

Supply Chain Distribution Trends in an Improving Economy

An improving economy gives businesses an opportunity to reassess their strategies, plans and tactics as well as the impetus to tune up their operations.

Introduction

As paradoxical as it may seem, the cloud of a deep recession followed by a prolonged period of uneven recovery can have a silver lining. While the economic recovery generally has been modest, some market sectors are seeing robust growth.[1] Improving conditions present a prime opportunity for business executives to strategize and rejuvenate their organizations. Many, if not most, companies have postponed major investments in supply chain improvements, but they may find that now is a propitious moment to re-evaluate the role their activities play in elevating the customer experience… in creating an even greater competitive edge. Their challenge is to continue transforming the distribution function into a core competency; their objective is to create fulfillment operations that leverage new and existing technologies to achieve a competitive advantage. While leveraging distribution for competitive differentiation is hardly a novel topic, those who are beginning to evaluate supply chain improvements are finding an exciting array of new tools and techniques to support their analysis and decision making.

This paper discusses four trends that are emerging as best practices with the potential to transform the way supply chain managers use technology and leverage operations intelligence to optimize their distribution facilities and networks:

- Operations are relying on data mining, predictive analytics, and performance metrics to more intelligently forecast business conditions and plan improvements in the supply chain – often enabled by enhanced, next generation warehouse control system (WCS) software.
- WCS is being asked to help companies make the transition from manual processes to automated, intelligent systems while also providing insight and capability to manage virtually every aspect of the distribution operation. In many cases, emerging mid-market companies are asking their (WCS) software to do more in expectation of delaying or avoiding the major investment in a warehouse management system (WMS).
- Operations are also taking advantage of the growing use of simulation, not only to evaluate the impact of automation integration and volume/capacity throughput changes, but also to perform real-time testing to optimize daily workflow.
- Businesses are employing more sophisticated network analyses through the use of custom modeling in the planning, design and implementation of the distribution network to provide a better customer experience while at a minimum, containing, if not reducing costs. Custom modeling offers maximum flexibility to account for any scenario, rule or constraint in choosing the optimal distribution center network. This sophisticated approach guides the strategic use of capital for network expansion, network consolidation, facility refurbishment and software investments.

1. For the first quarter of 2012, the U.S. Commerce Department reported economic growth of 2.2 percent as compared to 1.7 percent for all of 2011. The U.S. economy has been growing for 11 quarters since the recession officially ended in mid-2009, and quarterly growth has averaged 2.4 percent. During 2012's first quarter, consumer spending increased by 2.9 percent, while business investment declined by 2.1 percent.

Brain(y) Operation

Enterprises are more frequently relying upon real-time metrics and predictive analytics, generated from the DC's various operating systems, to uncover shifts in market or product mix and predict long-term business requirements. Information aggregation and analysis from warehouse systems – most notably enhanced WCS platforms – can drive both tactical and strategic decisions at the operations and management levels.

At the strategic level, for example, the WCS contains detailed order and shipping information that can be summarized to weight and volume by destination zip code … the basis for evaluating whether regional trends are emerging. This data can be easily accessed and used as critical input for supply chain network adjustment or expansion decisions. In addition, daily throughput/capacity data, combined with built-in trend analysis capability, allows warehouse operators to take a proactive stance on future planning of material handling system upgrades, network changes or facility expansions.

At the tactical level, the WCS can provide real-time tracking of cartons, lines, and pieces and detect full line conditions (i.e., bottlenecks or constraining conditions) and out of balance work zones. These capabilities provide warehouse operators the ability to confidently identify conveyor or automated control issues relative to throughput requirements, so planning and implementation of DC upgrades is accurate and appropriate for operating conditions.

By leveraging more data from their systems, DC operators are able to anticipate business changes, resulting in smarter investments, better returns, and the ability to quickly capitalize on dynamic market conditions.

An Agent of Change

Outside of automation, it is arguable that nothing has had as great an impact on the supply chain industry than the application of next generation WCS software. Over time, WMS software has shifted from core warehouse and distribution functionality to focus more on the broader-based management and planning requirements of the warehouse. In the meantime, WCS now routinely controls the daily transactional processes of real-time control of equipment and labor in highly automated systems. In effect, today's WCS augments the WMS by filling in functionality gaps or providing secondary WMS tasks in a manner more customized to a specific operation's requirements. For example, next generation WCS could be leaned on to drive efficient unload/receive/check-in/inspection processes where an existing ERP or legacy WMS is found lacking in these functions. Such custom approaches to using WCS can increase workflow flexibility, operator productivity and throughput.

Next generation WCS offers a facilities-centric solution by operating as an ultra-thin, high-speed service bus. This highly configurable, modular software addresses the DC's most essential requirements for automation, scalability and agility, allowing businesses to postpone or even avoid the investment in WMS. Essentially a lean technology, platform-neutral WCS software provides warehouse owners access to automation integration; real-time metrics, analytics and diagnostics; workflow balance; auxiliary processing functions; and increased visibility.

Using easily configured and modular adapters or agents, WCS software allows new islands of automation to be quickly and simply deployed when needed as well as:

- Message decomposition and translation
- Multi-directional communication and orchestration
- Viable upgrade paths for all warehouse management systems
- Long-term scalability of operational systems

Based upon standardized and field-tested modules, next generation WCS software has proven to be highly dependable, unfailingly reliable and easily adaptable.

Testing Before Investing

And while exploiting data from WCS and other systems helps uncover trends and predict future business requirements, prudent managers are also testing their operations' expected performance under the multitude of potential business scenarios before making significant investments in new or upgraded DC systems to meet these demands. Simulation software can help DC operators accurately forecast system performance by creating "real" conditions that strain every element of the automated warehouse – from conveyor systems to system data flows to WCS integration. Done effectively, simulation uncovers the true capacity of a distribution system, taking into account both hardware and software constraints.

To do this, it is essential that simulation software be applied in a manner that integrates hardware performance and the material handling and WCS software. An effective simulation will:

- Validate the material handling system design by checking every decision point, routing and diverting scenario
- Verify the true capacity of the system by: incorporating intelligence from the WCS about current and projected volumes; and "stressing" the material handling equipment *and* all system software well beyond peak design volume to identify the system's real breaking point

System simulation begins with throughput analysis that is validated by precise process modeling. This includes inputs, outputs, interactions, etc. System design requirements are then ascertained from exhaustive analyses and testing. These include: end-to-end scenario testing; system integration and interface testing; plan assumption validation; and comprehensive design cost-benefit validation. Order simulations for normal and irregular volumes are conducted along with complete dataflow simulation, incorporating ERP, WMS, WCS and other systems. A blueprint for system design, build and implementation (i.e., design evolution simulation and throughput validation) plus post-implementation activities (i.e., update and upgrade validations; process and system change testing) is generated. The result will be a DC system in tune with current business operations which is cost-effectively scalable to future growth.

Customized Network Optimization

It is critical to build a supply chain that is information-rich, highly flexible, relentlessly cost-conscious, and defined by both customer needs and internal corporate strategy. Management must periodically reinvent the supply chain to allow for growth and change. This can be accomplished through network optimization, a comprehensive and systematic analysis of

current operating data combined with a review of external factors which yields the most strategic, practical supply chain solution.

While there are many out-of-the-box optimization software solutions, more sophisticated custom modeling software will provide virtually unlimited flexibility to account for any scenario, restriction or conditional constraint. In the hands of a skilled network optimization practitioner, custom modeling can generate families of "best" solutions (versus an optimal solution), any of which may be the most viable option, depending upon the organization's specific priorities and constraints. Ultimately, an optimized distribution network will accurately reflect the company's strategic business plan, striking the appropriate balance between a "lean" paradigm, which is often associated with cost reduction, and the "agile" paradigm where service levels are critical as a competitive differentiator.

Simulation for Daily Operations Management

One of the most innovative applications of simulation software is its use as a testing tool for daily operations. An ideal use for distribution managers is analyzing wave builds in real time. By evaluating the impending orders (i.e., the next two-to-four hours) by quickly building waves and releasing orders in simulation, managers can foresee potential bottlenecks in pick zones and shipping as well as other full-line conditions before *actual* release. This allows them to adjust order waves and balance workflow for more efficient and timely order fulfillment.

Network optimization is not, however, a one-time event to complete and never revisit. Like other assessment tools, network optimization is viewed as an evolution by progressive companies who view DC operations as a competitive advantage rather than as a purely tactical and unavoidable cost center.

Reference FORTE's white paper, *Custom Modeling Consistently Identifies the Best Network Optimization Solution,* for more information.

From Competitive Edge to Core Competency

The emerging best practices reviewed here – the increased use of real-time distribution data to guide future planning; the expanded role of next generation WCS software as a highly effective and flexible operations management/control system; the expanded use of simulation software to validate design, understand real system capacity and optimize daily operations; and the routine application of customized network optimization software and techniques – can refine and leverage the product delivery system. These best practices are helping the supply chain to provide superior customer service capable of producing a tangible competitive edge beyond existing paradigms, resulting in a market-winning core competency.

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