

Study of Business Strategy of Construction Services Companies in Facing Challenges in the Era of Industrial Revolution 4.0

Ronny Abbas¹, Heru Subiyantoro²

{ronnyabbas@gmail.com¹, herusubiyantoro@gmail.com²}

Universitas Borobudur^{1,2}

Abstract. The fourth industrial revolution brings about changes that enhance efficiency and drive innovation in businesses. One influential business sector is construction services companies. The high level of competition in the construction services industry requires company management to develop appropriate strategies to survive, compete, grow, and operate sustainably. This article provides an analysis of the business strategies implemented by construction services companies to address challenges arising from the Fourth Industrial Revolution. A qualitative descriptive approach is used to investigate the context and actual situations faced by construction services companies. Through a comprehensive literature review, the article concludes that construction services companies can adopt several strategies to confront challenges in the era of the Fourth Industrial Revolution. These strategies include adopting new technologies and system integration, enhancing workforce skills, maintaining data security, and increasing investments. By effectively implementing these strategies, construction services companies can improve their competitiveness, operational efficiency, and business sustainability in facing the era of the Fourth Industrial Revolution.

Keywords: Business Strategies, Construction Services Companies, Fourth Industrial Revolution

1 Introduction

Industrial Revolution 4.0 brings the potential to integrate the digital and physical worlds, thereby providing new opportunities for collecting, disseminating, and utilizing information. The existence of the Industrial Revolution 4.0 increases efficiency and encourages innovation on a large scale within companies. The Industrial Revolution 4.0 introduced technology that can help human work, increase company production, speed up work processes, and use time effectively.[1] However, the emergence of this new technology has a complex impact on various aspects of the industry, including company management systems such as technology, business, and human resources. These changes cannot be ignored, especially in the context of the construction industry. The Industrial Revolution 4.0 influences the way construction companies plan, implement, and manage their projects.

Lee et al., in their research, explain the factors that encourage the Industrial Revolution 4.0 which is marked by increased digitalization in the manufacturing industry. The following are the four factors:[2]

1. Increased data volume, computing power, and connectivity

The Industrial Revolution 4.0 brought a significant increase in the amount of data generated and available, supported by increased computing capabilities and connectivity. This allows companies to collect, store, and analyze data more efficiently and accurately.

2. The emergence of analysis, capabilities, and business intelligence

Advances in analytics and artificial intelligence technology enable companies to make better and faster decisions based on in-depth data analysis. This provides an opportunity to improve operational efficiency, identify market trends, and optimize business strategies.

3. The emergence of new forms of interaction between humans and machines

Industrial Revolution 4.0 introduces more direct and intuitive interactions between humans and machines through increasingly sophisticated interfaces, such as augmented reality and virtual reality. This increases productivity and employee involvement in the production process.

4. Improved digital transfer instructions to the physical world

Technological developments such as robotics and 3D printing allow digital instructions to be implemented directly into the physical world, resulting in more efficient, flexible, and adaptive production processes.

Based on data from the Central Statistics Agency (BPS), the number of construction service companies by 2023 will reach 190,677 companies, consisting of 157,322 in the small category, 31,413 in the medium category, and 1,942 in the large category. The large number of companies operating in the construction services sector means that the level of competition for construction service companies can be said to be high. High competition will place demands on company management to be able to make strategic plans for the future so that companies can survive, compete, grow, and run sustainably.

Apart from the high level of competition, construction service companies have high complexity as seen from the stages with high risks as well.[3] Construction services can be defined as consulting services for activities in building facilities and infrastructure or construction work. According to Alfa in his research, construction stages can be divided into the following stages:[4]

1. Pre-Construction

This stage consists of activities such as feasibility studies, location surveys, planning, auctions for procurement of goods/services, as well as preparation of other documents related to construction project preparation.

2. Construction

This stage consists of cleaning the site, measuring, installing foundations, and conducting structural, architectural, mechanical, electrical, settlement, and finishing

work. The stage is divided into two categories of activities, namely minor and major work.

3. Post Construction

This stage consists of improving the phase of development results that have been used and implemented. Sometimes major repairs are needed if there is a force majeure or damage event.

In research conducted by Hecklau et al., it was explained that there were challenges from the Industrial Revolution 4.0 which were analyzed using the PESTEL-framework perspective which consists of political, economic, social, technical, environmental, and legal aspects. In the context of this research, the main challenges faced by construction service companies are challenges in the economic and technical aspects. The challenges of the Industrial Revolution 4.0 in the economic sector include the ongoing globalization process, shorter marketing times, shorter product life cycles, the need to cut costs to remain competitive, companies need to transform business models with a better service orientation, and changing expectations. consumers oriented towards customization and flexibility, and increasingly heterogeneous markets. The challenges of the Industrial Revolution 4.0 in the technical field include companies having to be able to handle big data efficiently, IT infrastructure needs, communication networks and internet protocols, development of standard interfaces and open architecture, cyber security, and employee readiness and skills in digitalization or increasing virtual work.[5]

The Indonesian government is also taking part in encouraging the construction services industry to adapt to the Industrial Revolution 4.0. Regulations regarding construction services are regulated in Law No. 2 of 2017 concerning Construction Services. The law regulates the obligation for construction services to use technology as regulated in Article 83 which reads "To provide accurate and integrated data and information in the provision of construction services, an integrated information system is created." The article analyzes the business strategies used by construction service companies to face challenges in the Industrial Revolution 4.0 era. The many challenges faced by construction service companies require construction service companies to be able to design appropriate strategies to compete, survive, and be sustainable.

2 Methods

A qualitative descriptive approach is utilized in this article to uncover the current context and situations faced by construction services companies in planning strategies to address the fourth industrial revolution. The selection of this approach is based on the need to gain a deep understanding of the challenges faced and the strategies implemented by construction services companies in response to these changes. Qualitative research does not involve numerical data.

Data is collected through a comprehensive literature review, utilizing relevant sources to explore various challenges and strategies related to construction services companies in facing the Fourth Industrial Revolution. Findings and analysis from this literature review are then presented in detail and descriptively, using an inductive approach to conclude the findings revealed in this article.

The inductive process is chosen for its ability to identify patterns that represent phenomena emerging from broader data.[6]

3 Discussion and Result

3.1 Strategy Analysis of Construction Services Companies in Facing the Industrial Revolution 4.0

3.1.1 Adopsi Teknologi Baru dan Integrasi Sistem

With technological advances such as Building Information Modeling (BIM), Internet of Things (IoT), and Augmented Reality (AR) playing a significant role in changing the industrial landscape, these companies must be ready to face the changes that occur. However, implementing these technologies is not easy. Implementation of new technology requires a large amount of investment in terms of materials, time, and training for employees.

According to research conducted by Birje et al., in 2017, combining cloud computing technology with Building Information Modeling (BIM) facilitates stakeholders in construction projects to interact in real-time and collaborate, even though they are in different locations.[7] It provides flexibility and convenience for project teams to work together without being constrained by geographical distance, thereby speeding up the decision-making process and increasing overall work efficiency. Research conducted by Supar and Yuliana in Tapin Regency concluded that the implementation of the BIM model in their building planning had increased the efficiency of project completion by aligning coordination and integrating single files.[8]

Other technologies, such as IoT, have not been widely implemented in Indonesia because they are still relatively new to Indonesia.[9] The application of the Internet of Things (IoT) in the construction industry has the potential to have a significant impact in five main areas, namely project site monitoring, machine control, construction safety, fleet management, and project management.[10]

Integration of various information systems and technologies within a company is an important step to increase efficiency and productivity. However, this process requires a well-coordinated strategy so as not to disrupt ongoing operations. By effectively integrating systems, companies can optimize their business processes and improve overall performance. This allows companies to respond more quickly to market changes, identify new opportunities, and increase their competitiveness in the market. In addition, system integration also allows companies to optimize the use of their resources, reduce operational costs, and increase customer satisfaction by providing better and more responsive service.

There are many benefits to be gained by utilizing new technology. Construction service companies need to adopt new technology and invest heavily in its implementation. Thus, it can be concluded that construction companies need to prepare themselves carefully to adopt and utilize this technology to increase their competitiveness and operational efficiency.

3.1.2 Improve Workforce Skills

In the current Industry 4.0 era, employees play a crucial role in every company, and their skills are more valuable than ever before. To enhance their abilities and ensure a seamless transition to new technologies, providing training and skills development is imperative. This step is essential in increasing overall productivity and efficiency, ultimately benefiting the company as a whole.

According to research conducted by Sihite, there are three key strategies for increasing the competitiveness of human resources in the Industrial Revolution 4.0 era. First, the strategy focuses on developing individual competencies, which involve improving technical skills and soft skills that are relevant to the demands of the ever-changing job market. Second, a strategy regarding a more adaptive and responsive education and training system, which integrates technology and innovative approaches to prepare the workforce with the knowledge and skills needed in a rapidly changing work environment. Third, strategies regarding work culture change, involve transforming attitudes, values, and practices in the work environment to create an atmosphere that supports innovation, collaboration, and continuous learning. By implementing this strategy holistically, companies can ensure that their human resources are ready to face the challenges and take advantage of the opportunities offered by the Industrial Revolution 4.0.[11]

According to Hatmoko and Pandarangga's research, efforts are needed from the government to change and align the education curriculum to suit future industry demands. The focus is on the STEAM (Science, Technology, Engineering, the Arts and Mathematics) approach, by integrating the world of education with the needs of the construction industry, updating the curriculum digitally and introducing elements of robotics, implementing an internship scheme tailored to the needs of the job market, and developing skills entrepreneurship[12]. Thus, these steps will help create a workforce that is ready and able to face the challenges and opportunities offered by Industry 4.0.

3.1.3 Maintain data security

Cyber security is an effort to prevent and protect telematic resources to prevent cybercrime.[13] Cyber security is an important aspect in the modern era, especially for business people. Every individual involved in application development must have a strong understanding of cybersecurity principles to ensure the smooth and secure running of their business activities. Cybersecurity is generally related to various tools, policies, and concepts used to protect organizational or national assets and reduce security risks that may occur in computer systems.

Security plays an important role in information systems because information can only be accessed by specified parties. Therefore, it is crucial to implement preventive measures so that information is not misused by parties who do not have authority or legitimate interests.[14] The security of project data and information is a crucial challenge in this digital era. Companies must take appropriate steps to protect their sensitive data from cyberattacks and security breaches. It includes implementing strict security policies, using effective encryption technology, and providing training to employees on good digital security practices.

Thus, it can be concluded that construction service companies need to design strategies to improve and maintain data security for the following purposes:

- a. **Maintaining Data Confidentiality:** Company data, including building designs, project plans, and client information, is often confidential and sensitive. If this data falls into the wrong hands, it can result in financial losses, reputational damage, and loss of client trust.
- b. **Regulatory Compliance:** The multitude of regulations and rules related to data privacy, such as the GDPR (General Data Protection Regulation), require companies to protect personal and sensitive data rigorously. Failure to maintain data security can result in legal sanctions and significant fines.
- c. **Business Sustainability:** Data security breaches, such as ransomware or identity theft, can disrupt business operations and cause damaging downtime. Protecting data effectively helps ensure smooth business continuity.
- d. **Maintaining Customer and Stakeholder Trust:** Customers and stakeholders in the construction industry rely on companies to securely protect their information. Strong data security can help build customer and stakeholder trust and strengthen long-term relationships.

3.1.4 Increased Investment

The initial costs of adopting new technology and integrating systems can be prohibitive, especially for small and medium-sized companies. However, by considering the long-term benefits of these investments and finding ways to efficiently manage implementation costs, companies can minimize the impact on their finances.

The government can encourage the implementation of Industrial Revolution 4.0 technology by providing investment incentives regarding innovation and adoption of technology that is in line with Industrial Revolution 4.0. It can be done through affirmative policies such as subsidies and tax cuts. In addition, the government can also provide additional financial support for investment and development of innovative technologies.

However, construction service companies cannot only depend on the government. Construction service companies can also improve their ability to attract foreign investors so they can invest their investment funds in their construction service companies.[12] The high cost of investment in Industry 4.0 technology and the lack of clarity regarding the return on investment are the main obstacles for many construction industry players. Therefore, the government needs to collaborate with global industry players to reduce the technology gap and accelerate technology transfer to local companies. Efforts to increase foreign direct investment (FDI) inflows require the right incentives as well as close cooperation and dialogue with the global community.

4 Conclusion

In facing the Industrial Revolution 4.0 era, construction service companies are faced with many challenges to compete in business. Based on the previous review, several important points

that constitute the business strategy of construction service companies in facing the challenges of the Industrial Revolution 4.0 can be summarized as follows:

1. Adoption of new technology and system integration.

Construction service companies must be ready to adopt new technologies such as Building Information Modeling (BIM), Internet of Things (IoT), and Augmented Reality (AR) to increase efficiency and productivity. Integration of information systems and technology within a company is an important step to improve overall performance.

2. Improve workforce skills.

Employees are a valuable asset, and improving their skills in facing the Industry 4.0 era is very important. Individual competency development strategies, adaptive education, and training, as well as changes in work culture, are needed to ensure that human resources are ready to face challenges and take advantage of the opportunities offered.

3. Maintain data security.

Data security is crucial in this digital era. Construction service companies must design strategies to maintain data confidentiality, comply with privacy regulations, maintain business continuity, and maintain customer trust.

4. Increased investment.

Although the initial costs of adopting new technologies can be a barrier, governments can provide investment incentives and additional financial support to encourage construction services companies to adopt Industry 4.0 technologies. In addition, companies can also improve their ability to attract foreign investment to overcome financial obstacles.

References

- [1] A. Savitri, *Revolusi Industri 4.0: Mengubah Tantangan Menjadi Peluang di Era Disrupsi 4.0*. Yogyakarta: Penerbit Genesis, 2019.
- [2] B. Bagheri, S. Yang, H.-A. Kao, and J. Lee, "Cyber-physical Systems Architecture for Self-Aware Machines in Industry 4.0 Environment," *IFAC-PapersOnLine*, vol. 48, no. 3, pp. 1622–1627, 2015, doi: 10.1016/j.ifacol.2015.06.318.
- [3] Mugiyatna, M. Sihite, and Derriawan, "Strategi Competitive Advantage Untuk Meningkatkan Kinerja Perusahaan Jasa Konstruksi Studi Pada PT Multi Fabringo Gemilang," *Jurnal Ekonomi, Manajemen, Bisnis, dan Sosial (EMBISS)*, vol. 3, no. 3, pp. 292–307, 2023, [Online]. Available: <https://embiss.com/index.php/embiss/article/view/228>
- [4] A. Alfa, "Industri Konstruksi di Era Industri 4.0," *Jurnal BAPPEDA*, vol. 4, no. 3, pp. 166–173, Dec. 2018.
- [5] F. Hecklau, M. Galeitzke, S. Flachs, and H. Kohl, "Holistic Approach for Human Resource Management in Industry 4.0," *Procedia CIRP*, vol. 54, pp. 1–6, 2016, doi: 10.1016/j.procir.2016.05.102.
- [6] I. N. Sari *et al.*, *Metode Penelitian Kualitatif*. Malang: Unisma Press, 2022.

- [7] M. N. Birje, P. S. Challagidad, R. H. Goudar, and M. T. Tapale, "Cloud computing review: concepts, technology, challenges and security," *International Journal of Cloud Computing*, vol. 6, no. 1, p. 32, 2017, doi: 10.1504/IJCC.2017.083905.
- [8] E. E. Supar and C. Yuliana, "Adaptasi Konsep Buiding Information Modelling pada Pekerjaan Perencanaan: Studi Kasus Bangunan Gedung Unit Pengadaan Barang dan Jasa Konstruksi Pemerintah Kabupaten Tapin," *Buletin Profesi Insinyur*, vol. 5, no. 2, pp. 76–82, Nov. 2022, doi: 10.20527/bpi.v5i2.114.
- [9] M. Wimala and K. Imanuela, "Perkembangan Internet of Things di Industri Konstruksi," *Journal of Sustainable Construction*, vol. 1, no. 2, pp. 43–51, Mar. 2022, doi: 10.26593/josc.v1i2.5701.
- [10] F. S. Ibrahim, M. Esa, and R. A. Rahman, "The Adoption of IOT in the Malaysian Construction Industry: Towards Construction 4.0," *International Journal of Sustainable Construction Engineering and Technology*, vol. 12, no. 1, pp. 56–67, 2021, doi: 10.30880/ijscet.2021.12.01.006.
- [11] M. Sihite, "Peran Kompetensi dalam Mewujudkan Sumber Daya Manusia yang Berdaya Saing Tinggi di Era Revolusi Industri 4.0: suatu Tinjauan Konseptual," *Jurnal Ilmiah Methonomi*, vol. 4, no. 2, pp. 145–159, 2018, [Online]. Available: www.methonomi.net
- [12] J. U. D. Hatmoko and A. Pandarangga, "Konstruksi 4.0: Tantangan dan Inisiatif Penerapan di Indonesia," in *Revolusi Industri 4.0: Perspektif Teknologi, Manajemen, dan Edukasi*, 1st ed., Yogyakarta: Andi, 2021.
- [13] C. Rahmawati, "Tantangan dan Ancaman Keamanan Siber Indonesia di Era Revolusi Industri 4.0," *Seminar Nasional Sains Teknologi dan Inovasi Indonesia (SENASTINDO AAU)*, vol. 1, no. 1, pp. 299–306, Sep. 2019.
- [14] H. Situmorang, "KEAMANAN BASIS DATA DENGAN TEKNIK ENKRIPSI: KEAMANAN BASIS DATA DENGAN TEKNIK ENKRIPSI," *JURNAL MAHAJANA INFORMASI*, vol. 1, no. 1, pp. 22–27, Apr. 2017, doi: 10.51544/jurnalmi.v1i1.92.