Market Snapshot

MULTI-DISCIPLINARY PRODUCT DEVELOPMENT

In partnership with

SIEMENS

Is this report for me?

Incisiv's market perspective in partnership with Siemens on "**Multi-Disciplinary Product Development**" dives into current product lifecycle practices, trends reshaping the consumer goods industry, development challenges faced by organizations and digital solutions reshaping the entire product development lifecycle and underlying processes..

This report is relevant for those who want:

- To adapt a multi-disciplinary approach to product development.
- To understand industry best practices and the impact of using digitally-transformed development cycles.
- Case examples and benefits.

Let's dive in.

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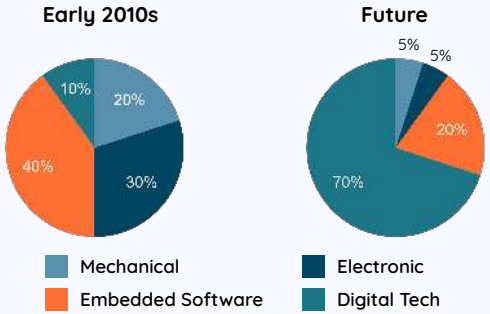
Consumer Goods Industry and Trends Shaping It

The cascading effect of technological evolution, rising and changing consumer expectations and constant product innovations are making brands rethink their entire approach to development and manufacturing.

The pie chart on the right represents factors that act as key product differentiators

In the early 2010s (Inner Circle) manufacturers relied heavily on mechanical and electrical components(50%) to develop differentiated products(Equipment capacity, the complexity of circuit boards, product design). However, this trend has seen a drastic shift in the last few years(Outer Circle). There has been a major value shift towards the integration of digital technologies for optimizing production and creating interactive, data-driven products.

To create smarter, agile and interactive products, technologies like AI, AR/VR and sensors are being integrated into every stage of the supply chain.



Evolution of Product Development

Traditional Approach

- Independent ideation, conceptualization, design and production
- Siloed team
- Linear information flow

Development is linear, the product is manufactured and then tested, and consumer demands are incorporated only in the first stage.

Results

- Longer product lead times
- A higher number of prototypes created and tested, leading to higher production costs
- High error rates due to teams working in silos

Multi-Disciplinary Approach

- Collaborative research, cross functional design, engineering and production
- Cross-functional teams
- Constant multi-directional information flow

Development is an iterative process where consumer demands and data analysis feedback are incorporated throughout the development cycle.

Results

- Shorter lead times
- Fewer re-runs and testing cycles, lowering costs
- Fewer errors and improved product quality

Brands need to invest in fundamental building blocks to sustain and garner market share in the highly-competitive consumer goods market

14.6%

Growth expected in the global home appliance market (2020-2026)

7.5%

Growth expected in the global sporting equipment market (2020-2026)

Innovative products (even if they cost more and offer customer-centric features) are outperforming ordinary products

Premium consumer goods brands have a **24%** market share, as consumers' express interest and willingness to purchase high-value products have increased.

207%

Increase in demand for robotic vacuum cleaners vs. static demand for cleaning equipment

14%

Increase in market share for fully-automatic coffee machines vs. 4% market growth

The evolution of consumer shopping behaviors, coupled with changes in product preferences, are reshaping the industry.

Time to Market

Consumer goods (CG) brands are constantly competing for shelf space. Reducing product launch times is a great way to capture retail space and gain market share.

Consumer Demand

Consumers demand high-value, efficient and smarter products. With a shift to online shopping channels, product ratings and reviews are impacting their purchase decisions. Home appliance manufacturers with highly-rated products grew at 2X the rate of the industry average.

Storage of Raw Material

Organizations that rely heavily on external vendors for resource procurement and have complex supply chains tend to experience a pronounced impact of challenging macroeconomic conditions.

Complex Global Production

Due to labor shortages and cost constraints, organizations are now setting up plants in low-cost regions. This trend has created a very complex distributed operating system where assembly, packaging, shipping and production are performed in different locations across the globe.

Rapid Product Evolution

45% of CMOs are concentrating on launching new products to achieve higher growth. The rise in competition, due to newer CG brands and declining consumer loyalty, has made increasing new product launches a part of the brands' operational strategy.

Usability and Maintenance

Consumers are looking for easy-to-use products that come with prompt customer service. Many CG brands are using sensors to keep track of product performance. Real-time data analysis allows for predictive and preventive maintenance where downtimes can be eliminated and repair costs reduced.

Many organizations face challenges in keeping up with shorter production cycles, achieving seamless collaborations and effectively linking all aspects of production together.

Scale Product Design

CG manufacturers have production plants distributed across the globe. However, they fail to maintain consistency in design, material and quality across units sold in each region due to inconsistent design sketches and lack of access to a central design database.

80% of consumer product launches fail in the first attempt.

Production Silos

Product ideation, design, engineering, assembly and production are usually performed at different locations and there is no real-time, constant information flow between the production plants. This results in missed deadlines, launch delays and final product assembly errors.

50% of product managers say that teams don't have a well-structured approach to development..

Team Collaboration

Often products are modified, altered or updated during the development cycle, and teams miss out on communicating critical changes. This results in execution delays and increases error rates and production costs.

83% of business professionals depend on technology to collaborate.

Data and Insights

Organizations don't have a real-time data gathering and analysis system that helps to predict design and process errors, map production capabilities against units required and incorporate consumer insights into the development cycle.

Brands are spending over **$180B** every year on big data analytics.

Supply Chain Costs

Freight charges and raw material costs have increased significantly. Manufacturers incur huge costs in developing physical prototypes and erroneous products. An essential resource like copper witnessed a 26% price increase in 2021.

2.2x growth in shipping prices in 2022.

Product Development Challenges

Consumers are now demanding products with maximum adaptability, thereby making smart, connected products the crux of the development cycle

Manufacturing firms are gradually recognizing the need for a value shift from mechanical enhancements to digital technologies like AR/VR, AI, IoT and Big Data. Nowadays, more than 50% of a product's value comes from technological improvements and software integration. A Multi-Disciplinary development model will help organizations link all aspects of enhancements from electrical components to the integration of smart sensors for creating connected data-driven products.

43% Of manufacturing firms say that AR/VR will become mainstream in the next 3 years(2021)

28.5% Increase in average revenue witnessed by manufacturers because of IoT

Multi Disciplinary Development leverages digital technologies to create a holistic model that encompasses all aspects of manufacturing and production

AI

Creates digital twins coupled with generative design techniques for faster, accurate product design, batch processing management, and defect forecasting.

AR/VR

Helps improve the speed of the prototyping process, and allows experts across the globe to collaborate and make shape, colour, feature and material enhancements remotely. VR also improves training efficiency by providing a digital hands-on learning experience.

IoT

The Internet of Things helps with predictive and preventive maintenance, reduces equipment downtime, improves product quality and reduces production costs.

Source: Incisiv Research

Digital Solutions for Multi-Disciplinary Product Development

#1 Product Design: 3D Modelling

Consumer goods brands are now focusing on faster product launches and wider assortment ranges than ever before in order to capture larger market share in a highly-competitive environment. 3D product design, also known as '**asset monitoring**,' is a an accurate, precise, digital representation of the physical product.

Design engineers can create different product variations through structural changes and run multiple product tests without having to create physical prototypes. There are numerous advantages to using a 3D model for design:

- Predictive maintenance: 3D models provide data, which can be analyzed and used iteratively.
- Cost-effectiveness: Multiple test runs at minimal costs.
- Reduced waste: Design changes can be made before the execution phase.
- Time savings: Complex CAD enhancements take less time, leading to shorter development cycles.

> *"Before the adoption of NX, our development cycle took 12 to 14 months; with NX, we've reduced our development cycle to 6 to 8 months. This is a significant result, not just because costs have been cut proportionally, but mostly because the capacity of our product development department has increased to such an extent that we can create an additional model each year".*
>
> -Matteo Tenni, Product Engineer, MET SpA

MET – Helmet Producers

Using the Siemens NX Software, MET SpA eliminated their manual, sketching-based design process.

- Product development cycles reduced by almost 50% from 12-18 months to 6-8 months.
- Perform virtual tests to ensure the design adheres to certifications and standards, thereby reducing testing costs.
- Plan and optimize large-scale production that helps minimize wasting raw materials and resources.

Uniwheel – Rideable Tech

Using the Siemens NX Software, Uniwheel created innovative, consumer-centric products

- Product assembly time reduced to 1 hour.
- Create lightweight products by reducing the overall weight by 2 pounds, allowing them to reach speeds of 12 miles/hr.

To Learn More Visit Here for MET, Here for Uniwheel

#2 Embedding Digital Technologies (AI, ML and IoT)

Multi-Disciplinary Product Development links all the digital and software technologies together to create innovative, superior quality products at reduced costs. AI is used by the engineering team and is also used to allocate processes for execution. IoT-enabled sensors map equipment capabilities to production units to determine the best pieces of equipment for production. In a digital supply chain, data is sequentially processed by each team and information is efficiently passed upstream for the next stage of production.

- IoT creates smart connected products and allows for real-time information flow.
- Predictive maintenance is triggered by real-time occurrences.

> *“ With Teamcenter, we can now handle the complexity of our portfolio more effectively, keep control of huge data volumes and, consequently, we have cut unnecessary work for late modifications and corrections in half.”*
>
> -Stefano Garbin, CAD/CAE/PLM Manager Campagnolo

Campagnolo

Campagnolo needed a digital solution to manage their large product assortment and the entire product development cycle.

- Adapt to changing market needs and unlock potential in existing markets.
- Transparency in workflow and elimination of paper-based production.

KPI Improvements

- 50% reduction in engineering errors.
- Faster Product Development Cycles.
- Enhanced Product Quality.
- 50% reduction in workload created due to late modifications.

To Learn More Visit Here

#3 Change Management

A multi-disciplinary development model allows for improved global team collaborations and brings about a complete change in the design, manufacturing and production phases of the development cycle. A digital solution eliminates the need for storing manual files of product information. Instead, it provides access to a large data repository that acts as a storage for product variants, assembly data, product features and raw material details. It also analyzes earlier product re-runs and test data to provide feedback on improvements and product behavior.

- Allows global data access to a regionally-scattered team
- Preventive maintenance through data analysis
- Better team communication and collaboration
- Efficient processes and time management

59%

Complex products require at least 2 design iterations

80%

Less time is needed to design electronic components for products

5X

Greater customer satisfaction.

Faber – Kitchen Appliance Manufacturers

Faber adopted Teamcenter to eliminate manual data storage and improve interdepartmental and company-wide collaborations.

- Centralized data access and search processes.
- Easy flow of information and continuous communication between on-site and off-site teams.

KPI Improvements

- Faster searches for information throughout the product lifecycle.
- Effective management of designs/drawings and technical product assembly information.
- Monitoring and tracing all product development activities.

To Learn More Visit Here

#4 Pre-Production Simulation

During the product development cycle, creating accurate designs that are successful within 2-3 re-runs is a huge challenge faced by manufacturers. A digital twin helps overcome the barriers of traditional product development by creating digital prototypes that can be tested through multiple simulations.

- A ‘what-if’ performance model can be applied to the digital twin to determine the factory/operational parameters required to optimize production.
- A product simulation allows engineers to test products in all possible real-world scenarios to analyze their performance and develop unique/innovative products that can address a new set of customer needs.

> *“In the first year with Teamcenter, we built more than 15,000 machines in several custom designs. I am positive that we would not have managed that without the digital transformation.”*
>
> -Marcel Lendenmann, Co-Owner and Chief Executive Officer, Aequator

Aequator – Coffee Machines

The company takes care of its complete product cycle from ideation to manufacturing of its parts. They wanted a digital solution that:

- Develops BOMs using the digital twin. Create and apply ‘what-if scenarios’ for identifying the best operational process flow.
- Simulations helped reduce design modification and manufacturing cycles from 1-2 years to just 6 months

KPI Improvements

- Shorter development cycles with superior quality products.
- Eliminated manual BOM adjustments, reducing product design time.
- Streamlined all aspects of product development.

To Learn More Visit Here

#5 Product Assembly: Streamlining Operations

In most CG organizations, assembly parts are sourced from vendors then products are assembled in-house by the production team. Quite often, the procurement process takes a very long time and has a high error rate due to ineffective communication. A digital solution allows vendors and execution teams on-site to share data digitally, reducing confusion about fitting, colouring, re-sizing, coating and other issues.

The availability of a digital BOM also allows vendors to manage deadlines better and deliver product parts on time.

- Improves supplier relationships
- Reduces errors and vendor costs
- Eliminates unnecessary production delays

> *"The use of Teamcenter has ... enabled us to effectively share and reuse information, and improve the reusability of various equipment, which has directly reduced our overall costs."*
>
> -Robert Chen, Chief Information Officer, Airmate Electrica

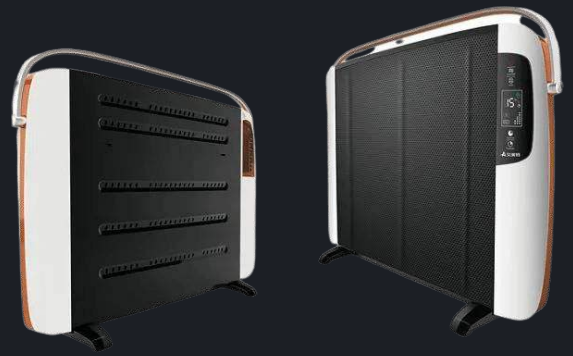
Airmate

Airmate was looking for a digital solution that manages collaboration within the organization, as well as across other enterprises.

- Reduce turnaround time to have a competitive edge in the market.
- Improve the quality of technical product parts and technical knowledge transfer among employees.

KPI Improvements

- The release cycle for engineering change was reduced from 5 days to 1.5 days.
- The release cycle for a BOM was reduced from 4 days to 2.4 days.
- Overall costs decreased by approx. CYN 25 million ($3.7 million US)
- Design change error rate decreased by 30%.



To Learn More Visit Here

Advantages of Multi-Disciplinary Development

Product availability, performance and sustainability are priorities for CG organizations

Digitization of the entire product development process helps to reduce the amount of waste generated, resources consumed and the overall carbon footprint.

Improving lead times will allow brands to produce more products in a shorter time period.

50%

Of shoppers will switch brands if product performance is an issue

49%

Shoppers have paid at least 59% more for sustainably-branded products

98%

Of shoppers will purchase from a competitor if their desired product is out-of-stock

Benefits of digitizing the product development cycle

Multi-disciplinary product development provides a 360-degree view of the manufacturing process that can help organizations proactively identify pain points in their processes, and course correct and optimize them to increase efficiency with minimal waste.

1

Incremental Data Exchange

Digital technologies help store product history, simulation outcomes, design modifications, as well as plant equipment and raw material data. This pool of data helps to create statistical models that help brands produce high-performing new products with fewer reruns and less resource utilization.

2

Reduced Lead Times

Hundreds of hours are spent testing products and perfecting physical prototypes. 3D design helps engineers use CAD to design perfect digital sketches with accuracy in just a few days, thereby reducing the overall development time.

3

Accelerated Risk Management

The use of digital twins for testing product replicas uses real-world data as input. They combine conceptualization with operational data to predict future product failures during execution and even product assembly. They act as a predictive and preventive maintenance tool for the manufacturing process.

4

Vertical Integration for Team Collaborations

An effective digital solution will allow organizations to take ownership of every stage of the development cycle. Update notifications, central database and viewership access across all verticals will allow for seamless team collaborations.

5

Reduced Operating Costs

Eliminating physical prototypes, understanding plant production capacity, analyzing raw material requirements and preventing failures will help organizations minimize waste, reduce energy/water consumption and save on maintenance costs, which arise when pieces of equipment are overloaded.

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