

# Optimizing Human Resources Development in the Era of Industrial Revolution 4.0

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## ABSTRACT

The rapid development of technology affects various sectors including changes in service orientation in the public sector towards the digital era. This change requires qualified human resources. This study aims to analyze competence as a means of optimizing human resource development in the era of industrial revolution 4.0. The study used descriptive qualitative to describe the competencies needed by human resources in the era of industrial revolution 4.0. Data were collected from various informants using in-depth interviews and supported by documentation. The results showed that relevant competencies that play a role in optimizing human resource development in the era of the industrial revolution are competencies based on technology and information.

**Keywords:** Human Resource Development, Human Resources, Competencies, Industrial Revolution 4.0.

## 1. INTRODUCTION

Human resources are an important factor in an organization. The strategic role of human resources in organizations was stated by [1] in which there are three key resources in the organization, namely financial resources, human resources, and information resources. Meanwhile, the most difficult to manage is human resources considering that humans are unique resources who have different experiences, abilities, and knowledge. The effect of industrial revolution 4.0 on human resources is the emergence of opportunities and challenges which require certain skills to be able to survive and compete in an uncertain era.

In general, Industry 4.0 is defined as the use of cyber physical systems in the manufacturing industry system which is considered equivalent to the internet industry by General Electric in North America. [2] Industry 4.0 is the technology of the future, but some design principles and technology have been applied and have become a field of research study.

Meanwhile, [3] describe the basic principles of industry 4.0, namely, the merging of systems and machines in a workflow, the application of intelligent networks in chains, and the production process to control each other independently. On the other hand, [4] states

that the challenge of human resources in the era of industrial revolution 4.0 is the integration of the use of the internet and production lines that utilize technology and information.

The influence of the industrial revolution 4.0 in Indonesia can be seen mainly in changes in communication and connectivity. Those changes have a significant impact on employment in creating opportunities and challenges in human resource development.

Based on the elaboration above, this study aims to describe the competence of human resources in accordance with the opportunities and challenges in the era of industrial revolution 4.0. The research questions are: (1) How is the optimization of the development of human resources in the era of Industrial revolution 4.0?; (2) What are the supporting and inhibiting factors for human resource development?

## 2. METHODS

This study used a qualitative approach to describe the impact of the industrial revolution 4.0 on human resource development in the Banyumas District. This study was conducted at a local government institution, namely the Regional Secretariat. Data were collected through

interviews, observation, and literature review. Primary data were obtained directly from informants. Meanwhile, secondary data were obtained from reports, documentation, literature, scientific journals, and statistical publications.

### **3. DISCUSSION**

#### ***3.1. Impacts of The Industrial Revolution on Human Resource Development***

History records that there have been four industrial revolutions, starting in England in 1784, marked by the invention of the steam engine and mechanization which slowly replaced human work. The second industrial revolution occurred at the end of the 19th century with the use of electric machines for mass production activities. While the third revolution in 1970 began with the use of computers in factories. Rapid technological developments accompanied by interconnection and data analysis have encouraged the emergence of the fourth industrial revolution [5]. Simply, the characteristics of industrial revolution 4.0 include digitalizing, optimizing, and customizing production; automation and adaptation; interaction between machines and humans; the added value of services and business, automation of data exchange and communication; and the use of internet technology. Meanwhile, [6] describe Industrial revolution 4.0 as smart manufacturing in which a cyber-physical system can make decentralized decisions through a copy of smart manufacturing that is physically integrated into the real world. The cyber-physical system can create integrated cooperation between humans and machines if they are linked through value chains.

The massive use of technology also has an impact on government organizations, namely changes in digital-based services that affect the need for resources with the ability and skill to master technology. Public services organized by the Banyumas Regency Government include e-KTP, e-office, e-government, e-planning, e-sakip, and many other digital-based services.

The impact of industrial revolution 4.0 on human resource development is affected by changes in the work dynamics. A report by Commonwealth Scientific and Industrial Research Organization (CSIRO), an Australian government agency, has listed ten major forces changing the dynamics of work (1) The increasing importance of education and training; (2) The need for new abilities for new jobs of the future; (3) The need for digital literacy alongside numeracy and literacy, (4) the changing importance of STEM; (5) Aptitudes and mindsets to handle a dynamic labor market; (6) Challenging perceptions and norms about job types; (7) Improving workforce participation in vulnerable demographics; (8) The need to move towards tapered retirement models; (9) A new model to forecast job transition requirements; (10)

Improved understanding of the peer-to-peer (and freelance) economy [7].

The impact of industrial revolution 4.0 on changes in human resources is complex and full of uncertainty. Thus, it is difficult for leaders to make decisions. As a result, it requires the ability to simplify the challenges faced. The simplification of the challenges of industrial revolution 4.0 as proposed by [8] include some considerations: 1) industrial readiness; 2) trusted workforce; 3) ease of socio-cultural arrangements; 4) diversification and job creation in industrial revolution 4.0. Diversification and job creation have to meet the criteria of 1) ecosystem innovation (2) competitive industrial base (3) investment in technology (4) integration of Small and Medium Enterprises (SMEs) and entrepreneurship.

Based on the above opinion, the industrial revolution 4.0 has an impact on the development of human resources in organizations. Changes in digital-based services require expertise and ability to master technology and communication. In addition, the impact of rapid change results in uncertainty. So it requires the ability to make decisions. These two things indirectly facilitate the direction of human resource development, because organizations more easily identify the abilities and skills needed.

#### ***3.2. Competences Needed in the Industrial Revolution***

The concept of competence relates to the standard capabilities or attributes that have to be possessed to meet the qualifications to complete a task or job.[8] Referring to this concept, the standard capability requirements of each organization will be different depending on the organization. In public sector organizations, employees do not only do technical work but also the correct things ethically. It is because the public sector has a responsibility to serve the community [9].

Referring to the role of public organizations as service providers, the competence of human resources in the public sector must meet the public service standards and the industrial revolution 4.0. The concept of competence proposed by [10] and the competency framework proposed by UNESCO (2015) are the beginning of the existence of the term of Human Resource Competency 4.0.

Competencies are divided into three, namely core competencies, managerial competencies, and core value competencies. Core competencies relate to individual attitudes or behavior in the implementation of a job [11]The core competence covers: (1) communication; (2) Cooperation skills; (3) Ability to build positive communication to work together and achieve goals; (4) Result Orientation; (5) Work productively and focus on achieving results in the workplace; (6) Ability to share knowledge and make continuous improvements (7)

Ability to share knowledge and sustainably increase work results; (8) Mastery of digital and networks (9) Knowledge and expertise in the use of digital media, information technology, coding and information systems; and (10) Update Knowledge.

Managerial competence is knowledge, skills, and attitudes/behaviors that can be observed, measured, and developed to lead and or manage organizational units. [12] They are (1) Complex problem-solving skills; (2) Quality decision-making; (3) Intercultural and language skills; (4) Leadership; and (5) Skill.

Core value competence is organizational cultural values manifested in behavior and typically as specific characteristics of an organization. [13]. The competence covers (1) Professionalism; (2) Creative and innovation; and (3) Sustainable Mindset. Efforts to obtain reliable human resource competencies are through introduction, understanding, feedback, and training and development. [14]. Identifying the need for competence in the organization can help optimize human resource development according to needs and avoid unnecessary resource use.

According [15] the competencies needed by human resources in the digital era are the main competencies and general competencies. The main competencies are related to Information and Technology, software, application programs and automation systems. Meanwhile, general competencies that must be possessed include communication skills, social skills, organizational skills, project workers, intercultural awareness and language. The impact of the industrial revolution 4.0 in Banyumas Regency can be seen clearly in digital changes in public services especially in the use of communication and information technology. These changes require technical competencies to design services and provide digital-based public services. Therefore, technology and information competencies are highly needed now.

### ***3.3 Supporting and Inhibiting Factors to the Development of Competent Human Resources***

Rapid technological changes affect various sectors of human life and cause uncertainty. Thus, organizations need competent human resources.

Organizations have resources that can be used to support the development of the competent human resource. Supporting factors include education and training to improve competencies organized by the organization. The results of the study prove that a person's education level and skills have a positive effect on mindset, decision-making, maturity levels, insights, and perspectives.

While the inhibiting factor is the attitude in which some do not want to follow changes, especially those who will retire soon. Another inhibiting factor is the

limited cost to conduct training for the development of human resources.

## **4. CONCLUSION**

Human resources are the most important resources in the organization. The industrial revolution 4.0 characterized by the emergence of technologies in various fields including the use of information technology and robotics, causes changes in the skill requirement needed to survive and win the competition. One of the efforts to improve competence is through human resource development. Identifying the competencies needed can direct the organization to optimize human resource development. The most needed competencies in the industrial revolution era are competencies based on technology and information.

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