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What is the ROI in warehouse automation?

Warehouse automation is a hot topic, and ever more companies are investing in robots, shuttles, or other systems. But how can you calculate the time it takes to recoup such investments? Consultant Rogier Verhaar from Groenewout, a logistics consulting firm, answers this and other questions.

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In an attempt to make their operations faster and more efficient, an increasing number of companies are exploring options to automate their processes. The past few years have seen an enormous increase in the range of options. It is possible to start quite simply with a few autonomous mobile robots, but other solutions include compact storage systems like Autostore and highly dynamic shuttle-based order-picking systems. Prices also vary widely depending on the system chosen, so how can you calculate which investment will yield the greatest profit?

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Scenario analysis

Before making this calculation, we first need to understand the company's future outlook. What are its growth estimations, and how reliable are they? How many order lines will it need to process in three, five, seven, or even ten years' time? How much storage capacity is required? And what will the costs be if the company continues to use existing systems and processes? Or maybe it would be better to ask how many extra people and resources will be needed to process orders in the future. The answers to these questions determine the basic scenario.

The next question is: What would this scenario look if the company invested in automation? We can draw up a new scenario that includes not only the operational expenditure (OPEX) but also the capital expenditure (CAPEX) for each automation solution. Comparing these scenarios against the basic scenario will reveal the impact of the investment on operational costs. To put it simply, an automation solution becomes profitable when the capital expenditure is recovered as a result of savings on operational costs. The time taken to reach this point is called the payback period.

If you want to calculate how profitable an automation solution will be, you need insight into the operational costs.

- **Labor costs:**

The most important cost element is labor costs. The benefit of automation is that you will need fewer people. Many investments are recouped solely by saving on labor costs. Automation is becoming increasingly attractive, especially given the rising wages and shortages in the employment market.

For some companies, automation has become an absolute necessity because they can no longer attract enough employees. Being unable to fill job vacancies is obstructing business growth, and in some cases the lack of staff is even leading to declining turnover, simply because it is forcing companies to turn customers away. Such costs are difficult to quantify, but can be the deciding factor when choosing whether or not to automate.

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- **Other costs:** Needless to say, there are numerous other cost components.
 - These include **service and maintenance**, which may vary greatly for each automation solution. For example, does the company have its own technical department that can take care of service and maintenance, or does it rely on service engineers from its supplier? It is increasingly common for suppliers to station a maintenance team on the customer's premises when carrying out large, complex automation projects. Furthermore, it often makes sense to hold a range of spare parts in stock – but this also costs money.
 - Higher service and maintenance costs are offset by saving on the **cost of space**. Because automated storage systems take up less space than manual storage systems, companies using them need less space. Moreover, providing that their business premises are suitable for the new storage system and no initial expansion or adaptation is necessary, they will not need to expand so quickly in the future.
 - Another factor rapidly gaining importance is the **energy supply**. Although little is known about the energy consumption of automation solutions, the energy costs are negligible compared to the investment costs – especially in the case of large and complex projects. However, the annual energy bill for the entire warehouse may increase substantially, while the power grid in many parts of the Netherlands is already under pressure, with some provinces even imposing a ban on new or heavy-load power connections.
 - When comparing the scenarios, we also take the **Weighted Average Cost of Capital (WACC)** into account. This rate of return, determined by the company, includes the costs of financing because the money allocated to automation could of course also be spent on other activities.

Non-quantifiable factors

In addition to labor shortages and the energy issue, there are other factors that affect the decision to invest. These factors, however, are difficult to express in terms of costs. Examples include ergonomics and safety – two factors that are increasingly important now that it is becoming more difficult to recruit and retain staff. Another factor is quality. If this is important to you, it would be a good idea to eliminate human intervention wherever possible. This is an argument in favor of automation.

Another important factor is the business continuity. Every automated system is designed to minimize the risk and impact of downtime. Naturally, this risk cannot be eliminated completely. In one recent project, this was reason enough for the company to decide not to go ahead with a packaging machine, despite the short payback period. Above all, this company wanted to prevent any risk that disruption could mean orders would not be shipped on time.

It is wise to evaluate all these factors as the basis for drawing up a list of selection criteria. The next step is to test each solution against that list. This could be done by assigning a score for each criterion. Along with the return on investment, the total score would be another factor in the decision whether or not to invest.

Acceptable payback period

What constitutes an acceptable payback period varies from company to company. One common requirement for logistics service providers is that an investment in automation must be recouped before the contract with the client expires. Publicly listed companies or those owned by investment companies also tend to require short payback periods. On the other hand, family businesses tend to take a more long-term view and are generally willing to settle for a longer payback period.

The payback period may not be a problem in the case of a relatively limited investment. For a packaging machine, for example, this period is usually between one and two years. In contrast, the payback period when building complex, fully automated warehouses is often more than five years, although there are signs of a downward trend; the payback period is generally decreasing as labor costs rise and automation becomes cheaper. The expanding range of automation solutions is also contributing to this, as it is becoming easier for each company to find an optimal solution.

Scalable solutions

There is good news, however, for anyone who is still worried about the payback time: more and more solutions such as autonomous mobile robots can be easily scaled up.

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This allows companies to start with a relatively small system and expand it as necessary. Especially in today's unpredictable economy, this reduces the risk of being lumbered with an underutilized system in a few years' time if growth fails to live up to expectations.

When analyzing these various scenarios, it is important to take each solution's scalability into account. This means breaking down the investment costs over several years rather than just calculating them for the first year. These scenarios also show what capacity is needed at the start and when it would be best to scale up according to growth expectations. Scaling up does not always mean that extra storage or processing capacity is required; it can also mean that the system is used for 16 or 24 hours instead of eight, or that robots are only used during the peak season.

Financing options

Financing your automation project should not be a problem if you have a solid business case. Some companies can draw on their resources for this purpose, while others will have to approach the bank. Banks will often require validation of the business case by an independent party like Groenewout.

If you run into financing problems, you can discuss alternative financing arrangements, such as Robot-as-a-service (RaaS) or Picking-as-a-Service (PaaS), with your supplier or a financing-solutions company. In these cases, the automation system is not owned by the company itself; instead, the company pays a fixed amount per month, per order, or per pick. This means a reduced investment cost but higher operational costs. One additional advantage of this type of arrangement is that it places some of the responsibility for system performance on the supplier. However, such financing concepts are still relatively uncommon.

Would you like to discover the ROI in automation for your warehouse? At logistics consulting firm Groenewout, we use a calculation model that allows us to make a reasonably accurate estimate of the ROI or NPV of various automation solutions based on the company's data. This model quickly reveals which four or five solutions are worth looking into more closely. Rogier Verhaar is a logistics expert at Groenewout. Feel free to contact him at verhaar@groenewout.com.

About the author



Rogier Verhaar works daily on logistics optimization issues and the design, tendering, and implementation of mechanized and other concepts.

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