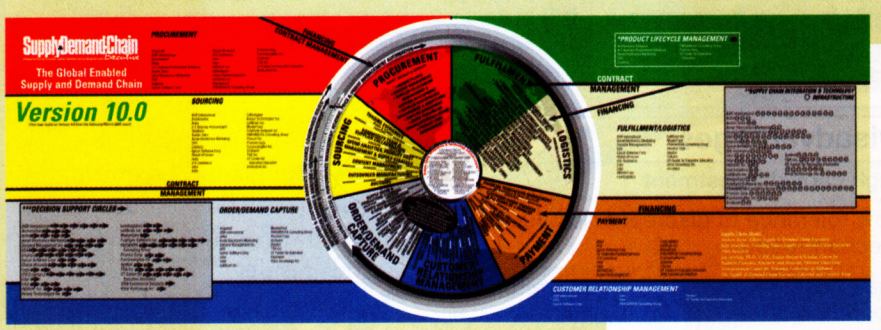

The Analyst Corner: Warehouse Management

Thinking about automating your warehousing operations? Take a strategic stance with this helpful guide.

By Ramez Rafla

Automating a warehouse can result in substantial improvements in productivity and in reduced costs. However, deciding whether and how to automate can be a complex decision. Each case is indeed quite different and competent help is required when taking on such an endeavor.

This article looks at the strategic side of automating a warehouse. Much of this content comes from our experience advising clients on how to improve their operations. We should caution decision-makers that independent and impartial advice is needed early in the automation process.

For our purposes we will consider the most common pallet automation system, namely the Automatic Storage and Retrieval Systems, or AS/RS. While they have been around since the 1950s, they have not yet found widespread adoption. These systems can completely automate the put-away, replenishment and pallet picking, resulting in a continuous 24/7 operation. More common in many industries is a hybrid AS/RS system, as shown in Figure 1, where pallet put-away and replenishment are automated, but case picking remains manual.

The typical business conditions that warrant automation are:

1. Standardized product sizes.
2. Labor costs exceeding $30/hour.
3. "Extreme" working conditions, such as in freezers.
4. High fixed costs, namely land and building.
5. Chronic labor shortage situations.

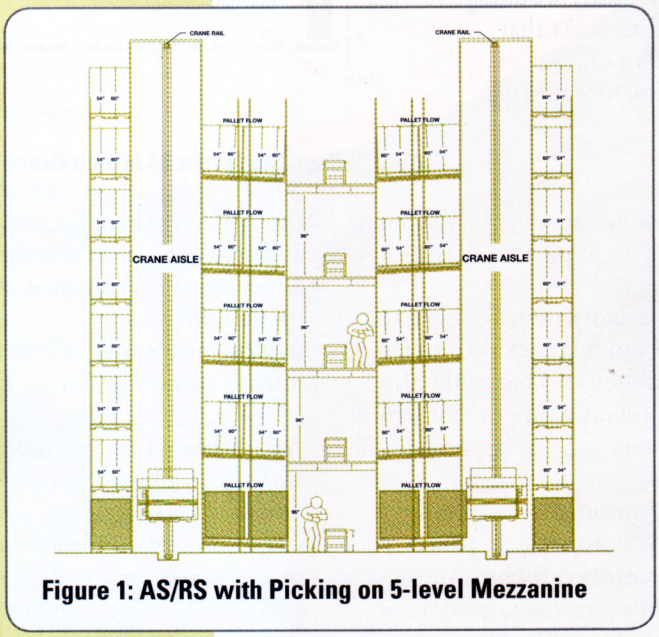

Figure 1: AS/RS with Picking on 5-level Mezzanine

Automation Costs

When deciding whether or not to automate, we should first start at the basic level of operations with a cost-benefit analysis.

In a crude form, we can express the cost-benefit analysis as: ***Savings in labor + Savings in land/building > Cost of equipment***

Competent help would be needed to specifically evaluate each element of that inequality and make a judicious recommendation about whether and how to proceed. This is also true in light of the many automation options available that will impact each cost element differently.

Advantages	Disadvantages
Reducing labor costs	High capital investment
Reduced forklift equipment and maintenance	Low tolerance to discrepancies due to mechanization
24/7 operation without overtime costs	Steep cost of downtime: the warehouse operation comes to a complete halt
Typically, automated warehouses are rack-supported	Reduced flexibility of the warehouse
Reduced product damage and improved inventory accuracy	Higher maintenance costs than typical lift trucks.

Figure 2: Advantages and Disadvantages of Warehouse Automation

From our experience, we often see that the building footprint is not reduced as drastically as initially expected. Furthermore, in hybrid facilities, the savings in labor are mostly concentrated in the replenishment and put-away, which are typically 25 percent of total labor cost. If the automation does not extend to picking – about 55 percent of costs – then the savings expectations would be lower. The exorbitant costs of equipment could very easily tilt the balance back towards conventional operations.

A more complete cost-benefit analysis can take the form of an Internal Rate of Return (IRR) analysis. The IRR simply identifies the point at which the expenditure will be profitable. In the case study of Figure 3 we set the hurdle rate at around 12 percent. The resulting total compensation per individual of about $61,000 (i.e. about $30/hour) would be needed to justify the expenditure. At that point, a Net Present Value (NPV) of just over $10 million would make the investment worthwhile.

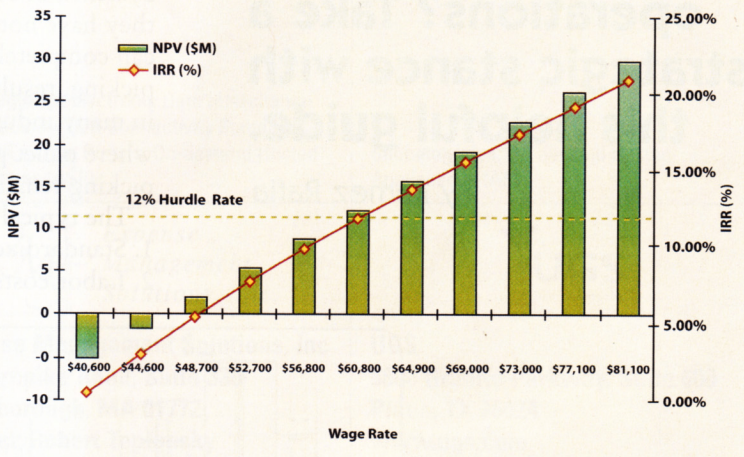

Figure 3: Case Study of a $4 billion Grocery Retailer – IRR versus Wage Rate

Impact on Operations

An issue like automation cannot be thoroughly addressed without a careful look at the direct impact on day-to-day operations.

First, automated warehouses are often rack-supported, which reduces the flexibility of moving racks around and for future re-slotting of the warehouse. This could also affect the resale value of the warehouse due to that loss in flexibility. Not all potential buyers want or appreciate the benefits of automation.

Secondly, because of the way automation works, it reduces the slotting efficiency. For instance, pallet replenishment for case picks becomes difficult. Automated warehouse operations need to allocate a second slot for full-pallets to avoid dealing with "partial" pallets in an older position. The cost per item or case picked therefore increases, offsetting building gains due to automation.

Finally, as a single crane serves many replenishment positions, long, tunnel-like aisles would interrupt a crane's "working zone," requiring more capital investment in cranes. For manual picking, this results in a decrease in productivity as pickers have to travel the complete aisle. Balancing productivity and cost can quickly become quite intricate.

Conclusion

This brief article is intended to introduce the main concepts to consider for warehouse automation. While the common idiom is that technological advances bring cost savings and improved operations, AS/RS systems have not seen wide adoption due to their many disadvantages. Only a thorough operations audit, along with a strategic view of the business environment, combined with careful financial analysis, can reveal whether it's a judicious choice, as well as provide recommendations on the kind of automation needed. Many shy away, leaving money on the table, while others realize a mistake too late. Whatever you are leaning toward, don't do it alone.

About the Author: *Ramez Rafla is an Operations consultant at KOM International, which focuses its expertise on supply chain strategy, distribution center design and layout, improving existing distribution operations, supply chain technology solution selection and implementation, and warehouse and transportation management consulting.*