

## **Transport Packaging in Industry 4.0**

By Ronald Margulis, RAM Communications

Over the last 50 years, the world's supply chains have undergone an unprecedented transformation. What was once a manual operation of moving assets from sender to receiver has become a technology-based practice that transfers the right product to the right places at the right time. When done correctly, companies deliver the perfect order and achieve total customer satisfaction.

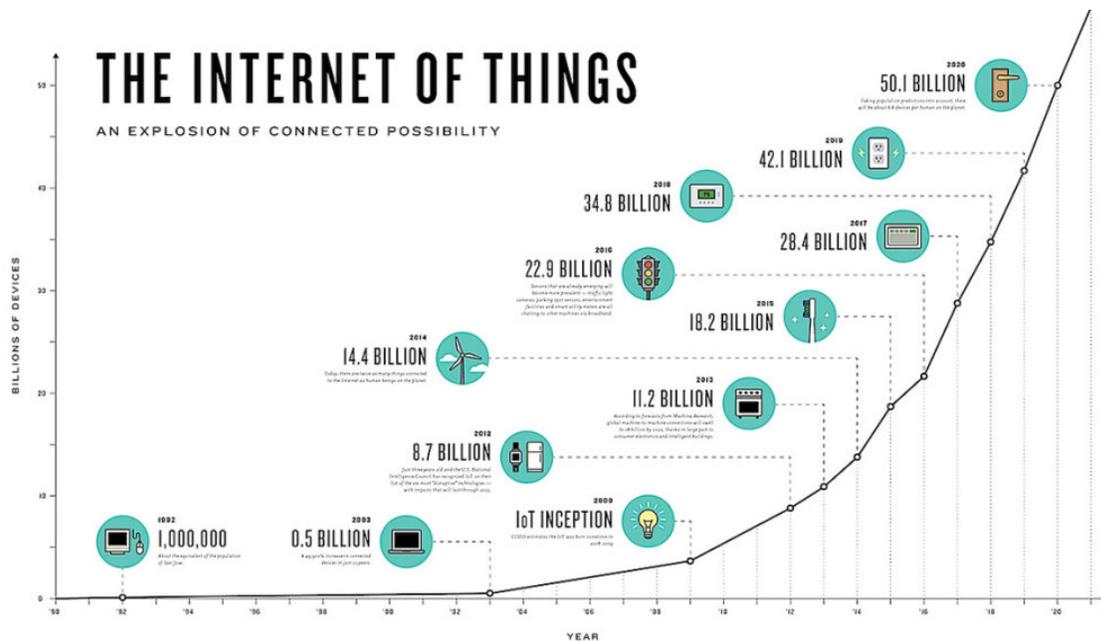
During the last decade alone, a series of technological and procedural developments have evolved — a move that has propelled the extended supply chain forward, enhancing performance and efficiency. These advances, which include everything from automation and robotics to artificial intelligence (AI) and machine learning (ML), have redefined the supply chain ecosystem.

Currently, companies are developing solutions that enhance the customer service process, an effort that makes the supply chain more efficient and promotes sustainable development. However, this effort is part of a wider initiative happening throughout developed countries — the transition to Industry 4.0.

This movement combines technology, engineering, production and logistics to generate a digital convergence of business operations. Specifically, Industry 4.0 innovations— such as the Internet of Things (IoT), advanced robotics, analytics and big data — will help jump-start both supply chain performance and customer satisfaction.

While it continues to evolve, the four key pillars within Industry 4.0 that impact the supply chain are smart factories, IoT, advanced analytics and more knowledgeable workers. Using this as their core, companies can use Industry 4.0 to look beyond existing silos and functions, and focus holistically on supplier management, supply chain visibility, demand planning, supply network design and product innovation platforms.

This will also become an easier task with 8.4 billion “connected things” expected to be in use worldwide in 2017, up 31% from 2016. Further, this volume will reach 20.4 billion by 2020, according to Gartner, Inc.



Industry 4.0 will also revolutionize the way that products are made, stored, transported and, very importantly, packaged. That said, the packaging industry must be aware of what changes within the fourth industrial revolution are likely to be, and how these will impact processes and profits. Klaus Schwab, founder and executive chairman of the World Economic Forum, states that Industry 4.0 “in its scale, scope and complexity will be a transformation unlike anything humankind has experienced before.”

Through all of these transformations — including the current early stages of Industry 4.0 adoption — the base of the supply chain remains the same: the pallet. However, this too, is primed for an evolution.

Consider the wood pallet. Cheap, recyclable and made from renewable resources, wood pallets were adopted by shippers and receivers eager to gain productivity in the distribution center and throughout transport during the 1950s and 1960s. At

their inception, wood pallets were far superior than floor loading and other manual forms of product warehousing and transportation.

Fast-forward to the 21st century's supply chain, and these once-innovative wood pallets are becoming operationally restrictive. Specifically, comprehensive supply chain optimization is stalled due in part to the many disadvantages of wooden pallets. This list includes product damage, the harboring of invasive species of insects, plant diseases and mold (if exposed to moisture), weight, issues with splintering, fire and cleanliness, worker challenges and usability.

### **The Future is Plastics**

As pallet users examine alternatives to wood containers, companies need solutions that will drive growth and enhance productivity, as well as ease freight costs and comply with food safety and trade regulations. While there are arguments for materials like coated foam, corrugated and pressed wood, plastic has emerged as the clear preference in the consumer goods and industrial channels, and beyond.

A recent study by the Freedonia Group reports that plastic pallets have the highest growth rate of all pallet types, growing by 2.4% annually to more than 130 million pallets by 2020, according to SandalResearch, and currently holding a market share of about 8%. By 2030, 30% of the market will be plastic. During this same period, demand for wood pallets is projected to plateau at the current rate, due to limited growth of pallet refurbishing services.

Besides being light weight, durable and sustainable, manufacturers and other shippers are increasingly drawn to plastics' stacking and nesting ability, easy reparability and branding options. In addition to solving the aforementioned challenges of wood pallets, plastic pallets also present a series of critical benefits, including:

- **Weight.** Plastic pallets are up to 50% lighter than wooden pallets and are more efficient to transport both empty and loaded with product. Given the difference in weight, shippers can transport considerably more product in the same size trailer.

- **Sustainability.** Plastic pallets are 100% recyclable, and can be used again if damaged. The manufacturing process is also environment-friendly.
- **Durability.** The materials used in most plastic pallets protect the platforms from damage. The design of plastic pallets has progressed to the point where they are more resilient with each new version.
- **Safety.** Several elements of the plastic pallet design and materials bolster both the safety of the platform itself, as well as the product loaded on top of it. Plastic pallets are easily cleaned, repel funguses, bacteria and pests like termites and limit the potential for workplace accidents.
- **User-Friendly.** Plastic pallets are flexible in terms of applicable products and pack sizes. They also accommodate customize display and promotion opportunities, allowing retailers to boost sales through superior merchandising.

### **Key Business Use Cases**

Practically every business use case for wood pallets can be applied to plastics pallets in Industry 4.0. From the basic transportation and rack storage of packaged goods to specialized in-store merchandising, plastic has proven to be as good — and in many ways — better than wood. In Industry 4.0, the move to automate as many processes as possible yields a use case where plastic is the clear winner.

One of the primary business use cases for plastic pallets is autonomous warehousing. Also referred to as dark warehousing, the process is comprised of systems that eliminate the need for human labor in distribution and manufacturing facilities.

Moving beyond the conveyers, automated storage and retrieval systems that have been implemented in many distribution centers around the world, autonomous warehousing deploys robots to check inventory; uses minimal lighting to keep videos and sensors working, and has comprehensive warehouse management systems interfacing to run the operation. The key to a successful autonomous warehouse is a platform that is standardized and won't breakdown the sophisticated machinery — an operation that can be jeopardized by wood pallets' loose boards and popped nails.

By investing in plastic pallets, companies are taking another step to uphold and optimize autonomous warehouse performance, and avoid system damage and downtime.

Companies designing autonomous warehouses typically coincide investments in plastic pallets within their major product handling strategic initiatives. In some cases, they are even part of the capital expenditure. Some also buy plastic pallets for closed loop product distribution. Meanwhile, many also require inbound freight to be on a pooled plastic pallet.

Another business use case for plastic pallets, particularly in the food & beverage sectors, is their place in retail-ready displays and other consumer-facing promotional activities. In the pharmaceuticals and chemicals sectors for example, plastic pallets support a focus on product and general safety, as well as efficient handling.

### **First-Mover Advantage**

There are clear benefits for “first movers” who adopt plastic pallets, including their potential for market dominance and higher-than-average profitability after a period of adaptation. (Researchers define “first movers” as the first companies to enter a market, not the first companies to develop or invent a product).

When observing first movers, there are clearly two levels of entry. First, a company must have an opportunity to be first at something, either through skill or luck. Second, the firm must be able to capture the benefits of being first.

There are three important benefits of being first: technology leadership, control of resources and buyer switching costs. But despite these benefits, only a small group of companies (4% of respondents) have chosen to lead the way on Industry 4.0, according to a PwC survey. These first movers say they have invested 6% or more of their revenues since 2013 in Industry 4.0 efforts, and also report high levels of digitization and competitive advantage. They are experiencing rapid payoffs in efficiency, cost savings and opportunities for innovation, and more than half expect to see rapid business returns on their investments, according to the report.

## Is a First-Mover Advantage Likely?

Your company's odds of succeeding with the resources it possesses depend on how well you understand the market and the technology. Use this chart to match your company's skills and resources with the environment you face in a particular situation.

The Situation Your Company Faces	First-Mover Advantage		Key Resources Required
	Short-Lived	Durable	
Calm Waters	<b>Unlikely</b> Even if attainable, advantage is not large.	<b>Very likely</b> Moving first will almost certainly pay off.	Brand awareness helpful, but resources less crucial here
The Market Leads	<b>Very likely</b> Even if you can't dominate the category, you should be able to hold onto your customer base.	<b>Likely</b> Make sure you have the resources to address all market segments as they emerge.	Large-scale marketing, distribution, and production capacity
The Technology Leads	<b>Very unlikely</b> A fast-changing technology in a slow-growing market is the enemy of short-term gains.	<b>Unlikely</b> Fast technological change will give later entrants lots of weapons for attacking you.	Strong R&D and new product development, deep pockets
Rough Waters	<b>Likely</b> A quick-in, quick-out strategy may make good sense here, unless your resources are awesome.	<b>Very unlikely</b> There's little chance of long-term success, even if you are a good swimmer. These conditions are the worst.	Large-scale marketing, distribution, production, and strong R&D (all at once)

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An example of first-mover advantage can be seen at Amazon, which was the first major online bookstore, seizing a head start on later entrants. Established book retailers Barnes & Noble and Borders were quick to develop their own web sites, but Amazon maintained its first-mover advantage by extending the product offerings into apparel, electronics, toys and housewares. Amazon's advantage over Barnes & Noble: it became a much larger, one-stop-shopping destination that attracted customers.

Amazon is also working toward first-mover advantage in several areas of logistics, including among platforms being used to transport its products. Amid efforts to morph into a conglomerate that does much more than merely sell products, the online retailer uses customer analytics to predict what shoppers want — and don't want — on the sales side, collaborates with suppliers to ensure fill rates and quick product introductions on the buying side, and drives efficiency throughout by adopting global standards for pallets, packaging and other logistics tools. Amazon's cloud solutions also have a significant impact on business operations.

Jeff Bezos, Amazon's founder and CEO, said; "There are two ways to extend a business. Take inventory of what you're good at and extend out from your skills. Or determine what your customers need and work backward, even if it requires learning new skills."

### **Resource Control and Pallet Management**

Another advantage that first movers have is the ability to control a mission-critical resource that is better than those used by later entrants. Resources available to a first entrant may include a supply of raw materials needed to make the product, or access to shelf space at the supermarket.

First-mover firms also can build resources that may discourage entry by other companies. For example, the first mover may increase production capacity or broaden their product line, signaling that there is not enough room for followers to enter and profit.

One company that excels at controlling resources and creating competitive advantage is Tesla. The company is at the nexus of integration of transportation and energy, especially since the future of transportation is electric, the future of electricity is solar, and the future of solar is grid storage integration. An undisputed leader in electric transportation and grid storage, Tesla is on pace to keep its leadership position by leveraging the Gigafactory's capacity and cost reduction model.

Tesla Motors, Tesla Energy and SolarCity make up the only companies that have been able to control resources in every single one of the megatrends in transportation and energy. Tesla co-founder, CEO and product architect Elon Musk is successful not because he is smart and a great engineer, but because he studied the economics of other people's technology. Thus, he understands that Tesla needs to position itself at the forefront of multiple growth waves that are coming together at the same time. Armed with this knowledge, Musk is building a platform that optimizes his vision through automation and standardization.

“There are really two things that have to occur in order for a new technology to be affordable to the mass market,” Musk said in a *Wired* magazine interview. “One is you need economies of scale. The other is you need to iterate on the design. You need to go through a few versions.”

Tesla is now applying its technology to over-the-road freight trucks that can go 500 miles on a single charge. Musk is determined to revolutionize the trucking industry as well as other parts of the supply chain by being the first mover.

In the transport packaging world, resource control is a concept that minimizes product handling and accommodates the newest automated systems. It incorporates the Internet of Things and total visibility of product movements from the point of ingredients/production to the point of purchase. It means that data on product damage, spoilage, availability, and theft, among other processes, can be shared with trading partners to increase positive and decrease negative implications. It also delivers quantitative benefits to users for a full range of activities, like speed to market and out-of-stocks.

“The rapid migration to plastic is being driven primarily by automation, legislation, cost efficiencies and the Internet of Things. The adoption of the autonomous warehouse and the quickly approaching autonomous vehicles are also playing a critical role. The only way automation works is with the consistent and uniform perimeter of the plastic pallet, which allows the platform to move freely through the system, as well as the imbedded smart tracing and tracking technology that integrates into the warehouse management systems,” said Ben Stoller, executive managing director of Paxxal Inc.

“Food and safety legislation is only going to get more rigorous over time, making the issues of pathogens and infestations that are innate to wood pallets unacceptable. The cost efficiencies of plastic pallets resulting from the lower weight of plastic pallets, the fuel savings and other cost benefits from reductions in work place injuries and damage to material handling equipment are well documented.”

Stoller adds a final point about the basic need for items to be connected to the Internet of Things, which is not possible with wood pallets. “With the long term scarcity of timber and rising timber prices, the sustainable competitive advantages of plastic and the ever increasing demand for plastic pallets, we feel the space has huge potential.”

### **Using Data to Optimize Transport Packaging**

Managing data efficiently has always been a critical element of logistics and transport packaging. Previously managed by transport planners and their computers, the big data emerging from Industry 4.0 will force the packaging industry to process huge amounts of logistical and related information. This will enable the optimization of transport processes far beyond any human scope.

There will also be an impact on the traditional transport packaging model of using pools and exchanges. With all the advantages that big data and IoT will bring, companies will be able to determine what categories are best matched with what transport packaging systems for the most effective total transport solution. Some companies are already starting to coordinate their inbound and outbound transport packaging to minimize the total number of times any given product is handled by using data analytics systems, a move that helps manage their end-to-end logistics processes much more efficiently.

The large-scale cost reductions provided by increased efficiency and improved delivery times will be welcomed by retailers and manufacturers, but will also have an impact on transport packaging. This is already being seen in the move to retail-ready platforms. Once one company demonstrates how this technology can increase profits, they will soon be joined by others. Again, this trend means companies will need to pay more attention to the role transport packaging will play in their entire ecosystem. Fortunately, the tools available now and in the future under Industry 4.0 will help.

## **The Path Forward on Transport Packaging**

Efficient transport platform capabilities are vital to move forward with Industry 4.0. Developing these solutions takes time and concentration, so a step-by-step approach is important. However, companies must move swiftly to avoid forfeiting the first-mover advantage to competitors. These five steps can help guide suppliers and retailers to successful Industry 4.0 transport packaging programs:

- 1. Develop an Industry 4.0 transport packaging strategy.** Evaluate current transport packaging systems, and map out how to most effectively move from where the company is and where it wants to be. Prioritize the measures that will bring the most value to the business and make sure these are aligned with the overall strategy. Gain commitment to this approach from the full range of top company leadership, and make sure that commitment is evident to people throughout the enterprise.
- 2. Start small with a few trial projects.** Use pilots to establish proof-of-concept and demonstrate business value. For transport packaging, testing materials, designs of pallets, and other platforms will quickly yield data that can be projected to determine the full impact of the project when rolled out. With early successes, companies will also gain buy-in from the other decision makers, and secure funding for more expansive rollouts.
- 3. Establish the capabilities required for success.** Build on lessons learned in the trials, determine the competencies needed to achieve corporate goals, and develop a blueprint for building those competencies. Include technological enablers, like a highly functional IT infrastructure with well-designed user interfaces, that can propel the business processes forward.
- 4. Incorporate data analytics into all business decisions.** Success with Industry 4.0 depends on the company's ability to unlock data possibilities and use analytics in creative, effective ways. Establish cross-functional analytics capabilities tied closely to the strategic priorities of the whole enterprise. Then draw on both in-house staff and outsourced expertise. It is also paramount to develop ways of combining data from different parts of the business. For example, merge quality, logistics and engineering functions, and apply these methods to as many domains as possible — particularly those that differentiate your company or attract customers.

**5. Think holistically.** Develop complete logistics solutions with trading partners, or align with platforms if a comprehensive solution cannot be created internally. The greatest performance breakthroughs occur when companies actively understand consumer behavior, and can orchestrate a distinctive role for the company within a complex ecosystem of partners, suppliers and customers.

“Industry 4.0 is inevitable, and new processes, methodologies, materials and concepts are now being embraced as global competition dictates change. These range from the transition to plastic pallets to a variety of trends related to big data, IoT and AI — all of which are impacting the transport packaging industry,” said Paxxal’s Stoller.

Experts agree that it’s time to evaluate what this evolution will mean for the industry, each individual business, and everyone individual’s role. Being prepared for the changes that the fourth industrial revolution will bring will be key to an organization’s survival and success.

#### **About Ronald Margulis**

Ron Margulis brings more than 30 years of work and management experience to RAM Communications. He started the firm in 1993 as an editorial support agency and has grown it into a full service public relations and marketing consulting company offering services like media relations, issue research, crisis communications management, speech writing and newsletter publishing. With more than 1,000 articles published, Ron is also an accredited journalist with articles on the food, retail, information technology and transportation industries published in *Canadian Business*, *Chicago Tribune*, *Cigar*, *Computerworld*, *Executive Technology*, *FT.com*, *Food Arts*, *ID*, *Sales & Marketing*, *Supermarket News*, *Washington Times* and several other newspapers and magazines. He has written more than 20 industry reports/white papers and is contributing editor of three professional reference books. Prior to starting RAM Communications, Ron was editor of *Distribution Channels* and *Shipping Digest* magazines and started his journalism career at *Forbes*, where he was a reporter covering the food, retail and transportation industries. Ron graduated from George Washington University, earned his Master’s in economics from New York University and studied journalism at University of London.