



The Impact of Disruptive Technologies on the Food Industry.

Just about every industry is under pressure to reduce costs, localize supply chains, and reduce waste to better service an increasingly concerned citizen consumer base, that with prosperity continuously dropping is struggling with affordability even for essentials.... like food.

Governments are requesting action from industrial leadership to assist them in closing this prosperity gap. The other added requirement is increasing legislation on the control of food & drug products for reasons ranging from consumer health to national security that will require significant product and process certification, traceability and proof-of-origin etc.

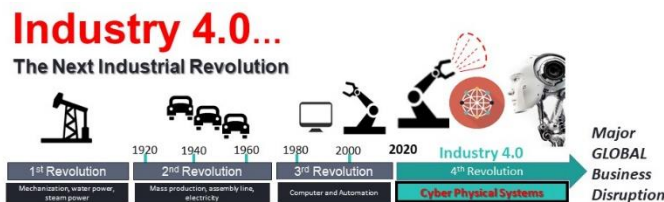
The main goal ...waste elimination

The food industry for many reasons struggles with the cost burden of food waste across the whole supply chain from field to fork that is almost 60% of the total food chain output. Although some of the waste is cultural due to our affluent and throwaway society, much of the waste problem could be solved with new disruptive technologies that can improve decisions and actions at the point of use for crops and livestock and for managing the control of materials in the conversion processes throughout the overall supply chains. This would also assist in reducing the manpower and associated costs incurred in supporting these transactions.

The future challenge of the food industry must be to learn how to access and innovate the application of these disruptive digital technologies and introduce them into the future business supply chain using a new industrial imperative called INDUSTRY 4.0 which is considered by many experts to be the next industrial revolution.

Sometimes this INDUSTRY 4.0 initiative is called "Smart Factory Evolution" and sometimes it's called a "digital transformation" within the business and sometimes its defined as the notion of building Sustainable Supply Chains. Whatever the handle used its about getting rid of the waste in the whole business process using a combination of LEAN business practices aligned with new disruptive digital technologies.

What is INDUSTRY 4.0



[Cyber-Physical:
Connecting Computers
to Processes without
human Intervention]

The first industrial revolution (INDUSTRY 1.0) was powered by water and steam to mechanize production.

The second industrial revolution (INDUSTRY 2.0) used electrical power and introduced mass production.

The third industrial revolution (INDUSTRY 3.0) added electronics, computers and information technologies to automate the production process.

The fourth industrial revolution (INDUSTRY 4.0) began with the digital age in the last decade and is characterized by a fusion of technologies such as artificial intelligence,

sensors, robotics, the Internet of Things, autonomous vehicles and 3-D printing to generate what is being called cyber physical systems and is facilitating what some are calling the age of technological disruption that is driving the emergence of these new advanced technologies that are generating new forms of innovation in the products the manufacturing process and the total supply chain.

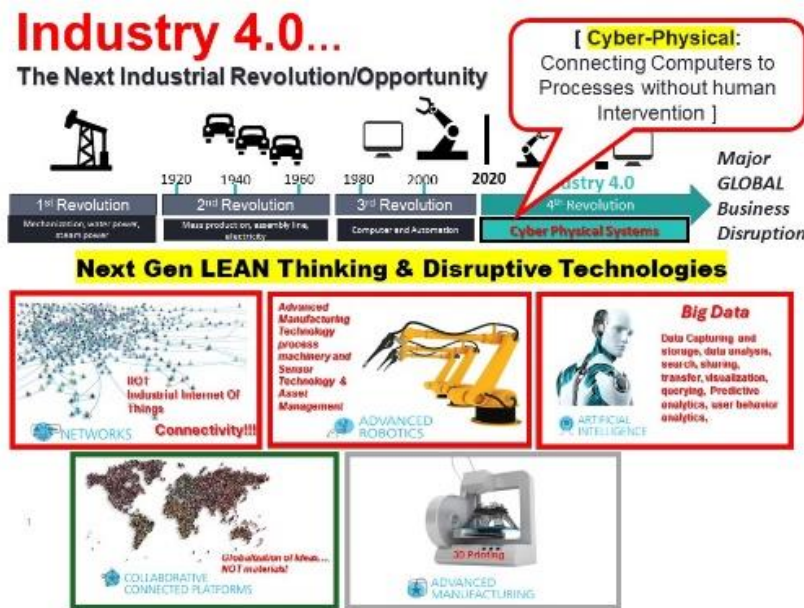
This may demand new facilities, capital, knowledge, skills, and systems, and must be fully integrated with LEAN thinking to ensure solutions are implemented without automating waste.

Correctly adopting such an imperative will provide an opportunity to change the competitive game, but much more needs to be done to assist the industries learn how these new technologies will be implemented.

In INDUSTRY 3.0 we added significant computerization to our manufacturing and business processes, but it created many environments in industry where we as humans got trapped in the process and ended up working for the computer, not the computers working for the process and benefiting us. This has, in many cases, made us slaves to the computer. An example is how Enterprise Resource Planning systems still struggle with multiple transactions, some of them semi-manual or manual, to keep a firm real-time grip on a dynamic business process.

But INDUSTRY 4.0 will employ cyber-physical systems that will eliminate the human interface with sensors and smarter systems, so we will have computers working for us, not us working for the computers and eliminate the burden of managing computers by humans and allow direct linkage between the computers and the process.

Here are the five key disruptive technologies and how they will impact the future.



Advanced Robotics

This means linking traditional computerized machine and automation technology with smart sensor systems, and we are witnessing this technology growth as defined by the upturn in the shipments of industrial robots of all types. These automation systems using smart-sensor solutions are being described as “cyber physical systems” because they place the computer power even more in control of the process without human intervention, which solves most of the major interface issues between computers and process management.

Artificial Intelligence (AI) and Big Data

In the last few years, computer technology has taken a huge leap forward in terms of computing power measured in operations per second. They can operate upon massive and multiple algorithms much faster than human thought, with almost the same level of complex logic and decision capability. This will generate enough information density and complex algorithm management to become a form of artificial intelligence. This improved computing power will enable computing systems to handle what the computer

industry calls “Big Data,” so that everything we want to know about a subject or event can be stored as a complete body of knowledge at the point of use and used at will in real time.

The industrial Internet of Things (IIOT).

Although the technical term is “connectivity,” the public is embracing the Internet of Things and its industrial version, the Industrial Internet of Things (IIoT).

This is suggesting that devices and therefore the knowledge they carry will be connected more than ever before. Again, it is about information and knowledge at the point of use in real time.

Collaborative Systems

The other disruptor is the “globalization of ideas” via collaborative and connected platforms that allow remote interaction, and it is breeding a cloud-based mentality and hopefully constructive crowd sharing of resources, skills, knowledge, and funds in an interactive manner. The control of IP may become an issue, but in principle the globalization of ideas is far more sustainable than the globalization of manufacturing and materials.

Advanced manufacturing

Besides computerization and automation, there have been many advances in manufacturing techniques over the years, such as 3D printing now available in a wide range of plastics and metals.

The next Industrial Revolution is on the way.

INDUSTRY 4.0 will embrace all functions in a business, and provide an integrated and computerized business, and will control the whole supply chain. It will manage the core conversion processes from raw materials to finished products including the management of all the manufacturing automation processes and integrate them with the customer demand and fulfillment process. It will enable the “smart-factory” concept to be conceived, and start us on a journey toward a new “business of the future” This will allow us to redeploy human skills toward improving our processes, and evolve how we do business to better satisfy the demand of the local customer in the most sustainable manner.

These cyber-physical systems using sensor technology, IIOT networking technologies, and advanced wireless position and transaction-system technology will enable not only the advancement of robotics and autonomous guided vehicles but will allow us to place computers seamlessly into our processes and connect computing devices with integrated analytics.

Working in partnership with LEAN thinking we can eliminate transactional waste and solve some of the major interface issues between computers and process management. It offers tremendous possibilities to eliminate transactions and allow business process and factory designers to take the business process to the next level, so they can effectively and cost-efficiently manage a broad scope of physical assets, such as processes, buildings, vehicles, machinery, equipment, and inventory.

Are we there yet?

INDUSTRY 4.0 solutions are being developed in each manufacturing sector by the sector-specific manufacturing equipment and automation suppliers and the business-system-solution providers.

Much more needs to unfold in this journey but it’s well underway, and the goal is to improve operating processes and better harmonize future products and processes to achieve more integrated, waste-free, and sustainable products, processes, and services to meet customer expectations.

A recent industrial study indicates that 70 percent of business leaders in North America are looking at how to embrace the INDUSTRY 4.0 environment, and they are revisiting both continuous improvement and disruptive technologies as strategic differentiators.

The application of INDUSTRY 4.0 and these disruptive technologies have a current global market size specific to the manufacturing industry of about \$3.9 trillion and are rapidly growing with investments predicted to exceed \$60 trillion during the next fifteen years.

Business improvement has always been a continuum, but the integration of these new disruptive technologies under the banner of INDUSTRY 4.0 constitutes a near-perfect storm to change the face of business, industry, and manufacturing into the next decade and provides a window of opportunity to offer not only business improvements but a chance for the renewal of national prosperity.

Food Industry benefits.

Every industrial sector will experience the benefits of Industry 4.0 in many different ways, but for the food industry the benefit will be across the whole supply chain.

For the crop farmer it means remote monitoring of crops using equipment and applications that can define irrigation and fertilization plans and improve growth and pick optimization.

For the livestock manager it will mean health and feeding optimization of the individual livestock and better management of final yields.

For food raw material processing it means automated traceability and environmental record keeping and the reduction of waste with improved automated quality screening and control – saving themselves and all their downstream customers money while improving product quality and traceability.



For the food manufacturing process, it means improved scheduling, batch management, inventory control and automation maintenance and performance optimization leading to reducing waste and improved labor productivity.

For the food distribution system, it will ensure safety and traceability and proof of origin as well as improved inventory integrity and management.

For the retail owners it means much lower disposal of spoiled goods, improved shelf life and improved supply management and internal operations.

For the consumers it should mean lower prices and fresher products.

The Food Industry Traceability Challenge

Its clear some parts of the food industry will struggle with the new traceability requirements now mandated to be operational by January 2026 at every food industry establishment, from producer through storage, distributors, retailers, and restaurants.

Many in the industry will try a “quick fix” by implementing manual and paper documentation, but this will add cost and more overhead and may even add delivery delays.

But new technology providers are positioning to provide an Industry 4.0 solution to offer an integrated and automated food traceability, integrity and waste reduction system that will deliver improved operations as well as seamlessly meeting these new industry wide traceability requirements.



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He consults and educates worldwide on Business Productivity Improvement, LEAN business practices, Advanced Manufacturing Engineering, Future Supply Chain Management, Industry 4.0, National Sustainability, Global technology transfer projects and joint ventures and more.

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