Executive Brief

On-demand Manufacturing:

A Formula for the Perfect Lean Market, and an Imperative in Today's Economic Climate

by David Bourque and Sherry Fox

TEC Technology Evaluation Centers

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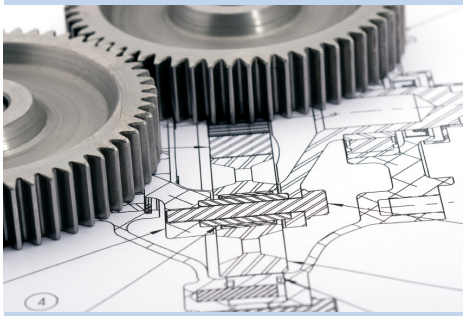


Introduction

For today's small to medium manufacturers, increasing the bottom line while optimizing efficiency poses an increasingly difficult challenge, especially in our current economic crisis. This need, coupled with competition in a global environment, puts manufacturers in a tight spot. Manufacturing has become a global activity, new methods of production have developed, and global sourcing has become a crucial element for a manufacturer's survival. The time for execution of best practices at the lowest total operating costs possible is now.

There are a number of challenges facing today's small to medium manufacturers:

- impaired growth due to small IT infrastructures
- environmental pressures
- compliance issues
- minimal global visualization in the supply chain
- decreased information flow among manufacturers, suppliers, and business partners

Due to the complex nature of the global manufacturing environment, manufacturers must find a way to overcome these issues and better compete in order to survive in our current economic climate.

Today, the Internet has grown into a collaborative tool for manufacturing organizations, and many firms can now access vital information using the Web. New tools and techniques are being used to move many existing enterprise applications onto a Web-based platform and migrating them to a more service-oriented architecture (SOA).

Because of their limited resources, it can be difficult for small to medium businesses (SMBs) to communicate with global suppliers and distributors. The introduction of new on-demand manufacturing solutions can help small to medium manufacturers—which often do not have the large IT infrastructure that bigger manufacturing firms have—to both grow and focus on their core business, as well as compete with their larger counterparts. On-demand manufacturing solutions allow midmarket manufacturers to concentrate on the future growth of their operations, without having to invest heavily in large IT infrastructures.

Leveraging on-demand levels the playing field and allows best practices in manufacturing to become attainable for midmarket manufacturers. Deployment and preservation of capital is key in these economic times, and leveraging a tier-one on-demand infrastructure without capital outlay will greatly help midmarket manufacturing to sustain and win business now. With the potential for slower growth in orders in the foreseeable future, applying lean principles to IT and your supply chain becomes an imperative, not a nice-to-have.

On-demand software alternatives, along with supply chain management (SCM) software, can facilitate collaboration among players in the supply chain, accounting, human resources (HR), and financials. This collaboration with multiple suppliers and distributors—as well as easy access to information—will provide the competitive edge SMBs require.

State of the Manufacturing Market: The Challenges

Global supply chain management… ever-changing compliance issues… environmental and competitive pressures… these all combine to create the most challenging manufacturing climate ever.

Effective Supply Chain Management—A Must for Evolving a Perfectly Lean Market
When the term was first coined more than a decade ago, "lean manufacturing" appeared to be a simple concept to grasp and implement. However, achieving a perfectly lean market has proven to be extremely challenging for many manufacturers, especially since globalization has changed the way most of them do business. The economic shift toward global sourcing has manufacturers working harder than ever to streamline efforts between suppliers—while eliminating waste and lowering costs.

To remain competitive, manufacturers today must be able to move information efficiently throughout their supply chains, and increase collaboration among multiple suppliers, distributors, and other manufacturers. To do this, manufacturers must create a harmonious supply chain where information is effectively shared in real time, processes are simplified, and supply chain waste is eliminated throughout the value stream.

You can't have a lean supply chain without lean manufacturing, the engine that drives lean supply chain efficiencies. Lean is all about creating the perfect manufacturing process by satisfying manufacturers' requirements with minimal waste while taking into consideration customer needs.

Lean principles are an imperative in these economic times. Continuing with current wasteful processes in manufacturing and the supply chain will spell disaster; in fact, a lean supply chain and a lean IT infrastructure are the core tenets of survival for today's midmarket manufacturers.

Enter SCM on demand. Two main aspects of SCM on demand aid in achieving this perfectly lean manufacturing environment:

- Creation of an integrated supply chain, where manufacturers can have a global view of their inventory, enables them to effectively manage production as well as lower costs.

- Alignment of business rules within the manufacturing environment and throughout the supply chain allows each workstation in the production cycle to manufacture goods in the most efficient way possible.

SCM is now an integral part of many tier-one global manufacturers, and leveraging a on-demand infrastructure enables all manufacturers to adopt global lean supply chain principles while preserving critical capital. It not only helps support an organization's lean strategies; it also enables an organization to leverage best prices from suppliers and obtain components in the quickest time possible by using just-in-time (JIT) delivery methods.

By focusing on their lean strategies, manufacturers can maximize plant efficiency, lower costs, and eliminate waste. By implementing proper SCM on-demand business processes and coupling them with lean manufacturing practices in a globally open technology environment, achieving a perfectly lean market—though challenging—becomes attainable.

The Compliance Conundrum

Adhering to Government and Industry Compliance Standards

Government and industry-imposed compliance regulations are just some of the challenges that manufacturers must deal with. As the complexity of the manufacturing environment and global supply chain increases, organizations must find solutions that can automate and document the processes required for them to be in line with imposed standards.

The US Sarbanes-Oxley Act (SOX), International Organization for Standardization (ISO), International Financial Reporting Standards (IFRS), and current Good Manufacturing Practice (cGMP) are very complex requirements that all manufacturers—large or small—must comply with. Additionally, they must comply with Federal Accounting Standards Board, US FDA Title 21 CFR Part 11, and Occupational Safety and Health Administration (OSHA) requirements, among many others, with many differences from one country to the next.

Along with these local state or provincial and federal regulations (which include emissions standards, safety standards, and fuel economy standards), there are global standards that are imposed on manufacturers.

"Green" Manufacturing

In addition to government and industry compliance standards, organizations must also deal with another ever-evolving issue: the impact of green standards on their manufacturing operations.

IT itself is getting greener, and this is helping the manufacturing process. Software as a Service (SaaS) solutions help reduce power consumption in the data center and workplace, improve labor efficiency, and can ultimately create more manufacturing capacity at lower cost. The role on-demand technology plays in supporting green manufacturing and achieving environmental goals will become more evident over the next decade. However, today's use of available technologies—along with an effective environmental strategy—can launch manufacturers toward achieving corporate sustainability.

Let's look at the automotive industry as an example. This is one industry that has invested significantly in green technologies over the last five years. Leading organizations like Nissan and Toyota have for many years been engaged in developing products and services with minimal environmental impact, and are leading the way for other automotive producers to follow suit.

Manufacturers that adopt lean technologies, leveraging an on-demand infrastructure, are at the same time creating the beginnings of a good environmental strategy—which in turn helps enhance their corporate/social responsibility image. Going green makes good business sense and can help businesses grow their bottom line.

While there are certain standards that manufacturers must follow in order to avoid costly fines, the price of going green doesn't have to cost them their business. Over time, the cost of being environmentally conscious will likely decrease, but it requires that certain efficiencies and controls become part of the manufacturing process.

Today's Complex Global Competitive Environment

Today's manufacturing environment is no longer that of local firms competing in a closed market economy, or of local manufacturers trying to compete for a fair share in the local marketplace. Today's manufacturers are now international and transnational enterprises, competing in a world where borders no longer exist and where the preservation of capital is key.

As such, today's manufacturing firms are highly competitive, have multidimensional organizational structures, compete in multiple locations, and work with many far-flung subsidiaries, suppliers, and customers.

The multisite, multidimensional nature of manufacturing firms poses many challenges in terms of raw material costs, energy costs, transportation costs, return to shareholders, and resource scheduling for every company division and employee.

These challenges have led to the integration of lean manufacturing principles with supply chain software that leverages an on-demand infrastructure. Because of this, manufacturers can now address these complex global issues without large capital outlays.

So, how can all of these challenges be addressed in an efficient and cost-effective manner? You need a formula—one that can help you to start contributing to the manufacturing marketplace vision for a perfect lean market.

The Formula for Achieving the Perfect Lean Market

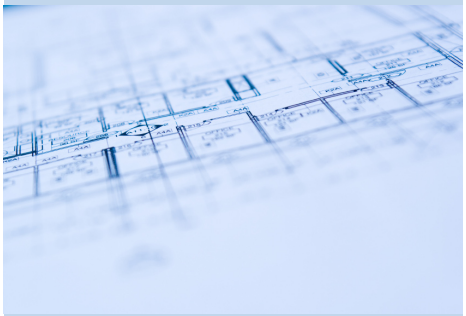
Service-oriented architecture (SOA) on demand is a must for integrating and merging the myriad platforms and processes in today's supply chain.

SOA-based applications are very adaptable and enable firms to expand their operations across borders by using the Internet, as well as to access applications through Web portals. Because of this, today's manufacturers can penetrate new markets, seamlessly integrate multiple software applications on one integration platform, and merge the different IT infrastructures of multiple enterprise applications leveraging an on-demand infrastructure, thus reducing costs.

SOA applications have been developed to meet today's software integration challenges. This can increase both an organization's IT efficiency and its return on investment (ROI). In order to lower the total cost of ownership, different departments in an organization can now access one main data repository, extracted from multiple sources, whether enterprise resource planning (ERP), SCM, or another type of enterprise application, enabling them to share pertinent data much more quickly.

The Value of SOA

SOA enables systems to seamlessly interact and integrate with one other in a way that allows the user to have a single view of what is happening in the organization. Leveraging SOA on demand allows manufacturers to use a tier-one technical infrastructure without having to create it themselves.



SOA also allows users to more easily extract data from multiple enterprise systems—which can often be a very challenging and complex procedure. To get the most out of SOA, an organization must use a software architecture model that will both adapt to changing business requirements and align with its IT strategy.

Because of the integration SOA allows, enterprise applications can process and relay data in real time. This helps managers make better and more efficient decisions. Also, this type of integration leads to a decrease in costs for mid-tier manufacturing organizations.

The Advantages of Using the Internet as a Business Platform

Given its ease of use, the Internet, when combined with SOA (which enables far easier application integration), provides manufacturing systems with increased capacity to improve their ability to leverage IT. In other words, an SOA platform enables manufacturers to address the demand for a personalized software solution while ensuring that the system has been built to address their specific business requirements. In short, it's a win-win whose time has come.

Web-based applications enable manufacturers to have a direct connection to consumers, allowing manufacturers to know what and how much to produce. This, along with demand planning applications, can help manage production for the manufacturer and decrease the unnecessary costs associated with not knowing how much product to produce or even what the consumer wants. SOA and Web-based applications do this through efficient sharing of data, without the technology challenges and security concerns of sharing direct data access to computers.

Manufacturers are always looking for ways to bring the consumer into product development and design. Adding consumers to the mix and bringing the needs of the client to the forefront is a crucial element for retaining the competitive edge that all manufacturers are looking for.

Deployment Options

When deploying Web-based applications, there are three main options available for aligning budget and IT considerations:

- **On-premise:** This is where the computer technology—hardware, software, and networking systems—is housed on the organization's site.
- **On-demand:** This is also known as SaaS. The software is hosted at a vendor location and the client can access it through a portal or the Internet.
- **On-appliance:** This is a particular hybrid model where the software is delivered preconfigured and out-of-the-box on a server provided either by the vendor or the client. The software is preconfigured and managed by the software vendor.

In today's economy, the preservation of capital is critical, and lean manufacturing principles are an imperative. Leveraging an on-demand architecture that complements the other, more traditional deployment alternatives, creates a "blended" computing model that allows midmarket manufacturers to compete in a more cost-effective manner. And as today's tumultuous marketplace calls for more efficiency, at least there are two companies who are helping midmarket manufacturers reduce waste in their supply chains and increase their bottom line: **QAD (www.qad.com)** and **Progress (www.progress.com)**.

QAD and Progress Software: Together, Addressing the Challenges Facing Manufacturers in Today's Tumultuous marketplace

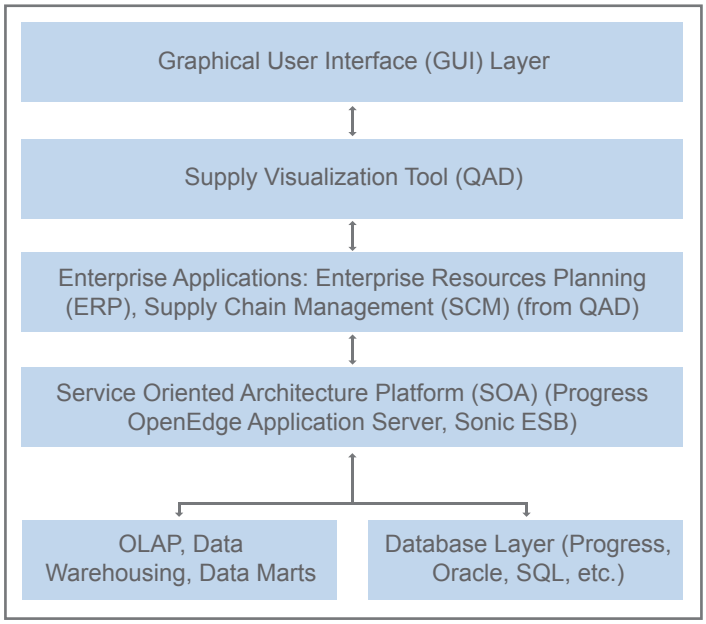
Global supply chains, multiple manufacturing facilities in multiple locations, and lean manufacturing are all complex issues that require comprehensive enterprise applications and expertise to match. We'll use QAD and Progress Software as an example to illustrate the points outlined in this paper, and to see how they apply in a software setting.

The SOA Platform in Detail

Exactly how does an SOA platform enable all systems to seamlessly integrate? And how does each enterprise software application communicate with other software solutions and users?

SOA allows for multiple applications to seamlessly integrate by offering the user one view of all enterprise applications and the data they provide. The following diagram represents the full spectrum of the SOA environment. Whether users are connected through an online portal, or another application, the SOA environment can support all applications communicating with each other, and deliver the scalability needed for continued growth as new applications are added onto the software architecture.

Service-oriented Architecture



The above diagram represents the basic architecture used in a typical manufacturing environment. This SOA allows users to integrate various types of software applications in many different ways.

The top level is the graphical user interface (GUI). This enables all applications at the third level (ERP and SCM) to display data in the same fashion. The GUI level enables Web applications to integrate into this framework as well. SOA takes into account the look and feel of Web 2.0 applications and other new Web-based technologies that have been developed.

QAD Supply Visualization is a supplier relationship management (SRM) tool that allows suppliers to see exactly where stock is in the supply chain. It creates alerts that notify manufacturers when there's a problem with a shipment. The tool allows everyone in the supply chain to know who has what, where it is, and when it will be delivered. The application also has a supplier scorecard that helps determine which supplier best adheres to specific conditions.

At the enterprise application layer, SCM software integrates multiple software solutions, such as transportation management systems (TMSs), warehouse management systems (WMSs), SRM, and analytics, in order to accommodate the needs of manufacturers, suppliers, and distributors.

Also at the enterprise application layer there is what's called a global trade management (GTM) system. This aids organizations with the challenges of international trade by enabling them to automate and streamline complex import and export processes, ensure regulatory compliance, expedite customs clearance, mitigate the financial risk of global transactions, and take full advantage of international trade agreements.

In order for all applications to be able to communicate with one other, underlying technology provided by Progress Software must come into play, including the OpenEdge™ Application Server and the Sonic™ Enterprise Service Bus (ESB). By using Progress' Advanced Business Language (ABL) and Qxtend, which is QAD's combination of ABL and Java, users can set up their workflows within the organization and integrate with all of their enterprise applications—whether ERP, SCM, or Web applications. Underneath this layer is the database or data warehouse, depending on the IT infrastructure and business user requirements.

Within the above architecture, the Progress OpenEdge Application Server connects Web-based applications together. Midmarket manufacturing firms often cannot deploy a large IT infrastructure, which is why an on-demand or SaaS option can be extremely beneficial—almost an imperative in these economic times.

On-demand manufacturing enables software applications to be accessed via the Internet, while being managed and maintained remotely at a hosted facility—and still allowing for integration across the entire supply chain. Integrating Web-based SaaS applications and in-house applications together can be accommodated, providing a unified solution.

Is it possible for an organization to leverage on-premise solutions using SOA and to integrate SaaS solutions in parallel? The answer: Yes. SOA-based applications provide a solid foundation for SaaS and enable scalability and flexibility within a distributed, global environment.

Conclusion

In today's economy, manufacturers in the mid-market are facing the challenges of preservation and growth. The software market, and vendors such as QAD, understand these challenges and have developed business applications on demand—such as ERP and SCM—specifically to address manufacturers' unique requirements. These on-demand applications are the same feature-rich offerings as their on-premise counterparts, and full lean business process benefits are therefore received without large capital outlays toward needless IT infrastructures.

Lowering costs, branching out into global competition, increasing the bottom line, and adhering to compliance regulations are just some of the major issues that manufacturers face every day.

Along with those issues, increasing the IT infrastructure is often too costly to enable the organization to expand the way it needs to in order to address these challenges. Because of this, SOA on demand is being used to enable integration of multiple enterprise applications.

With a combined solution such as the one offered by QAD and Progress Software, manufacturers can focus on their core business instead of the systems that help run the business. With deployment independence and options that include on-demand, on-premise, or on-appliance, manufacturers are given more choices and flexibility around how they implement and manage global business applications. By leveraging a software vendor's IT infrastructure on demand, manufacturers can reduce costs associated with running the IT department, and focus more on their core competencies, leading to an overall leaner—and greener—manufacturing environment.

About The Authors

David Bourque is a research analyst at Technology Evaluation Centers (TEC). His expertise covers a broad range of technology areas, but his focus is on the distribution and logistics industry. He has developed software evaluation criteria and supporting research for TEC's ERP Distribution knowledge base as well as other enterprise software areas.

Bourque has written articles on industry issues facing professionals in the ERP - Distribution and supply chain management (SCM) space for leading publications such as TEC's Newsletter and SupplyChainBrain.com.

Bourque earned his BA from Concordia University in Montreal (Canada), with a specialization in economics.

Sherry Fox is a TEC research analyst with over 20 years of experience in the private sector. Before joining TEC, Fox spent five years as vendor compliance administrator for a large Canadian clothing retail chain. She helped create and manage the department and provide support regarding policies and procedures to vendors all over the world. Fox also helped develop various programs relating to environmental and human rights issues within the apparel industry, and participated in conferences on the subjects of sustainability and climate change.

Fox has been involved with several software implementation projects during her years in the retail industry. From deploying payroll software to integrating a benefits module, she was actively involved in all phases of these implementations.

A proficient writer of articles, online content, guides, and manuals, Fox has comprehensive knowledge in the areas of retail, manufacturing, compliance, and technology. She also has in-depth management experience with various enterprise segments, including payroll, human resources, logistics, and compliance.

Contact Us

Technology Evaluation Centers
740 St. Maurice, 4th Floor
Montreal, Quebec,
Canada, H3C 1L5

Phone: (514) 954-3665
Toll free: (800) 496-1303
Fax: (514) 954-9739
E-mail: enquiries@tec-centers.com

www.technologyevaluation.com