

## Vocational School Curriculum Development Design In The Era Of The 4.0 Industry Revolution

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**Abstract:** This study uses a qualitative research type method, namely the Literature Study. Data collection is sourced from several theories obtained from secondary data, namely journal articles, the internet, and books. The results of the literature study show that in the design of vocational curriculum development in the Industrial Revolution Era 4.0, it is necessary to form a monitoring and evaluation team, be literate in technology, use learning designs, and improve 21st-century skills such as critical thinking and problem-solving; communication and collaboration; creativity and innovation; and engagement with industry partners.

**Keyword:** Curriculum, Development Design, Industrial, Revolution Era 4.0

### INTRODUCTION

Indonesia is currently in the era of the Industrial Revolution 4.0 (RI4). Some of the fields that have changed RI4 are the social, political, and economic fields. Research conducted by the World Economic Forum and the Global Agenda Council Forum in Schwab Klaus<sup>1</sup>, concludes that the advances made by new technologies that integrate the physical, digital and biological worlds have influenced all disciplines, economics, industry, and government.

RI4 made the times change, from initially using human power to using machine power to do various things like today. Many jobs will be lost, while economic needs will continue to increase. One of the educational institutions contributing to facing this global competition is a Vocational High School (SMK).

The databox information in Jayani<sup>2</sup> sourced from BPS in May 2019 describes the Open Unemployment Rate (TPT) that occurs at several levels of education such as SD, SMP, SMA, SMK, Diploma I / II / II, and University). SMK graduates recorded the highest unemployment rate in 2019.

<sup>1</sup> Klaus Schwab, *The Fourth Industrial Revolution* (Currency, 2017).

<sup>2</sup> "Lulusan SMK Mendominasi Tingkat Pengangguran Terbuka | Databoks," accessed December 1, 2020, <https://databoks.katadata.co.id/datapublish/2019/05/07/lulusan-smk-mendominasi-tingkat-pengangguran-terbuka>.

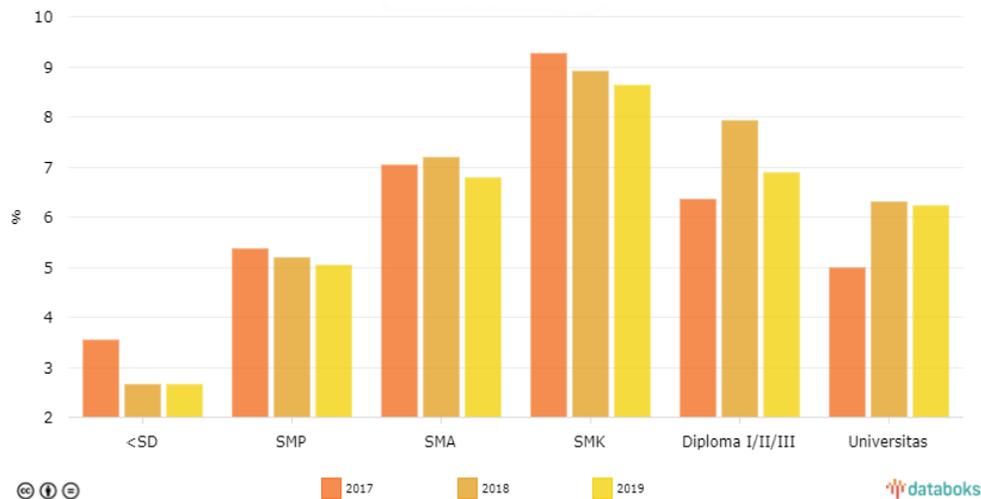


Fig.1 TPT by Education Level from lowest to highest graduate (February 2017-February 2019)

When viewed based on education level, SMK graduates informed that the highest TPT was 8.63% in February 2019. This shows that there is a workforce that is not absorbed. The data states that the unemployment rate for SMK graduates in February 2017 was 9.27%, in February 2018 it was 8.92%, and in February 2019 it was 8.63%. Although the TPT for SMK graduates decreases every year, the TPT is still the highest among education levels at SMK graduates.

The above statement is supported by Rusdianto<sup>3</sup> which states that the number of unemployed is increasing. The government already has a focus on addressing RI4. The government is still facing obstacles and it needs to work hard in realizing the road map to make Indonesia 4.0. Among these obstacles are uneven infrastructure, lack of understanding of the leaders of distraction to create new jobs using a disruption strategy.

One of the SMK roadmaps is perfecting and aligning the SMK curriculum with competencies according to the needs of graduate users (link and match) which is reflected in the implementation of the 2013 curriculum (K13).

One of the most important fields to respond to RI4's needs is education. In this case, the curriculum is one part of educational development that determines the quality of Human Resources (HR) who have the knowledge, attitudes, and skills to participate in the opportunities, challenges, and needs of the Industrial Revolution. The curriculum will direct the content and teaching methods to achieve these goals.

21st-century learning is defined as learning that provides skills to students, commonly referred to as 4C, which includes: (1) Communication (2) Collaboration, (3) Critical Thinking and problem solving, and (4) Creative and Innovative. It aims to improve the quality of education to answer challenges, both internal challenges to achieve the 8 (eight) National Education System (SNP) and external challenges, namely globalization.

<sup>3</sup> Eko Risdianto, "Analisis Pendidikan Indonesia Di Era Revolusi Industri 4.0," *Bengkulu: Universitas Bengkulu*. Diakses dari [https://www.researchgate.net/profile/Eko\\_Risdianto/publication/332415017\\_ANALISIS\\_PENDIDIKAN\\_INDONESIA\\_DI\\_ERA\\_REVOLUSI\\_INDUSTRI\\_40/links/5cb4509b4585156cd7993519/ANALISIS-PENDIDIKAN-INDONESIA-DI-ERA-REVOLUSI-](https://www.researchgate.net/profile/Eko_Risdianto/publication/332415017_ANALISIS_PENDIDIKAN_INDONESIA_DI_ERA_REVOLUSI_INDUSTRI_40/links/5cb4509b4585156cd7993519/ANALISIS-PENDIDIKAN-INDONESIA-DI-ERA-REVOLUSI-) (2019).

Taking into account the current state of Indonesia which is currently in the RI4 era, educational institutions need to consider their role in developing the four intelligences (contextual, emotional, mental, and physical) mentioned by the previous Swab in students. One of the formal education pathways that have prepared graduates to have excellence in the world of work is SMK. Facing this big challenge, education, SMK must be demanded to change.

This is in line with research conducted by BPS <sup>4</sup> which states that the highest unemployment rate is SMK graduates, namely 11.24 percent. This is of course a concern for policymakers. Because, according to Presidential regulation Number 41 of 2015 concerning the Grand Design of Teaching Factory Development, vocational education has not been able to realize its initial goals. The aim is to help bridge the gap that exists between the industry and the world of education.

One way to deal with RI4 is the awareness of students in mastering skills or skills to produce a professional workforce. The education system that can answer these challenges is a competency-based vocational education system that links and matches the industry. Education that can produce a workforce with special abilities according to the needs of each industry.

The process of curriculum preparation and curriculum design is needed. The dynamic development of the times demands that human resources can meet the needs of the world of work and direct all educational activities to achieve goals. There needs to be a review in the curriculum. The context in this case is curriculum development. Curriculum development is carried out through the design of SMK curriculum development following the competency requirements in RI4. Based on this background, the focus of this article is to find out the design of SMK curriculum development in facing RI4.

### **Industrial Revolution (RI4)**

Schwab stated that we can only face the challenges of the industrial revolution with the meaning: "if we mobilize the collective wisdom of our minds, hearts, and souls. To do so, I believe we must adapt, shape, and harness the potential of disruption by nurturing and applying four different types of intelligence" <sup>5</sup>. We need to move the mind, heart, and soul together to nourish and apply the four intelligences, including mind, emotional, soul, and physical. This intelligence needs to be prepared by the education sector; both basic education, secondary education, and higher education. In this context, education plays a role in creating graduates who have the intelligence to face the world of work in the RI era4.

Based on the above statement, RI4 has a huge impact on changes to the world revolution in both the digital and non-digital industries. This requires very thorough preparation to face RI4, especially in the field of education, both at the levels of basic education to higher education.

### **SMK Education (Vocational High School)**

Vocational education is secondary education that prepares students to work under Law no. 20 of 2003 concerning the National Education System states that Vocational Education is education that prepares students to be able to work in certain fields (the Republic of Indonesia, 2003).

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<sup>4</sup> *Badan Pusat Statistik*, n.d., accessed October 30, 2017, <https://www.bps.go.id/publikasi/view/4238>.

<sup>5</sup> Schwab, *The Fourth Industrial Revolution*.

Besides, Finch and Crunkilton<sup>6</sup> in Dwi also state that the main objective of learning at SMK is "to prepared students for successful employment in the labor market"<sup>7</sup>. This means that students are prepared to become successful workers in the labor market.

In line with that, in Government Regulation Number 19 of 2005 concerning SNP Article 26 Paragraph 3 explains that the competency standards of graduates in vocational secondary education units aim to increase intelligence, knowledge, personality, noble character, and skills to live independently and follow further education by vocational. The hope of the competency standards of these graduates can lead students to become independent individuals to become workers in certain fields.

In facing the challenges RI4 SMK must continue to develop dynamically and be able to provide competency-based education so that education is relevant in SMK and the world of work. There must be guidelines and activators so that SMK can map future challenges and needs.

The implementation of 21st-century learning is expected to produce graduates from a productive generation who have great quality and skills. To face RI challenges 4. The hardening of the SMK curriculum prioritizes the suitability of technological developments and conformity with the real needs of the business world and industry. This alignment refers to the need for new types of skills such as contextual intelligence, emotional intelligence, mental intelligence, and physical intelligence. The types of skills that are outdated are updated by new skills that can shape SMK graduates in the face of job field turbulence. Alignment of graduate competencies with industrial needs, accompanied by structuring and strengthening of expertise programs.

Alignment can be seen in the development of the SMK curriculum. So far, the Government has overcome this by issuing a policy that there must be a revitalization of SMKs with competencies according to the needs of link and match graduate users by looking at various perspectives. The most important thing is to innovate the SMK curriculum through curriculum development. Why should there be an innovation in the SMK curriculum? Because of the quality of SMK graduates, in particular, is determined by a curriculum designed to be work-ready.

Based on some of the explanations above, it is confirmed that SMK is a vehicle for preparing students to build knowledge, skills, behavior according to their interests and talents to become someone ready to work. This is the hope of many stakeholders that SMK graduates are ready to use for job opportunities. Thus, it is pointed out that the competence of SMK graduates is relevant to the availability of job opportunities.

## METHODS

This research is a type of literature study research by looking for references from theories that are relevant to the cases or problems found. The data source used is secondary data from journals, articles, previous research, and internet sites that are per the problem to be studied. The method used is the descriptive analysis method, namely by collecting, preparing, and analyzing

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<sup>6</sup> Curtis R Finch and John R Crunkilton, *Curriculum Development in Vocational and Technical Education. Planning, Content, and Implementation* (ERIC, 1999).

<sup>7</sup> "TEACHING FACTORY: Arah Baru Manajemen Sekolah Menengah Kejuruan Di Indonesia - Alexius Dwi Widiatna - Google Books," accessed December 1, 2020, [https://books.google.co.id/books/about/TEACHING\\_FACTORY.html?id=JOGqDwAAQBAJ&redir\\_esc=y](https://books.google.co.id/books/about/TEACHING_FACTORY.html?id=JOGqDwAAQBAJ&redir_esc=y).

the data under study.

## RESULT AND DISCUSSION

### Vocational School Curriculum Development Design in Facing RI 4

#### Monitoring and Evaluation Team

According to Andriani<sup>8</sup>, stating that in curriculum development it is necessary to match the implementation of the learning process with the design of curriculum development. It is necessary to form a curriculum team and a monitoring and evaluation team with certain criteria to be able to compare the two things. The results of the implementation and design of the curriculum development are to be able to create a graduate profile under the curriculum design and meet the demands of DUDI (business and industry / PT with stakeholder wishes following the school's strategic plan.

#### Technology

According to Hadromi, Suwahyo, MD, & Setiaji<sup>9</sup>, the characteristics of work skills to prepare RI4 by compiling innovative learning systems such as adjusting the learning curriculum, technology, operational technology, internet, and big data analysis. These things are integrated to produce vocational graduates who are competitive and skilled, especially in data literacy, technology literacy, and human literacy.

According to Triyono<sup>10</sup>, one of the characteristics of RI4 is the presence of technology that has integrated into the society which will affect the performance of vocational education that is preparing graduates for work. Conditions like this need to increase teacher competence. Especially in terms of curriculum development. What educators need to do is that teachers need to learn to change quickly, cooperate with industry, recognize new competencies needed by the industry, manage students, provide career guidance through the use of big data so that they can adapt to current RI4.

#### Learning Design

##### Blended Learning method

According to Verawadina et al.<sup>11</sup>, the vocational education curriculum needs to apply the blended learning method that integrates face-to-face and online learning to build students into independent learners and master RI4 competencies such as data literacy, technology literacy, and human literacy. Besides, the teacher's role is important in delivering flexible learning in determining learning models, learning designs, and motivation to produce graduates with optimal

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<sup>8</sup> Tuti Andriani, "Pengolahan Ikan Pati Menjadi Makanan Variatif Dan Produktif Di Desa Sawahan Kecamatan Kampar Utara Kabupaten Kampar," *Jurnal Kewirausahaan* 13, no. 1 (2014): 1–16.

<sup>9</sup> Hadromi et al., "Employability Skills for High School Students According to the Needs of Industry 4.0," *Proceedings of the 1st Vocational Education International Conference (VEIC 2019)* (Atlantis Press, 2019), <http://dx.doi.org/10.2991/assehr.k.191217.026>.

<sup>10</sup> Moch Bruri Triyono, "Tantangan Revolusi Industri Ke 4 (I4. 0) Bagi Pendidikan Vokasi," *Proceeding Semnasvoktek* 2 (2017): 1–5.

<sup>11</sup> Unung Vera Wardina, Nizwardi Jalinus, and Lise Asnur, "KURIKULUM PENDIDIKAN VOKASI PADA ERA REVOLUSI INDUSTRI 4.0," *Jurnal Pendidikan* 20, no. 1 (2019): 82–90, <http://dx.doi.org/10.33830/jp.v20i1.240.2019>.

performance. In revitalizing curriculum content, the government, educational institutions, and industry need to work together to produce a work-ready impact on graduates according to industry needs.

### Skills

According to Ayu<sup>12</sup>, to be able to improve students' understanding in facing RI4 is to revitalize the curriculum into the K13 national curriculum that adapts to 21st-century learning. 21st-century learning integrates skills, attitudes of understanding knowledge, and information and communication technology. There are three important aspects of 21st-century learning: 1) life and career skills; 2) learning and innovation skills; 3) information, media, and skills. There are aspects of skills in learning innovation including a) critical thinking and problem-solving; b) communication and collaboration: c) creativity and innovation. These skills need to be possessed by students in facing RI4.

Also, according to Lase<sup>13</sup>, he explained that curriculum development in the RI4 era needed to complement the abilities of students and teachers in several skills. Student skills include skills that are explicitly seen, of course, academic abilities in the STEM field, ICT learning (internet of things, big data, and computers as well as entrepreneurship and internships, life skills together, think critically and creatively. Invisible skills such as interpersonal skills, skills think globally, as well as media and information literacy, Besides, the skills a teacher needs to possess are technology-friendly attitudes, collaboration, being creative and taking risks, considering face-to-face and online learning for all teachers who decide to conduct learning.

According to Winch<sup>14</sup>, several categories are needed in designing the curriculum. These categories can be seen from the skills, abilities, project management, knowledge, and personal characteristics that are relevant to the job (competence). This is very important as curriculum designers, especially vocational curricula. One of the categories in the curriculum design framework is job-appropriate skills. In this context, the skill in question is intelligence to face RI4 which is needed by work.

### Industry Partners

Also, according to Laguador & Ramos<sup>15</sup>, industrial partners value the competence of graduates in terms of the relevance of student knowledge and skills in research and work discipline, *communication* skills, computer skills, while the least entrepreneurial skills are obtained. Industry partners love employees, who are loyal and committed to their jobs and functions. Responsible team member; with strong moral values and high professionalism. Employers select graduates who are proactive, trainable, cooperative team players, and who can assume all responsibilities easily and results-oriented individuals with a full appreciation of the achievement

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<sup>12</sup> Putu Eka Sastrika Ayu, "Keterampilan Belajar Dan Berinovasi Abad 21 Pada Era Revolusi Industri 4.0," *Purwadita: Jurnal Agama dan Budaya* 3, no. 1 (2019): 77–83.

<sup>13</sup> Delipiter Lase, "Pendidikan Di Era Revolusi Industri 4.0," *SUNDERMANN: Jurnal Ilmiah Teologi, Pendidikan, Sains, Humaniora dan Kebudayaan* 1, no. 1 (2019): 28–43, <http://dx.doi.org/10.36588/sundermann.v1i1.18>.

<sup>14</sup> Christopher Winch, "Towards a Framework for Professional Curriculum Design," *Journal of Education and Work* 28, no. 2 (2015): 165–186, <http://dx.doi.org/10.1080/13639080.2014.1001335>.

<sup>15</sup> Jake M Laguador and Leon R Ramos, "Industry-Partners' Preferences for Graduates: Input on Curriculum Development," *Journal of Education and Literature* 1, no. 1 (2014): 1–8.

of the company's mission. Higher education graduates need to have competence in skills, attitudes, and behavior.

### *Illustrations*

#### *Learning Models*

- **The Kwu-Kop model**, according to other research in curriculum development to improve entrepreneurial skills it is necessary to use a learning model. One of the learning models according to Nurbudiyani<sup>16</sup>, , the development of the Kwu-Kop model is divided into two activities, the first is pre-development including the investigation stage, the design stage, the realization stage. Second, the model manual includes lesson plans, modules, job sheets, and evaluation tools
- **Teacherpreneur Model**, according to Prihadi <sup>17</sup>, one of the vocational learning models prepared to face the RI4 era in the Main Design is the teacherpreneur model which was originally composed of only three pillars, including competence, creativity, and effectiveness into four pillars with additional collaboration under the demands of the 21st century.
- **Model HO2S4C**, also, one of the curriculum development designs within the framework of the Higher-Order Skills 'Four Cs' (HOS4C) model according to Siswanto et al.<sup>18</sup>, is 1) Creativity; 2) Critical Thinking; 3) Communication; 4) Collaboration is necessary for vocational training. The results of his research state that HOS4C is a soft skill development of Human Resources (HR) which includes activities, objectives, methods/techniques, social dynamics, and psychological outcomes. This model can be called the Human Resources Development Model in the RI4 era to improve career development skills for vocational and professional education in any field.

## DISCUSSION

### *Vocational School Curriculum Development Design*

Based on Law Number 20 of 2003 concerning SNP, Article 36 states that: (1) Curriculum development is carried out by referring to national education standards to realize the goals of national education; (2) The curriculum at all levels and types of education is developed with the principle of diversification according to the education unit, regional potential, and students; (3) The curriculum is prepared according to the level of education within the framework of the Unitary State of the Republic of Indonesia. (4) Provisions regarding curriculum development as referred to in paragraph (1), paragraph (2), and paragraph (3) shall be further regulated by a Government Regulation.

Government Regulation Number 19/2005 Article 17 Paragraph 1 states that the curriculum at the level of SD / MI / SDLB, SMP / MT's / SMPLB, SMA / MA / SMALB, SMK / MAK, or other equivalent forms is developed by the educational unit, potential area /

<sup>16</sup> Iin Nurbudiyani, "Model Pembelajaran Kewirausahaan Dengan Media Koperasi Sekolah Di SMK Kelompok Bisnis Dan Manajemen," *Jurnal Pendidikan Vokasi* 3, no. 1 (2013), <http://dx.doi.org/10.21831/jpv.v3i1.1577>.

<sup>17</sup> Wisnu Rachmad Prihadi and Herminarto Sofyan, "PENGEMBANGAN MODEL TEACHERPRENEUR PADA SEKOLAH MENENGAH KEJURUAN," *Jurnal Pendidikan Vokasi* 6, no. 2 (2016): 230, <http://dx.doi.org/10.21831/jpv.v6i2.9553>.

<sup>18</sup> Budi Tri Siswanto, Putu Sudira, and Wardan Suyanto, "Pengembangan Higher Order Skills Four Cs (HOS4C) Pendukung Industri Kreatif," *Laporan Penelitian* (2013).

regional characteristics, socio-culture of the local community, and students.

Revitalizing the curriculum by developing a new curriculum, namely Curriculum 2013 (K13). The development of this curriculum is legally supported by Permendikbud Number 20 of 2016 concerning Graduate Competency Standards (SKL) which states that every graduate of primary and secondary education units has competence in three dimensions, namely attitudes, knowledge, and skills.

According to Afrina, et al in Verawadina, Jalinus, & Asnur (2019), the current curriculum preparation refers to the Indonesian National Work Competency Standards (SKKNI) or international standards. One of the 2017-2025 Indonesian vocational development policy roadmaps, namely where the curriculum is too general in vocational schools. So that curriculum development is carried out by SMK which is tailored to the needs of the RI era4.

According to Suryani, Karmila; Jalinus<sup>19</sup>, states that to realize SKL in the face of RI4 curriculum changes to meet stakeholder needs by reconstructing CPL and CPMK; reviewing the profile of graduates under the demands of the job market with advances in knowledge in the RI era4; rearranging materials, strategies, evaluation techniques under the DIKTI curriculum guide; accommodate different individual abilities; holding workshops for educators in making lesson plans following the demands of the RI era4.

From this explanation, it can be concluded that the SNP, PP, SKKNI, CPL, and CPMK reconstruction as a juridical basis for curriculum development for the vocational education level. Curriculum development needs to be adjusted to the competencies in the RI4 era, such as reviewing the profiles of graduates who are ready to work according to RI4

## CONCLUSION

Based on the results and discussion, it can be concluded that in the design of curriculum development in the RI4 era, a monitoring and evaluation team is needed, teachers and technology literate students use learning designs such as the blended learning method and learning models such as kwu kop, teacerpreneur, and HO2S4C and skills. following the 21st century, namely a) critical thinking and problem-solving; b) communication and collaboration: c) creativity and innovation and engagement with industry partners.

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<sup>19</sup> Wardina, Jalinus, and Asnur, "KURIKULUM PENDIDIKAN VOKASI PADA ERA REVOLUSI INDUSTRI 4.0."

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