

DIGITAL TRANSFORMATION IN INDUSTRIAL MANAGEMENT: CHALLENGES AND OPPORTUNITIES

Suwanda

Universitas Krisnadwipayana, Jakarta, Indonesia

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Email :
suwanda@unkris.ac.id

ABSTRACT

This research examines the impact of digital transformation on industrial management and investigates the challenges and opportunities that arise with the adoption of digital technology. Through a qualitative approach, this research involves literature analysis regarding industrial players who have implemented digital transformation. The research results show that digital transformation in industrial management makes a significant contribution to increasing operational efficiency, product innovation and the organization's ability to compete in the global market. Despite being faced with challenges such as changing organizational culture, data security, and a lack of technology skills, organizations that successfully implement digital transformation gain benefits in increasing production efficiency, responding more quickly to market changes, and optimizing cross-border partnerships. This research provides a deeper understanding of the importance of digital transformation as a strategy to strengthen organizational competitiveness and continuity in an ever-changing industrial era.

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INTRODUCTION

Although the concept of applying digital technology to improve operational excellence has become an integral part of company strategy, unfortunately, there are still limitations in budget allocation for digital transformation initiatives, especially in the process industry and manufacturing sectors (Aisha, 2022). Despite the potential benefits, many companies in this industry still encounter challenges in designing and implementing effective digital transformation strategies. This may be caused by uncertainty regarding investment outcomes, required changes in organizational culture, and a lack of full understanding of the potential opportunities that can be generated (Sulksono & Nursyamsi, 2022).

Investments in digital transformation are often considered a significant financial commitment, and some companies may be reluctant to allocate adequate budgets to these projects (Prathama & Yustika, 2021). However, it needs to be recognized that this investment is a critical step towards long-term sustainability and competitiveness. In the context of process and manufacturing industries, where operational efficiency and technological innovation have a major impact, increasing the budget for digital transformation can be a decisive strategic step (Rizqi & Himawan, 2022)

A holistic approach is needed to overcome these obstacles, including increasing awareness about the concrete benefits that can be obtained, developing a clear investment

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plan, and creating an organizational culture that supports change (Tahar et al., 2022). By taking these steps, companies in this industrial sector can maximize the potential of their investments in digital transformation, achieve operational excellence, and position themselves to face the challenges and opportunities in the industry 4.0 era (Kadim, 2017).

Market changes and shifting consumer preferences have been the main drivers behind the surge in large-scale investment in digital transformation in recent years (Rohida, 2018). Changing market dynamics, including the rapid growth of e-commerce, increasing focus on digital customer experiences, and consumer demand for more efficient solutions, have pushed companies to accelerate the adoption of digital technology (Raharjo, 2021).

In this context, companies are realizing that to remain relevant and compete effectively, they need to adapt their business models quickly. Digital transformation is the key to increasing responsiveness to market changes, optimizing supply chains, and providing the best customer experience (Wakil et al, 2022). Changing consumer preferences leading to greater demand for personalization, digital convenience, and product innovation are also strong drivers for investing resources in digital technology (Ngamal & Perajaka, 2022).

By recognizing that markets and consumers are becoming increasingly digital and connected, companies feel the need to invest significantly in digital technology solutions in order to anticipate and meet customer expectations, while gaining competitive advantage amidst intense global competition (Lestari, 2019). Thus, digital transformation is not only a necessity, but also a proactive strategy to position companies to be able to face market changes and meet consumer expectations in this digital era (Jamaludin et al, 2022).

Recent commodity price fluctuations have had a significant impact on process industry revenues. As a sector that is substantially dependent on the value of commodities, these price fluctuations create economic uncertainty and place extra pressure on the finances of companies in this industry (Amanda et al., 2018). Additionally, process industries often feel the brunt of pressure to reduce capital spending consistently year after year. This is a serious challenge, especially because this industry has a large number of assets that require regular maintenance and replacement (Julyanthry et al, 2020).

Meanwhile, increasing competitive dynamics and consolidation trends in the process industry emphasize that speed is a determining factor for success. Companies are required to adapt quickly to changing market conditions and optimize their operational processes to remain competitive (Fauziyyah, 2022). Additional challenges arise from generational shifts in the workforce, with a new generation of tech-savvy but less experienced workers replacing veteran workers. This creates a gap in knowledge and experience, which must be addressed so that the expertise and history of the industry is maintained (Junita, 2021)

In addition, in facing a new generation of technology-savvy workers, digital transformation also supports knowledge and skills management by utilizing digital learning platforms and knowledge management systems (Wakil et al, 2022). By leveraging artificial intelligence to match worker skills to job requirements, companies can address experience gaps and ensure the effective transfer of knowledge from veteran workers to younger generations (Goleman, 2007).

Furthermore, digital transformation also enables the personalization of solutions to meet increasingly high customer expectations. The application of technology such as customer behavior analytics and platform-based solutions helps companies respond more quickly to changing consumer preferences and create more customized experiences (Prabandari & Handrito, 2022). By understanding and responding to market needs more adaptively, companies can gain a competitive advantage in this ever-changing industry. Thus, digital transformation is not only a strategic response to industrial challenges, but also the key to creating sustainable added value in process industry management (Santoso, 2003).

METHOD

This kind of research is known as qualitative research, which aims to understand the phenomena experienced by the subject in depth. Examples of qualitative research include behavioral research, perception, motivation, and action research which describes phenomena in natural contexts using various natural methods (Gunawan, 2013). Descriptive research, on the other hand, aims to collect comprehensive information about a particular problem or situation, with the aim of gaining an in-depth understanding of the topic being investigated (Soendari, 2012). This research, which is classified as descriptive research, was carried out with the main aim of providing an accurate and systematic description of the facts and qualities of the object or subject being studied. Researchers utilize primary data sources from political sociology as the main literature center. Secondary data sources, which are also known as social reality data sources, are obtained by researchers directly in the field or through media such as newspapers and discussions. By combining primary and secondary data, this research aims to comprehensively describe the phenomenon being investigated and provide an in-depth understanding of the research topic.

RESULTS AND DISCUSSION

Digital transformation is a new use of digital technology to accelerate business strategies. It is about applying digital technology to empower people, optimize processes and automate systems of an organization to radically reorient its business performance. Digital transformation in industrial management brings a number of challenges and opportunities that organizations need to pay attention to. The following are some examples of these challenges and opportunities:

Challenges of digital transformation in industrial management

Organizational Culture Change

Changing the mindset and culture of an organization to embrace technological change is a challenge that requires a strategic and comprehensive approach. There is natural resistance from employees who have become accustomed to conventional work methods and view change as a threat to job stability or the skills they have developed. Organizational leaders need to realize that successful digital transformation depends not

only on the implementation of technology, but also on the ability to overcome internal resistance.

Supporting the transformation process requires effective and transparent communication. Leaders must clearly communicate the benefits of change, motivate employees to adapt, and provide necessary support. A comprehensive training program to improve digital skills and knowledge of technology can also help reduce resistance. Additionally, involving employees in the transformation planning and implementation process can create a greater sense of ownership, reduce fear, and increase acceptance of change.

Additionally, building an environment that supports innovation and experimentation can help change an organization's culture. Providing space for new ideas, motivating creativity, and celebrating success in adopting new technology can change negative perceptions of change. Thus, leaders need to view resistance as a normal part of the transformation journey and take proactive steps to create an environment that supports acceptance of change and growth.

Data Security

As the adoption of digital technology becomes more widespread, attention to data security risks becomes increasingly urgent. Increased connectivity and data storage in digital environments presents new challenges related to vulnerability to security breaches. Organizations must strengthen the protection of their sensitive information to be able to face increasingly complex and often organized cyber threats.

Protection of sensitive data is not just a necessity, it is a critical priority. Data security breaches can have a serious impact on a company's reputation, lose customer trust, and can even result in legal sanctions. Therefore, companies need to invest sufficient resources to develop and implement a strong security system. This involves the use of advanced encryption technology, state-of-the-art security software, and implementation of best practices in cyber risk management.

Apart from that, employee awareness and training are also key in maintaining data security. Organizations need to build a security culture across the enterprise, ensuring that each individual understands their role in maintaining the confidentiality and integrity of data. Security incident planning and response must also be well prepared, including data recovery measures and effective communication strategies. By recognizing the complexity of data security risks, organizations can design a holistic and proactive approach to protecting their information assets from evolving threats.

Limited Human Resources

The lack of skills and expertise in the field of digital technology creates significant challenges in facing digital transformation. As technological change accelerates, many employees may feel left behind and ill-equipped to adopt new software, digital platforms and other technology solutions. These obstacles can make it difficult for organizations to optimize the potential of technology to increase productivity and efficiency.

To overcome this skills shortage, employee training and human resource development are crucial. Comprehensive training initiatives should be designed to provide a

deep understanding of digital technologies, including an introduction to the latest tools, an understanding of data analysis, and the skills necessary to adapt to technological change. This training is not just about mastering the tools, but also includes understanding the basic concepts behind digital technologies and how to apply them in a business context.

In addition, human resource development needs to focus on creating an environment that supports continuous learning. An organizational culture that encourages innovation, experimentation and collaboration can stimulate employees to continuously improve their skills in an ever-evolving digital environment. Measures such as mentoring, job rotation programs and support in taking external training or online courses can also help build employees' digital capabilities. Thus, organizations can overcome the obstacles of lack of skills with targeted and sustainable human resource development strategies.

Large Financial Investment

Digital transformation, as a critical step towards modernization and competitiveness, often demands significant financial investment from organizations. This change process involves the adoption and integration of advanced technologies, innovative software, and often fundamental restructuring of business operations. However, the challenge many organizations face is the difficulty in allocating adequate funds to support these digital transformation projects. Budget constraints can stem from competing priorities, restrictive spending policies, or concerns about financial risk.

To overcome these challenges, organizations need to develop wise financial strategies focused on long-term value. The first step is to create a clear and comprehensive business plan for digital transformation, which includes estimated costs, expected benefits and long-term financial impact. By presenting a strong argument about the value of the investment, organizations can more easily convince stakeholders and gain support for adequate funding allocation.

Additionally, seeking alternative funding sources, such as strategic partners, external financing, or government subsidy programs for digital transformation, can help reduce financial stress. Financial risk management is also important; Companies can consider a phased approach to digital transformation, starting with small projects that add value quickly, while continuing to gain buy-in and demonstrate positive results to stakeholders. By designing a smart and strategic financial approach, organizations can overcome funding constraints and ensure long-term success in their digital transformation journey.

Digital Transformation Opportunities in Industrial Management

Increased Operational Efficiency

The implementation of digital technology is the main pillar in efforts to increase the efficiency of the company's operational processes. By adopting advanced technology solutions, organizations can automate many aspects of their operations, reducing reliance on manual processes that are prone to human error. Automated production management systems, real-time monitoring via the Internet of Things (IoT), and advanced data analysis can work together to improve production processes. This can result in significant improvements in efficiency, reduce production cycle times, and automatically adjust operations to increase smoothness and responsibility.

Not only that, the use of digital technology also has a positive impact on supply chain and logistics management. Automation systems can provide better visibility of the entire supply chain, allowing companies to respond quickly to changing market conditions or customer demands. The use of smart technology in inventory management and distribution can also minimize inventory costs and ensure products can reach consumers quickly and efficiently.

Apart from operational efficiency, the implementation of digital technology can also reduce overall operational costs. Replacing manual processes with automated solutions can reduce labor costs, minimize production errors and optimize resource use. While the initial investment may be significant, the long-term benefits in efficiency, productivity and reduced operational costs can bring a substantial return on investment. Thus, the implementation of digital technology not only brings improvements in daily operational processes, but also creates a strong foundation for organizational sustainability and growth in an ever-changing business environment.

Product and Service Innovation

Digital transformation is not only a tool for improving operational efficiency, but also an important catalyst for the innovation of new products and services. By leveraging the latest technologies such as artificial intelligence, big data analytics, and the Internet of Things (IoT), organizations can create more sophisticated products and more personalized services. The ability to combine consumer data with powerful analytical tools allows companies to gain a deep understanding of customer preferences and behavior. This opens the door to designing products and services that better suit customer needs and expectations, providing significant added value.

In addition, digital transformation also allows organizations to respond quickly to dynamic market changes. With adaptive technology integration, companies can monitor market trends in real-time, analyze data quickly, and identify new opportunities. These capabilities enable organizations to be more responsive to customer demand, reduce product development time, and launch innovations more quickly to market. This provides a significant competitive advantage in an ever-changing business environment.

In other words, digital transformation not only changes the way we operate, but also opens up new opportunities to create value for customers and achieve sustainable growth. Product and service innovation supported by digital technology can help organizations to remain relevant, competitive and leading in facing dynamic market challenges.

Deep Data Analysis

Utilizing sophisticated data analysis is key to gaining a deep understanding of various aspects of an organization's operations. By collecting, processing, and analyzing data thoroughly, organizations can detail their internal processes, identify efficiencies and imperfections, and find opportunities for improvement. Data analysis also enables real-time monitoring of operational performance, providing instant insight into the effectiveness of implemented strategies and policies.

In addition, data analysis is a very effective tool for understanding market trends and consumer behavior. By processing data from multiple sources, including customer

interactions, feedback, and industry trends, organizations can identify shifts in consumer preferences and anticipate market changes. This capability enables organizations to respond quickly to market dynamics, align marketing and sales strategies, and optimize their product or service portfolio according to evolving customer needs.

Overall, sophisticated data analysis gives organizations a strategic advantage. Deep insights gained from data help organizations make better decisions, identify growth opportunities, and improve operational efficiency. By supporting data-based decision making, organizations can achieve higher competitiveness, better adaptability, and excellence in responding to changes in the dynamic business environment.

Competitiveness in Global Markets

Digital transformation not only creates opportunities for advancement on a local scale, but is also key to expanding an organization's reach in the global market. Through the adoption of digital technology, organizations can overcome geographical limitations and exploit the potential of global markets. The internet, e-commerce platforms and other technology solutions enable organizations to spread their business wings across the world more effectively.

Improved communication and connectivity capabilities gained through digital transformation enable organizations to forge cross-border partnerships more smoothly. These partnerships may involve collaboration with foreign companies, participation in global supply chains, or even participating in joint research and development projects. The adoption of digital technology can also give organizations access to global resources, including the best talent in various parts of the world, enriching innovative capabilities and creativity.

By optimizing global market potential, organizations can expand their market share, achieve faster growth and increase competitiveness. This opportunity gives organizations a strategic advantage in navigating competition at the international level. Additionally, through cross-border partnerships, organizations can gain additional resources, reduce business risks, and create stronger networks in a dynamic global business environment. Thus, digital transformation not only opens doors to global markets, but also creates a solid foundation for cross-border collaboration that provides long-term benefits for organizational growth and sustainability.

CONCLUSION

Digital transformation in industrial management challenges organizations to change culture and mindset, improve data security, overcome the lack of technological skills, and allocate significant funds. Internal resistance and budget constraints may be obstacles, however, despite these challenges, opportunities exist for improving operational efficiency. The implementation of digital technology can automate processes, reduce production cycle times, and minimize costs, providing strategic advantages in fierce industrial competition. Additionally, digital transformation opens the door to new product and service innovation, increases responsiveness to market changes, and better meets customer needs. Sophisticated data analysis provides deep insights into operations, market trends and

consumer behavior, empowering decision making. In addition, digital transformation expands an organization's reach in global markets, enables cross-border partnerships, and opens up broader growth opportunities. Although challenges such as commodity price fluctuations and pressure to reduce capital expenditure are present, digital transformation remains the key to creating sustainable added value in process industry management. By overcoming these obstacles and harnessing the potential of digital transformation, organizations can position themselves as leaders in this ever-changing industry.

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IMPLEMENTATION OF SUPPLY CHAIN MANAGEMENT TO REDUCE PRODUCTION COSTS

Suwanda

Universitas Krisnadwipayana, Jakarta, Indonesia

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ABSTRACT

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Supply Chain Management has become a crucial element in optimizing production and distribution processes. By implementing this concept effectively, companies can achieve operational efficiency, reduce waste, and ultimately reduce production costs. This research aims to explore and analyze the application of Supply Chain Management as a strategy to reduce production costs in a specific industrial context. This research uses a qualitative approach with descriptive methods. The research results show that implementing supply chain management with a focus on cost reduction strategies, operational optimization and sustainable practices has a positive impact on company efficiency and sustainability. The adoption of technology such as inventory management software and transportation management systems successfully automates processes, reduces errors and simplifies supply chain operations. Lean strategies, such as reducing overproduction and lead times, also play a role in improving operational efficiency. Additionally, sustainable practices, including waste reduction and use of renewable energy sources, not only support environmental sustainability, but also result in long-term cost savings.

E-mail:

suwanda@unkris.ac.id

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1. INTRODUCTION

Supply chain is a concept that involves an entire network of entities, from companies to individuals and resources involved, in every aspect of the creation and delivery of a product or service (Pongoh, 2016). As the product moves through the stages from raw materials to the hands of the final customer, the supply chain includes various crucial activities, including production, transportation, and distribution of goods or services (Anwar, 2013). Beyond the physical aspect, the supply chain also includes close coordination in the exchange of information and financial flows between participating parties. This includes the sharing of data regarding supply, demand, and production processes, as well as the flow of funds that ensure the smooth running of the entire network (Martono, 2019).

In the era of global business and ever-increasing complexity, supply chain success is a key factor for a company's sustainability, efficiency and competitiveness (Calystania et al, 2022). Digital transformation, as an integral part of business evolution, further strengthens the role of supply chains by increasing engagement and transparency. Companies can quickly respond to market changes and build operational resilience through information and communication technology innovation (Tritularsih & Sutopo, 2017). Therefore, a deep understanding of each element in the supply chain, including the role of information and finance, becomes imperative for companies that want to maximize their operations and meet customer expectations in a dynamic business environment (Firmansyah & Saepuloh, 2022).

With an increasing emphasis on the use of technology and digital excellence, companies can optimize their supply chains to achieve greater resilience and efficiency (Zhang, 2022). The application of integrated information systems and data analytics can provide deep insights, enabling smarter decision making and rapid adaptation to market changes. Successful companies not only understand the physical dynamics of the supply chain, but also harness the power of technology to create a responsive and highly competitive ecosystem (Erwin et al., 2023).

Supply chain management has the main aim of optimizing the entire flow of goods, services and information in order to fulfill customer demands efficiently and effectively (Wijaya et al, 2021). Basically, the main goal of supply chain management is to create a responsive and flexible system, able to accommodate changing market dynamics. By understanding customer needs and managing the process

from raw materials to finished products, companies can avoid imbalances between supply and demand, which can result in waste and unnecessary costs (Suwanda, 2023).

Steps in supply chain management include inventory monitoring and management, efficient production planning, and timely coordination of transportation and distribution. In addition, information technology integration plays a key role in achieving this goal (Zulkarnain et al, 2020). By using integrated information systems and data analytics, companies can identify potential improvements, reduce lead time, and increase visibility of the entire supply chain (Handayani, 2013). Thus, supply chain management functions as a strategic foundation for companies in responding to market demands, increasing competitiveness, and achieving sustainable customer satisfaction (Pasaribu & Widjaja, 2022).

Cost reduction has a central role in supply chain management because of its direct impact on a company's profitability and competitiveness. When production, storage and distribution costs can be reduced, companies have the potential to increase their profit margins significantly (Suwanda, 2018). This not only makes a direct contribution to profitability, but also creates financial space that can be allocated for business development, product innovation, or investment in technology that can improve operational efficiency (Pratama & Widodo, 2018).

Cost reduction also has direct implications for a company's competitiveness in the market. With lower costs, companies can offer more competitive prices for their products or services, attract more customers, and increase market share (Wuwung, 2013). Additionally, the financial freedom gained from cost reductions can give companies the flexibility to invest in other areas of the supply chain, such as improving product quality, better customer service, or environmental sustainability. Therefore, smart and integrated cost reduction strategies in supply chain management not only create financial advantages, but also strengthen the company's position in increasingly fierce competition (Wibawa et al., 2015).

Cost reduction in supply chain management not only brings benefits in the form of increased profitability and competitiveness, but also opens up opportunities for obtaining additional benefits. One of these benefits is improved customer service (Bismala et al, 2018). By optimizing operations and minimizing costs, companies can provide services that are more efficient and responsive to customer needs. Companies that are able to provide products or services at lower costs tend to have the flexibility to offer competitive prices, which in turn can increase customer satisfaction and strengthen long-term relationships (Suhaeni, 2018).

Additionally, reduced costs can provide additional flexibility to companies. By having lower operational costs, companies can more easily adapt to market, technological or regulatory changes. This opens up opportunities for investment in innovation, new product development, or business expansion without having to increase financial burdens significantly (Ardiansyah, 2023). In addition, better risk management is also a positive impact of cost reduction, because companies can respond more quickly to supply chain disruptions or crisis situations, reducing potential losses and negative impacts on operations (Kusmantini et al, 2021).

Cost reduction in supply chain management is not only a strategy to increase profitability, but also plays an important role in supporting a company's sustainability goals. By optimizing operations, companies can reduce waste, increase resource efficiency, and significantly reduce the environmental impact of their entire supply chain (Solehudin et al, 2023). These steps create a more sustainable operational environment, which not only benefits the planet, but also meets the expectations of customers and stakeholders who are increasingly concerned about environmentally friendly business practices (Putri et al, 2023). By integrating sustainability practices into supply chain management, companies can achieve balanced financial and ecological sustainability, strengthening their position as responsible businesses in an increasingly environmentally conscious era.

2. METHOD

This research adopts a qualitative approach with the aim of understanding the meaning of implementing supply chain management to reduce production costs. Data collection methods involve observation, in-depth interviews, and documentation studies. Data analysis was carried out descriptively by following the steps proposed by Huberman & Miles, which include data collection, data reduction, data presentation, and drawing conclusions (Sugiyono, 2011). By focusing on interpreting the meaning of the data, this research seeks to gain an in-depth understanding of the dynamics of political communication and the image of political parties, by utilizing a qualitative approach in presenting and analyzing data.

3. RESULTS AND DISCUSSION

Supply chain management can play a significant role in reducing production costs through several integrated strategies and practices. Here are some cost reduction strategies in supply chain management.

Inventory Management

Effective inventory management plays a crucial role in supply chain management by accommodating inventory needs and optimizing storage and handling costs. One of the main aspects of effective inventory management is reducing inventory carrying costs. By minimizing excessive inventory levels, companies can avoid additional storage costs that include warehouse space rental, insurance, and security. Careful inventory monitoring and planning is key to achieving optimal inventory levels.

Additionally, effective inventory management can also help minimize the risk of stock outs. By using an accurate demand forecasting strategy, companies can identify customer purchasing trends and patterns, so they can anticipate inventory needs in a more timely manner. Implementing order management software is also a critical step in ensuring that orders are placed and processed efficiently, reducing the risk of stock shortages that can hinder smooth production and delivery.

In addition to optimizing storage costs and reducing the risk of out-of-stocks, effective inventory management also has a direct impact on warehousing and handling costs. By managing inventory in such a way, companies can minimize costs associated with shifting and managing goods in the warehouse. Proper placement of goods and selecting an efficient storage system can speed up the process of picking and sending goods, reducing labor costs and increasing productivity.

Overall, a thorough and integrated inventory management strategy is the key to achieving efficiency in the supply chain. By understanding and responding appropriately to inventory needs, companies can reduce carrying costs, minimize the risk of stockouts, and optimize warehousing and handling costs. Additionally, implementing technology such as order management software can help improve accuracy and responsiveness in inventory management, having a positive impact on a company's overall efficiency and profitability.

Transportation

Optimizing transportation costs is a strategic step in supply chain management that companies can take. One effective way is to optimize delivery routes. By using a sophisticated, technology-based route planning system, companies can determine the shortest and most efficient path to distribute products to their final destination. This not only saves time, but also reduces fuel costs and other operational costs associated with long-distance travel.

In addition, choosing an efficient transportation mode can have a significant impact on reducing transportation costs. Companies can choose a mode of transportation that suits product characteristics and customer needs, such as using land, sea or air transportation. Understanding the advantages and disadvantages of each mode of transportation helps companies tailor options to be more cost efficient and add value to the supply chain.

Consolidating shipments is also an effective strategy in reducing transportation costs. By combining multiple deliveries to the same destination, companies can optimize vehicle capacity and reduce the number of trips required. This process not only cuts fuel costs and carbon emissions, but also improves overall operational efficiency.

By implementing these strategies in an integrated manner, companies can reduce their transportation costs significantly. This not only contributes to efficiency and profitability, but also supports companies' efforts to create sustainable and environmentally friendly supply chains. Along with this, companies can build a good reputation in terms of social and environmental responsibility, which is increasingly appreciated by consumers and stakeholders.

Supplier Relations

Building solid and mutually beneficial relationships with suppliers is a strategic step in supply chain management that can provide various benefits for the company. One of the main benefits is related to the financial aspect, where good relationships can lead to better prices. By establishing open communication and close partnerships, companies can negotiate to obtain more competitive prices, which in turn can help optimize production costs and increase profitability.

Apart from that, good relationships with suppliers can also improve delivery times. By deeply understanding supplier needs and processes, companies can build more efficient schedules and minimize delays in the supply chain. Better delivery times not only help companies maintain product availability, but also increase customer satisfaction by delivering on more consistent delivery promises.

The importance of long-term contracts and partnerships with key suppliers cannot be ignored either. Long-term contracts provide stability and certainty in the supply chain, reducing the risk of

uncertainty that can arise due to fluctuations in price or availability of raw materials. Solid partnerships with key suppliers also open up opportunities to collaborate on innovation, improving product quality and increasing operational efficiency together.

Overall, building strong relationships with suppliers is not just about gaining financial benefits, but also creating sustainable synergies. By prioritizing transparency, honesty and collaboration, companies can ensure that they have reliable supplies, competitive prices and sustainable partnerships that support long-term business growth.

Lean principles

Applying lean principles in supply chain management is a strategic approach to eliminate waste and increase efficiency holistically. Lean principles, which originate from the Toyota production system, focus attention on improving processes and eliminating activities that do not add value. One key strategy is to reduce excess production, which can minimize unnecessary inventory and optimize resource use. In this way, companies can reduce storage costs and obsolescence risk, while increasing responsiveness to changes in demand.

Additionally, reducing lead time is a key element in lean principles. By identifying and addressing factors that cause lead times throughout the supply chain, companies can improve workflow and reduce lead times. This not only impacts operational efficiency, but can also provide a competitive advantage through faster product delivery and better response to the market.

Process flow optimization is another strategy that is closely related to lean principles. By deeply understanding all workflows in the supply chain, companies can identify and eliminate bottlenecks and waste that occurs. These process improvements can include improving product quality, reducing production costs, and increasing overall productivity.

Overall, applying lean principles in supply chain management is not just about reducing waste, but also leads to improving overall efficiency and quality. By focusing on reducing overproduction, lead times, and optimizing process flows, companies can achieve these goals while increasing competitiveness and responsiveness to changing market dynamics.

Technology

The use of technology in supply chain management has a significant impact on the efficiency and effectiveness of company operations. The use of inventory management software allows automation in inventory monitoring and management. With the integration of this technology, companies can monitor stock in real-time, identify demand trends, and optimize inventory levels without constant human intervention. This not only reduces the risk of human error, but also allows companies to respond to market changes more quickly and accurately.

Transportation management systems also play an important role in streamlining supply chain operations. Through the use of this technology, companies can automate the route planning process, manage deliveries more efficiently, and monitor delivery status in real time. Automation in transportation management not only improves delivery accuracy, but also helps optimize transportation costs by selecting the most efficient modes and routes.

Supplier management systems are another technology solution that can provide great benefits. By using this technology, companies can monitor supplier performance, manage orders, and optimize the overall purchasing process. Using a supplier management system speeds up workflow, reduces communication errors, and improves collaboration with supplier partners.

Overall, leveraging technologies such as inventory management software, transportation management systems, and supplier management systems enables efficient automation in the supply chain. By reducing human involvement in routine operational tasks, companies can increase accuracy, efficiency and responsiveness to market dynamics, thereby creating a more adaptive and resilient supply chain.

Continuity

Implementing sustainable practices in the supply chain is a strategic step that not only supports corporate social responsibility but can also result in cost savings in the long term. One of the main strategies is reducing waste, which involves managing production waste or unused materials more efficiently. By minimizing waste, companies not only contribute to environmental conservation but can also reduce waste management costs and their negative impact on environmental health.

Packaging optimization is also an important factor in sustainable practices. By designing more efficient packaging, companies can reduce material use and storage space, thereby reducing production and distribution costs. Additionally, lighter packaging can reduce shipping costs, minimize carbon footprints and improve overall transportation efficiency.

Utilizing renewable energy sources is also a sustainable strategy that can result in cost savings. Switching to renewable energy, such as solar or wind, can reduce long-term energy costs and have a positive impact on a company's image as an environmentally conscious entity.

By implementing these sustainable strategies, companies not only fulfill their social responsibilities, but can also achieve operational efficiencies and cost savings in the long term. In addition, sustainable practices are increasingly appreciated by consumers who are increasingly concerned about the environment, opening up opportunities for increasing market share and sustainable brand image.

4. CONCLUSION

Effective and sustainable supply chain management plays a key role in increasing efficiency, reducing costs and creating added value for companies. Applying supply chain management principles such as the use of technology, lean strategies, and good partnerships with suppliers can result in more responsive, predictable, and efficient operations. Reducing production costs can be achieved through various means, including optimizing inventory, selecting efficient transportation modes, and good risk management. The importance of adopting sustainable practices in the supply chain cannot be ignored either. Efforts to reduce waste, optimize packaging, and switch to renewable energy sources not only support environmental sustainability, but can also result in long-term cost savings. These practices not only meet the expectations of increasingly environmentally conscious consumers, but also help companies achieve sustainable operational efficiency. In this context, holistic and forward-looking supply chain management is key to achieving sustainability and business success. Companies that are able to integrate technological innovation, lean strategies, good partnerships and sustainable practices in their supply chains can face market challenges more resiliently, increase competitiveness and create long-term value.

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The Role of the Six Sigma Method in Controlling and Improving Product Quality

Suwanda

Universitas Krisnadwipayana, Jakarta, Indonesia

Email: suwanda@unkris.ac.id

Abstract

The Six Sigma method has been proven effective in industry for reducing process variability, increasing customer satisfaction, and optimizing operational efficiency. This research aims to analyze the role of the Six Sigma method as a systematic approach in controlling and improving product quality. This research uses qualitative methods with descriptive methods. The results of this research reveal that the application of the Six Sigma Method in controlling and improving product quality has a significant positive impact. Controlling process variability, focusing on customer satisfaction, and using statistical methods in data analysis have succeeded in increasing product consistency, building customer loyalty, and providing a strong basis for fact-based decision making. Implementation of the DMAIC concept provides a structured framework for continuous improvement, while cross-functional employee involvement creates a work environment that supports collaboration and innovation.

Keywords: Six Sigma, Total Quality Management (TQM), Improvement, Product Quality, Processing Industry

A. INTRODUCTION

Industry is an economic sector that has the main objective of increasing the prosperity and welfare of society through efficient use of human resources, cost management, optimization of natural resources, and various other factors (Crouch & Ritchie, 1999). One form of industry that has a crucial role in achieving this goal is the processing industry. The processing industry is an industrial sector that focuses on the process of transforming raw materials into semi-finished or finished products (Larger et al., 2017). In this process, added value is given to the product through various stages of production, so that the final result has a higher economic value compared to the initial raw materials. This value addition process involves various skills and technologies to produce high quality products (Sathre & Gustavsson, 2009).

In the context of the processing industry, utilization of human resources is the main key in achieving efficiency and productivity. Involving a workforce that is skilled, innovative and has deep knowledge of modern production technology is an important factor in improving product quality and industrial competitiveness in the global market (Caeneiro, 2000). Not only that, cost management is also a crucial factor in the processing industry. Efficiency in the use of raw materials, energy and production processes is a challenge that needs to be overcome to ensure operational sustainability and long-term profitability (Yusuf et al., 1999).

Optimizing natural resources is also a major concern, considering that processing industries often depend on raw materials from nature. Environmentally friendly practices and the development of green technology are important elements in maintaining a balance between industrial growth and environmental conservation (Goldman & Nagel, 1993). The development of the processing industry is not only about increasing production efficiency, but also about creating a positive impact on society, the environment and the economy as a whole (Lieder & rashid, 2016). Integration of the latest technology, effective human resource management and awareness of environmental impacts are the keys to achieving the goals of prosperity and prosperity in the context of the processing industry (Duflou et al., 2012).

According to Forza & Filippini (1998), product quality is a critical factor that must be taken seriously by every company. Customer satisfaction, as the main benchmark, can be achieved through positive evaluation of the quality of the products they use. Customers will feel satisfaction and trust in a brand or company if the product they receive meets or even exceeds their expectations regarding quality. Customer satisfaction with product quality not only impacts specific transactions, but also has significant long-term implications. As highlighted by Anderson et al. (1994), customer satisfaction with product quality can be the main driver for building loyalty. Customers who are satisfied with product quality tend to become loyal customers, which then forms a strong basis for loyalty. Not only will they continue to use the products offered by the company, but they may also become brand ambassadors who provide positive recommendations to others (Zhou et al., 2008).

Customer loyalty is not just a short-term gain; the company also sees it as a long-term investment that can protect and improve its results in the future. By having loyal customers, companies can achieve stability in market share and increase their resilience to changes in market trends or competition (O'Malley, 1998). Customer loyalty also plays an important role in building a positive company image, creating a strong customer base, and ensuring business sustainability. The company not only saves existing customers, but also protects itself from the risk of losing market share (Dowling & Uncles, 1997). Therefore, paying serious attention to product quality, maintaining customer satisfaction, and developing customer loyalty is an important strategy for companies in achieving long-term success and business sustainability (Bernan, 2006).

To improve quality in a company, a company can apply a method called Six Sigma. Six Sigma is an effective management method in improving quality within a company. This method not only replaces the role of Total Quality Management (TQM), but also brings a more focused and measurable approach to quality improvement (Antony & Banuelas, 2002). While TQM provides general guidance about maintaining and improving quality without always proving the success of those improvements, Six Sigma offers a more detailed and measurable approach (Revelle & Kemerling, 2005).

In comparison with TQM, Six Sigma's contribution is more focused on customer or consumer value. Six Sigma allows companies to more accurately identify specific aspects that need to be improved in performance or systems to meet customer expectations (Folaron & Morgan, 2003). By emphasizing the reduction of process variability, Six Sigma provides a strong foundation for measuring and improving product or service quality. The importance of focusing on customer value in implementing Six Sigma has a positive impact on the production process (Basu, 2009). By applying this method, companies can systematically identify, measure, analyze, improve, and control variability in their processes. The result is increased efficiency, reduced defects, and more consistent service (Antony & Banuelas, 2002).

What differentiates Six Sigma is its ability to provide concrete evidence of successful quality improvement. By using a data-driven approach and focusing on measurable results, Six Sigma has proven itself to be a reliable tool in solving problems that arise in companies, especially those related to improving quality. Therefore, the application of Six Sigma not only provides clear direction in improving quality, but also provides concrete solutions to overcome the challenges faced by the company.

B. METHOD

This research uses a qualitative descriptive approach with the main aim of uncovering and explaining phenomena, events, facts and circumstances that occurred during the research. The focus is on presenting the true reality (Gerring, 2017). The data used comes from secondary literature, such as journals, previous research, scientific articles, and other sources of information. Data analysis follows the Miles and Huberman (1994), which includes data

collection, data reduction, data presentation, and drawing conclusions and data verification. The data analysis process begins with collecting data from various sources, followed by a data reduction stage to filter and summarize the main relevant points. The reduced data provides a more focused picture. Next, the data is presented and arranged based on the previous process to facilitate understanding of research findings. This research concludes the results and verifies the findings, ensuring interpretations and conclusions are in accordance with existing data.

C. RESULTS AND DISCUSSION

Six Sigma is a comprehensive and flexible system that aims to achieve, provide support, and maximize business processes. The focus lies on understanding customer needs by utilizing facts, data, statistical analysis, and a continuous commitment to adjustment, improvement, and re-evaluation of business processes (Yang et al., 2003). The "zero defect" concept applied by Six Sigma refers to efforts to overcome errors that arise due to lack of knowledge by utilizing modern techniques. Additionally, errors stemming from lack of adequate facilities can be addressed through regular surveys of plant and equipment. The role of Six Sigma in controlling and improving product quality is as follows.

1. Process Variability Reduction

Six Sigma applies a very strong focus to controlling and reducing process variability in a production context. By identifying the factors that cause variation in a production process, Six Sigma seeks to increase the consistency of the products produced. In essence, variability can create uncertainty in production results and lead to products that do not meet desired quality standards. Through detailed analysis steps, Six Sigma allows companies to better understand the sources of variability in processes. By knowing and understanding these aspects, companies can take concrete actions to reduce or eliminate the causes of this variability. This includes close monitoring of every step in production and correction at any point where variations may occur.

Tighter control of quality specifications is one of the main results of the Six Sigma approach to variability. By reducing variation, companies can ensure that the products they produce comply with predetermined quality standards. This not only increases customer confidence in the product, but also helps achieve the goal of "zero defects" which is the basic principle of Six Sigma. Furthermore, the reduction of defects as a result of well-managed variability has a positive impact on overall production efficiency. More consistent and predictable processes help companies avoid wasting resources and optimize productivity. Thus, Six Sigma's contribution to control and reduction of variability in production processes not only leads to improved product quality, but also to increased efficiency and operational excellence.

2. Orientation to Customer Satisfaction

Six Sigma, by implementing the concept of "zero defects," pursues the goal of creating products without defects. The main focus is not just on quality control, but furthermore on in-depth understanding of customer needs. By understanding customer desires and expectations, Six Sigma strives not only to achieve predetermined quality standards, but also to exceed customer expectations. Through this approach, Six Sigma not only becomes a system for ensuring that products meet quality specifications, but also becomes a tool for increasing customer satisfaction. A deep understanding of customer needs allows companies to tailor products and services in a more precise manner, creating a positive experience for customers.

Improved customer satisfaction through the implementation of Six Sigma has a wider impact, namely forming customer loyalty. Customers who are satisfied with a product or service tend to remain loyal to the brand or company. Customer loyalty creates long-term relationships that provide benefits both in terms of customer retention and product recommendations to others. By achieving zero defects and focusing on customer satisfaction,

Six Sigma builds a strong foundation for building customer loyalty. Customer loyalty, in turn, not only creates a stable customer base but also helps companies in maintaining and increasing market share. In this way, Six Sigma becomes more than just a quality method; it becomes a strategic tool for achieving competitive advantage through deep understanding and responsiveness to customer needs.

3. Use of Statistical Methods

By integrating statistical methods in process analysis, Six Sigma is transformed into an approach that allows companies to make decisions based on facts and data that can be measured accurately. The use of statistical methods in the context of Six Sigma provides a powerful analytical framework for analyzing various aspects of the production process. Through this approach, Six Sigma facilitates more thorough identification of the root causes of problems. Statistical analysis allows companies to look deeper into data and identify patterns or trends that may not be immediately apparent. In this way, companies can determine the root cause of problems more accurately, minimize speculation, and focus on more targeted improvements.

Decisions taken based on facts and measurable data ensure that quality improvement strategies are based on reliable information. This reduces the risk of making wrong or inappropriate decisions, thereby increasing the effectiveness of implemented corrective measures. Additionally, this data-driven approach provides a strong foundation for evaluating the impact of implemented changes on overall product quality. By using statistical methods, Six Sigma empowers companies to not only address problems as they arise, but also prevent similar problems from arising in the future. The use of strong data helps companies to better understand the dynamics of production processes and make smarter decisions in optimizing operations and improving product quality in a sustainable manner. Thus, the integration of statistical methods in Six Sigma is not only an analytical tool, but also the foundation for making smarter and more measurable decisions in the context of quality improvement.

4. Continuous Improvement Cycle

The DMAIC (Define, Measure, Analyze, Improve, Control) concept in Six Sigma provides a structured framework for continuous improvement in business processes. This approach provides step-by-step guidance that allows companies to systematically increase efficiency, reduce variability, and improve product or service quality. The first step in DMAIC is "Define," where the company determines specific goals for improvement and identifies important constraints and parameters. This creates a clear understanding of the improvement project to be undertaken. Then, the "Measure" step involves collecting data to evaluate the current performance of the process. By measuring and analyzing data, companies can get a clear picture of the extent to which the quality of existing products or services meets standards.

Moving on to the "Analyze" step, companies explore the data further to identify the root cause of the problem or potential improvements. In-depth analysis helps Six Sigma teams understand the factors that influence process performance. The "Improve" step involves implementing the solutions and improvements identified during the analysis. This action is aimed at improving the process and achieving the stated improvement goals. Finally, the "Control" step includes developing a control system that ensures that implemented improvements remain sustainable and consistent. This involves creating guidelines and procedures to ensure that improvement results can be maintained over the long term.

By conducting repeated evaluations using the DMAIC approach, companies can not only identify areas that require improvement, but can also implement corrective actions systematically. Additionally, this approach allows companies to continuously monitor and measure improvement results, creating a continuous improvement cycle that supports achieving quality and efficiency goals. Thus, DMAIC becomes a powerful instrument for companies committed to achieving operational excellence and quality through the Six Sigma approach.

5. Understanding Data and Facts

Six Sigma, with its emphasis on careful data collection and analysis, presents an approach that is highly focused on facts and measurable information. By carefully mining and analyzing data, companies can gain a deep understanding of process performance, variability, and other key aspects that influence product or service quality. The importance of careful data collection is that companies can make decisions based on accurate and objective information. Valid and measurable data allows companies to evaluate process performance clearly and objectively, identify areas that require improvement, and measure the impact of improvements that have been implemented.

By utilizing careful data, Six Sigma helps avoid making decisions based solely on intuition. Data-driven decisions provide a stronger basis for measuring the effectiveness of improvement measures, preventing speculation and reducing the risk of error. This is especially important because the decisions made have a direct impact on product quality, operational efficiency, and customer satisfaction. Additionally, careful data collection allows companies to identify trends or patterns that may not be immediately apparent. With this deeper understanding, companies can take more targeted and strategic actions to improve quality and efficiency. In the context of Six Sigma, data collection and analysis is not just an analytical tool per se, but rather the foundation for wise decision making, continuous improvement, and achievement of established quality goals. In this way, Six Sigma leverages data as a critical tool to achieve operational excellence and sustainable quality.

6. Efficiency and Productivity

With a primary focus on reducing defects and improving quality, Six Sigma not only improves product outcomes, but also has a positive impact on a company's overall efficiency and productivity. Processes that are run more efficiently and of higher quality intrinsically provide significant benefits across various operational aspects. First of all, improving quality through the implementation of Six Sigma means less defects or failures in production. This leads to reduced levels of waste, such as a reduction in products being rejected or needing to be reprocessed. Thus, Six Sigma makes a significant contribution to operational efficiency by reducing losses and increasing production yields.

Additionally, more efficient processes and increased productivity enable companies to optimize the use of resources, including labor, raw materials and time. Cost savings resulting from operational efficiency can be allocated to other investments or increase the company's net profits. In a fiercely competitive market, the increased competitiveness brought about by operational efficiency can be a significant advantage. Improved operational efficiency through Six Sigma also provides an advantage in responding more quickly to market changes or customer needs. With a more responsive process, companies can be more agile in developing strategies and facing challenges that arise in the market. In other words, Six Sigma not only creates high quality products, but also has a holistic positive impact on company productivity and efficiency. This helps create a strong foundation for competitiveness in the market, ensure business sustainability, and achieve long-term goals.

7. Employee Engagement

Six Sigma not only focuses on improving product or process quality, but also encourages employee involvement as a key element in these improvement efforts. Involving employees in Six Sigma projects opens the door to strong synergy between various cross-functional teams across the organization. Why is engaging employees so important? Employees, as key stakeholders in a production or service process, have valuable insight into daily challenges, improvement opportunities and potential for innovation. By involving them, Six Sigma can take advantage of the diverse skills and experiences possessed by each individual.

Cross-functional teams in Six Sigma projects create a collaborative platform where various departments and divisions can actively contribute. This not only enriches the conversation with different perspectives, but also allows for the exchange of ideas and knowledge that can strengthen improvement solutions. Involving employees across levels and functionalities also provides a boost to team spirit and ownership of the desired improvement outcomes. Additionally, employee participation in Six Sigma projects creates a sense of shared responsibility for the quality of the product or service. This can establish an organizational culture that is more open to innovation and continuous improvement. Employees who feel heard and empowered to contribute to improvement can be effective change agents in achieving quality goals. The importance of employee involvement in Six Sigma is not only to bring diversity of ideas and expertise, but also to build a sense of shared ownership of improvement goals. Thus, Six Sigma is not only a method of improvement, but also a catalyst for building an organizational culture that is proactive and continuously innovates.

D. CONCLUSION

Six Sigma is a holistic and structured quality management methodology and philosophy, focused on control, improvement and continuous innovation. This method has several key aspects that contribute to its success in improving product and process quality in various industries. First, Six Sigma emphasizes controlling process variability, with the concept of zero defects as the main goal. By reducing variability, companies can achieve higher product consistency and increase customer confidence. Second, Six Sigma places customers as the main focus, with the aim of understanding and meeting customer needs. By increasing customer satisfaction, Six Sigma not only controls quality but also builds customer loyalty, creating long-term relationships. Furthermore, Six Sigma uses statistical methods for careful data analysis, allowing companies to make decisions based on measurable facts and information. This helps avoid making decisions based solely on intuition and ensures improvement steps are supported by strong data. Additionally, the DMAIC concept provides a structured framework for continuous improvement, with iterative evaluation of the process to systematically identify and implement improvements. The importance of data collection and analysis in Six Sigma is also emphasized, providing an accurate and objective basis for decision making, avoiding speculation, and supporting continuous improvement. Finally, Six Sigma encourages employee involvement in quality improvement efforts. Engaging cross-functional teams leverages diverse skills and experiences across the organization, creating a collaborative culture that supports continuous improvement and innovation.

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Implementation of Risk Management Strategies in the Industrial Sector

Suwanda

Universitas Krisnadwipayana, Jakarta, Indonesia

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Email :
suwanda@unkris.ac.id

ABSTRACT

Risk management is a crucial aspect in a dynamic business environment, especially in industries related to various risks such as financial, operational and environmental. This research will identify risk management strategies commonly used in industrial contexts and analyze the extent to which their implementation minimizes the impact of possible risks. This research uses a qualitative approach with descriptive methods. The research results show that implementing an effective risk management strategy has a positive impact on the company's development in the long term. Companies that succeed in minimizing the risks associated with developing new products and acquiring funds are more likely to be able to survive in the market and achieve significant growth. A good risk management system helps companies plan smart and efficient business steps, strengthen their position in the market, and increase the potential for long-term success. Implementing appropriate risk management strategies is also key to reducing the impact of possible risks, enabling growth into a successful company in a dynamic market. Steps such as planning, risk identification, risk evaluation and risk mitigation are essential in achieving sustainable business success.

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INTRODUCTION

In carrying out their business activities, industrial sector companies are often faced with challenges and risks that are different from companies that are already established in the market (Mitchell & Singh, 1996). As an integral part of the economy, the industrial sector plays an important role in providing goods and services, but often has to operate in a dynamic and uncertain environment (Al-Hyari et al., 2012). These challenges can include changes in regulatory policies, fluctuations in raw material prices, increased competition, and operational and environmental risks (Sharifi & Zhang, 1999).

One approach that can be taken by industrial sector companies in facing this challenge is to implement an effective risk management strategy (Liu et al., 2011). Risk management is a process that includes identification, evaluation and control of risks that can affect the achievement of company goals (Burnaby & Hass, 2009). In the industrial sector, risks can come from various sources such as equipment failure, uncertainty in the supply of raw materials, and even reputational risks due to environmental impacts (Sanchez et al., 2009).

Implementing appropriate risk management strategies can help industrial companies to anticipate, reduce, or even manage the impact of these risks (Sturz, 2008). This process involves the involvement of all levels of management and stakeholders, and requires a deep understanding of the specific business environment and the characteristics of the risks faced (Christopher & Lee,

2004). By implementing preventive and responsive measures, companies can increase their resilience to market volatility and protect the sustainability of their operations (Pettit et al., 2013).

By implementing the right strategy, companies can minimize or even eliminate risks that may occur. As a concrete example, manufacturing companies that are developing new products are often faced with high risks related to difficulties in obtaining funding, choosing inappropriate marketing strategies, or even potential failure in product development (Alzoubi, 2022). Without effective risk management, companies can focus too much on achieving business goals without considering the risks that may arise (Beasley et al., 2007).

In this context, implementing an appropriate risk management system is the key to preparing ourselves to face these challenges (Peck, 1998). By identifying potential risks early on, companies can design proactive mitigation measures, including diversifying funding sources, developing more mature marketing strategies, and implementing more thorough product testing methods (Zhou et al., 2008). Through this approach, companies can reduce the possibility of risks occurring, while at the same time, minimizing their negative impact on operations (Stark et al., 2014).

Involvement of all levels of management and stakeholders is essential in this risk management process. By involving various parties, companies can ensure that the various points of view and knowledge required to manage risk have been comprehensively considered (Dastous et al., 2008). The results of a mature risk management system not only help companies to overcome risks that may arise, but also create a stronger foundation for sustainable growth and company resilience amidst business uncertainty (Mojtahedi & Oo, 2017).

In the long term, implementing an effective risk management system will shape the company's development pattern with a significant impact (Manuj & Mentzer, 2008). As a concrete example, a manufacturing company that is able to minimize the risks associated with developing new products and acquiring funds can experience significant growth and increase its competitiveness in the market (Drew et al., 2006). By implementing a good risk management strategy, the company can identify new opportunities, reduce risks that may hinder growth, and overall, create a more stable business environment (Borghesi & Gaudenzi, 2012).

In this case, an integrated risk management system can be a powerful tool to guide companies in planning smarter and more efficient business steps (Vann Geest et al., 2021). By better understanding the risks it may face, companies can make more informed investment decisions, identify potential growth areas, and manage resources more effectively (Gates, 2006). As a result, companies become more responsive to market changes, more flexible in dealing with uncertain situations, and better able to compete at a higher level (Upton, 1994).

In addition, the positive impact of implementing a risk management system can be seen in increasing the trust of stakeholders, including investors, customers and business partners. Companies that are known to have mature risk management strategies tend to be more respected and considered reliable partners in the long term. Thus, it not only provides operational benefits, but also strengthens the company's image and increases the potential for long-term business success.

METHOD

The method applied in this research is descriptive analysis combined with a qualitative approach in the data collection process. The purpose of data collection is to provide an overview of

the conditions and situations in the field that will be investigated. This method involves interviews, observation, and documentation studies. Qualitative research is an effort to investigate the state of natural objects, with the researcher as the main instrument in the investigation (Sugiyono, 2011). According to Moloeng (2014), qualitative research aims to understand phenomena surrounding the experiences of research subjects such as behavior, perceptions, motivations, actions, and others holistically, by using descriptions in the form of words and language, in natural contexts, and by utilizing various methods. natural. The main goal of qualitative research is to provide as comprehensive an explanation of a phenomenon as possible by collecting as clear data as possible.

In the research entitled "Implementation of Risk Management Strategies in the Industrial Sector," to obtain accurate data, researchers used data collection techniques that are in accordance with the characteristics of a qualitative approach. Therefore, the type of research carried out is descriptive narrative. The data collection process is carried out continuously through cross-checking, re-checking and data analysis in order to find true facts. Data analysis aims to provide depth of meaning to the information that has been collected. In the context of research, analysis is a task that demands effort, honesty and sincerity, requiring creative thinking and strong analytical skills. The process of arranging data to make it easier to interpret and understand is called analysis.

RESULTS AND DISCUSSION

To prevent and overcome various undesirable impacts, it is necessary to implement an effective risk management strategy. This strategy not only minimizes potential risks, but also has a positive impact on the work system implemented in the company. By having a mature risk management strategy, a company can anticipate, manage and respond to risks that may arise in its operations.

Implementing effective risk management strategies creates a more structured and resilient work environment. Management teams can work more proactively in identifying potential risks, measuring their impact, and designing appropriate mitigation measures. This not only involves successfully managing financial or operational risks, but also includes risks related to the company's reputation and employee welfare.

Apart from that, a good risk management strategy can also increase work efficiency and productivity. By understanding the risks that may occur, companies can optimize their resources and design more efficient work processes. This can include improvements in supply chain management, cost control, and the development of more targeted and controlled innovation. The following are risk management strategies that can be implemented.

1. Risk Management Planning

Planning is a very important first step in determining how risk management will be implemented effectively and in accordance with the company system. In this context, planning must be based on careful consideration regarding the scope of the project, company environmental factors, and project management plans that will be implemented in the future. In this way, all parties involved can carry out an in-depth analysis of the activities to be carried out and discuss to formulate the best risk management strategy.

One important aspect of risk management planning is establishing a clear arrangement of roles and responsibilities. This involves identifying the people or teams responsible for risk

management and their duties and authorities. With a clear understanding of their respective roles, companies can ensure that every aspect of risk management is monitored and carried out well.

Apart from that, risk management planning also includes preparing risk management policies that are appropriate to the characteristics of the company and ongoing projects. This policy should include general principles that will guide risk-related decision making, provide a framework for risk evaluation, and determine mitigation steps that can be taken.

Project charters, which detail the goals, scope, and limitations of the project, are also an integral part of risk management planning. It provides a solid foundation of understanding of the project to be undertaken, assists in the identification of potential risks, and provides direction for the risk management strategy to be adopted. The level of stakeholder tolerance for risk must also be considered in planning. By understanding the extent to which stakeholders are willing to accept risk, companies can direct risk management efforts in a direction that meets their expectations.

Finally, the work breakdown structure (WBS) or work division structure is also a vital part of risk management planning. WBS helps identify all project elements in detail, allows the team to identify potential risks at each stage, and plan appropriate mitigation actions. Thus, a thorough risk management plan forms a solid foundation for the implementation of an effective risk management strategy, ensuring that every aspect of risk can be identified, assessed and addressed appropriately according to the company's needs.

2. Risk Identification

After planning the implementation of a risk management system, the crucial next step is carrying out the risk identification process. This process is based on an in-depth understanding of the various potential risks that may arise during the implementation of a project. Risk identification can be done through several approaches, the first is by analyzing the root of the problem from the source. By understanding the root of the problem, the team can identify risks that may arise at various stages of the project.

Apart from that, risk identification can also be done by checking the risk register based on experience from previous projects. This approach allows teams to learn from past experiences and recognize risk patterns that frequently emerge in similar contexts. Involving previous experience can enrich the team's perspective and enable more comprehensive risk identification.

In the risk identification process, it is important to involve the entire project team and relevant stakeholders. Team discussions and collaboration can bring out diverse points of view and broaden thinking about possible risks. This step will provide benefits in identifying risks optimally and comprehensively.

The importance of experience as a key factor in risk identification cannot be ignored. Experience is a valuable source of knowledge that can guide teams in recognizing potential risks that may have been overlooked. Therefore, leveraging experience from previous projects can enrich risk analysis and make the identification process more optimal.

Thus, the risk identification process is not only a technical step, but also involves elements of creativity and continuous learning. Through a holistic approach, teams can gain in-depth insight into the risks they may face, enabling the adoption of risk management strategies that are more effective and responsive to changes in the project environment.

3. Risk Evaluation

After the risk identification process is complete, the crucial next step is to evaluate the risks that have been identified based on the probability of occurrence and the associated potential losses. Recognizing the risk is not enough; It is also necessary to have a deep understanding of the extent to which these risks can affect the running of the business. Not all risks have the same degree of probability, and the potential losses associated with each risk can vary widely.

In evaluating risks, the probability of risk occurrence needs to be analyzed carefully. Some risks may have a higher probability of occurring than others. Understanding this probability level helps companies determine the extent to which these risks need to be anticipated or mitigated. Furthermore, evaluation also involves assessing the potential financial or operational losses that could arise as a result of the risk.

The importance of risk evaluation lies in a deep understanding of the possible impact on the business being managed. By evaluating risks, companies can determine priorities in managing risks and allocate resources more effectively. Risks that have a significant impact and high probability may require more intensive mitigation strategies, while risks with a low impact may be acceptable or addressed with simpler measures.

Through careful risk evaluation, companies can develop a more mature understanding of the scope of potential losses and identify the most effective steps in dealing with these risks. This is an important step in developing a responsive risk management strategy, which can help companies optimize opportunities and reduce threats that can affect business continuity. Thus, risk evaluation becomes the basis for informational and fact-based decision making in carrying out business operations more efficiently and effectively.

4. Mitigation Plan

Mitigation is a crucial cornerstone of risk management, representing plans and strategies to reduce the impact that may arise due to unexpected events. The main goal of mitigation is to minimize losses that the company may have to bear due to a particular risk. In an effort to achieve this goal, there are several mitigation techniques that can be applied, including risk sharing, risk transfer, risk avoidance, and risk reduction.

Risk sharing involves sharing risks between the parties involved, including business partners, stakeholders, or other parties who can contribute to overcoming risks. This approach allows companies to distribute liability and potential losses in a more even manner. Risk transfer, on the other hand, involves transferring risk to a third party, such as an insurance company. By transferring this risk, companies can reduce the direct impact of the risk on their operations and finances, while still paying insurance premiums as compensation.

Risk avoidance is the action of completely avoiding or stopping activities or situations that may pose a risk. While it can be an extreme option, there are situations where avoiding risk completely is the wisest move. Risk reduction includes concrete steps to reduce the probability of a risk occurring or reduce its impact. This could involve improving processes, introducing tighter controls, or investing in safer technology.

In planning mitigation, each of the techniques above will be applied with an appropriate approach to each risk event. The selection of mitigation techniques must be based on careful analysis and in-depth understanding of the characteristics of each risk. Thus, companies can take appropriate and proportional actions to maximally reduce the impact of risks that may occur.

Mitigation, therefore, is not just a backup plan, but rather an integrated and responsive strategy, enabling companies to manage risk more effectively and proactively.

5. Transfer risk

If the risk cannot be handled internally by the company, then the wise approach is to transfer the risk to parties who have the expertise and resources to handle it. One option commonly used to overcome risk is to involve an insurance company. Insurance companies can be strategic partners who help companies manage risks related to unexpected events such as theft, fire, damage, and so on.

In this context, insurance companies function as external risk stakeholders providing financial protection against possible losses. Through an appropriate insurance policy, the company can transfer the risk to the insurance company by paying a certain premium. If a risk event guaranteed in the policy occurs, the insurance company will be responsible for providing financial compensation in accordance with the agreed provisions.

The importance of involving an insurance company lies in its ability to help the company minimize losses that may become a significant financial burden. This way, companies can focus on core operations without having to worry about the financial consequences that can arise due to certain risks. However, choosing the right insurance company and policy is key in this strategy. Careful analysis of the type of risk faced, the premium charged, and the provisions in the policy are crucial steps to ensure protection that suits the company's needs.

By considering various risks that may occur, the company is able to develop a mature and responsive strategy to face increasingly tight market conditions. This effective risk management process not only serves as a shield against potential losses, but also as a guide that guides companies through unpredictable market dynamics. The company's courage to identify, evaluate and manage potential risks provides a significant competitive advantage. By understanding risk, companies can be more proactive in designing and implementing strategies that suit market demands. This is a strong foundation for achieving success in every step of the business. The importance of preparing for risk also creates a solid foundation for the company. By having a measurable strategy and a deep understanding of potential risks, companies can minimize negative impacts, thereby increasing the company's resilience and resilience in facing challenges.

CONCLUSION

Implementing an effective risk management strategy will have a positive impact on the long-term development of a company. A company's success in minimizing the risks associated with developing new products and acquiring funds can be the key to continued and significant growth in the market. In this context, implementing a good risk management system has an important role in helping companies plan smarter and more efficient business steps. This not only strengthens their position in the market, but also increases the potential for long-term business success by reducing uncertainty and mitigating the impact of possible risks. To avoid undesirable consequences, every company must adopt an effective risk management strategy. The first step in this effort is to plan risk management in accordance with the company's characteristics and needs. After that, the risk identification and evaluation process based on the probability of occurrence and potential loss becomes an important stage. Next, companies need to design appropriate risk mitigation plans and have readiness to transfer risks if internal capacity is insufficient. By

implementing appropriate risk management strategies, companies can reduce the impact of possible risks and develop themselves into successful business entities in a competitive market.

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