

Operational Excellence Offers Paths to New Technologies

written by Lauri Moon | November 1, 2016

(IW - Steve Minter: 10-24-16) The Industrial Internet of Things promises more efficient operations, higher quality products and new levels of integration with suppliers and customers. Those promises, though, come at a price. For companies large and small, sluggish demand is reining in capital expenditures and making many manufacturers hesitate to commit to investments in advanced technologies.

Emerson Process Automation Executive President Mike Train, however, says that *companies that invest in advanced automation and follow industry best practices can realize the kinds of significant savings that will make the investment in new technologies pay off.* In fact, companies can achieve improved earnings of up to 15% through new technology and improved operating practices, Train told the Emerson Global Users Exchange in Austin, Texas.

“After years of running at maximum production, postponing improvements, dealing with an aging workforce and delayed turnarounds, many companies are living on borrowed time,” Train said. “They desperately need to invest in improvements, maintenance and upgrades.”

Emerson and research partners have been studying what separates top-performing companies from their peers in terms of operating performance over the past year, Train said.

“If you look across the broad industrial sector globally, as much as \$1 trillion of company value is lost every year to sub-optimal operating performance,” he said.

Top quartile performers show significant operational performance in four areas that can affect their financial results, Train told attendees. They include:

- Safety - Top performers have three times fewer safety incidents than companies performing at an average level, said Train.
- Reliability - Companies in the top 25% of process firms have 4% higher

availability of equipment (an extra 15 days per year) and spend half as much on maintenance.

- Production - Operating costs are 20% lower for top performing companies than their average performing peers, Train said.
- Energy and Emissions - Top performing plants have 30% lower CO2 emissions than their average performing peers and spend a third as much on energy.

Train said this data will help companies which “lacked the confidence in knowing which investment option will move the needle on financial performance.”

IIoT an Evolution, Not a Revolution

While noting that the Industrial Internet of Things is a hot buzzword these days, Train said it did not represent a revolution but rather “a logical evolution of the past 25 years of technology innovation.” He pointed out that process manufacturing companies have long invested in intelligent sensors, digital valve controllers and other technologies. As a result, he said, “Your IoT strategy must take into account the investments you have already made and leverage the infrastructure you already have. It all starts with having the right business case.”

At the user event, Emerson announced an expanded array of products and services it is calling the PlantWeb digital ecosystem. They include PlantWeb architecture to serve the enterprise as well as new sensing technologies, Secure First Mile products and services to securely connect data to the cloud, two suites of analytical software and an AMS ARES platform that allows companies to aggregate assets from multiple business systems and send that data to plant personnel either on desktop or mobile devices. Emerson said these solutions were scalable and would allow companies to begin the IoT journey with “limited effort or investments.”

Emerson is also providing real-time monitoring services where its experts will “constantly monitor and report on asset and operational performance, prioritized repair and asset trending.” Emerson will use Microsoft Azure as the cloud service for its connected services.

Train said that much of the current discussion about IIoT is “visionary” but “kind of

hard to act on.” He continued that with the introduction of these products, Emerson will help customers develop a “clear, practical roadmap for how to make Industrial IoT actionable.”

R&D Tax Credit Myths that may be Costing You Money

written by Lauri Moon | November 1, 2016

(RSM - Tom Windram: 9-30-16) The federal research and development (R&D) credit gives companies conducting qualified research the ability to generate a net research tax credit of 13 percent (9.1 percent under an alternative simplified method) of incremental qualified R&D spending* in order to lower their regular tax bill. This credit can result in significant tax savings for manufacturing companies, however studies have shown that it is surprisingly under-claimed. While nearly \$9 billion in R&D credits were claimed in 2010, National Science Foundation¹ statistics indicate that another \$4 billion in R&D credits could have been claimed but were not. Manufacturing companies that develop new products, make improvements to existing products and develop or improve manufacturing processes are likely to qualify for the R&D credit. Middle market companies are among those least likely to take advantage of this beneficial credit.

The Protecting Americans from Tax Hikes Act of 2015, signed into law by President Obama on Dec. 18, 2015, modifies and makes permanent the R&D tax credit. Eligible small businesses may now claim the credit against alternative minimum tax. Additionally, a small business start-up is now able to claim a credit of up to \$250,000 against its FICA payroll tax liability if it had less than \$5 million in gross receipts for the current taxable year and no gross receipts for any taxable year prior to the five-taxable-year period ending with the current taxable year. These modifications are retroactive to Jan. 1, 2015.

In our experience, many companies that have eligible activity erroneously disqualify themselves from claiming the R&D tax credit because of one or more of the following assumptions:

Myth #1:	The R&D tax credit is only for companies that invent something revolutionary.
Reality:	The R&D tax credit is designed to encourage innovation. As such, it is equally available to companies that attempt evolutionary improvements to existing products or processes and companies that undertake revolutionary activities. The development or improvement effort does not have to equate to a moon shot. The regulations define research as activities constituting a process of experimentation “intended to eliminate uncertainty” based on information available to the taxpayer at the outset of the project. An experienced R&D tax professional can help you understand what types of activities meet the qualifying criteria.
Myth #2:	The R&D tax credit is only for companies engaged in basic research.
Reality:	The R&D tax credit also extends to applied science, something that many companies perform on a daily basis as they try to improve their business and production processes through the use of technology and science.
Myth #3:	The R&D tax credit is not available for companies that fail in their research.
Reality:	You do not have to be successful to claim the credit. The R&D tax credit is an efforts-based credit. In fact, the regulations specifically state that success is not required in order to be eligible.
Myth #4:	The R&D tax credit won’t help my company because my company is not profitable.

Reality:	<p>It is true that the federal R&D tax credit is a credit against taxes, meaning you must be profitable to utilize the credit. However, the credit carries forward 20 years and back one year. Thus, it could be of immediate benefit if your company was profitable in the prior year and can be banked for use in future profitable years. Also, small start-up companies may now be able claim a credit against their payroll tax even if they pay no income tax. In addition, some state R&D credit programs provide for refundable credits.</p>
Myth #5:	<p>The R&D tax credit is only for big companies.</p>
Reality:	<p>While large companies may claim the biggest and most headline-grabbing credits, the program is open to all companies. There are no company size requirements; the credit is only based on engaging in qualified activities. The credit, however, must be actively claimed; it is not automatically granted. In 2010, more than 12,900 companies claimed the credit. Eleven percent, or 1,441, of these companies had business revenues below \$25,000, and 39 percent, or 5,015, companies had revenues below \$5 million.² In other words, approximately half of the companies that claim the federal research tax credit are considered middle market companies or small businesses.</p>
Myth #6:	<p>The R&D tax credit is not available to my company because our research is funded by the government.</p>
Reality:	<p>This is an understandable misconception that invites deeper consideration. The R&D tax credit requires both technical uncertainty and financial risk. If a contract between the government (or other party) and the taxpayer requires the taxpayer to succeed or return funds, or to incur costs beyond what the government is paying, the taxpayer is at financial risk and thus eligible for the R&D tax credit. A determination can only be made by reviewing all of the contractual payment provisions. Taking the time for a thorough review usually proves rewarding.</p>
Myth #7:	<p>The R&D tax credit doesn't reduce state taxes.</p>

Reality:	About two-thirds of states have an R&D credit program. As mentioned previously, some of these offer refundable credits, while others offer credits that can be carried forward. Most state eligibility requirements mimic federal eligibility requirements, though some may restrict, include or provide for enhanced credits for specific types of research. The most common differences between federal and state R&D credit computations relate to the credit rate and base amount computations.
Myth #8:	The R&D tax credit is not a big deal since my company is already getting a deduction.
Reality:	Smart tax planning includes taking advantage of all available benefits. An election under section 280C(c)(3) allows a taxpayer to take a reduced credit without disallowing the deduction for R&D expenses. Thus, a taxpayer may take a deduction for qualified R&D expenses in addition to a reduced credit at the tax-effected rate of 65 percent. The reduced credit is in addition to the deduction and represents a dollar-for-dollar reduction in regular income tax liability. Why leave money on the table and potentially put your business at a competitive disadvantage?
Myth #9:	The R&D tax credit is for increasing research; since my spending is flat, my company is not eligible.
Reality:	This is another tricky area full of misconceptions. The R&D credit does require an increase in research spending. However, current-year spending is compared to a base, which is 50 percent of the average spend for the prior three years, calculated under the ASC method*. In reality, your company's research spending could actually be decreasing, and your company could still be eligible for the credit.

If any of these nine assumptions have discouraged your business from claiming the benefits of the R&D tax credit, think again. It is not too late. Key owners of pass-through entities should be consulted, as this would require extending their individual return filings as well. Under some situations, businesses may also be able to amend prior-year tax returns and retroactively claim the credit. Amended returns will invite IRS scrutiny, and a well-documented study is essential to sustain the refund claim. Additionally, many state claim periods are also open, including some

that offer refundable credits—meaning you don't even have to wait until you are profitable to see the dollars enhance your bottom line.

We recommend you work with your tax team and tax advisors and enlist them to take a look at your various business activities to see whether you qualify. By uncovering the truth behind a frequently misunderstood credit program, you may bring substantial dollars to your bottom line.

*Credit calculation note: The standard credit is 20 percent (13 percent under the reduced credit election) of the current-year qualified research expenses (QREs) over a historical base amount computed by applying a fixed-base percentage to the average of the prior four years' gross receipts. The fixed-base percentage is a function of aggregate QREs divided by gross receipts for the 1984 through 1988 base period. Companies that do not have QREs in at least three of the five base years use a start-up method based on a complex, five-year sliding scale formula. Under an alternative simplified credit (ASC) method, the credit is 14 percent (9.1 percent under the reduced credit election) of current-year qualified research expenses over 50 percent of the prior three years' QREs. Because the regular method can penalize companies whose R&D spending grows more slowly than revenues and the difficulties associated with documenting QREs in the base years, the ASC is often the more favorable approach.

[1]National Science Foundation, National Center for Science and Engineering Statistics; U.S. R&D Resumes Growth in 2011 and 2012, Ahead of the Pace of the Gross Domestic Product, Arlington, VA (NSF 14-307, December 2013). <http://www.nsf.gov/statistics/infbrief/nsf14307/>

[2] Statistics of Income Division: 2001 - 2010 Corporate Returns Data; Figure B. Corporations Claiming a Credit for Increasing Research Activities; Number of Credit Claimants by Size of Business Receipts; Tax Years 1990-2010

(Tom Windram is a partner at RSM LLP)

Communities Save \$250K in Annual Energy Costs

written by Lauri Moon | November 1, 2016

Millheim and Selinsgrove boroughs are starting to save \$250,000 in annual energy costs, reaching an anticipated \$1 million in savings within five years. This concludes a two-year effort by SEDA-COG's Energy Resource Center.

This project, similar to the successful community-wide project completed in New Berlin in 2013, was primarily funded by the Appalachian Regional Commission.

Many partnering organizations contributed to the project via funding and/or technical assistance, including SEDA-COG's Weatherization Program, Selinsgrove Area School District, Innovative Manufacturers Center (IMC), PennTAP, Selinsgrove and Union County Area Agency on Aging, Selinsgrove Area School District, PPL Electric Utilities, Central PA Community Action Agency, Snyder County Planning Department, Centre County Planning Department, Selinsgrove Borough Council, and Millheim Borough Council.

Commissioners Proclaim October 7th Lycoming County Manufacturing Day

written by Lauri Moon | November 1, 2016

IMC's Lauri Moon accepts a proclamation from Commissioners claiming October 7th Lycoming County Manufacturing Day.

Thank you Commissioners R. Jack McKernan, Tony R. Mussare and Richard Mirabito

for recognizing the importance of manufacturing in Lycoming County.



Research and Development Tax Credit Myths that May be Costing You Money

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MFG Day: How Manufacturing Drives the Economy

written by Lauri Moon | November 1, 2016

Expert panel discusses value of Manufacturing Day, including the downstream sales chain, and how manufacturing accounts for an estimated 33% of GDP and 33% of employment.

(Supply Chain 24/7 - Staff: 10-7-16) To kick off the nationwide celebration of Manufacturing Day today, October 7, an expert panel hosted by the Fabricators & Manufacturers Association, International (FMA) has highlighted the significant role manufacturing plays in bolstering America's economy and the critical need to ensure that the sector remains a positive force.

Sharing insights at the "How Manufacturing Drives the Economy" program are;

- *Stephen Gold*, president and CEO of the Manufacturers Alliance for Productivity and Innovation;
- *Scott Mayer*, chairman and CEO of QPS Employment Group;
- *Chris Kuehl*, managing partner at Armada Corporate Intelligence and FMA economic analyst; and
- *Kenneth Voytek*, chief economist for the Hollings Manufacturing Extension Partnership Program (MEP).
- Panel Moderator is *Eric Lundin*, Editor of The Fabricator magazine and Tube & Pipe Journal.

"Manufacturing is a much more significant factor in our economy than official government statistics show, as those numbers only measure the value of the upstream supply chain and only include goods sold to 'final demand'," Gold said. As an example, he cited motor vehicle manufacturing, which includes production and transport of materials, R&D and corporate services in the upstream chain.

"When you include the downstream sales chain, the impact is magnified and multiplied," he said. In his example, this encompasses retail auto dealers, transport and import of the finished vehicles, wholesale operations and aftermarket services."

Using the traditional upstream supply formula across all segments, manufacturing represents 11% of GDP and 9% of employment, Gold said. The downstream sales chain analysis provides a more complete picture at 33% of GDP and 33% of employment.”

Chris Kuehl looked at the significance of U.S. manufacturing from a global perspective. “The manufacturing sector is the dominant player in U.S. exports, particularly with heavy machinery and other capital goods,” he said.

“And the U.S. is more export dependent than people realize; it accounts for 14% of GDP, almost matching export-driven Japan at its 14.7% of GDP. What most people don’t recognize is that the U.S. accounts for 30% of all global manufacturing by value. China accounts for only 10%.”

According to Gold, it is important for policymakers to understand the dramatic impact manufacturing brings to the economy and to develop public policy to ensure a dynamic manufacturing base is ever-present. Such developments can help manufacturers themselves gain greater confidence to spend more capital and invest in new productivity techniques.

Smaller Manufacturers as Catalysts While acknowledging the sector’s rebound over the past several years, Voytek said manufacturing performance has leveled off and slowed, the result of several broad macro trends that include a stronger dollar, declining commodity prices (particularly oil) and weaker demand globally for manufactured goods.

Voytek sees smaller firms as the key to combating these trends. The fact that 99% of manufacturers fall in this category (less than 500 employees) reflects the increasing share smaller establishments bring to the manufacturing landscape.

“It must be recognized that small firms do face a different set of challenges when compared to larger firms,” Voytek said. “They don’t have the deep pockets and deep resources like those competitors. But opportunities are available for them to improve in the areas of operational excellence, strategies, new product development and entering new markets.”

A new study of the greatest challenges manufacturers face revealed that employee recruitment concerns have increased the most in recent years, cited by 45% of respondents in 2015, but only 19% in 2009. Voytek shared another chart highlighting how job openings are outpacing hiring in manufacturing. Scott Mayer focused on the reasons for such numbers.

“Every day the baby boomers are retiring at a high rate and a new generation of workers in this sector is needed,” Mayer said. However, filling this gap continues to be an issue. According to Mayer, high school teachers and counselors continue to direct too many students to attend college for traditional four-year degrees when a large number of young people may be better suited to focus on the skilled trades.

“You can’t put everyone in the same bucket,” he said. “There is not enough recognition that manufacturing today offers many good, well-paid middle-class jobs. Sadly, such jobs are usually not considered an ‘in’ thing.”

Mayer points to a need for more “grass roots” efforts that involve parents and educators alike. “Parents need to steer their kids in the right direction when it comes to career choices,” he said. “Kids are impressionable and will listen to their teachers. Words mean a lot.”

Manufacturing Day Shines Spotlight on Needs, Opportunities Each panelist asserted that Manufacturing Day - marking its fifth year anniversary today, October 7 - exemplifies this comprehensive grass roots approach and delivers effective, educational programs. Thousands of manufacturers will again host students, teachers, parents, job seekers and community leaders at open houses, plant tours and educational sessions to showcase modern manufacturing technology and the attractive jobs that are available. It is a chance for students to see diverse career options that are innovative, impactful and durable, and understand how to apply their studies in math and science to those careers.

“Manufacturing Day truly dispels old, negative myths about manufacturing and highlights the shift from a labor-intensive environment to one of high-tech, robotics and computers,” said Kuehl. “It also provides opportunities to communicate how manufacturing is a big part of GDP and our economy.

Both Gold and Mayer note the 3,000 events to be held throughout the country raise the profile of the industry. In addition to the program's ability to "put manufacturing on the map," Voytek views Manufacturing Day as a way to highlight a distinctive personal benefit for those who select the industry as a career.

"Manufacturing enables workers to show their accomplishments in a very tangible way," he said. "They can say, 'I made this piece of machinery, equipment or product.' It's another way to position manufacturing in a positive light."

The Buzz on Manufacturing Technology from IMTS 2016

written by Lauri Moon | November 1, 2016

(American Machinist - Robert Brooks: 9-20-16) IMTS 2016 is in the books now, and having spent the better of the past week browsing, listening, and noting to myself, here is a quick analysis of manufacturing and machining industry developments based on ideas promoted by the experts and developers there.

We have spent the past five months previewing new machinery and devices, preparing to see and learn more on-site: there is still plenty of time to review the details of all that was exhibited at McCormick Place, and some of what was new there will become the basis of future developments in precision manufacturing. But first, ...

Manufacturing technology has four general platforms for product development, which IMTS mostly recognizes via its floor plan: machining and cutting equipment; tooling and materials; programming and networking technologies; and automation and handling processes. There is more, of course — ancillary supplies, shop organization and management systems, consumable products and supplies, etc. — but this is all for classification purposes.

What follows here is a summary of ideas, themes — buzz words, if you will — with relevant (but not exclusive) examples from IMTS 2016 that are shaping the current and future

understanding of manufacturing technology.

Automation

“Automation” has long been a synonym for “robotics” in manufacturing, but robotics are coming into their own (read on...) and the term automation is growing to encompass much more: networked machines and shared databases, actuators and performance models, all the connected devices and packages that are helping machine shops and other manufacturers realize the high-concept vision of the Industrial Internet of Things / Industry 4.0. IMTS 2016 had numerous examples of such broad-based automation technology — such as the Siemens Digital Enterprise Showcase.

For manufacturers, the value of such platforms that they encourage the operations to develop a strategy for growing into an IoT-compatible enterprise, rather than having that standard imposed on them from some invisible “partner.” IMTS 2016 offered visitors numerous examples of technologies and programs for connecting with suppliers, customers, and data partners, to make manufacturing automation more intuitive and “automatic.”

Robotics

Robots have had a place in machine shops and manufacturing for decades now, though it’s been a grudging acceptance by the operators. Whether the objections are based on technical complexity, plant safety, or some intangible feeling about human involvement, IMTS 2016 made clear how the future of machine-shop productivity is premised on robotics.

ABB Robotics introduced the FlexMT™, a pre-engineered system designed to load and unload machine tools using vision guided robotics. Designed for both small batch and high volume production, its developers promise to boost spindle utilization by up to 60% over manual machine tending. The system can handle most any size and type of part, and is compatible with a wide range of machine tools, including horizontal and vertical lathes, machining centers, 5-axis machines and grinders.

Robotics are quickly evolving into a separate discipline, with auxiliary devices for gripping, conveying; intuitive interfaces and customized programming software; and variations in reach and payload standards that mean robots will find their functions in a growing number of machining and manufacturing applications.

Multi-tasking

Five-axis machining is widely understood as giving machine shops the flexibility to perform complex tasks with fewer set-ups ... but is it widely applied? In other words, shops that have invested in five-axis machining may not need to operate with all those features, and in fact may over-invest to establish the capability. Finding ways to make two- and three-axis machines gain the flexibility of five-axis machining is gaining influence with machine shops — and thus with machine tool developers.

Haas Automation exhibited its new TR200Y dual-axis trunnion rotary table, which it explained “puts five-axis capabilities well within reach of the average job shop, and its compact size provides greater mounting flexibility.”

The TR200Y mounts in the Y direction (front to back on the table) of a mid-size VMC. At less than 27 in. (686 mm) wide and 20 in. (508 mm) deep, it fits on one end of the machine’s table, freeing up the remainder for additional fixtures or vises. The TR200Y has a 7.87 in. (200-mm) T-slot platter, and will swing parts up to 8.1-in. (206-mm) diameter. The maximum platter capacity is 80 lb (36 kg). The trunnion provides ± 120 degrees of tilt and 360 degrees of rotation for full simultaneous 5-axis motion, or to position parts to almost any angle for machining. Still, it can easily be removed when not needed.

They may not need more spindles, but maximizing “spindle time” is an idea that is gaining priority with machine shops.

Precision

Precision is not a hard idea to understand — but it’s hard to achieve and maintain. Unfortunately, it’s an idea that underpins an increasing number of product designs in high-value industries like aerospace, electronics, and medical/surgical parts, sectors that can be very rewarding to qualified and capable suppliers. Achieving precision invariably depends on the selection of the right machinery, the right controls, the right programming — all of which were emphasized by IMTS 2016 exhibitors. Precision is also the consistent theme from tooling developers.

Switzerland-based Mikron Tool introduced its new CrazyDrill SST-Inox 12 x d for drilling stainless materials in diameters as small as 0.3 mm (0.012 in.) — which is possible thanks to

highly advanced and specially developed tool geometry for the drill, and an efficient cooling concept for the drill shank.

Precision is not an idea that can be put aside once it has been raised and defined: suppliers of tooling who can maintain their reputation for precision designs and precision performance will have a bright future after IMTS 2016.

Solutions

Machine tool developers (among others) have been promising “solutions” to their customers for a long time now, and there is a sense from IMTS 2016 that customers are turning the idea around on them — demanding better application of design principles to save production time, energy, system flexibility, reliability, and more.

For example, Makino displayed its a40 horizontal machining center, which it emphasized is the first system purpose-built for machining aluminum and nonferrous diecastings. Previous machine tools have been “over-designed” for diecasting producers, who need to maintain high-throughput of near-net-shape parts, with the right parameters for power, energy consumption, and cycle times that will address their productivity and “per-piece costs.” The a40 HMC is a solution to over-designed systems.

“Diecast manufacturers are under intense pricing pressure with mandatory cost reductions from OEMs and increasing global competition. The keys to overcoming these challenges lie in the reduction of machining cycle time and elimination of unplanned down time,” explained Makino’s horizontal product line manager David Ward. “To address the cycle time issue, Makino has re-evaluated each of the major castings using an Intelligent ‘Reduction of Inertia’ (ROI) design philosophy. The new design provides superior linear and radial agility and acceleration.”

The a40 is a customized solution for the diecasting sector, providing those manufacturers with productivity improvements as well as savings in capital investment, labor, floor space, utility consumption, and tooling. It’s an example of manufacturing technology buzzword being realized and demonstrated at IMTS 2016.

Eve of Disruption: How the Auto Industry Is Remaking Itself

written by Lauri Moon | November 1, 2016

Automakers are trying out all kinds of new business models, from rebranding themselves as mobility companies to partnering with obscure start-ups. Can they take it to the bank?

(IW - Laura Putre: 9-27-16) Although the U.S. automotive industry saw record sales in 2016, the mood of its leaders right now is low-key, even a bit anguished. Gains that OEMs made after the Great Recession have slowed to a near-halt, with predicted sales for 2016 hovering around last year's numbers, then dipping slightly in 2017.

Wall Street wants growth, and automotive manufacturers, realizing that they can't rest on their SUV and pickup-truck laurels, are looking for it in uncharacteristic places. Nissan is partnering with an electric scooter company in San Francisco. Volkswagen wants to focus more on car-sharing and introduce up to 30 new electric vehicle models. General Motors has a vice president of urban mobility who recently told an auditorium full of automotive executives that in New York City, where she lives, "the whole idea of owning a car, parking it for \$1,000 a month, and not using it 95% of the time is ludicrous."

"Everything about our business is changing," Bill Ford, avuncular executive chairman of Ford Motor Co. and great-grandson of Henry, told a potpourri of Detroit automotive beat reporters, soccer-mom and fashion bloggers, radio hosts and foreign journalists at his company's trend conference in September. "It's been a tough time for the auto industry because Wall Street doesn't have a whole lot of faith in [us]."

Ford said some investment firms see auto companies as flatlining now that they've ridden a crest of post-recession growth. Or, they adopt the attitude that "with all this disruption, it's not clear to us who's going to win—what any [automotive companies] are going to look like in five years—so we're just going to take a step back."

More disruption is going on in automotive now than at any time since cars replaced horses as

the dominant mode of long-distance transportation: After a long incubation period limited to annual DARPA challenges and whatever Google was doing in Mountain View, self-driving cars are on the fast track. Tech companies are muscling in on the traditional auto space. New mobility services like ride-hailing and microtransit are challenging the individual car ownership model.

Meanwhile, the price of cars is outpacing wages in the United States, and political uncertainty and economic stagnancy are slowing growth in some emerging markets. Electric and fuel-cell vehicles are gaining traction as their price tags come down and range goes up (along with fuel economy standards).

The auto industry has to think about all this and the Volkswagen emissions cheating scandal and finding tech-savvy people to run the factories and software engineers to design algorithms to tell a driverless car how to behave when a herd of cattle is crossing the road.

“It’s not clear where some of these business opportunities really are,” Bill Ford said. “We are going to try a lot of different things, and obviously we have to build business models around them that work, and I’m very confident that that will happen.”

Until then: stay tuned for a considerable bit of rooting around in the dark.

Taking the Slow Road

Automakers looking for meaningful growth aren’t likely to find it in the United States. Vehicle prices have been growing faster than wages, observes Patrick Manzi, senior economist for the National Automobile Dealers Association. Consumers are stretched: car payments made up 12% of personal income in 2014—higher than the previous nine years. And the loans take longer to pay off: 67 months in 2015, compared to an average 54 months two decades ago.

Paul Traub, senior business economist for the Federal Reserve of Chicago, says that automotive sales likely peaked in 2015. Some of the reasons he sees include a trend since 2010 of Americans saving more of their income; a depletion of pent-up demand for new vehicles after the Great Recession; shortened commutes for more people working remotely from home; and a shift in population from smaller cities and suburbs to “megacities” where mass transportation is convenient. People are also holding onto their new vehicles longer: from an average 50 months in 2005 to 77.8 months in 2015.

Even in the richest metro area in the country, San Jose, Calif., a median-income household cannot afford the average new vehicle, says Bankrate's 2016 Car Affordability Study.

Worldwide, car ownership climbs when average incomes hit the range of \$5,000 to \$20,000, says Gary Silberg, lead automotive industry partner for KPMG. Within that range, ownership leaps from one car per 10 people to one per two.

China is in that sweet spot for growth, but hurdles include car quotas in pollution-wracked major cities and regulations that require foreign automotive companies to partner with Chinese companies (and share their research).

India has huge potential, with about one car for every 30 people. But wages aren't high enough.

"If you talk to the auto guys, every 10 years they say India will be 10 years away," says Silberg. "It's a low-end, \$10,000 vehicle market—kind of a nuts and bolts market," with the modest profit margins to match.

So where will the growth come from? If you subscribe to the iPhone theory that new features = people dashing to turn in their old products and buy new products quickly, then leaps in technology could benefit automakers. And if the self-driving, living-room-on-wheels models cost way too much for all but the wealthiest consumers, then replacing individual ownership with fleet-owned vehicles to share, hail and rent looks better and better.

How Technology is Reshaping the Modern Supply Chain

written by Lauri Moon | November 1, 2016

(C3 Solutions - Gregory Braun: 9-21-16) It's no secret that tech innovations have become key to the evolution of business processes. Whether born of necessity, to fill a niche need, or developed as a blue-sky invention that business adopts, new technologies power much of the

growth and development we see in supply chain operations. But early adoption of new technologies, until very recently, was the preserve of the large, well-capitalized corporation.

Tech investments used to be major projects, time-consuming and expensive, requiring the assets and human resources capabilities of big players that needed to leverage big investments in order to compete. Think about the early adoption of mobile scanners by the large last-mile couriers—in 1985 FedEx developed tracking and equipped its drivers with handheld scanners, enabling real time package tracking. P&G introduced continuous replenishment in 1987, thanks to mainframe software from IBM. ERP software was introduced in the 1990s, as the preserve of big enterprise, motivated by the recognition that the data in various parts of a business could be linked together to help deliver better bottom line results, but also out of fear of the Y2K crisis.

However, although these all began as the preserve of the massive, many of these and other supply chain technologies have since evolved into more scalable and affordable options for businesses across the spectrum—from the truly small to the massive enterprise. As they mature, the cost of entry has declined, making many technologies accessible to all businesses. It is said that, thanks to these developments, supply chains are on the cusp of a digital revolution. But as outlined by Georgia Tech, which is a leader in supply chain education notes: “Since the 1980s, computer technology has advanced at such a phenomenal rate that it is currently far ahead of the ability of the supply and logistics field to adequately utilize the new technologies.”

So, as the pace of adoption continues to accelerate, there is still plenty of opportunity for technologies to be adapted to supply chain operations. At the moment, there are several that are quickly gaining traction. **This paper is going to explore the current influence of mobile technology ... Software as a Service (SaaS) ... big data, ... web APIs.** These four have come a long way recently and continue to evolve rapidly. We’re going to take a look at where they are now and where they might be headed.

Mobility

From the first use of mobile scanners on delivery trucks back in the 1980s, the potential for mobile devices has long been recognized as a boon for supply chain operations.

Numerous factors contribute to this utility. First, the need for communications between widely

dispersed and moving members of the supply chain—drivers, dispatch and destination, for example—meant adopting mobility was an obvious advantage. Suddenly, disparate parts of the supply chain network could communicate instantly, and not just by voice—wireless data transmission was a huge advancement. But it has been the advent of personal handhelds—smartphone and tablets—that has really increased the viability of mobile tech options for supply chain operations.

As the devices proliferate to the point of ubiquity and become ever-more sophisticated, the barriers to entry continue to fall. Prices are dropping and because nearly everyone has one, businesses can take advantage of “bring your own device” (BYOD) options for some applications, further decreasing the cost, and even shifting it from capital to operating budgets.

And, as we noted in our Whitepaper, “The Internet of Things and the Modern Supply Chain,” the average smartphone is a truly powerful tool. An Apple iPhone 5 has 2.7 times the processing capacity of the 1985 Cray-2 supercomputer, the gold standard of the time. With this kind of power at users’ fingertips, it’s no wonder that new avenues for mobile technology continue to open.

According to The 2016 MHI Annual Industry Report, 36 percent of respondents said these technologies had the potential to either provide competitive advantage or disrupt supply chains. While current adoption rate of mobile technologies in supply chains is 26 percent, it is expected to surge to 75 percent over the next six to 10 years.

Increasing competition, the need for speed in the e-commerce environment, the growing drive to use available data to better operations efficiency are also contributing to the demand for mobile solutions that provide more than just immediate communications. The combined data that is gained from the application, device and user contribute to more informed and faster considerations, however that organizations need to consider before jumping into a mobile strategy.

Managing security, especially with employees’ own devices, can be a challenge. There are also potential dangers in a piecemeal approach to apps that, far from bringing data into one big useful pool for analysis, can end up creating data silos. Caution also needs to be exercised in selecting apps that are tailored to supply chain by experienced providers.

Some of the most popular and successful application areas for mobile technologies in logistics

at present, according to recent research, are navigation and routing using GPS, dispatch management and dock scheduling, parcel tracking, proof of delivery, telematics and customer service. Growing areas include fleet management and yard management.

Looking at yard management provides an example of how using mobile technology can pay off. By using an application on a device that most drivers have already, a mobile YMS can reduce costs, speed up operations and simplify processes.

Payoffs for mobile adoption can be measured in improved productivity, reduced operating costs, improved customer loyalty, faster decision-making, better collaboration between staff and departments and an enhanced bottom line.

While mobile applications have not yet become the mainstream for supply chain, they are rapidly gaining traction. The benefits they convey in terms of immediacy and building collaborative networks within supply chains cannot be discounted. According to some analysts, mobility is “morphing into the backbone of IT infrastructure” for many in the supply chain, and will only continue to grow in popularity.

SaaS

Software-as-a-service or SaaS (also known as cloud-based software), like mobile technology, has been around for a while. But like mobile supply chain apps, cloud computing is still immature and has yet to truly develop its potential.

SaaS offers numerous benefits for companies occupying the sweet spot where it makes sense. (To find out where that sweet spot is, read our blog: “SaaS vs Licensed Software: Factors to Consider in your Cost Analysis”.) It affords a lower cost of acquisition, with monthly fees instead of capital costs. SaaS offerings are kept up to date by the provider, and are also secured by the provider.

SaaS is gaining in acceptance because it is also native to the increasingly digital nature of supply chain. In conjunction with the connectivity of The Internet of Things, cloud-based apps help to bring the data together for analysis.

Cloud technology is also permitting greater integration of different platforms through the use of standardized protocols. This contributes as well to reduced IT costs, as you can refocus personnel to other areas when you outsource to a SaaS provider. The cost savings in this area

have been quantified: In a recent study it was shown that: “costs for IT resources were 16 percent in a SaaS model, while for licensed software 41 percent of the cost was allocated to in-house IT resources.”

SaaS apps are easily scaled to your business needs, and create opportunities for collaboration across your business and with clients and suppliers. Cloud-based systems also work across geographical and international boundaries, effectively shortening supply chains by bringing far-flung parties digitally closer together. Collaboration is a highly valued feature of SaaS, according to a recent SCM World study. In fact, 94 percent of respondents believe that more collaboration equates to problems being solved more quickly.

Possibly the greatest benefit of SaaS applications is that it will allow smaller companies to gain access to types of software that were previously beyond their reach for reasons of cost. SaaS erodes the leverage that larger enterprises once had with their big IT departments and provides cushion to cope with peaks and valleys in demand. With SaaS all companies have the potential to get software that was previously only available to the large.

In *The 2016 MHI Annual Industry Report*, over 70% of the respondents said SaaS is having some impact on operations. Forty-five percent claim to be using the cloud already, while another 22% expect they will adopt SaaS within the next couple of years. Overall, adoption rates of cloud computing are anticipated to achieve 86% in the next six to 10 years.

While adoption of SaaS solutions is not yet widespread in the supply chain, it is being touted as an almost inevitable solution. Oracle’s CEO recently said he thinks that by 2025 fully 80% of all applications will be cloud-based.

The Internet of Things is widely identified as one of the main sources of the supply chain data that’s now available for analysis. But even before it was highlighted, there was plenty of information available, coming in from sources such as ERP systems, and more recently the data coming in from GPS devices being used for last mile deliveries, and other applications.

Big data includes discrete bits of information about items, locations, movements, usage and demand. Being able to extract actionable analysis from that requires extremely advanced algorithms and computing power—these are the new parts of the equation. New technologies are able to interpret data from disparate systems— ERP, pricing and competitive intelligence systems, for example—bring it together and turn a spotlight on previously dark corners of

business operations.

When these techniques are deployed consistently, organizations stand to benefit. A recent study by Accenture noted: At the moment, properly analyzed big data can be used to optimize distribution, logistics, and production

networks. Demand forecasting is another important area the data can illuminate, helping to create more accurate predictions, and uncovering demand patterns that previously would have been unknown. Furthermore, information collected from products in use can be used to improve uptime, anticipate when maintenance is required and even improve customer service.

Risk mitigation and chain of custody are also enhanced by data analytics, potentially streamlining processes around product tracing and recalls, which are increasingly important for both food and pharma supply chains. All of these benefits contribute to creating more efficient supply chain networks, with lower inventories, faster turns, better throughputs and ultimately superior bottom line results. Good demand forecasting can cut 20 to 30% from inventories and ultimately deliver a couple percentage points in profit.

Utilizing big data analytics in operations can improve reaction time to supply chain issues (41%) and can lead to a 4.25-times improvement in order-to-cycle delivery times, according to Accenture.

In this year's MHI report, 44% of respondents believe analytics has the potential to be a disruptive or competitive force in their industry. In this year's MHI report, 44% of respondents believe analytics has the potential to be a disruptive or competitive force in their industry.

Big Data

Big data is not new. What's different now is the velocity, the volume and the availability of analytical tools to use it.

"Although the adoption rate in supply chains stands at just 22%, according to the report, it is expected to grow to 80% over the next six to 10 years." Similarly, 64% of supply chain executives surveyed in an SCM World study consider big data analytics a disruptive and important technology, that will "set the foundation for long-term change management in their organizations."

The key for managers in this is to not be deterred by the impression that big data requires a big corporation to use it. MHI proffers this advice: “Options could range from simple spreadsheets to complex visualization layers. A key is to start with something small enough to be achievable, yet big enough to matter – and then iterate and improve from there.”

What does this mean for supply chain? Essentially, they speed up and streamline communications. They also are the enablers for all the other tech innovations we’ve mentioned in this paper. APIs are used in SaaS applications; sensor-interpreting software uses them; contextually based mobile apps rely on them; and the data that goes into the big-data crunching systems gets there through APIs. Estimates say that about 24% of web apps and 15% of mobile apps are taking advantage of APIs. And by the end of 2018, these numbers are expected to climb to 80%.

A current example of how APIs can help is seen in a recent crackdown by retail giant Target on its suppliers. In an attempt to curb stockouts, the company reduced the delivery window for shipments to distribution centres from two to 12 days down to one day. They also announced plans to increase penalties for deliveries that didn’t arrive in the scheduled window.

Target’s suppliers now have a communications problem if they are still using EDI to transact business with the retailer. EDI bundles information and sends it in packets at timed intervals. The information is captured and forwarded without confirmation. This can result in delays of between 30 minutes and four hours.

This means that companies using EDI can be four hours out of date in responding to orders, and when there is a one-day window for delivery, that’s just not acceptable. APIs and web services can solve the problem with instantaneous communication.

As APIs come to the fore as a tool enabling the revolution in supply chain technology, it will be important to ensure your organization is onboard. They “unlock data, increase agility, encourage innovation and speed time-to-value,” making them a crucial piece of the coming IT toolkit for successful supply chain management.

Web APIs

APIs (Application Programming Interfaces) enable communications between different apps. Together with the connections between them they’ve been described as “the plumbing of the

Internet of Things,” as well as the EDI of the 21st century.

While we don’t want to invoke apocalyptic scenarios, there is a danger that those who are not on the lookout will run afoul of that tech juggernaut in a Titanic manner. Strategic and tactical employment of these new technologies can result in significant supply chain optimization. Increased visibility, better cost control, better integration within and across businesses, improved planning of demand and networks, better tracking and regulatory compliance — these are just some of the many advantages that can accrue through the adoption of some or all these innovations.

And there’s more to come. Supply chain 2.0, disruptive technology, the always-on supply chain—these are themes that are occupying the top supply chain analysts these days.

What will it mean for the supply chain manager trying to stay on top of trends?

Keep looking for the technology that will offer competitive advantage in your sector. That may not always mean the most recent, or the most expensive; it will depend on the task that needs to be accomplished. That much hasn’t changed.

But what has changed—and will continue to change—is the environment in which you operate. A few years ago we laughed at drones, wearable tech in the warehouse was a goofy fad, and autonomous vehicles were sci-fi.

Now autonomous truck platoons have been proved in Europe with a recently successful cross-continental trip, wearables are being used successfully in DC operations and drones are delivering packages.

Next up is artificial intelligence. Hopefully it will be smart enough to help us avoid hitting the new technology iceberg lurking on the near horizon.

The Future

Where is all this going to take us? While we see increasing adoption predicted for all the technologies explored here, that information on its own shows only a tiny sliver of the looming iceberg that technological change currently represents.

(C3 Solutions is an information technology company specialized in yard management (YMS)

and dock scheduling (DSS) systems.)

Commissioners Proclaim October 7th Centre County Manufacturing Day

written by Lauri Moon | November 1, 2016

IMC's Lauri Moon accepts a Proclamation by the Centre County Board of Commissioners on September 27th announcing October 7th as Centre County Manufacturing Day. #MFGday16 portion starts at 26:57.

To learn more about #MFGday16 visit www.mfgday.com.