



Navigating Technology Transformation: An Intelligent Approach to Warehouse Automation

Guided by business objectives, informed by operational assessments, measured by financial impact

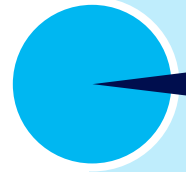
Executive Summary

Warehouse operators are evaluating ways they can transform their facilities to meet increasingly aggressive performance demands in today's labor-constrained environment. Front-and-center is the allure of mobile robotics due to their flexibility, scalability and limited infrastructure requirements. However, automation adoption does not guarantee performance success, as exemplified by the numerous automation projects that failed to meet business objectives.

To maximize success, we recommend a holistic approach that is guided by business objectives, informed by robust operational assessments and measured by financial impact. A comprehensive evaluation across the people, process, and technology framework is essential to obtaining a thorough understanding of current processes and improvement opportunities. Establishing efficient manual processes ensures that current resources are optimally utilized -- increasing current productivity while intelligently directing future automation efforts toward areas that will most benefit from the capital outlay.

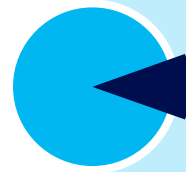


A large apparel retailer utilized this approach and achieved the following benefits:



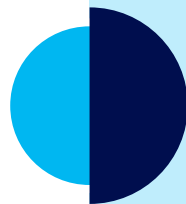
4%

overall efficiency gain through process engineering



11%

increase in efficiency through a labor management program



50%

improvement in the picking and packing process from the targeted application of AMRs

Key takeaways

- Siloed approaches to automation deliver improvements in one area at the expense of performance in another.
- Labor savings are the primary source of ROI for automation projects, but a skilled workforce remains essential to many warehouse functions.
- A holistic approach to warehouse transformation provides immediate benefits, directs automation adoption toward areas that will deliver the greatest ROI and establishes a foundation for continuous improvement.
- Maximum ROI is achieved through an emphasis on process flows, interdependencies and resource utilization.

Case in point

A large apparel retailer embarked on a warehouse transformation project, beginning with a holistic evaluation of its operations across all major functions within warehouse. This assessment laid the groundwork for a strategic roadmap targeting improvements in facility layout, process redesign, labor optimization, automation adoption and fostering a culture of continuous improvement. The initial phase delivered a 4% overall efficiency gain through lean methodologies and process engineering. The subsequent introduction of a labor management system (LMS) with performance incentives drove a further 11% increase in efficiency. Finally, a remarkable 50% improvement within the picking and packing processes stemmed from the targeted integration of autonomous mobile robots (AMRs).

Introduction

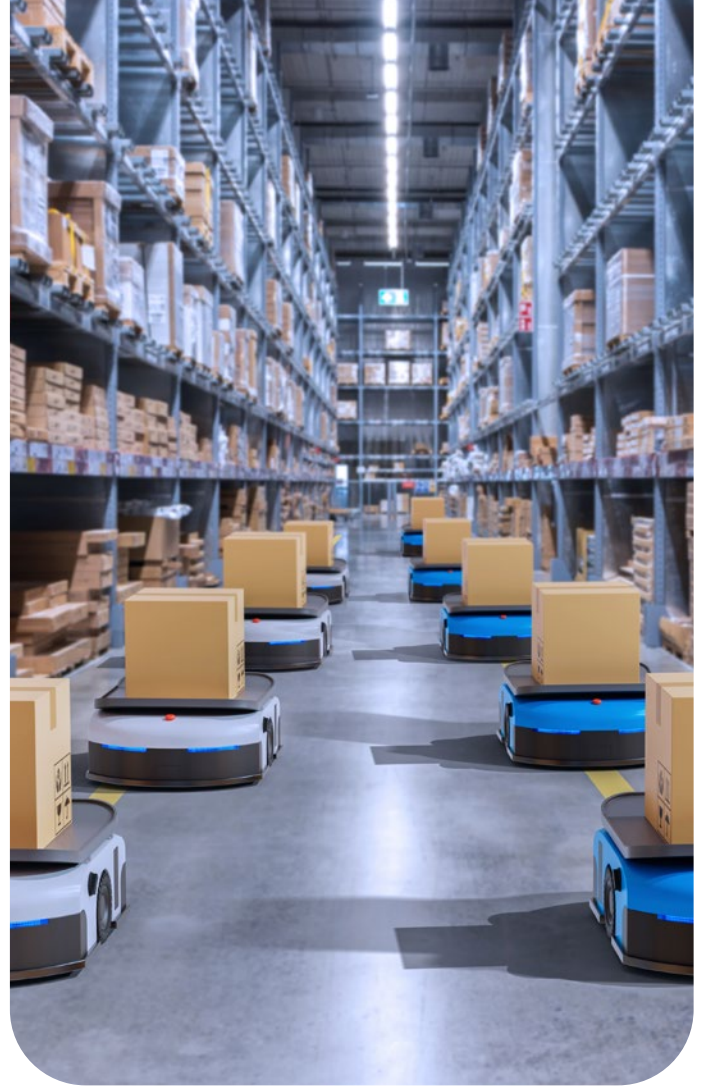
Increasingly complex workloads are putting intense pressure on today's warehouses. Higher numbers of SKUs, additional processing steps, and more frequent shipping cut-offs require greater agility and increased productivity. These intense pressures began in direct-to-consumer warehouses and then spread to store replenishment, distribution and 3PL operations. Subsequently, the heightened demand for scarce warehouse labor placed upward pressures on wages and increased labor turnover rates.

Managers of brownfield facilities are looking for ways to transform their operations to meet these aggressive demands. Front-and-center is the allure of robotics and other forms of warehouse automation. However, disruptive large-scale projects are a poor fit for these facilities because of their long lead-times, physical infrastructure requirements and the need to maintain operational continuity. In contrast, autonomous mobile robots (AMRs) and automated guided vehicles (AGVs) are often seen as a natural fit due to their flexibility, scalability, and limited infrastructure requirements.

The promise of warehouse automation

The trade press and industry events have produced an abundance of success stories that describe the productivity benefits from warehouse automation projects. These stories tend to center on the system or subsystem's mechanical performance and the beneficial results from adoption. Meanwhile, contextual information such as process reengineering and change management efforts remain opaque. To be clear, the mechanical performance of robotics and automation is essential to success. However, there are also many mechanically sound warehouse automation projects that fail to meet their business objectives -- indicating that mechanical performance by itself does not determine success. The root cause of these project shortcomings can be categorized into two broad groups:

- Misalignment between automation performance and future business needs
- Myopic approach to automation adoption



Misalignment can result from a flawed business plan that inaccurately forecasts throughput volumes, fails to account for handling requirement variations, or misinterprets equipment capabilities. Recent large project cancellations by prominent online retailers are the most notable forecast-driven misalignments^{1,2}. However, there are also many lower profile examples that occur in stable macroeconomic environments.

Companies that deploy automation in brownfield facilities typically focus on specific process areas or subsystems within the warehouse. A narrow or short-sighted approach to these projects can deliver process improvements in one area at the expense of performance in another. The end-result is misdirected investments, limited potential and suboptimal performance. These outcomes are informally described as “trading automation for labor,” “automating bad processes” or “exchanging operating expenses for capital expenditures.”

¹ KION Group Q3 2022 earnings press release

² Warehouse Automation: Top Five Factors Impacting Adoption

To maximize success, we recommend a holistic approach that is guided by business objectives, informed by robust operational assessments and measured by financial impact. The essential elements for success include the following:

- Clearly defined business objectives
- Holistic approach
- Comprehensive operational assessment
- Emphasis on process flows and interdependencies
- A continuous improvement mindset
- Financial impact analysis

A holistic approach guided by business objectives

Despite the excitement surrounding emerging technologies, companies must carefully construct robust business cases to objectively evaluate warehouse investments. Sound financial analysis of capital projects is based on incremental cash flows relative to the “current state” — typically a manual operation supported by equipment such as pushcarts, forklifts, tuggers, etc. Labor accounts for the highest variable cost in these operations, with picking being the most labor-intensive process. As a result, a large percentage of return on investment (ROI) is derived from automating low-value tasks that free up worker time to perform higher-value activities. The improvements are often measured as productivity per unit of labor. Put differently, successful automation projects substantially increase process efficiency and worker productivity. This fundamental fact can be obscured by project details but remains critical to successful warehouse transformations.



Costs



Labor:



55 — 70%
of total warehouse costs



Picking and packing:
~55 — 60%
of labor cost



Loading and shipping:
~10 — 15%
of labor cost



Assess current performance

A holistic evaluation of people, processes and technology is essential to obtaining a comprehensive understanding of current practices and improvement opportunities. Companies that establish efficient manual processes obtain immediate productivity benefits and valuable insights that direct future automation investments toward options that provide the greatest financial benefit (DSC)³. In contrast, a company that compares potential automation productivity to inefficient manual processes will artificially inflate the gains from automation, potentially leading to a misallocation of capital.



Identify and quantify improvement opportunities

Interdependent processes

A comprehensive assessment can identify process improvement opportunities within and across functional areas. A process flow perspective identifies the ways in which one activity impacts the cost or performance of complementary steps within the broader system⁴. This approach uncovers opportunities to better coordinate tasks, sequence activities and implement more effective methods.

Labor and methods

Warehouses that conduct detailed observations of the numerous activities that are performed frequently throughout a shift can uncover widespread inefficiencies. Although the discrete steps may appear minimal when viewed in isolation, small improvements across a high volume of activities can deliver substantial overall improvements. Examples include poor ergonomics, excessive transition moves, and other inefficiently designed material handling and indirect work.

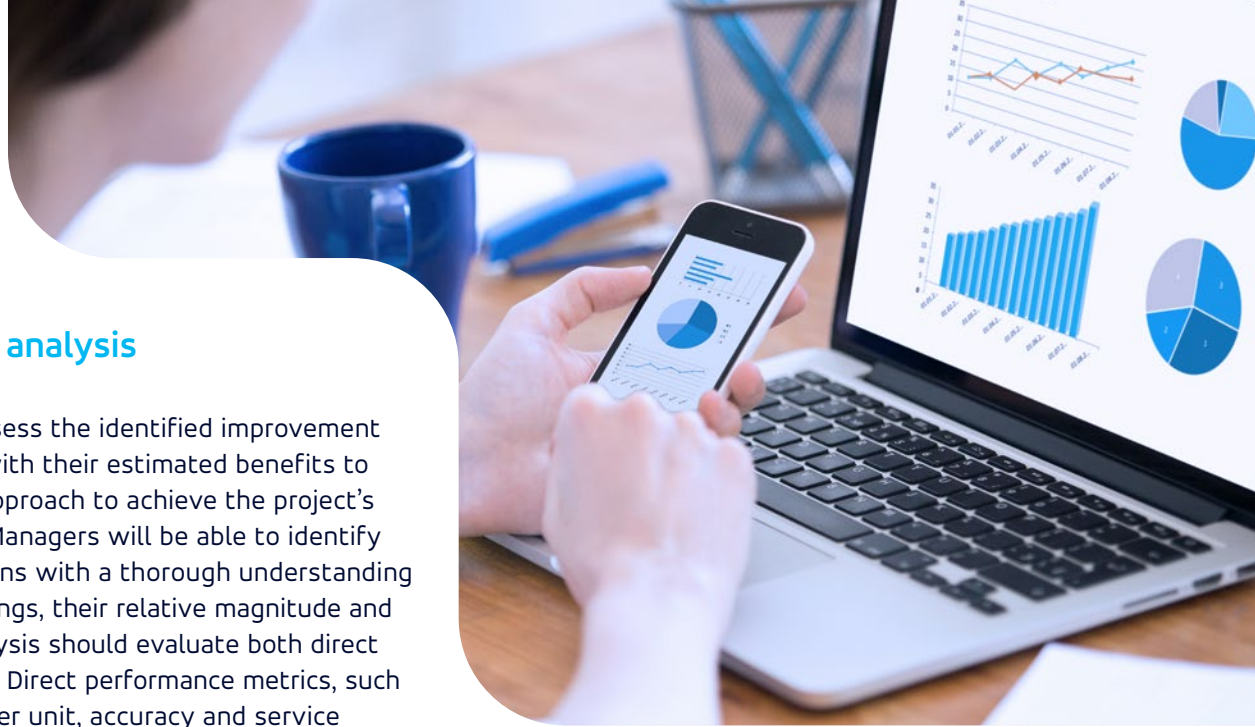
Best practices and preferred methods can be documented and deployed within the facility to increase labor performance and worker safety. Meanwhile, companies can introduce labor standards as a benchmark for comparison across warehouse functions, shifts and time. These insights then enable managers to easily identify gaps in utilization, labor-intensive tasks and improvement opportunities.

Adaptability and continuous improvement

Approaching the assessment with a long-term perspective addresses the ongoing management necessary to maintain and extend performance improvements into the future. Introducing a continuous improvement mindset can instill performance improvements into the organizational culture — enabling ongoing productivity enhancements. Meanwhile, process improvements and the efficient orchestration of warehouse activities can be managed and scaled with the intelligent application of technology.

³ DSC Logistics Sees 20% Decrease in Variable Labor Costs

⁴ How Genco's Labor Management Project Uncovered Extensive Opportunities



Financial impact analysis

Companies should assess the identified improvement opportunities along with their estimated benefits to determine the best approach to achieve the project's business objectives. Managers will be able to identify the high-impact options with a thorough understanding of the sources of savings, their relative magnitude and timing. A holistic analysis should evaluate both direct and indirect activities. Direct performance metrics, such as throughput, cost per unit, accuracy and service levels should be assessed along with secondary considerations, such as training and installation costs, facility modifications, integration efforts, operational downtime, and scalability options.

The performance enhancements from process redesign, improved coordination of activities and more efficient deployment of labor may exceed expectations and satisfy the project's short-term requirements. These improvements can then be extended and maintained with an ongoing continuous improvement program. More likely, the manual process improvements will reduce the performance gap, and the scale of automation required. For example, a facility that previously projected a need for a goods-to-person system may achieve the same performance level with a less-costly and more adaptable AMR solution.



Technology enablement

The proper application of technologies supports the effective implementation of process changes, management of continuous improvement programs and integration of warehouse automation into existing processes. Performance enhancing hardware ranges from hands-free ring scanners to large-scale AS/RS systems. Similarly, software such as labor management systems provide visibility into performance improvement opportunities and the mechanisms to scale procedures and manage continuous improvement programs.

Companies that introduce warehouse automation into their operations must perform integrations with the warehouse management system to enable coordinated and automated execution of warehouse tasks. While travel time minimization is critical to manual warehouse efficiency, capacity utilization is essential to capturing the productivity benefits from automation. When managing a hybrid environment, it is essential to maximize the utilization of both labor and automation. This is best achieved with a warehouse execution system that utilizes real-time insights into workloads, resources and capacities to maximize overall warehouse performance.



Case Study:

The power of strategic automation planning

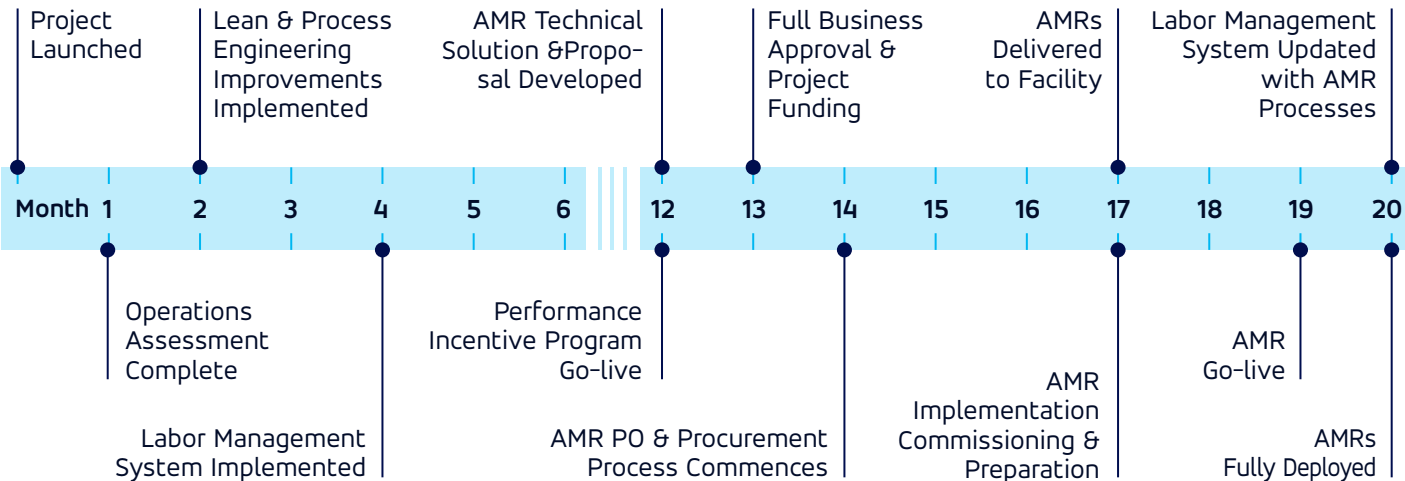
A large apparel retailer embarked on a warehouse transformation project, beginning with a holistic evaluation of its operations. The company assessed existing workflows with an eye on opportunities for targeted improvements. This evaluation spanned multiple productivity factors across all major job functions within the warehouse. By identifying and measuring opportunities for improvement, they developed a clear understanding of areas needing attention and the ability to prioritize the enhancements with the greatest impact.

They pinpointed several enhancement opportunities from the analysis of process flows and interdependencies. Examples of enhancements include the introduction of an optimized put-away strategy, task interleaving during replenishment processes, e-commerce batch picking with put-wall consolidation and layout adjustments to improve travel sequences. These modifications collectively boosted productivity through an overall travel reduction of almost 25%.

The company also identified many opportunities to introduce more efficient work methods through detailed observations of discrete activities. The use of 5S (a lean methodology targeting an organized workplace) and a focus on eliminating the seven types of waste (commonly referred to as TIMWOOD) highlighted inefficiencies that cost time, money and resources.

The resulting enhancements include the addition of a ring scanner for all RF users to reduce unnecessary steps in frequently performed activities, the installation of a mounted scanner at the pack station to streamline the packing process and redistribution of slotting across pick levels to maximize use of the golden zone in the

Transformation Project Timeline



e-commerce fulfillment area. Picking efficiency was maximized by organizing these items based on order affinity. This strategy also enhanced ergonomics by reducing the need for bending and reaching. As the frequency of each-picks continued to rise, the improvements in overall efficiency became even more pronounced.

Furthermore, the analysis of transactional time gaps in the WMS provided insights into low utilization levels and led to the identification of the root causes. The company subsequently identified effective methods to increase utilization and workforce productivity. The quantification of these proposed enhancements correctly indicated that increased labor utilization would deliver substantial performance improvements.

Leveraging labor management

This apparel retailer implemented a labor management program to support visibility into workforce performance at this large distribution center. The analysis and documentation of discrete tasks uncovered time utilization by activity category, provided benchmarks for reasonable performance expectations, and insights into performance improvement opportunities. Furthermore, these insights contributed to the development of a labor staffing model that analyzed demand for specific time windows and uncovered opportunities to better align labor scheduling with workload requirements. Finally, they introduced a change management program involving leadership and hourly associates that included performance incentives to boost employee engagement and morale.

Uplift from AMR adoption

The optimized processes paved the way for a strategic AMR deployment that targeted high-impact areas like picking and packing. Insights from the prior process improvements justified the adoption of AMRs. The robots automated repetitive tasks, reduced manual labor, and allowed workers to focus on higher-value activities. The AMR processes were seamlessly integrated into the existing labor management system, enabling real-time coordination and fostering a culture of continuous improvement.



Performance results

The initial phase of the transformation delivered an approximate 4% overall efficiency gain through lean methodologies and process engineering. The subsequent introduction of a labor management system (LMS) with performance incentives drove an additional 11% increase in efficiency. This was achieved by optimizing workforce management through improved scheduling, setting clear performance benchmarks, and enhancing employee productivity and engagement.

Finally, a remarkable 50% improvement within the picking and packing processes stemmed from the targeted integration of autonomous mobile robots (AMRs). Focused specifically on these high-impact areas, AMRs automated essential tasks, significantly reduced manual labor and accelerated order fulfillment. This deployment was guided by insights and efficiencies from earlier stages, ensuring a seamless integration into the previously enhanced operational environment.

Collectively, these initiatives resulted in a 26% overall operational benefit, underscoring the effectiveness of strategic alignment and comprehensive execution. By enhancing the coordination between human and robotic resources, the transformation not only elevated the efficiency of picking and packing but also improved overall workflow effectiveness, showcasing a successful transformation of the operation.



Savings and ROI



15%



savings from labor management + process engineering



11%



savings from AMR solution



26%



total savings

Total five-year benefit:

\$7.5M

Total five-year investment:

\$4.0M



Top 5 Things You Can Do Now

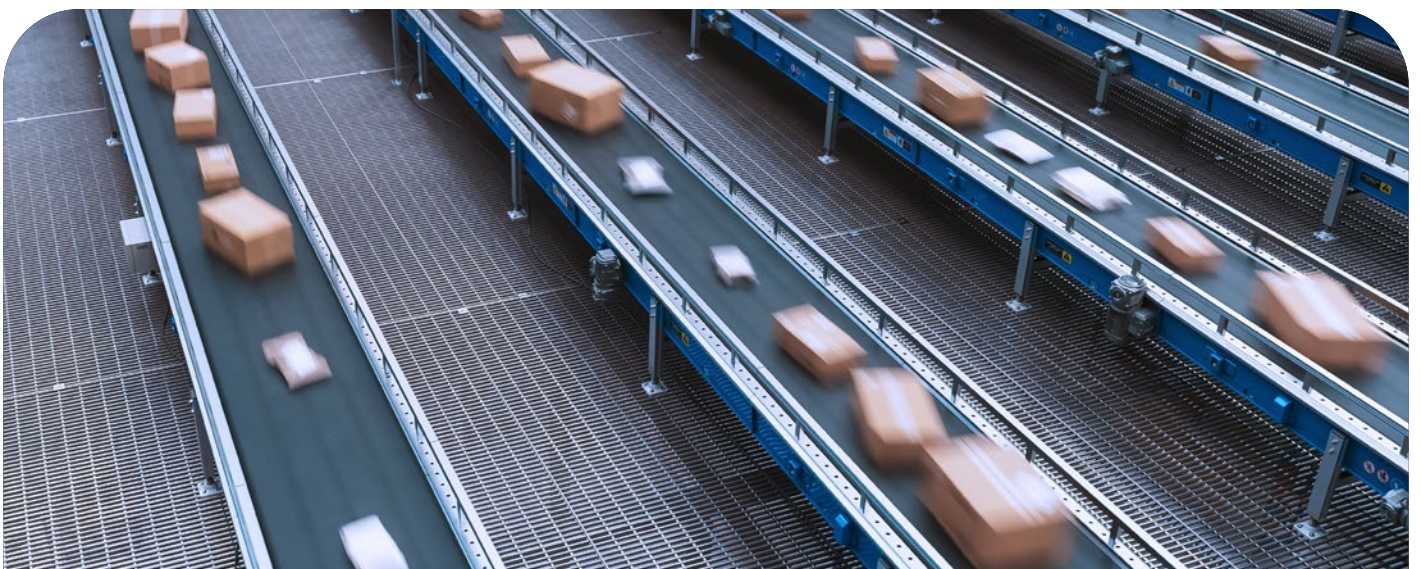


- 1** Develop a business case with clearly defined objectives that creates organizational alignment and establishes operational and financial success metrics.
- 2** Learn how Connors Group leverages deep industry and industrial engineering expertise that leverages the integration of people, process and technology to enable clients to achieve an optimal state of operational excellence.
- 3** Discover how Connors Group unlocks maximum ROI through an emphasis on process flows, interdependencies and resource utilization.
- 4** Find out more about how Blue Yonder's comprehensive Warehouse Labor Management solution improves workforce productivity while encouraging continuous improvement.
- 5** Learn how Blue Yonder's comprehensive set of Warehouse Solutions enables maximum resource productivity in manual, hybrid and automated facilities -- supporting your journey with the ability to balance an ideal mix of labor and automation.

Conclusion

The accumulating portfolio of robotics and automation success stories has become self-reinforcing, at times without proper due diligence or consideration for long-term applicability and business fundamentals. A narrow or short-sighted approach to these projects can result in an improvement to one process at the expense of performance in another. The end-result is misdirected investments and suboptimal performance.

To maximize success, we recommend a holistic approach that is guided by business objectives, informed by robust operational assessments and measured by financial impact. As a case in point, a large apparel retailer utilized a holistic approach that provided rapid returns, sustainable process improvements and targeted investments that maximized return on investment.





About Blue Yonder

Blue Yonder is the world leader in digital supply chain transformation. Retailers, manufacturers and logistics service providers worldwide rely on Blue Yonder to optimize and accelerate their supply chains from planning through fulfillment, delivery, and returns. Blue Yonder's AI-driven supply chain platform and multi-enterprise, multi-tier network enable more accurate forecasting and dynamic management of capacity, inventory and transport. Blue Yonder helps businesses navigate modern supply chain complexity and volatility with more resilient, sustainable supply chains to delight customers, scale profitably and run flawlessly.

About Connors Group

Founded in 2008, Connors Group is a management and industrial engineering consultancy committed to helping clients achieve measurable, sustainable operational improvements. Specializing in human capital management and workforce productivity, they deliver long-term success through proven methodologies and extensive field experience. Serving industries such as retail, supply chain, manufacturing, QSR, public sector and healthcare, they are dedicated to improving operational efficiency, driving financial performance and creating positive employee experiences. With an average 7.25x ROI on over 1,000 successful projects globally, Connors Group remains a trusted partner for clients looking to enhance productivity and workforce management.

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