Integrated Industrial Estate Development Strategy in Increasing Competitiveness Through Technological Innovation and Research

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The unified and integrated industrial estate is an industrial development model that aims to create a superior business environment by integrating various industries and utilizing innovative technology and research. The integrated and integrated industrial area development strategy is very important to increase the competitiveness of companies and countries in today’s highly competitive global market. Through the development of integrated industrial estates, companies can optimize resource potential and market access more effectively. The application of innovative technology and research is the key to increasing the competitiveness of companies and countries. In an integrated and integrated industrial area, companies can apply the latest and innovative production technologies that will speed up the production process, improve product quality and reduce production costs. In addition, the integrated industrial area also allows companies to collaborate in new research and development, thereby creating innovative and superior products for the global market. Increasing the competitiveness of integrated and integrated industrial areas is also supported by government support in the form of policies and regulations that accommodate industrial needs.

ABSTRACT

INTRODUCTION

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In the era of globalization and increasingly fierce competition, technological innovation and research are key factors in increasing the competitiveness of integrated industrial areas. Without continuous innovation and research, the integrated industrial area is at risk of being left behind and losing its competitiveness in the global market. Therefore, the government and industry players must work together to encourage technological innovation and research in order to increase the competitiveness of integrated industrial areas. Increasing the competitiveness of a country or industrial area is very important to face increasingly fierce market competition. One effective way to increase competitiveness is through technological innovation and research.

Technological innovation is the creation or implementation of new ideas, products, processes or services that add value to an industry. With technological innovation, an industrial area can produce products or services that are superior and of higher quality, so that they are able to dominate the market more effectively. Technological innovation can also improve production efficiency, reduce production costs, and increase labor productivity.

Research is an activity to find or acquire new knowledge that is relevant to a particular field. In industry, research is very important to develop new technologies, find solutions to existing problems, or improve the quality of products or production processes. By continuously conducting research, an industrial area can anticipate the latest technological developments and become a leader in its field.

The development of integrated integrated industrial estates is also an important strategy in increasing competitiveness. In an integrated industrial area, various industrial sectors are connected and mutually support one another. This provides advantages in terms of access to human resources, infrastructure, and other support. With the existence of an integrated industrial area, the provision of the necessary resources for technological innovation and research can be carried out efficiently and sustainably.

The growth of Indonesia’s industrial sector is quite stable. In 2021, Indonesia’s industrial sector will grow by 4.3%. This growth was mainly driven by growth in the manufacturing sub-sector, which was around 4.8%. The manufacturing industry sector is the most dominant industrial sub-sector in Indonesia (an-nur.ac.id)

Through a strategy to increase competitiveness through technological innovation and research in an effort to develop an integrated integrated industrial area, it is hoped that an industrial area can become a gem center in its field, increase investment attractiveness, create new jobs, and increase the income of local communities. In addition, this strategy can also improve the quality of life and welfare of the community through increased production and income.
Increasing the competitiveness of integrated industrial areas is important for advancing the industrial sector in a country. An integrated industrial area is an area that is the center of industrial activity that is integrated with sophisticated infrastructure, human resources and technology.

Increasing the competitiveness of integrated industrial areas can be done through technological innovation and research. Technological innovation is the development and application of new technology to increase efficiency and productivity in the production process. Research is a research activity carried out to produce new knowledge and solutions to problems in the industrial sector. Through the support of technological innovation, it can speed up and simplify the production process thereby saving time and costs. Research can also provide a better understanding of the production process so that new ways to increase efficiency can be found.

Some of the challenges and opportunities in the development of integrated industrial estates that must be considered include funding, policy settings, environmental impacts, and global market changes. Meanwhile, opportunities can arise from technological innovation, strategic partnerships, and broader market access.

Problems Technological innovation and research are important elements in increasing competitiveness and developing integrated industrial estates. However, there are still various strategic issues that need to be scrutinized to ensure innovation and research can have a significant impact in the development of an integrated industrial area.

By using new technology and research results, production costs can be reduced. for example, by utilizing automated machines, jobs previously performed by humans can be automated, thereby reducing labor costs. Product quality can also increase, for example, by using quality control technology such as automatic testing machines, products leaving the factory can be of higher quality and in accordance with established standards. Integrated industrial area can be superior compared to its competitors. Innovative and high quality products will be more in demand by consumers.

The strategy for developing and increasing the competitiveness of integrated industrial estates can be carried out through infrastructure development, establishment of supportive policies, increased human resource development, use of sophisticated technology, industrial diversification, and increased efficient production processes.

Strategies for increasing regional competitiveness according to the Ministry of Home Affairs (2020) include mapping regional potential, strengthening economic infrastructure, improving the quality of human resources, synergizing provinces and districts/cities, creating product innovations, encouraging the people's economy by using local products. (kemendagri.go.id)
Industries in integrated integrated industrial areas need access to the latest technology to increase their competitiveness, this limited access can hinder the achievement of integrated industrial development goals. Technology-based industries require skilled human resources capable of producing new innovations. Partnerships between the government, industry and research institutions are key in the development of an integrated integrated industrial area.

The presence of an integrated industrial area that has high competitiveness will attract investment interest both from within and outside the country. Investors will see that the industrial area has the potential to provide high profits.

Increasing the competitiveness of integrated industrial areas will have a positive impact on a country’s economic growth. With technological innovation and research, industries in the region can develop rapidly and increase their contribution to the country’s GDP.

LITERATURE REVIEW

The development of integrated industrial areas is an effort to develop certain areas as integrated industrial areas. The aim is to facilitate the spread of industrialization on a large scale, thereby promoting regional and country economic growth. The related theories are as follows:

1. The link between technological innovation and competitiveness

Technological innovation is an important factor in increasing the competitiveness of an industry or industrial area. Technological innovation can include developing new products, improving manufacturing processes, and using information technology to increase efficiency and productivity. In the context of integrated industrial estates, technological innovation can strengthen synergies between companies operating within them and increase the competitiveness of industrial estates on a larger scale.

Technological innovation is the use of e-commerce technology as an alternative solution in innovating strategies to make the existing business processes sustainable (Parinda S et al, 2023)

This theory suggests that increasing the competitiveness of an integrated industrial area can be achieved through technological innovation. Technological innovation can refer to the development and use of new technologies that can improve production efficiency, quality and competitive advantage of an integrated industrial area.

2. Development of an integrated integrated industrial area

The development of integrated integrated industrial estates can increase competitiveness through the formation of industrial clusters. An industrial cluster is a group of similar companies geographically located in one area. Through clusters, companies can interact, share knowledge, and collaborate on technological innovation and research. This can create synergies between
companies thereby increasing the overall competitiveness of the integrated industrial area. Integrated integrated industrial estates have several advantages, such as easier access to human resources, infrastructure, and supply of raw materials. With the integration between companies in the industrial area, collaboration and knowledge exchange between companies can occur more easily. This increases opportunities for technological innovation and joint research that can enhance the overall competitiveness of the industrial park. Industry is any place where factors such as people, machines and production equipment (facilities), materials, energy, money (capital), information and natural resources (land, water, minerals, etc.) are managed jointly in a product effectively to produce an effective, efficient, and safe product (Haris Kebumen 2018)

3. The role of research and development (R&D) in technological innovation
Research and development has an important role in creating technological innovation. Research and development can be carried out by companies operating in integrated industrial areas as well as research institutions in the area. Several countries and industrial areas that have been successful in increasing their competitiveness through technological innovation have strong systems of support for research and development, from both the public and private sectors.

4. Government involvement to create an innovation ecosystem
The government has an important role in creating an innovation ecosystem that supports the development of integrated industrial estates. The government can provide incentives to encourage companies and research institutions to carry out technological and research innovations. In addition, the government also needs to create policies that support the growth of technology-based industries, such as through infrastructure development, workforce training, and business network development.

5. Internal and external factors that influence technological innovation
Internal factors, such as technical expertise, research and development capacity, and a company's culture of innovation, can influence the level of technological innovation in an industrial area. In addition, external factors, such as access to markets and resources, regulation, and competition, also play a role in influencing technological innovation. Therefore, strategies to increase competitiveness through technological innovation and research need to consider these two factors.

6. Research and Development
Increasing the competitiveness of an integrated industrial area can be achieved through the development and application of research and development (R&D) results. Research and development focused on new inventions, new product development, or
improving production processes can give an integrated industrial area a competitive advantage.

Sugiyono (2017) states that the research and development method is defined as a research method used to produce certain products and test the effectiveness of these products.

7. **Industry-Academic Partnership**

Partnerships between industry and educational or research institutions can increase the competitiveness of an integrated industrial area. Through these partnerships, industry can gain access to the latest knowledge and research, while educational or research institutions can gain a deep understanding of industry needs. This allows the development of technological innovations that are more relevant to market needs.

According to Thoby Mutis, partnership is a business strategy carried out by two or more parties within a certain period of time to achieve mutual benefits and mutual benefits according to the principle of mutual need and mutual complementarity according to the agreement that appears. The desire of the two parties to establish a cooperation is principally based on the desire of each party to be able to meet each other's business needs.

8. **Institutional Arrangements**

Institutional arrangements and policies that can increase the competitiveness of an integrated industrial area through the application of technological innovation and research. Favorable institutional arrangements, such as reducing bureaucracy, facilitating licensing, and protecting intellectual property rights, can encourage investment in research and technological innovation.

Mutiarin (in Budiman, 2018: 18) argues that institutional strengthening is an organizational or institutional effort in order to improve its overall performance by increasing capacity through institutions, systems and individuals.

9. **Competitiveness**

Competitiveness in the development of industrial estates is the ability of the industry to compete with other industries in producing and marketing quality products or services at competitive and efficient prices. Competitiveness also involves the industry's ability to adapt to market and technological changes, improve production processes, increase efficiency, and create new innovations.

Several factors affect industrial competitiveness, among others:

1. Qualified and well-trained human resources. Technology that continues to develop and can be adopted by the industry.
2. Technology that continues to develop and can be adopted by the industry.
3. Adequate infrastructure to support product production and distribution.
4. Government policies that support the industry in terms of regulations and incentives.
5. Access to broad markets and possible export opportunities.

In industrial development, high competitiveness is very important to ensure success in a competitive market. Therefore, there is a need for strategies and continuous efforts to increase industrial competitiveness in order to meet the demands and competition of the global market.

Agricultural competitiveness is measured by production and efficiency (Haryono, 2014). Efficiency is measured by time, resources and suitability (Yuniastari and Wiyati, 2015). Agricultural resources consist of land, labor, capital and cultivation interventions by humans such as the provision of agricultural inputs (Heryawan, Fauzi, and Hidayat, 2014).

10. Framework

![Conceptual Framework](image)

**Figure 1. Conceptual Framework (images must be in good quality)**

**METHODOLOGY**

This research method uses applied research methods with the aim of applying, testing, and evaluating the ability of a theory and providing several descriptions of solutions to problems related to the development of integrated industrial areas through technological innovation and research. The results of applied research can be used directly by industrial estates to improve the efficiency or quality of the products or services they offer. This research uses scientific methods that involve experiments or testing in the field.
RESEARCH RESULT

The development of an integrated industrial area is one of the government's efforts to increase the competitiveness of the national industry. Integrated industrial zones can speed up the production process, increase efficiency, and reduce production costs. Therefore, a combination of technological innovation and research can be the right strategy to develop an integrated industrial area to be able to compete at the national and international levels.

The following are several integrated industrial area development strategies in increasing competitiveness through technological innovation and research:

1. Develop a technology incubator
   Technology incubators are centers for the development and incubation of innovative ideas and new technologies. With a technology incubator in an integrated industrial area, entrepreneurs and companies can develop new ideas and technologies in a more structured and sustainable manner. In addition, technology incubators can also collaborate with research centers and universities to improve the quality of research and innovation.

2. Formation of supportive policies is an effort to create regulations and policies that encourage economic growth and social development. Policies can take the form of incentives for investors, improvements in the investment climate, and support for specific sector strategies.

3. Increasing the development of human resources includes increasing the quality and quantity of the workforce through education, training, and skills development. It aims to have a workforce that is competent and skilled in facing global competition.

4. The use of sophisticated technology means utilizing the latest technology to improve production processes, efficiency and productivity. It involves the use of robotics, artificial intelligence, information technology and digital communications in economic activities.

5. Industrial diversification is an effort to reduce dependence on certain economic sectors or certain products. This is done by developing a variety of different industrial sectors, so as to create new jobs and improve the economy as a whole.

6. Increasing efficient production processes aims to optimize the use of existing resources, reduce waste, and increase output or production results. This involves implementing new methods and technologies, continuous improvement in production management, and applying lean manufacturing principles.

Technological innovation has a very important role in increasing the competitiveness of integrated industrial areas. Following are some
examples of technological innovations that can increase the competitiveness of integrated industrial estates:

1. Internet of Things (IoT): The application of IoT in integrated industrial areas will connect various devices and machines in one integrated network. This will enable real-time data collection, more efficient monitoring and control, and more rapid and accurate decision making. With the implementation of IoT, integrated industrial areas can increase productivity and efficiency, reduce operational costs, and increase customer satisfaction.

2. Big Data Analytics: Big data processing and analysis can help integrated industrial areas identify new trends, patterns and opportunities in business. By using advanced algorithms and data analysis techniques, the integrated industrial estate can optimize production processes, improve product quality, and make more timely and accurate decision-making. The use of big data analytics can also assist in increasing energy efficiency and identifying potential resource savings.

3. Artificial Intelligence (AI): The use of AI in integrated industrial areas can help automate production processes, quality control, and supply chain management. By leveraging technologies such as machine learning and natural language processing, AI can assist in performing complex tasks, increasing the precision and speed of production, and reducing the risk of human error.

4. Robotics: The use of robotics in integrated industrial areas can increase efficiency and productivity. Robots can perform repetitive tasks quickly and accurately, and can work in conditions that are hazardous to humans. In the manufacturing industry, robots can assist in the production process, sorting and warehousing, as well as packaging and shipping of goods. The use of robotics can also help in reducing labor costs.

5. Clean Energy Technologies: The use of clean energy technologies such as solar panels, wind turbines, and energy storage systems can help integrated industrial areas reduce dependence on fossil energy sources and reduce greenhouse gas emissions. In addition, the use of clean energy technology can also help save energy costs and enhance the image of integrated industrial areas as sustainable and environmentally friendly places.

By implementing this technological innovation, integrated industrial estates can improve efficiency, productivity and product quality. This will help increase the competitiveness of integrated industrial estates both at the national and international levels.

The challenges of developing an integrated industrial area:

1. Dependence on one sector: Dependence on one industrial sector can make the region unstable and vulnerable to economic and industrial changes.
2. Reliance on foreign markets: Relying on foreign market demand may lead to risks of market volatility and price fluctuations that are detrimental to industrial estates.

3. Dependence on inadequate infrastructure: Lack of adequate infrastructure such as roads, electricity grids, and availability of clean water can hinder the development of integrated industrial estates.

4. Environmental and social problems: The development of industrial estates can sometimes cause environmental and social problems, such as environmental pollution, ecosystem damage, and local community health problems.

5. Regulatory and legal issues: Complex regulations and laws can make it difficult to develop integrated industrial parks and hinder industrial growth.

Opportunities for the development of integrated industrial estates include:

1. Synergy between industrial sectors: Integrated industrial estates can provide synergy benefits between industrial sectors, enabling collaboration between companies and generating long-term economic resilience.

2. Improved production efficiency: Integrated industrial estates can create better production efficiency and reduce operating costs for companies.

3. Availability of skilled labour: The existence of a thriving industrial environment can attract skilled workers who are looking for better jobs and potentially create new jobs.

4. Technology deployment: Integrated industrial parks can assist in the deployment of the latest technologies and assist in the development of new products and production.

5. Discovery of new resources: Integrated industrial parks can help companies find new resources, such as raw materials and fuels that are cheaper and environmentally friendly.

Increasing competitiveness through technological innovation and research is very important in the effort to develop an integrated industrial area. The following are strategies that can be implemented:

1. Building an innovative and creative environment that encourages technology development and research. This can be achieved by supporting collaborative relationships between companies and universities or research centres. The government can also provide tax incentives and offer research funds to encourage innovation and research.

2. Increasing access to the necessary technological infrastructure for the development of new products and services. Access to production machines and information systems will help companies to develop new products and services more quickly.
and efficiently. The government can help by providing the necessary infrastructure facilities.

3. Building an innovation ecosystem system that integrates all stakeholders in technology development and research. This includes companies, universities, governments and local communities. By forging strong partnerships, all stakeholders can optimize existing resources to create an environment that supports innovation and research.

4. Encouraging the development of international networks. Through cooperation with companies and foreign investment, integrated industrial parks can gain access to the latest technology and a wider range of research resources. This can accelerate the development of new products and services and increase the competitiveness of the industrial area.

5. Provide training and education that pays attention to the latest technological and research developments. Educational institutions can provide curricula that are relevant to current industry trends, so that graduates can be better prepared to face the demands of a fast-developing industry.

With this strategy, the integrated industrial area can increase its competitiveness through technological innovation and strong research. This will enable the integrated industrial estate to become an influential center of technological innovation and development and make a significant contribution to the national economy.

Basically, research has a very important influence on increasing the competitiveness of regional industries. The following are some of the influences of research on increasing the competitiveness of regional industries:

1. Product Innovation
   The research carried out can produce new product innovations that can increase the competitiveness of regional industries. By conducting continuous research, regional industries can produce products that are superior and of higher quality, so that they are more in demand by consumers.

2. Technology Development: Through research, regional industries can develop new technologies that can provide competitive advantages. The development of this technology can increase the efficiency and productivity of the regional industry, as well as enable more sophisticated and modern production processes.

3. Efficiency and Productivity: Research can assist in identifying and implementing new ways to increase the efficiency and productivity of industrial estates. By conducting research to identify existing problems and developing appropriate solutions, regional industries can improve competitiveness through increased efficiency in the use of resources and increased employee productivity.
4. Competitive Advantage: Through research, regional industries can identify market opportunities or potentials that can provide competitive advantage. Research also enables the region's industry to study its competitors and identify their weaknesses, so as to take steps to improve weaknesses and increase competitive advantage.

5. Quality and Standard Improvement: Research can help industrial estates to improve product quality and meet standards set by customers or government regulations. By improving quality and meeting higher standards, regional industries can create consumer confidence and expand market share.

Overall, the research has a significant impact on increasing the competitiveness of regional industries. Through planned and continuous research, regional industries can generate innovation, develop technology, improve efficiency and productivity, create competitive advantages, and improve product quality and standards.

DISCUSSION

In an era of increasingly fierce competition and competition, an integrated industrial area development strategy is very important to increase a country's competitiveness. An integrated industrial area can function as a center for technological innovation and research as well as being a center for industrial strategy that can become a driving force for the national economy. Several integrated industrial area development strategies that can be implemented are as follows:

1. Integrate the industrial value chain. Integrated industrial estates must be able to integrate all elements in the industrial value chain, from raw material producers to finished product marketing. Through the integration of this value chain, the integrated industrial estates will be more efficient and effective in producing and marketing their products.

2. Increase collaboration between companies. Intercompany collaboration is essential for the development of an integrated industrial park. Apart from increasing production efficiency, collaboration can also improve product quality and open up new business opportunities.

3. Invest in research and development. Investment in research and development is essential to develop better and more innovative products and technologies. Integrated industrial estates must be able to provide the necessary support to produce innovations that benefit industry and society.

4. Build modern infrastructure. Investments in modern infrastructure such as telecommunications networks, transportation systems and other supporting facilities are urgently needed to support industrial activities. The availability of modern infrastructure will facilitate the process of product production and distribution.
5. Build a conducive business environment. A conducive business environment is very important to attract investors and industry to invest and develop in the integrated industrial area. This can be done by providing convenience in licensing, clear government policy support, as well as other foothold facilities that can provide benefits for investors.

In developing an integrated industrial area, the existence of technological innovation and research is an important key in increasing competitiveness. Therefore, it is necessary to increase investment in research and development in order to produce innovations that are more sophisticated and beneficial to industry and society. Integrated industrial estates that focus on technological innovation and research can become centers for the development of new technologies and have high competitiveness at the global level.

In developing an integrated industrial area, the existence of technological innovation and research is an important key in increasing competitiveness. Therefore, it is necessary to increase investment in research and development in order to produce innovations that are more sophisticated and beneficial to industry and society. Integrated industrial estates that focus on technological innovation and research can become centers for the development of new technologies and have high competitiveness at the global level.

CONCLUSIONS AND RECOMMENDATIONS

The integrated and integrated industrial area development strategy is very important in increasing the competitiveness of companies and countries in today's highly competitive global market. The use of innovative technology and research is the key to success in achieving this goal. However, government support in the form of policies and regulations is also very important to create a superior and effective business environment for the industry.

The integrated industrial estate aims to increase industrial competitiveness through increasing production efficiency, developing technology, and improving product quality. With the existence of an integrated industrial area, companies can achieve greater economies of scale and access resources more efficiently. This will increase the competitiveness of the industry in the global market.

The development of an integrated industrial area in an area also aims to encourage regional economic growth. With the existence of an integrated industrial area, new jobs will be created and various related economic activities such as trade, services, and infrastructure improvements. The economic growth resulting from the integrated industrial area will have a positive impact on infrastructure development, increasing people's incomes, and the welfare of the area as a whole.
Integrated industrial estates can also play a role in reducing regional disparities between urban and rural areas. The development of integrated industrial estates in rural areas will open up employment opportunities for local people and reduce migration rates to urban areas. This will help increase the distribution of economic development between regions.

Integrated industrial area development strategy must be carried out by taking into account the sustainable and responsible use of natural resources. This is included in efforts to reduce negative impacts on the environment and utilize renewable energy. Thus the integrated industrial area can also function as a center for innovation in the utilization of natural resources that is more efficient and environmentally friendly. Innovation and technology can help increase production efficiency in integrated industrial areas. The use of advanced technologies such as automation, robotics, and internet of things (IoT) can help reduce production costs, speed up production processes, and increase output.

By using the latest innovations and technologies, integrated industrial estates can improve the quality of the products produced. The use of technology such as quality monitoring and control, the latest designs and techniques, and more relaxed production processes can help produce higher quality products that can compete in the global market.

Innovation and technology can also be used to improve work security and safety in integrated industrial areas. The use of technology such as sensors, fingerprint readers and monitoring systems can help prevent workplace accidents and ensure safe working conditions for workers. Innovation and technology can also contribute to reducing the environmental impact of industrial activities in integrated industrial areas. Environmentally friendly technologies such as the use of renewable energy, efficient waste management, and energy efficient production processes can help reduce greenhouse gas emissions and other environmental pollution.

By implementing the latest innovations and technologies, the integrated industrial park can increase its competitiveness in the global market. The use of more advanced technology and more efficient production processes can help increase flexibility and responsibility for market changes, thereby enabling integrated industrial estates to compete with other industrial estates at the international level. Overall, innovation and technology can play an important role in the development of integrated industrial estates by helping to improve efficiency, quality, work safety, environmental sustainability and competitiveness.

The development of integrated industrial estates requires close cooperation between the government and the private sector. The government must provide supportive policies and provide incentives for investment in integrated industrial estates, while the private sector is responsible for the management and operation of these areas. Good
cooperation between the government and the private sector will create a conducive business ecosystem for industrial growth.

Industry can provide funds and resources for research, while universities and research institutes can provide the knowledge and technical expertise that industry needs. Encouraging technological innovation through research and development (R&D) funding. The government and the private sector need to allocate sufficient funds to support research and development of technological innovations in integrated industrial estates.

The combination of technological innovation and research can be the right strategy to develop this integrated industrial area. The steps that can be taken include creating incubator technology, increasing access to quality human resources, building research and innovation centers, utilizing digital technology, and building strong networks with various parties.

Based on the explanation above, it can be concluded that an integrated industrial area development strategy can provide significant benefits for the industry in increasing competitiveness through technological innovation and research. Some recommendations that can be given are as follows:

1. Development of adequate and integrated infrastructure, such as transportation networks, energy and other supporting facilities.
2. Utilization of digital technology and data analytics in carrying out manufacturing operations and increasing the efficiency of production processes.
3. Focus on research and development of new products that have added value and are able to compete in the global market.
4. Encouraging partnerships between industry, education and the government to support each other in terms of technology development and research.
5. Building an innovation community and facilitating access to outreach opportunities and access to global markets.

In order to increase the competitiveness of the national industry, it is very important to implement an integrated industrial area development strategy through technological innovation and research. This must be supported by the collaboration of various parties, good coordination in implementing strategies, as well as a strong commitment from the government to facilitate and guide the industry in increasing innovation and technological development.
ADVANCED RESEARCH

The world industry continues to experience very fast and very dynamic changes. Therefore, it is important for the region's industry to keep abreast of the pace of technological development and innovation. To be able to maintain and improve competitiveness, regional industries must develop strategies and create an innovative environment that encourages the birth of new technologies and research development.

It is necessary to carry out further research aimed at evaluating the integrated industrial area development strategy in increasing competitiveness through technological innovation and research. One of these strategies is to develop a technology center that focuses on new and innovative research and development. This technology center must have cooperation with universities and other research institutions to be able to optimize the potential of existing research and technology.

In addition, industrial estates must also consider the use of digital technology in their operations, such as big data analytics, Internet of Things (IoT), and cyber security. By implementing digital technology, industrial estates can improve operational efficiency and optimize resource use.

Local association communities should also focus on an integrated industrial area development strategy. This can be done by developing training programs and workshops to help improve the quality of the workforce, as well as support the development of local products and technologies.

Through this research, it is hoped that concrete strategic recommendations will be obtained and can be implemented by industrial estates in maintaining and increasing their competitiveness through technological innovation and research. With the right strategy in place, industrial estates will continue to grow and develop into centers of technology and innovation that can strengthen the domestic economy and improve people's welfare.
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