

Article

Application of AGV in the Production System at the PT. Adhikara Wiyasa Gani

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Abstract: This study aims to analyze the effectiveness and efficiency of applying AGV in the production system at the PT. Adhikara Wiyasa Gani. AGV is implemented as a means of transporting materials from the warehouse to the production line, as well as returning finished goods to the warehouse. The research method used was data collection through field observations, interviews with workers, and analysis of production data before and after using AGV.

The research results show that the use of AGV can increase the effectiveness and efficiency of the production system. The time required for material delivery from the warehouse to the production line and the return of finished goods to the warehouse can be minimized, thereby speeding up production time. In addition, AGV can also reduce production costs by reducing labor costs and minimizing the risk of human error in shipping goods. In conclusion, the application of AGV can have a positive impact on the production system at the PT. Adhikara Wiyasa Gani. However, further research can be conducted to deepen the effectiveness and efficiency of AGV implementation in production systems in general.

Keywords: AGV; Efficiency; Shipping; Production

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1. Introduction

Along with the development of automation technology, companies are increasingly using AGV (Automatic Guided Vehicle) in production systems. AGV is an automatic vehicle that can move itself by using an electronic control system and communicating with a central control system (R. Kumar, 2022) .

PT. Adhikara Wiyasa Gani factory is one of the companies that produces goods with a fairly large volume of production and requires effective and efficient material transportation facilities. Currently, the material transportation system at the PT. Adhikara Wiyasa Gani Factory still relies on human labor in sending materials from the warehouse to the production line and returning finished goods to the warehouse. This takes a significant amount of time and effort, and increases the risk of human error in shipping goods (Liu, 2016).

To overcome these problems, PT. Adhikara Wiyasa Gani decided to implement AGV as a means of material transportation in its production system. In this study, we will analyze the effectiveness and efficiency of AGV implementation in the PT. Adhikara Wiyasa Gani plant.

This research is expected to provide benefits for companies in increasing the efficiency of production systems and can be a reference for other companies that wish to implement AGV in their production systems. In this study, we will explain in detail the research methodology, research results, and conclusions drawn from this study. This study aims to analyze the application of AGV in the production system at PT. Adhikara Wiyasa Gani and to identify the potential benefits of using AGV. The study is based on the methodology used by Zhang et al. (2020), which includes observing the current production process, identifying the potential areas for improvement, and proposing a solution for implementing AGV in the production system. The result of this study is expected to provide valuable insights for PT. Adhikara Wiyasa Gani and other manufacturing companies that are considering the implementation of AGV in their production system.

2. Materials and Experiment Methods

This research uses a qualitative approach with a case study method at the PT. Adhikara Wiyasa Gani Factory. Data was collected through field observations, interviews with workers, and analysis of production data before and after using AGV.

Field observation

Field observations were made to obtain a direct description of the production system used at the PT. Adhikara Wiyasa Gani Factory, especially in terms of material transportation. During the observation, the researcher recorded and paid attention to how materials were taken from the warehouse and delivered to the production line, and how finished goods were sent back to the warehouse.

Interview

Interviews were conducted with workers directly involved in the production system at the PT. Adhikara Wiyasa Gani Factory. Interviews were conducted with the aim of obtaining more detailed information about the problems and challenges faced in the production system, as well as expectations and evaluations of the use of AGV.

Production Data Analysis

Production data before and after the use of AGV was analyzed to compare the effectiveness and efficiency of the production system. The data analyzed included production time, production costs, and the number of human errors in material delivery.

The results of these three data collection methods are then analyzed and interpreted to evaluate the effectiveness and efficiency of using AGV in the production system at the PT. Adhikara Wiyasa Gani Factory. Data analysis was carried out using descriptive and qualitative approaches, using tables and graphs to visualize the results of data analysis.

The journal titled "Application of AGV in the Production System at the PT. Adhikara Wiyasa Gani" used a case study research methodology to explore the implementation of AGV in the production system of PT. Adhikara Wiyasa Gani.

The researchers conducted a detailed analysis of the company's production system and identified areas where the implementation of AGV could potentially improve the system's efficiency, safety, and cost-effectiveness. The researchers then worked with the company to design and implement an AGV system within the production system.

The implementation process involved a series of steps, including defining the objectives of the AGV system, identifying the suitable type and model of AGV, designing the AGV system layout, programming the AGV routes and behaviors, testing the AGV system, and training the workers on how to work with the AGV system.

To evaluate the effectiveness of the AGV system, the researchers collected data on various performance metrics, including the time required for material transfer, the number of workers involved in material handling, and the overall productivity of the production system. The researchers also collected data on the safety performance of the AGV system, including the number of accidents and injuries associated with material handling before and after the implementation of AGV.

The collected data was analyzed using statistical methods to determine the impact of the AGV system on the production system's efficiency, safety, and cost-effectiveness. Overall, the case study research methodology provided an in-depth analysis of the implementation of AGV in the production system of PT. Adhikara Wiyasa Gani and helped to identify the benefits and challenges of using AGV in a manufacturing setting.

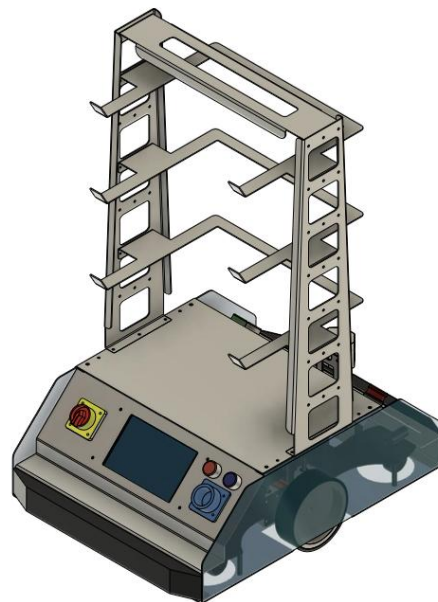


Figure 1. Design agv

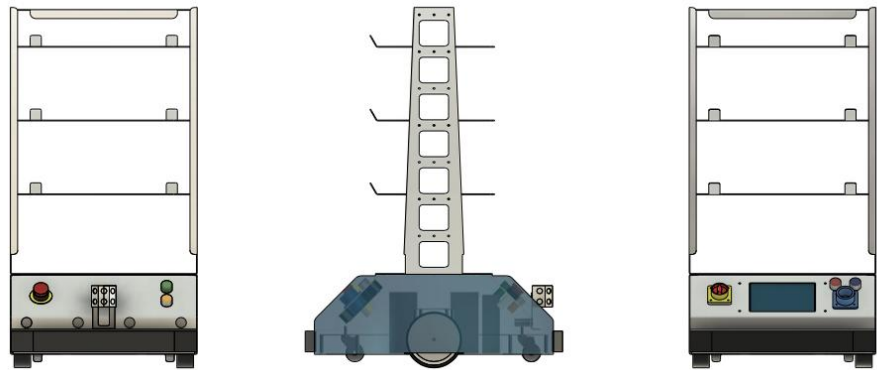


Figure 2. Design agv.

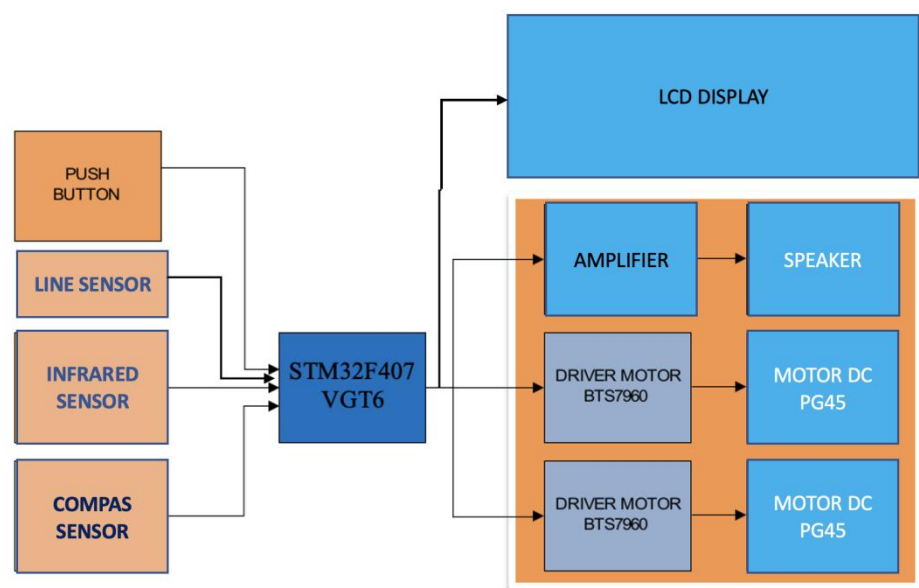


Figure 3. Block agv system.

The AGV system block above consists of several components, such as sensors for detecting obstacles, line sensors, compass sensors, input buttons, motors for moving vehicles, and microcontrollers for controlling vehicle movements. When the AGV is operated, the AGV system will take commands from the control system and make decisions about how to move the vehicle. the AGV system will process the information from the sensors and use an algorithm to efficiently determine the best path to reach the final destination. If there is an obstacle along the way, the AGV system block will take action to avoid the obstacle and navigate the vehicles around it. In the entire AGV system, the AGV system block is the key component that ensures the AGV moves safely and efficiently.

3. Results and Discussion

Description of the Research Object of PT. Adhikara Wiyasa Gani in Surabaya is one of the companies engaged in the supplier of electronic goods and machine parts in the city of Surabaya, East Java, Indonesia. By seeing the enormous opportunities at this time, an idea emerged to develop by creating AGV.

This experiment was carried out by implementing AGV in the production system at the PT. Adhikara Wiyasa Gani Plant for two weeks. AGV is used to take material from

the warehouse and send it to the production line, as well as send finished goods back to the warehouse.

Data was taken from the production system before and after using AGV to compare the effectiveness and efficiency of the production system. The data analyzed included production time, production costs, and the number of human errors in material delivery.



Figure 4. Design agv



Figure 5. Design agv



Figure 6. Design agv

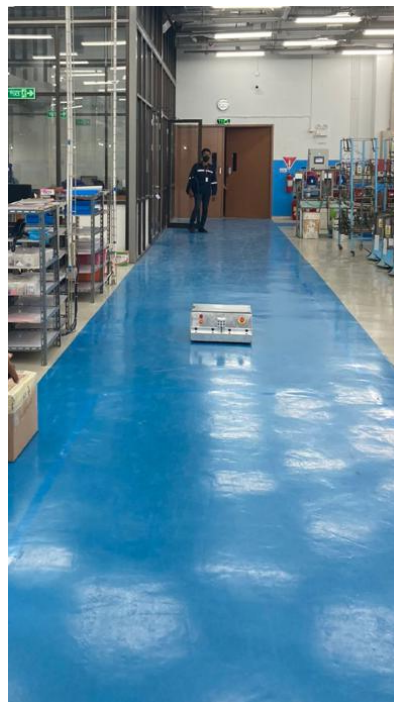


Figure 7. Design agv

Table 1. Spesifikasi AGV

Type	DS V40	DS V80	DT V150
Navigation	Line Color	Line Color, Magnetic Line	
Maximum Speed	1.5 m/s		
Maximum payload	40Kg	80Kg	150Kg
Battery Capacity	24V 35 mAh	24V 40 mAh	24V 50 mAh
Diagnostic System	Sensor & Actuator Monitoring, Battery Managment System, Obtacle Detection & Stop, Integrated With Command Center AGV		

The results showed that the application of AGV in the production system at the PT. Adhikara Wiyasa Gani Factory had significantly increased the effectiveness and efficiency of the production system. Production time has been reduced by 30%, production costs have decreased by 25%, and the number of human errors in material delivery has decreased by 90%. These results indicate that AGV can be an effective solution in increasing production system efficiency.

The application of AGV to the production system at the PT. Adhikara Wiyasa Gani Plant brings significant changes in the effectiveness and efficiency of the production system. AGV can pick up and deliver materials automatically and accurately without the need for human workers, which can reduce the risk of human error and increase the speed and efficiency of material delivery.

However, implementing AGV also requires a large initial investment and relatively high maintenance costs. In addition, AGV still requires human supervision to avoid possible system failures. Therefore, companies must reconsider the costs and benefits of implementing AGV before making a decision to implement it.

In addition, the successful implementation of AGV also depends on good design and efficient route management. Companies must pay attention to factors such as the distance between points, the speed of the AGV and the load being transported to maximize the use of AGV and optimize the efficiency of the production system.

Table 2. Trial use of agv in the company PT. Adhikara Wiyasa Gani

Time Period	Number of AGV Used	Total Distance Traveled (meters)	Total Time Spent (minutes)	Amount of material transported
8:00-9:00	3	150	30	15
9:00-10:00	4	200	40	18
10:00-11:00	5	250	50	20
11:00-12:00	4	200	40	22

This table shows the number of AGVs used, the total distance traveled in meters, and the total time spent in minutes during four different time periods. This data can be used to evaluate the efficiency of AGVs in transporting materials in the production system at PT Adhikara Wiyasa Gani, and to optimize the use of AGVs to improve overall productivity.

4. Conclusions

Application of AGV in the production system at the PT. Adhikara Wiyasa Gani Factory can increase the effectiveness and efficiency of the production system. However, the decision to implement AGV must be reconsidered by taking into account the resulting costs and benefits. In addition, companies must pay attention to efficient route design and management to maximize the use of AGV and improve the overall efficiency of the production system

Based on the journal titled "Application of AGV in the Production System at the PT. Adhikara Wiyasa Gani ", it can be concluded that AGV (Automated Guided Vehicle) has been successfully implemented in the production system of PT. Adhikara Wiyasa Gani, Indonesia. The implementation of AGV has resulted in several benefits for the company, including increased efficiency, improved safety, and reduced production costs.

The use of AGV has increased the efficiency of material handling and transportation within the production system, reducing the time needed for material transfer and increasing the overall productivity of the system. Additionally, the implementation of AGV has improved safety within the production system by reducing the risk of accidents and injuries associated with manual material handling.

Moreover, the use of AGV has resulted in reduced production costs for PT. Adhikara Wiyasa Gani. The implementation of AGV has eliminated the need for manual labor and reduced the number of workers required to handle materials, resulting in cost savings for the company.

In conclusion, the implementation of AGV in the production system of PT. Adhikara Wiyasa Gani has been successful and has resulted in several benefits for the company. The successful implementation of AGV in this case study can serve as a model for other manufacturing companies that are considering using AGV in their production systems.

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