Aftermarket 4.0
Business Operations in the Era of Manufacturing Intelligence

WHITE PAPER
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The line between digital and physical world is diminishing as the emerging technologies such as connected devices, big data technologies, and machine learning, are penetrating the customer landscape. The growing volume of data generated is reshaping CX while allowing the customer to get what they want, almost precisely at the same moment when they need it. These digital technologies have transformed consumer habits, creating a new breed of ‘Digitally Conscious Customer. Not surprisingly, enabling customers to rate organizations on their digital CX first and exhibit deeper loyalty to companies that understand them very well.

This paradigm shift is compelling the manufacturers to reinvent their customer service journey and thus the aftermarket experience. These developments are causing disruptions across the entire value chain of the businesses. While tremendous new opportunities arise out of these macro changes, it also poses significant new challenges for organizations.

This paper explores the changes, benefits, challenges, and what the future holds for the Aftermarket segment that will significantly evolve with the Industry X.0 transformation that is already underway.
The fourth industrial revolution is much more complex and intertwined than any of its predecessors. Two things stand out as we march in the age of 4.0. First, unlike the previous industrial revolutions, Industry 4.0’s scope and impact are not limited to the factory walls itself. Second, 4.0 will impact everyone – customer, supplier, manufacturer, and the competition – it doesn’t matter what role one plays in the business landscape; no one is immune to the immense changes industry 4.0 is bringing in.

The overall impact is so overwhelming that every aspect of a business lifecycle should be studied for how it will evolve in the 4.0 era. Surprisingly, very little has been discussed about Industry 4.0’s impact in the aftermarket space. In this whitepaper, we will discuss the impact Industry 4.0 and related technologies are bringing in the aftermarket space and discuss opportunities and challenges for the manufacturers.
Aftermarket, as we define it, is that phase of the product lifecycle which starts from the point of customer acquiring the product till the end of the product lifecycle. From a manufacturer’s perspective, it includes all business aspects and operations of customer service, and support post the product sale. Aftermarket 4.0 is the emergence of new-age business operations in the world of Industry 4.0. It is the application of Industry 4.0, and related technologies to these aftermarket functions of the business. It is the changes in the customer service journey caused by the convergence of the physical and digital world in the context of the equipment.

The vast amount of data arising out of connected products is enabling organizations to innovate new business models. These new business models change the traditional landscape of collaboration between OEM, service partners, and the customer. As an example, an autonomous truck manufacturer operating in the “As a service” business model needs to redefine the truck’s scheduled maintenance and repairs through its service channel. The OEM is expected to keep track of these jobs, preemptively assign them to the qualified technicians while keeping the downtime minimal. To study these changes in detail, we can logically divide the Aftermarket 4.0 into three major components: Warranty 4.0, Service 4.0, and Engagement 4.0.
Over the last decade, manufacturers have been focusing heavily on the service lifecycle to drive revenue generation. Excellent customer service is not a differentiator anymore; it is a pre-requisite for survival. Organizations have been innovating and experimenting with different ideas to prosper in customer service. In this backdrop, the emergence of connected devices, along with big data technologies, and data-driven business models adds new arsenal for manufacturers to innovate. All these developments are converging to drive new age aftermarket business.

The traditional ownership model is being challenged. Organizations are beginning to acknowledge that the customer is not looking at buying a product instead solve a problem at hand. For e.g., a farmer's motive is to grow and harvest and not to own a tractor. This shift in viewing customers from a fresh perspective turns the whole business model upside down. The focus is on reducing and eliminating down-time, ensuring service availability, assuring parts availability, and selling uptime rather than products. All these initiatives can be done with greater precision and efficiency when combined with the data coming in from the products including but not limited to data usage, error codes, GPS locations, etc.

This convergence of business drivers, customer expectations, and technology advancements is both exciting and challenging in the aftermarket space.

There are three major components of Aftermarket 4.0:

1. **Warranty 4.0:** This deals with the changes in the definition of warranty, entitlements, service contracts and agreements, managing lifecycle of product issues, mining data to gain valuable insights into emerging issues, provide quality inputs, and to optimize warranty management operations.

2. **Service 4.0:** This covers the aspects of customer and product support services. It involves tools, technologies, and processes around customer support, product repair and service, information, etc. The objective of these processes is to keep the product downtime to a minimal.

3. **Aftermarket Engagement 4.0:** This focuses on the interaction and communication between various parties involved in the aftermarket phase. While customers and the product are the central focus, offering exceptional service involves interaction with partners, technicians, contractors, suppliers, logistics, and other internal functions.

What’s New? (Key Drivers of Aftermarket 4.0)

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Revolutionizing Manufacturing through Connected Devices

Business Impact and Value

The impact and benefits of connected devices to everyday consumer are well established. It is not just your refrigerator ordering milk when you are out of it, but it refers to all connected “things” as it pertains to an industry such as the machines and all the associated hardware (such as sensors), software (cloud-based applications and integrations to other systems) and communication (networks etc.) The impact of connected IoT devices, is almost taken for granted these days, but the impact of IIoT also cannot be ignored. The extra “I” stands for the Industrial internet of things. Just as the IoT created new experiences and expectations which created new opportunities and efficiencies for the consumer, IIoT creates a whole new set of opportunities all along the value chain of the manufacturing sector and more so in the aftermarket world. Even in the traditional aftermarket, companies that leveraged multiple data sources and integrated better into the product lifecycle tended to perform better. Now the stakeholders along the aftermarket value chain such as OEMs, part suppliers, repair shops, dealers, and users each tend to leverage and maximize the aftermarket potential as it applies to them.

By 2020, discrete manufacturing, transportation & logistics and utilities industries are projected to spend $40B each on IoT platforms, systems, and services.¹
As mentioned, Aftermarket 4.0 leverages the interconnected machines, processes, industry standards, and all relevant direct and indirect data to create a new and better customer experience. While there are several immediate discernable benefits like faster turnaround, lower cost, parts authenticity, and better service, the most tangible benefit we predict from the Aftermarket moving to 4.0 is the reduction in TCO of assets as maintenance is a significant contributor to TCO.

The made to order discrete industry sector perhaps will reap the benefits of Aftermarket 4.0 the best, given the high value and customization of its assets, parts, assembly, and operations. Here are interesting stats from the A & D industry as reported by Aerospace Industry Association.

- End-use manufacturers of A&D systems accounted for 51% of total sales, while the industry’s supply chain accounted for the remaining 49% of sales

- In addition to the sales generated by the industry’s commercial aerospace and defense and national security segments, U.S. A&D generated an additional $458 billion of sales from the industry’s supply chain, which includes $123 billion from firms providing services to manufacturers

Given the service market size for some prominent industries that are already connected or will be such as the A&D, Automotive, Industrial, Transportation, and Farm equipment, it is easy to forecast the clichés of disruption and innovation. To survive and thrive in the Aftermarket 4.0 companies must rejig all along the chain – Dealers, OEMs, Suppliers, Repair shops, and End customers.
Aftermarket 4.0 will, in general, mirror the growth and benefits of the broader Industry 4.0 and is reliant upon a set of new expectations around user experience and technology such as the factors listed below:

- Customer/ User experience – Product life, order, service, pay, etc. all mobile and easy
- Connectivity of machines to machines (M2M) and enterprise systems
- Data science advancements
- Smart factories, connected services, AR/VR, mobility, etc.

**New avenues of revenue through IIoT-Driven Manufacturing**

The Aftermarket of the future will have a broader role and greater access to data that will help the sector find new and innovative revenue streams beyond traditional means. Data monetization seems obvious, but other areas such as predicting failures based on the analysis of parts return and performance-based warranty, etc. will open additional revenues. Also, the connected scenario warranty will cover more than just the basic part as the performance of a component, system, or asset. It will also include the hardware, software, and communication elements that connect it to relevant human and machine interfaces.
Aftermarket 4.0
The Road Ahead

How prepared are we for Aftermarket 4.0?

With connected devices paradigm, some industries and geographies will have the edge over others in terms of leveraging the advances in the aftermarket sector. Industries such as the HVAC and elevator sectors (which already incorporate intelligent connected elements in their operation), and A & D (which already have the connected Aircraft paradigm in play), will also tend to extend and leverage technological advances to service the aftermarket space. Connected factories and smart cities and buildings and the already mature automotive sectors will all take the lead in propelling Aftermarket 4.0.

Technological innovation (cognitive technologies such as machine learning, natural language processing, neural nets, and AI have shifted from being siloed capabilities to tenets of strategy), and an increasing number of interaction points will empower the end customers in the overall scheme of Aftermarket 4.0. In the future, the customers will be able to receive a workshop recommendation from the vehicle itself – complete with cost estimate– and decide whether to follow that recommendation or seek alternative services based on price, quality, or location.
The following provides a broader view of the various technologies that are playing a key role in providing disrupting power in the context of Aftermarket 4.0

**Internet of Things (IoT):**
IoT can enable improved performance across the organization, like: Optimizing and managing channel structure, marketing and targeting, optimizing pricing, servicing via field force, forecasting and demand planning, improved asset utilization, higher uptime, improved customer service, enhanced end-to-end supply chain performance, improved supply availability, supply chain visibility, and reliability.

**Artificial Intelligence (AI):**
Organizations can improve order delivery and service levels by using AI capabilities to determine the most optimized route for deliveries. They can optimize shipping replacement parts by applying AI algorithms and notify users of potential equipment failure before it occurs, enable demand forecasting, production planning, or predictive maintenance.

**Big Data and Advanced Analytics:**
Provide real-time or near-real-time solutions in areas such as dynamic pricing, product quality testing, and dynamic replenishment. The Supply Chain data (such as the Internet of Things data, dynamic sales data, and weather patterns) provides the ability to extrapolate the current environment to understand future scenarios and make profitable recommendations. Big data and advanced analytics will allow aftermarket players to store and process vehicle, customer, and vehicle usage data to optimize the value chain end-to-end based on predictive maintenance.

**Digital Twins:**
Expensive industrial or business equipment, services, or processes, improving utilization by reducing asset downtime and lowering overall maintenance costs will be extremely valuable, making internal software competencies critical to driving value with the digital twin.

**AR (augmented reality)/ VR (virtual reality):**
AR/ VR is redefining the fundamental ways in which humans interact with their surroundings, data, and each other. The multiple mobile, wearable, IoT, and sensor-rich environments and conversational platforms are improving safety and making mundane tasks easy. E.g., AR can provide renderings of equipment to visualize the footprint in a defined space to compare different configuration options. In another example, voice-controlled personal assistants can help check product features or appointments remotely.

**Blockchain:**
Solves multiple supply chain issues like counterfeit products and efficiency, verifying authenticity, improving traceability and visibility, and improving transactional trust.
It is imperative to leverage past investments by modernizing core systems to serve as a foundation for innovation and growth; move cyber risk from a compliance-based activity to an embedded, strategic function; and re-engineer an organization’s technology function to deliver against the promise of emerging technologies.

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