

# Family Business Challenge in Technology and Engineering: Human Capital in Industrial 4.0

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**Abstract**— More than 95% of business in Indonesia is a family business that is facing difficulties and challenges to match their human capital with industrial 4.0, related to technology and engineering. This study aimed to describe efforts to develop human capital in a family business and to propose guidelines for the government to accelerate human capital development in a family business to face industry 4.0. We used a systematic literature review to synthesize findings qualitatively. The secondary data were collected for this propose. The study found three efforts were missing from family business strategic planning, namely education, training, and career development. These three efforts were a basic foundation to face the industrial revolution 4.0. The study highlighted career development as the main problem in a family business. Since executive positions were limited to the families. As a result, the turnover of high-performance employees was high. Since the family business could not provide these three efforts to face industrial 4.0 by themselves, therefore the government support is needed to design their human capital development. The proposed guidelines for the government consist of IT-based competency and its implementation for a family business. The guidelines include vocational training design, such as curriculum and infrastructure. The current curriculum was designed to adjust to industry 4.0. Thus, the finding implies the government to redesign vocational training curriculum that consists of subject matter, transfer of knowledge, and capacity development. Finally, the family business has to start developing a human capital strategic planning that linked with the proposed government supports.

**Keywords:** *human capital, family business, industrial 4.0, technology and engineering*

## I. INTRODUCTION

Today, changes in the world entering the era of the industrial revolution 4.0 or the fourth world industrial revolution where information technology has become the basic in human life [1]. The world has experienced four stages of revolution through The Fourth Industrial Revolution [2], namely: 1) industrial revolution 1.0 occurred in the 18th century through the invention of steam engines, thus enabling goods to be mass produced, 2) industrial revolution 2.0 occurred in the century 19-20 through the use of electricity which made production costs cheap, 3) the industrial revolution 3.0 occurred around the 1970s through the use of computerization, and 4) the industrial revolution 4.0 itself occurred around the 2010s through intelligence engineering and the internet of things as the backbone movement and connectivity of humans and machines.

Human capital (HC) is a big challenge facing Indonesia at this time for industry 4.0. Industry in the 4.0 era needed reliable human resources in the fields of technology and engineering. Such several challenges are also faced by family businesses in Indonesia because more than 95 percent of companies in Indonesia are family businesses. A survey conducted by Price Waterhouse Cooper (PwC) in 2014 on family businesses in Indonesia stated that more than 95 percent of companies in Indonesia are family businesses [3].

Family businesses dominated business in Indonesia and spread in various fields of industry and organizations [4]. Family businesses are defined as businesses where ownership and policymaking are dominated by members of "emotional kinship groups" [5]. The family business is an organization that has at least two generations of involvement in the family, and they influence company policy [6].

Family businesses in Indonesia face the challenge of adjusting their human resources in industry 4.0, especially those related to technology and engineering. HC in the family business is currently facing the challenge of talent development for industry 4.0 in the fields of data scientist, coding, and software development. Research conducted by [7] found that family business owners did not apply HC management seriously. In the company, HC management only functions as personalization and is only considered clerk and administrative employees. In companies often do not provide coaching and employee development.

The 2014 family business survey found that the main problems or issues faced by family businesses include how to attract and obtain human resources with good quality and quantity. The survey also found that there was a shift to the digital world and the emergence of global trends. The survey found that family businesses need to adapt to the digital world because digitization will help increase awareness or sensitivity and help achieve business benefits for business people.

This study aimed to describe efforts to develop human capital in a family business and to propose guidelines for the government to accelerate human capital development in a family business to face industry 4.0.

## II. MATERIALS AND METHODS

We use a systematic literature review to synthesize qualitative research results about the challenges facing the family business in the field of technology and engineering,

especially related to the role of HC in the era of the industrial revolution 4.0. Secondary data was collected for this proposal, where literature searches were carried out using the google scholar search site. Keywords used in the literature search include human capital, family business, industrial, technology, and engineering. Articles come from business management journals, family business journals, and human capital journals. As many as 30 articles found, and around 20 article fulfilled the inclusion criteria both in Indonesian and in English.

### III. RESULTS

We found that it was not enough just to use old human literacy-competence based only on the ability to read, write, and count to answer the challenges of the industrial revolution 4.0 era [8]. In order to have a competitive HC in the industry 4.0, the education curriculum is designed to create HC with new literacy competence, namely: 1) data literacy, namely the ability to read, analyze and use big data technology in the digital world, 2) technology literacy, namely the ability to understand how to work machinery, technology applications such as coding, artificial intelligence and engineering principles and 3) human literacy, humanities, communication and design.

A recent development showed that increasingly developing technology had a major impact on the educational qualifications needed for HC [9]. Only qualified and highly educated human resources will be able to control technology. The education system will transform from education 3.0 to education 4.0. Education 4.0 will combine real-world and virtual information. Virtual resources such as glasses for virtual reality will be used for teaching. Education will also be scaled up; for example, information science courses need to include knowledge about the management process. The virtual learning environment or VLE will be used for a high transfer of developed knowledge and skills. Teachers and students will meet their avatars on VLE. VLE will be the first step in education for new employees.

The next part of education is the actual implementation of augmented reality. In this section, training courses for new employees will be realized through augmented reality glasses. This type of education is very expensive, and this fact can lead to the privatization of several higher education institutions or those that establish high schools by large companies [9]. The digitalization of education makes the atmosphere of learning today more collaborative [10].

Education 4.0 serves the needs of people in the 'innovative era' [11]. This education is consistent with changing behavior with special characteristics of parallelism, connectivityism, and visualization. This learning management helps develop students' ability to apply new technology, which will help students to develop according to changes in society. The management of learning in this era is a new learning system that allows students to grow with knowledge and skills for the whole of life, not just to know how to read and write [12]. To be able to live in society and be equipped with the best abilities. Therefore, education 4.0 will be more than just an education.

The training programs for employees were beneficial for increasing company profits [13]. The training program strongly supports businesses to emphasize the knowledge, expertise, and abilities of employees. Today companies, including family businesses, widely used information technology systems for their learning programs. Family business owners were required to ensure that employees can learn whenever they need them. To accomplish this goal, organizations need internet and computer-based learning segments. Training programs supported employees to improve their performance and not just their work competencies [14]. Employee training programs can also help HC to learn and facilitate them to become critical philosophers [15].

The study highlighted career development as the main problem in a family business since executive positions were limited to the families. Career development is a process of increasing and or increasing the capability of workforce that is carried out formally and continuously to achieve his career goals [16]. Career development is the responsibility of an organization that prepares workers with certain specifications so that at one time, the company needs to have workers with certain specifications. Research conducted by [17] states that there is no career development for prospective successors in the family business understudy. Prospective successors can immediately serve as head of marketing without any career paths carried out in the company, so that succession preparation is not optimal because prospective successors do not get real experience. Career development is not given to prospective successors because the company has provided training for successors and is considered sufficient by the company's leaders. Besides that, the successor has also been appointed to occupy the position as the next company leader. So there is no need for career development for successors.

Falconi's stated some of the causes of employee turnover, namely dissatisfaction due to lack of promotional opportunities, wage dissatisfaction, dissatisfaction with superiors or coworkers, and dissatisfaction with the work itself (repetition, autonomy, responsibility) [18]. The study found that there was a relationship between employee dissatisfaction and turnover, where high employee satisfaction would reduce employee turnover.

Because the family business cannot provide all HC of these efforts to deal with Industry 4.0 itself. Therefore government support is needed to design their human resource development. In line with this, the Indonesian government launched Making Indonesia 4.0 as a roadmap and strategy for Indonesia to enter the digital era [19]. HC is important for achieving the successful implementation of Making Indonesia 4.0. Indonesia plans to overhaul the education curriculum with more emphasis on STEAM (science, technology, engineering, the arts, and mathematics), aligning the national education curriculum with future industrial needs [20]. Indonesia will work with industry players and foreign governments to improve vocational schools while improving the global labor mobility program to take advantage of the availability of human resources in accelerating the transfer of capabilities.

#### IV. DISCUSSION

The proposed guidelines for government consist of IT-based competencies and their implementation for family businesses. HC in family businesses was essential to master the competencies that needed in this industrial revolution era. These competencies include:

- The ability to speak a foreign language, it is important to be mastered so that it can communicate on a global level
- The ability to think critically can be improved through the habit of reading and discussing intensively  
Creativity, which is the ability to find something unique and out of the box by creating new innovations or developing existing ones
- People management, namely the ability to manage leaderships that can be sharpened when joining organizations at universities through organizational and extracurricular activities
- Emotional intelligence or emotional intelligence, including the ability to identify, manage and utilize emotions
- Mastery of information technology.

Today's family business needs reliable HC in the IT field. HC needs to improve skills and knowledge related to the latest technology, both related to networks, programs, and so on. Some of the HC expertise in the IT field needed by family business owners include:

- A programmer is an important component in the scope of IT-based corporate organizations. The programmer in charge of designing a program.
- A network engineer is a job working in the network world. This work is more focused on network systems that make up communication systems within the scope of business organizations. A network engineer is in charge of solving network problems in terms of maintenance to troubleshooting.
- IT support is a job that requires general expertise related to software, networking, and PC troubleshooting. IT support is required to be able to know the basis of all fields and IT divisions related to technical improvement and handling.
- Database administrator is a type of work in the IT field related to databases used in planned programs. In this work, a database administrator is required to be able to maintain, maintain, and back up existing databases on a system.
- A security engineer is a skill that is needed in the scope of companies that use IT standards. A security engineer is required to maintain the security system used in the system to be built.

The government needs to design vocational training both in terms of curriculum and infrastructure. In terms of curriculum, the government had prepared a grand design of national vocational training since 2018. In 2019, it reached

90 percent and will be the basis of vocational training in Indonesia. The curriculum was designed to adapt to the needs of industry 4.0. In compiling the grand design of the national vocational training, a collaboration between government agencies, between the government and the private sector, as well as stakeholders or stakeholders, was needed. Intergovernmental and public-private collaboration aimed to create an adaptive HC development ecosystem. The government, through the ministry of labor, needs to work in synergy with the industry, which was the party most aware of the needs of the industrial workforce. Collaboration is key in preparing a vocational system that is adaptive to the development of labor market needs. This collaboration is needed in the face of an increasingly dynamic job market in the industrial revolution era. The government is expected to implement a vocational education system in vocational schools and vocational placement. This study described a proposal for the government to redesign the vocational training curriculum, which consists of subject matter, knowledge transfer, and capacity development. It was expected that these programs will be able to improve the competence of HC especially those needed by family businesses as the majority business in Indonesia.

Infrastructure is an important thing that must be prepared by the government as readiness in the face of the industrial revolution 4.0. The equitable distribution of the quality of internet infrastructure in all regions in the country is very important in this digital era. With the increasingly even internet access in the country, it is hoped that technology will also increasingly develop throughout the region. The government is demanded to encourage the completion of digital infrastructure so that the regions can be connected to one another.

Finally, family businesses must begin to develop strategic human resource planning related to the proposed government support. HC strategic planning should be carried out with reference to the HC competencies needed in this digital age.

#### V. CONCLUSION

This study concluded that family business owners must make efforts to develop HC in family businesses. Business owners can provide education, training and career development for employees to enhance HC competitiveness in the era of the industrial revolution. This study also highlighted aspects of career development as a major problem faced by family businesses because family businesses generally do not carry out career development for HC. Strategic positions in the company were generally occupied directly by family members. This situation caused jealousy feeling from other employees who are performing well but do not have family relationships. As a result, high turnover rates due to employee dissatisfaction was increasing which limit career advancement.

The study also proposed guidelines for the government to accelerate the development of human resources in family businesses to face challenges in industry 4.0. We proposed the government to design vocational training both in terms of curriculum and infrastructure. In terms of curriculum,

the government had prepared a grand design of national vocational training since last year. In terms of infrastructure, the government was demanded to encourage the completion of digital infrastructure, which is an effort to equalize the quality of internet infrastructure in all regions in Indonesia so that between regions will be connected.

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