

Your Guide to Warehouse Robotics

Executive Summary ·

This paper highlights the major driving forces for Warehouse Robotics investments, explores various costs associated with warehouse robots, and provides best practices for the successful roll-out of robots in the warehouse.

Driving Forces for Warehouse Robotics Investments

Today's warehouse and distribution leaders are focused on developing agile, speedy, and efficient fulfillment operations to meet their ever-evolving e-commerce customers. This focus has led to new challenges that are driving reliance on robots including:

- Need for Reliability, Flexibility and Scalability
- Labor Costs
- Safety Concerns

Cost Associated with Warehouse Robotics

Warehouse Robotics investment cost is the biggest challenge for robotics adoption [1]. This barrier is partly because of a lack of information on the various costs associated with Warehouse Robotics. To address this barrier, we highlight key cost components associated with two major categories: Capital and Operational.

- Capital Cost: The one-time fixed cost that will be incurred for installing robots in the warehouse.
- Operational Cost: The on-going expense related to the usage and maintenance of robots.

Warehouse Robotics Recommended Best Practices

Based on our industry experience, we provide the five best practices to enable the successful adoption of robots in the warehouse.

The whitepaper concludes with a readiness assessment to help leaders start the conversation on robots.

Global Warehouse Robotics Market

Robotics market encompasses Warehouse the deployment and maintenance of robots in the warehouse to perform tasks such as pick-place, packaging, transportation, packaging, and palletizing. According to the report published by Allied Market Research, the global warehouse robotics market was estimated at \$2.44 billion in 2016 and is expected to hit \$5.18 billion by 2023, garnering a CAGR of 11.6% from 2017 to 2023 [2]. The robots are helping with agile, accurate, reliable operations in the warehouse while increasing the warehouse storage space and operational efficiency. In the following sections, we will explore the driving forces for warehouse robotics adoption, the various costs associated with warehouse robots, and recommended best practices for seamless deployment of warehouse robots.



Driving Forces for Warehouse Robotics Investments

Warehouses are a highly dynamic and unstructured environment. Today's warehouse and distribution leaders are focused on developing agile, speedy, and efficient fulfillment operations to meet their ever-evolving e-commerce customers. This focus has led to new challenges that are driving reliance on robots including:

Need for Reliability, Flexibility and Scalability

• With the omnichannel expansion, customers have the flexibility to place orders from a variety of mediums. Warehouse leaders are continuously challenged to meet this dynamic and growing demand. Leaders conventionally have done a good job of planning for additional labor during peak season, but new consumers are changing conventional planning. A new product release, severe weather changes, a new marketing campaign push, or a pandemic like COVID-19 drastically changes the peak planning. In such times, the hiring of manual labor to support a one-off event is not monetarily viable or sustainable. On the other hand, robots can be quickly upscaled or reduced on the floor depending on the demands. Robots need minimalistic training hence they can be put in action quicker.



Labor Costs

- Warehouses are physically demanding workplaces. With a strong economy, warehouses are finding it
 hard to find a pool of applicants. Even when they find applicants, the turnover rate is so high that this is
 becoming hard for the hiring team to offset the hiring costs, along with training and onboarding costs.
 On average, labor costs have been increasing at a rate of 2-3% [3].
- Robots, on the other hand, are becoming affordable with the advancement in technology and an increase in service providers.



Safety Concerns

- According to OSHA, the fatal injury rate for the warehousing industry is higher than the national average for all industries. [4] This sole factor has been a driving force for warehouse safety leaders to explore robots that can do more dangerous or repetitive jobs, thereby reducing injury exposure for humans.
- Robots in warehouses are designed to keep safety as #1 priority. A triple-check safety feature developed by NASA and Carnegie Mellon triggers warehouse robots to shut-down/stop before making any human contact. [5] This feature is widely adopted in all warehouse robots.

Cost Associated with Warehouse Robotics

Now, as with any business investment, it is important to understand the cost factors involved while considering robots for warehouses. Warehouse Robotics costs can be divided into two major categories: Capital and Operational.

Capital Cost

- <u>Hardware Cost</u>: The cost of the actual robots and peripherals that will be installed in the warehouse. Consider this as an asset-based cost. Service Providers have flexible options like leasing or subscriptions for payment of hardware costs.
- <u>Installation Cost</u>: The cost associated with installing robots and peripherals in the warehouse. Consider this as a one-time service cost.
- <u>Facility Cost</u>: The cost associated with re-configuring or re-designing the facility so robots can operate. This cost usually depends on the facility and not every installation will need it.
- <u>Integration Cost</u>: Warehouse Management Systems drive work allocations to robots. Hence robots are needed to be integrated with Warehouse Management and Execution Systems. The cost of integrating robots to Warehouse Management Systems is a one-time cost for the successful implementation of robots. The Integration cost will be technology cost and cannot be skipped.

Operational Cost

• <u>Hardware Maintenance Cost</u>: As with any mechanical equipment, maintenance is needed to ensure its optimal working. Warehouse Robots usually have yearly maintenance cycles and "on-need-basis" in case of over-used during unexpected peaks. For a high-volume environment with many robots, hardware maintenance can require dedicated personnel and spare parts inventory to ensure minimal downtime.

- <u>Energy Cost</u>: Warehouse Robots need electricity and/or pneumatic power to operate. The consumption of energy is dependent on the usage hence the cost of energy is variable.
- <u>Software Maintenance Cost:</u> Warehouse Robots can be equipped with elementary software or fully functional execution software to support its' operation. There can be a yearly subscription/maintenance cost associated with using the software or a need to hire inhouse system admin for the software, that needs to be taken into consideration for cost calculation.



Warehouse Robotics Recommended Best Practices

As we consider the key factors driving warehouse robotics adoption and explore associated costs, the next step would be undertaking recommended best practices for rolling out robots in the warehouse seamlessly. We, at Bricz, recommend our clients to start their Warehouse Robotics journey with the five best practices outlined below:

Start Small

Leaders often drift towards the most complex task to automate but we recommend finding the low-hanging fruits to automate first. Leaders should identify processes that are underutilizing the workforce or have bottlenecks or are repetitive/dull and aim to address those processes systematically. For example – a picker waiting on the replenishment to complete or a packer manually applying a shipping label. Small victories help create business case for a larger investment.

Incremental Robotization

Warehouse Robotics project can be a sizeable investment for a company, so we recommend doing a proof-of-concept approach to it. Partner with your robot provider to implement an incremental plan with checkpoints along the way. Establish quantitative and qualitative KPIs with your partner for the process. If at each checkpoint, ROI is realized move to the next checkpoint. If not, identify the root cause and devise a corrective action. For example, in AMRs proof-of-concept, if unproductive travel time quantitative KPI is not reduced significantly, teams should identify the root cause and a devise a corrective action.

People Focus

In any robotics project, skilled warehouse operators play a vital role. Involve the workforce from the initiation phase. Let them help you identify key business use cases that will drive the most impact using robots. Then, upskill the workforce to learn the troubleshooting of robots to reduce robot downtime. Involving the workforce from the beginning and upskilling helps boost robots as enablers and not replacers.

Iterate for Improvements

Once an acceptable ROI is realized on the warehouse robotics system based on the established KPIs, iterate for improvements. An acceptable ROI can be a payback period of two years or a specific goal of productivity gain or higher space utilization, specific to your business goals. An important note when conducting robotics ROI analysis is to mind the difference between the payback period and the total value of impact created by robots. To enable a complete picture of robotic investments, many prefer to include the payback period and overall tangible and intangible business benefits and impact, both short and long term, in their ROI calculations.

Share your Success

This is one major step in gaining wide acceptance for Warehouse Robots as enablers and not replacers. With every incremental win, the pro-forma for Warehouse Robotics gets improved. This pro-forma can then be leveraged across your warehouse network to achieve fulfillment success.

Conclusion

The average robot price has fallen by half [6]. As a result, robots are becoming normal in warehouses. Robots are enabling agility, adaptability, and speed in fulfillment operations that a new breed of warehouse leaders need to meet the demand. The question for Warehouse Robot is not 'If' but 'when' should you implement? In the readiness assessment section below, answer three simple questions to start your Warehouse Robotics decision making journey.

Readiness Assessment

1) What size of SKUs do you plan Robots to handle?

- Pallets
- Cases
- Single Piece

2) What business problem you are trying to address with Robots?

- Improve Workplace Safety
- Reduce Operating Costs
- Improve Space utilization
- Improve Throughput
- Enable Innovation
- Improve Quality KPIs

3) What barriers do you perceive in your Robotics adoption?

- Facility Redesign
- Upfront Capital Investment Cost
- Support and Maintenance Cost
- Operational Disruption
- · Inability to integrate with existing software landscape
- · Workforce perception of robots as job replacers

Once completed, please call us at 678-753-7277 or email us at info@bricz.com to set up a time to review your unique business needs.

 Matt Leonard, (2019,July 9) "A third of supply chain pros use robotics, but cost and ROI remain barriers" Retrieved from https://www.supplychaindive.com/news/third-supply-chain-robotics--automation-cost-ROI-barrier/558290/
 Nikhil Dasyam, "Warehouse Robotics Market by Product Type (Fixed, Mobile, Gantry and Stationery Articulated Robots), by Function (Pick & Place, Palletizing & Depalletizing, Transportation, Packaging), and by Application (Food & Beverage, Consumer Electronics, Industrial Goods, Automotive, Healthcare, Defense, and Others): Global Opportunity Analysis and Industry Forecasts" Allied Market Research, (2017, July)

[3] U.S. Bureau of Labor Statistics (2020, June 1) Industry: Warehousing. Retrieved from

https://data.bls.gov/timeseries/CEU4349300003amp%253bdata_tool=XGtable&output_view=data&include_graphs=true [4] OSHA Worker Safety Series Warehousing. Retrieved from https://www.osha.gov/Publications/3220_Warehouse.pdf [5] NASA Spinoff. Autonomous Robots Take on Dangerous Warehouse Jobs. Retrieved from

https://spinoff.nasa.gov/Spinoff2018/ps_4.html

[6] Jonathan, Tilley (2017, September 7) Automation, Robotics, and the factory of the future Retrieved from https://www.mckinsey.com/business-functions/operations/our-insights/automation-robotics-and-the-factory-of-the-future