial World, Muara Enim Vocational School 2 as a competent Technology and Engineering Vocational School in Muara Enim Regency which is a place for examining prospective workers in the fields needed by Business/Industrial World, and YTK Chemical Vocational School which focuses on vocational education in the field of Chemical Engineering that has a well-known Business/Industrial World standard in South Sumatra Province.

4. Conclusion

Based on the results of research and discussion, it can be seen that the Principal's Strategy in preparing vocational graduates who are ready to compete and be ready to face the industrial revolution 4.0 Total Quality Management that takes place following work programs both short and long term. Some strategies used by 5 (five) Vocational Schools in South Sumatra Province in aligning education with the demands of the Industrial Revolution 4.0 era as follows. The five Vocational School Principals studied have different strategies, but in improving the quality of facilities and infrastructure 5 (five) Principals are based on Industrial Needs (Link and Match), and Teacher Competence is focused on the era of industrial revolution 4.0 and in harmony with the program Making Indonesia 4.0 launched by the Ministry of Industry has been prepared and harmonized to create competent and ready graduates.

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