

## Using Microsoft Business Dynamics – NAV<sup>®</sup> in a Lean Environment

Much has been written about the benefits and mechanics of Lean Manufacturing, so I won't attempt to replicate this information here. Instead, I will focus on the problems faced with using traditional ERP systems in Lean environment and how Microsoft Business Dynamics – NAV<sup>®</sup> can be used to accommodate Lean concepts. Nevertheless, in order to understand the trouble with most ERP systems when it comes to Lean, and how NAV can be adapted to work with Lean, we need to review basic Lean concepts.

The most common mantra surrounding Lean Manufacturing is “reduction of waste.” In a Lean environment, waste is typically defined as falling into one of eight categories:

1. Overproduction of work in process
2. Waiting
3. Transportation of parts/materials/tooling
4. Non-Value-added processing
5. Excess Finished Inventory
6. Defects
7. Excess people motion
8. Underutilized people

Lean seeks to address the above through the application of the 5 S's: (1) Sort, (2) Simplify, (3) Shine, (4) Standardize, (5) Sustain.

Lean is primarily a visual system. Lean manufacturing uses a signaling concept called Kanban to provide information on when more product is needed, or when a problem exists. Kanbans can be as simple as a card or colored light, or as sophisticated as an electronic messages, but Lean systems do not provide shop floor data reporting.

Lean is flow based, not order based. In a Lean manufacturing environment, production occurs due to signaling, not because a production order was released. Production occurs at a rate, not in batches of a given size.

### The Trouble With Traditional ERP Systems

The primary goal of Enterprise Resource Planning (ERP) systems is to integrate the many functions required to run a company – financials, supply chain management, manufacturing, project management, human resources, and so on – into one system. Most ERP systems achieve this integration by designing around a core set of “best practices” which can be customized to meet individual company needs. This leads us to problem number one:

**1. *Some ERP systems can be too rigid and too difficult to adapt to the specific workflow and business practices of some companies.***

For example, a few years ago I worked at a company that had implemented a just-in-time approach to manufacturing. In this environment, production was planned to be finished just in time to be shipped out. Based on inventory levels and sales order demand, production orders were run through the facility. When production was completed for an order, the finished goods were placed into inventory, making them available for picking.

The ERP system produced pick lists which showed which product should be shipped from stock. Pick lists were printed at night to allow picking and shipping to occur throughout the day.

Lean aficionados will see the problem with this “best practice” immediately. Almost all product could have been shipped the same day as production, but the ERP system required it to be placed into inventory first before picking would occur. This resulted not only in unnecessary labor, but also in excess space (enough for a whole day’s worth of production) being required to hold materials for the day long delay caused by procedures. Once understood, the problem was fixed with a minor amount of programming that allowed production personnel to determine whether goods should be put away into inventory or shipped. This simple change eliminated 40% of the labor in the finished goods warehouse, cut space requirements for finished goods by 90%, and improved on-time shipping. These changes resulted in product cost savings of 3%, primarily in indirect cost. This leads to problem number two:

**2. *Traditional cost-based financial accounting approaches focus too much on controlling material and direct labor costs.***

In a manufacturing environment, it is fairly easy to identify material and direct labor costs for any given product. While attention is paid to controlling material costs, in a manufacturing environment, most of the pressure seems to fall on controlling direct labor costs. This is not so much due to the way ERP systems work, but rather the management is taught to think. While ream after ream of paper is often expended in analysis of direct labor and material, overhead costs often receive little attention.

In contrast, in a lean environment, continuous improvement initiatives tend to focus on costs other than direct labor times. Direct labor is considered a “value add,” not a waste. To support a lean environment, the accounting system needs to be set up to identify the full cost stream of any product.

Remember the “same day shipping” issue previously discussed. This story actually begins with the Plant Manager being challenged with reducing product cost by 5%. The poor guy sweated for months trying to figure out how to achieve this goal by

cutting labor steps until it was pointed out that only 3% of the total cost of the products they were building could be attributed to direct labor. Approximately 85% of the product cost was in materials, with the remainder made up of overhead costs – rent, heat, power, and indirect labor costs.

In this case, the endless reports put together by the cost accountant did not help either. Why? Because indirect labor and other overhead costs, were simply lumped together and expressed as a percentage of direct labor. Cost accounting is not the only area traditional accounting approaches fall down when it comes to Lean.

**3. *Typical cost-based accounting approaches tend to focus on short-term cost reductions, which can run against the grain of a long-term Lean strategy.***

For example, getting rid of unneeded inventory is a lean strategy goal yet, in a conventional cost-based financial accounting system, inventory is considered an asset. If some of these assets (which may be doing nothing more than taking up space) are eliminated, a company's profit statement can actually appear to get worse. The key to resolving this issue is to realize that, despite what the books may say, inventory has no current value if it cannot be resold or transformed into something that can be sold.

As in the case above, the numbers produced by a ERP system sometimes do not tell the whole picture. In other cases, the “best practice” tools supported by the ERP system may be misapplied due to their complexity. This brings us to the next problem with most ERP systems.

**4. *It is not uncommon for ERP systems to be over engineered or beyond the capabilities of those using it.***

Material Requirements Planning (MRP) and Master Production Scheduling (MPS) are complex planning tools that are commonly provided as part of high-end accounting or ERP systems. MPS is used to plan production of finished goods over a short-range planning horizon that usually spans a time period of a few weeks to a few months. In MPS the production schedule is based on demand generated from released sales orders, longer range sales forecast, and item stocking policies such as safety stock and reorder points.

Material Requirements Planning (MRP) is designed to support a materials delivery and production schedule to support the master production schedule. MRP works backward by using the due date of demands to determine the starting date of production orders based on processing time. It then uses the starting date of production orders, along with lead times established for bringing materials in, to calculate when materials must be ordered. MRP communicates with a list of “action

messages” that tell buyers and production planners to create orders, change dates or quantities, or delete orders based on changing needs.

The description of MPS/MRP has been greatly simplified here and these techniques can be complex to master. When set up properly, MPS/MRP can produce wonderful results, but they require careful set up to work. Countless experts have, and continue to extol the benefits of MPS/MRP, but it is not the only way of doing planning and scheduling, or even the best way in some situations.

Lean Manufacturing environments tend to use “Pull” approach to planning and scheduling. In a pull system, sales order fulfillment drives production. As finished goods are depleted from inventory, production requirements are generated. As production occurs, raw materials are depleted, driving the purchasing of more product. Pull systems generally rely on the use of Kanbans (signals) to drive production and purchasing. Kanbans are entirely reactive.

MPS/MRP is considered a “Push” system. In push systems, a proactive schedule determines what to produce next, based on real and forecasted demands. Date formulas are used to create a schedule for ordering and producing product. Orders are created ahead of need to make sure finished product will be available when needed. These proactive orders are “pushed” through the system.

It is rare for forecast to exactly match reality or for sales orders placed in advance to remain unchanged. MRP reacts to these changes by creating “action messages” to cancel, add, or modify orders. If demand is volatile, reacting to these action messages can be time consuming and confusing. Imagine, for example, being a buyer and seeing a message to create a purchase order one day and the next day seeing a message to cancel the same order. This brings us to our next ERP problem:

***5. ERP systems tend to encourage the continuous collection of data that has no limited value.***

Most ERP systems are “transaction based” meaning that a record of every activity is written to some data base. Often, transactions are tied to the financial system. Manufacturing execution analysis becomes a goal of the financial system. To support this, transactions are fed into either material, labor, or overhead accounts, which may be further segmented by department, product class, or other attributes. The goal is to use this historical information to ascertain what happened on the production floor, versus what was planned.

I commonly run into situations where cost accountants insist that production workers detail actual labor times for every step of the operation. This information, the cost accountant argues, is needed to produce actual versus expected analysis on production orders. Reams of paper are then used in reporting statistics for each and

every production order and filing cabinets fill with reports. When differences between expected and actual numbers are detected, the production worker is questioned: Did you forget to enter your time? Was the entry a mistake? What are these numbers off? Often, time has passed and the production worker no longer remembers the circumstances, or the problem that occurred has been resolved or is not likely to happen again. As a result, little is advanced through the investment of time needed to enter, analyze, and file the information.

Lean environments do not rely on after-the-fact reporting to determine continuous improvements. In a Lean environment, continuous improvement initiatives begin in the actual work center with the people doing the work. Improvements do not originate as the result of noticing a single anomaly, but rather the experience of commonly occurring events studied over time. In a Lean environment, detailed data from the manufacturing execution system is rarely brought into the financial system.

### **What ERP Systems Need To Do In Order to Support a Lean Environment**

As we have learned from the above, ERP systems are often designed to fit a model that contradicts with Lean concepts. Lean environments require a different approach; one which can identify the financial benefits of lean efforts that result in shorter lead times, improved on-time delivery, increased first pass yields, less scrap, less rework, reduced inventory, and less unproductive machine time. Lean financial systems need to provide a scorecard for measuring the real improvements, but without the overhead of writing every transaction on the floor to the accounting system.

In order to support a Lean environment, ERP systems need to do the following:

1. Eliminate system logic constraints that slow the transfer of materials.
2. Provide flexible analysis tools that focus on identifying and tracking waste, not just labor and material dollars.
3. Allow workers to record production as it occurs without the administrative burden of creating production orders ahead of time.
4. Drive production from sales orders not production orders.
5. Simplify data entry by defaulting or calculating values based on standard practices.
6. Automate data entry using bar coding, RFID, and other electronic means.
7. Provide suppliers with “portals” that allow them to change and confirm delivery schedules and self-manage inventory.

8. Provide customers with solutions that allow them to change or confirm orders electronically.
9. Utilize automatic notifications to alert suppliers to slow down or speed-up the flow of incoming materials without the need to create individual purchase orders.
10. Provide visual cues instead of just numbers to reduce analysis time.
11. Provide performance measurements based on lean principles: elimination of waste and value stream costing.
12. Create systems that provide full visibility of available tools, their current location, and use.
13. Provide tools that help measure product quality and support continuous improvement initiatives.

### **How Microsoft Business Dynamics – NAV<sup>®</sup> and ABC Computers Can Help**

Dynamics - NAV is an incredibly flexible system that allows almost every aspect of the product to be modified and new capabilities to be added. This allows Dynamics - NAV to be adapted to the requirements of different types of businesses and encourages the construction of features to minimize data entry and automate steps to eliminate logic constraints that slow the transfer of materials. For example:

- ABC customized Dynamics-NAV to allow production personnel to be able to record the production of lot-tracked goods simply by entering the product's item number and quantity, making it immediately available for shipping. The customization eliminated the need for the production planner to separately record production.
- For a recent customer, ABC eliminated the need to enter warehouse transactions or pick orders to direct picking by creating a pick list report which prioritized lot-tracked material for shipping based on the product date of manufacture and bin priority.
- Because you can add or modify forms, it is relatively simple in Dynamics – NAV to use bar coding and RFID to eliminate data entry or even whole transactions. ABC Computers encourages the use of these technologies and was a forerunner in integrating RFID technologies with Dynamics – NAV.

- When a customer wanted to record the fulfillment of sales orders from materials purchased from a vendor without first recording the product in inventory, ABC modified Dynamics – NAV to eliminate the need to record transfers in and out of inventory.
- For a number of customers, ABC has created custom pricing and configuration rules that allow customer service personnel to accurately record sales orders with minimal effort.
- For a process manufacturer, ABC created additional capability that allows the customer to optimize the sequence in which products are produced to minimize clean-ups and change-overs.

The ability to modify Dynamics – NAV has allowed third party developers and resellers construct tools that allow all members of the supply chain to communicate better.

- ABC has worked with numerous clients to implement Electronic Document Interchange (EDI) using add-ons from Lanham. With EDI, a company's customer can create, modify, or eliminate sales orders without the company having to manually enter or modify the order.
- Microsoft has built tools into Dynamics – NAV to allow it to work with Biztalk. Biztalk allows applications to talk to each other without the formality and constraints of EDI. For example, Biztalk can be used to facilitate web portals that allow vendors to monitor inventory levels at their customers facility.
- ABC created customizations that allow documents to be attached to any master record. This allows procedures, check-off lists, flow charts, autocad drawings, quality control plans, certificates of compliance, and others types of documents to be referenced and launched from purchase orders, sales orders, item masters, customer masters, and production orders.
- Dynamics-NAV provides tools that facilitate the use of electronic Kanbans. For example, Dynamics – NAV incorporates routines for sending eMails directly from within the product. This can be used in place of passive reports to create active Kanban notifications directly to customers, vendors, or employees.
- In the upcoming 5.0 release of Dynamics – NAV, Microsoft has provided tools that allow the product to exchange information with Microsoft Office products such as Word and Excel. This will allow Dynamics – NAV to work with simpler Lean scheduling systems built using Excel.

Customizations and add-on modules are available that are designed to support quality and continuous improvement initiatives. For example:

- ABC created a customization that allows documents to be attached to any master record. Procedures, check-off lists, flow charts, autocad drawings, quality control plans, certificates of compliance, pictures and others types of documents to be referenced and launched from purchase orders, sales orders, item masters, customer masters, and production orders. In the upcoming 5.0 release of Dynamics – NAV, Microsoft is including this functionality in the base product.
- Several third party vendors sell add-ons for Dynamics – NAV that can be used for tracking product test results, warning about nonconformance, and storing information which can be used for analysis.

## **Conclusion**

Lean environments require different tools and processes than those provided in most ERP systems. Without the flexibility to modify operating logic or integrate with other products, traditional ERP systems may not be suitable for Lean environments. While Microsoft Dynamics – NAV contains many of the same tools as other traditional ERP systems, it also provides nearly endless flexibility to modify and extend the product, including integration and signaling tools which are needed in Lean environments.

ABC Computers has used the flexibility in Dynamics-NAV to eliminate transaction overhead for customers, incorporate business-specific logic, and integrate with a myriad of other systems. With the right tools, years of experience, and a thorough understanding of Lean concepts, the combination of Microsoft Dynamics – NAV and ABC Computers is a smart choice for Lean Manufacturers.