Xoriant

Engineering Success Chronicles – Volume 1

Will Digital Technologies and Digital Processes Push the Envelope Toward **Mass Customization** in the Physical World?

Explore real-world examples of how leading brands are unlocking mass customization in the physical realm.

Possibilities of

Mass Customization
in the Physical World

Advances in technology have made personalization and, to some extent, customization a reality in the digital world. However, the physical world has encountered its share of obstacles when striving for mass customization. In this Point of View, we delve into the prospect of extending the boundaries of mass customization into the physical world through digital technologies and digital processes.

Mass Customization in the Digital World Fuels Physical World Expectations

In the digital world, personalization and customization are common. Organizations are using AI to analyze user data and provide personalized recommendations. Platforms like Amazon, Netflix, Facebook, and Spotify have excelled at this, tailoring product recommendations, movie suggestions, localized ads, and playlists to individual preferences. This level of personalization is largely driven by the vast amount of data that is being collected and analyzed in the digital space. Some offline data from the physical world is also being added to enhance the effectiveness of personalization. From an era of seeing only national ads, we have entered an era of hyper personalized and localized ads. This sophistication keeps improving every day. It has prompted businesses to adapt operations for cost-efficient personalized offerings at scale. Technology has played a foundational role in enabling this transformation.
A recent Salesforce study indicated that

All this is leading to changes in consumer attitudes and expectations towards receiving personalized/customized services. Generation AI, the current generation of young people growing up with AI as a part of their daily lives, is highly accustomed to personalization and expects products and services to cater to their individual preferences. Also, as Generation AI matures, it is expected that their desire for personalized and customized products and services in the physical world will continue to increase.

Digital Technologies & Processes Enable Mass Customization in The Physical World

Applying the digital world level of customization to the physical world has traditionally been challenging. The complexity further increases in the high-volume, mass distribution model-based consumer packaged goods. Products like food, beverages, cosmetics, and cleaning products that are targeted towards a large consumer base are often produced in bulk and have limitations in adapting to individual preferences.

Needless to say, within the continuum of consumer-packaged goods, there are certain product categories and services where personalized and even customized offerings are increasing. It is more likely for high value and low consumption products to have customized options.

What will facilitate the achievement of mass customization within physical industries?

There are two key factors that will enable physical world products to keep up with the demand for mass customization, as illustrated in the below Exhibit 1:

Digital Technologies:

The continuous advancements and growing commercial feasibility of digital technologies, including but not limited to Cloud, Analytics, Artificial Intelligence (AI) and Generative AI, vision technologies, Metaverse Digital Twins, Automation, Virtualization, Flexible Manufacturing, Mobility Solutions, and various Platforms.

Digital Processes:

In addition to harnessing digital technologies, the implementation of digital processes throughout the entire value chain, spanning design and development along with sales and distribution, is essential to achieving a paradigm shift in mass customization. These processes may encompass decentralized manufacturing, digital manufacturing, digital configuration, immersive customer experiences, iterative R&D feedback loops, crowdsourcing, community management, gamification, automated quality control, and digital inventory management, among others.

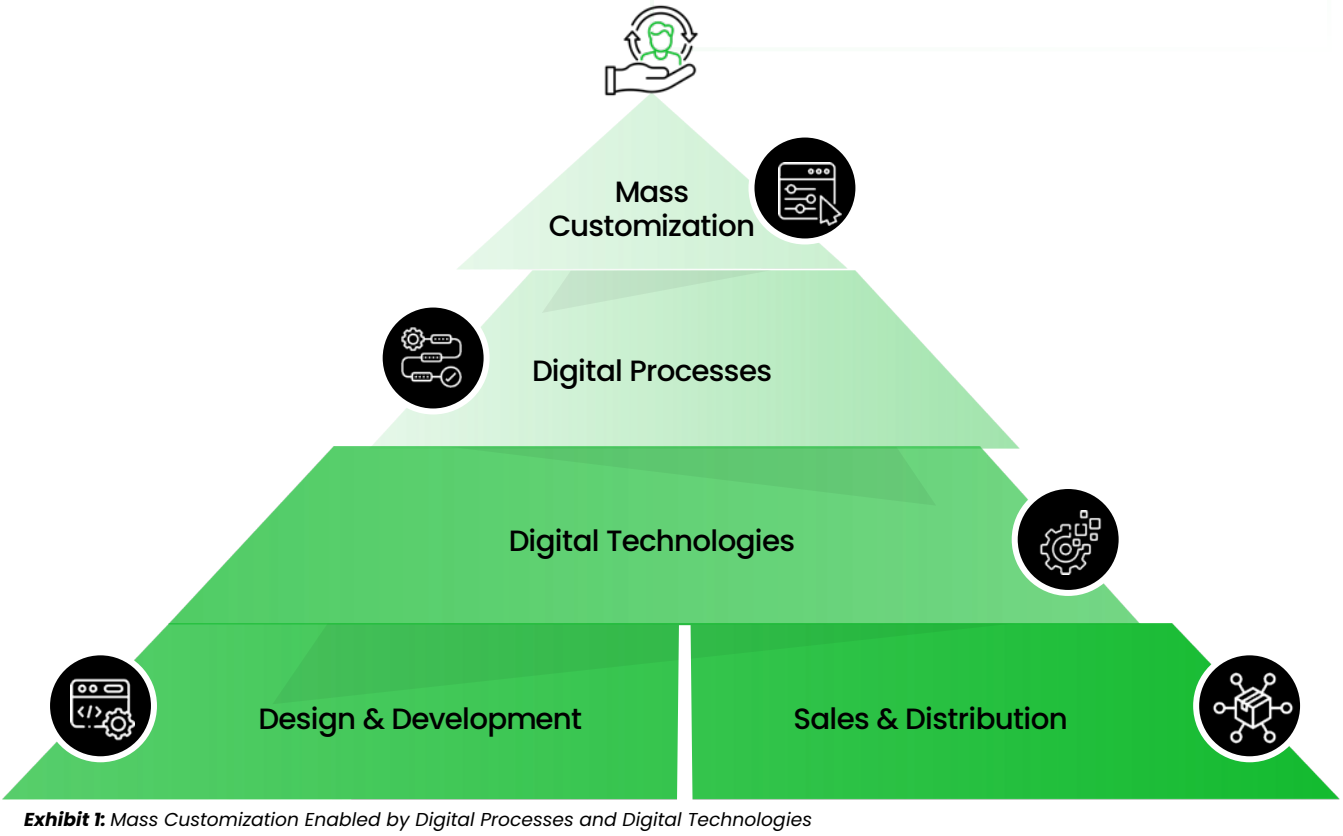

Exhibit 1: *Mass Customization Enabled by Digital Processes and Digital Technologies*

Source: *EIIRTrend*

Let's now look at various examples of mass customization projects that digital technologies and digital processes have driven in various physical industries.

1 **Digital Technology: AI, Analytics**
Digital Process: Automatic Quality Control, R&D Feedback Loop, Digital Inventory Management

Digital manufacturing with machine-learning systems that use machine vision to observe and analyze the manufacturing process and then correct errors in how the material is handled, all in real-time, does not sound like science fiction today. AI has started aiding in the efficient management of inventory by analyzing consumer behavior, demand patterns, and historical data.

2 **Digital Technology: Cloud, Platform**
Digital Process: Crowdsourcing, Gamification, Community Management, Customer Experience

Design costs can be reduced while increasing consumer engagement and loyalty through community participation and crowdsourcing. LEGO's Ideas Platform, which has an online community of nearly a million members, is using crowdsourcing to select new product ideas and to provide their most loyal supporters with an outlet to share their creations. LEGO captures value from the Ideas Platform by lowering design and marketing costs when some selected ideas are converted into products[2]. Some other examples include Starbucks My Starbucks Idea and Trader Joe's inventory customization initiative. Harvard (2018). Building Together: How LEGO leverages crowdsourcing to sustain both innovation and brand love.

3 **Digital Technology: Cloud, Platform**
Digital Process: Digital Configuration

Many asset-heavy firms offer products configured to order, a process where products are assembled and configured according to customer requirements, something more enterprises across different industries are offering to consumers. One such example is Frito-Lay. They announced a new way for shoppers to customize their own Frito-Lay Variety Pack to fit the snacking needs of their household via a new feature on its direct-to-consumer website, Snacks.com.

4 Digital Technology: 3D Printing

Digital Process: Decentralized Manufacturing

Digital Manufacturing and AI-driven technologies have started to enhance the production, distribution, and marketing of physical products in ways that cater to individual preferences and needs. All this can cause serious disruption and rethinking of supply chains. This journey has already begun, and some organizations are leveraging 3D printing for printing parts of an aircraft engine e.g., an aircraft engine needs ~40,000 parts that were put together from various parts of the world, and now some of these are being 3D printed in a single facility. The balancing act of savings in sourcing and transportation costs vs. the cost of printing seems to be more viable by the day.

5 Digital Technology: Metaverse

Digital Process: Digital Configuration, Realtime Customer Experience

Service for customers to see the manufacturing of their customized or personalized products live on their devices has already begun. Hyundai Motor Group plans to develop a 'Meta-Factory' in Singapore with Singtel. It will enable customers to personalize their chosen vehicles and watch their cars being manufactured live via their smart devices. Once ready, the vehicles will be transported by specially designed autonomous guided vehicles to Sky Track, where customers can test drive them[3].

Businesses are now able to streamline their product offerings by ensuring that the SKUs available are those that customers are most likely to personalize and prefer. AI will also start enabling the real-time feedback loop that hereto has been limited to the digital world.

Xoriant in the Mass Customization Experience

Xoriant has delivered multiple initiatives that are furthering the concept of mass personalization and customization in the physical world. These initiatives have been for Retail, CPG, Healthcare, Life Sciences and Manufacturing customers. Some leveraged digital technologies like analytics, cloud, AI, machine vision while others leveraged digital processes like real-time customer experience, automatic quality control, and real-time feedback loops. Some recent examples include:

1 **Digital Technology: Cloud, Platform, AI**
Digital Process: Real-time customer experience, feedback loop

Xoriant's Real-Time Recommendation Engine for Luxury Retail

The system sources data from the retailers' channels, including websites and mobile apps, as well as external sources like social media feeds, market trends, etc. It then overlays customer feedback, buying history, associate data, and real-time inventory to ensure a dynamic and engaging customer experience. The synergy of these components is fostering strong customer engagement by providing tailored suggestions based on evolving customer preferences and product offerings.

2 **Digital Technology: IoT, Cloud, Platform**
Digital Process: Real-time relevant customer advertising

Elevating In-Store Shopping with Xoriant's IoT Screens

Xoriant helped modernize a customer's in-store shopping experience via IoT-enabled screens. This has provided the brick-and-mortar retailer with a mechanism to engage digitally savvy consumers. With this, the customer is engaging with their consumers in-store at their moment of truth – immediately before selecting. This has resulted in increased sales and improved brand equity by delivering messages at the right time and in the right place.

Based on Xoriant's experience, our advice to enterprises looking to initiate mass personalization/customization in the physical world is as below:

Be Proactive:

Incorporating advanced digital technologies like AI-driven systems into production and distribution processes can offer a competitive edge. Establishing a robust data analytics framework to glean insights from consumer behavior and preferences is crucial for informed decision-making.

Explore Possibilities:

Create digital processes that harness technologies to accomplish tasks, ultimately benefiting both the customers and the enterprise.

Innovate & Adapt:

Embrace pilot projects and collaborations with technology providers to test and implement personalized solutions. Addressing privacy concerns and ensuring transparency in algorithms are critical for building trust with consumers.

Continue to Evolve:

In this transformative journey, enterprises should continually assess the evolving landscape of technological possibilities and consumer expectations. By staying agile, embracing innovation, and navigating ethical considerations, businesses can position themselves at the forefront of the mass customization revolution, delivering personalized experiences that meet the demands of the future consumer landscape.

Conclusion

Technological advancements are reshaping consumer expectations and business operations. While digital platforms have mastered the art of personalized services, translating this level of customization into the physical world has been historically challenging, particularly in high-volume, mass-distribution consumer goods. However, the landscape is evolving rapidly.

Emerging digital technologies and AI-driven systems are ushering in a new era where physical products can be tailored to individual preferences. These innovations are causing disruption throughout supply chains and are revolutionizing the manufacture of intricate components. The increasing commercial viability of these technologies prompts a reevaluation of traditional manufacturing processes.

AI's role in streamlining inventory management, analyzing consumer behavior, and providing real-time feedback loops is pivotal in adapting physical products to personalized demands. While there are a host of important issues around privacy, consent, algorithmic bias and fairness, transparency, and the potential reinforcement of discriminatory practices in personalized content delivery that need to be solved, the journey towards customized physical products has begun and will continue to accelerate.

At some stage in the future, it is likely that mass customization will become the norm. So, while in the preindustrial era, customized goods were painstakingly made by hand for each individual, in the future we might go back to getting customized goods, albeit delivered by digital technology and digital processes.

Rather than waiting for the mass customization market to mature, progressive enterprises can seize the initiative and actively contribute to shaping this market, ultimately benefiting both consumers and the enterprise.

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About Xoriant

Xoriant is a Silicon Valley-headquartered digital product engineering, software development, and technology services firm with offices in the USA,UK, Ireland, Mexico, Canada and Asia. From startups to the Fortune 100, we deliver innovative solutions, accelerating time to market and ensuring our clients' competitiveness in industries like BFSI, High Tech, Healthcare, Manufacturing and Retail. Across all our technology focus areas-digital product engineering, DevOps, cloud, infrastructure, and security, big data and analytics, data engineering, management and governance -every solution we develop benefits from our product engineering pedigree. It also includes successful methodologies, framework components, and accelerators for rapidly solving important client challenges. For 30 years and counting, we have taken great pride in our long-lasting, deep relationships with our clients.