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New Product Development in an Omnichannel World

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SUMMARY
Firms compete in an increasingly omnichannel environment. Customers no longer travel a single linear path but traverse a complex map invoking many channels, firm-owned and external, seamlessly through integrated technology. The associated changes in consumer behavior and the ways that firms engage consumers have led many to reshape the way they innovate their product portfolios. This article presents a structured overview of some of the most striking changes to firms' new product development (NPD) processes in B2C settings. Enlisting the classic NPD funnel, it describes how the omnichannel environment and its technologies affect speed and execution in each development stage. It illustrates key changes with examples from packaged goods, consumer technology, and fashion.

KEYWORDS: new product development, omnichannel, cross-functional cooperation, data analytics, innovation

Firms today compete in an omnichannel world. In this new reality, consumers interact with firms and their products through multiple interconnected channels, often *simultaneously*. These channels span the physical and digital worlds, include channels not owned by the firm, and require advanced integration to facilitate seamless customer journeys.[1] This new landscape calls for companies to change the way they identify opportunities, design, test, and launch new products to market. Firms need to enhance their new product development (NPD) processes to remain profitable and grow in an omnichannel world.[2] This emerging omnichannel reality has pushed retailers and manufacturers to coordinate their product offerings across channels

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while recognizing channel-specific idiosyncrasies. Partners must work closer than ever before.[3]

Although omnichannel is often heralded as a revolution, it is, from a firm perspective, the final stage in an evolution that started with a single-channel world. Traditionally, this single channel was offline. Later, it would gravitate to the online channel with the birth of digital native brands. The single-channel world transitioned into a new multichannel reality where different channels coexist as independent modes. The latest evolutionary stage is omnichannel, which adds seamless integration across multiple channels where consumers use them at once without friction. Consumers now use apps to check online reviews while inside a physical store.

Omnichannel magnifies four challenges that face firms transitioning from single-channel to multichannel operations: channels lying outside the firm's control; the push for channel complementarity while exploiting their idiosyncrasies; channel-switching by consumers *during* decision-making stages rather than merely between such; and the resulting demand for real-time information platforms and data-driven decisions.

In this article, we discuss how firms have adapted their NPD processes and business models to better serve omnichannel customers by focusing on seven main adaptations: using more consumer input, especially early; engaging consumer co-creation; enlisting more input from trade partners; leveraging feedback loops to consolidate steps; phase-leading the operations perspective sooner; developing channel-specific products; and making decisions that are more data-driven. We visualize these adaptations in a conceptual framework building on the well-known depiction of the NPD process as a product funnel, and we illustrate our observations with several examples.

We focus on B2C settings since we believe that the omnichannel evolution in B2B lags. The current state of evolution in B2B seems stuck on the move from single-channel to multichannel with many B2B firms developing e-commerce capabilities. To its credit, B2B is taking a cue from B2C when it comes to omnichannel. Forrester[4] noted that B2C customer experiences are driving B2B buyers to expect the same level of omnichannel service. On the other hand, notable changes in B2C's new product development processes arising from the move to omnichannel are already taking hold in B2B settings. In certain industries, such as IT and automotive, B2B co-creation or corporate partnership is the rule rather than the exception.

Companies that want to stay relevant and thrive must keep investing effectively in NPD. It is thus crucial for them to rethink how to adapt their NPD processes to win in today's omnichannel environment. Our conceptual framework can help *practitioners* rationalize the NPD process. Meanwhile, *academics* must keep exploring how the classic, internally oriented funnel model of NPD is changing in response to the omnichannel terrain.

Omnichannel Consumer Behavior and Its Consequences for the NPD Process

Omnichannel Consumer Behavior

The traditional customer journey is characterized as a succession of stages, starting with need recognition and ending in post-purchase evaluation. Here, switching across channels is rare or absent, and the path to purchase is viewed as "linear." In contrast, the omnichannel journey can be best characterized as an expedition through interconnected channels, touchpoints, platforms, and devices.[5] Omnichannel consumers tend to switch channels when traversing decision-making stages, or even *during* a single stage. "Showrooming" is where a consumer acquires information inside a physical store to purchase the product online. "Webrooming" is where orientation occurs online followed by in-store purchase. Both well exemplify omnichannel journeys.[6]

From a consumer perspective, new technologies (e.g., Alibaba's cloud shelf and interactive fitting rooms) are blurring the lines between the offline and online worlds.[7] Moreover, customers today use smartphones to access online touchpoints while navigating physical spaces. It is the frictionless, *simultaneous* use of channels that sets omnichannel apart from a multichannel (sequential) approach. Bijmolt et al.[8] and Rooderkerk and Kök[9] provide detailed overviews of omnichannel consumer-behavior characteristics.

Another salient trait of omnichannel journeys is that a large number of interactions between customers and the firm do not always translate into instant sales. In these situations, quantifying the benefits of the customer interaction (or touchpoint) can become quite elusive. For example, suppose a customer does his/her orientation on a manufacturer's website to later buy from a retailer; the manufacturer has served the customer without seeing a direct benefit. It is even harder to quantify the benefit to a retailer, or even see one to begin with, when customers browse its store to then buy from a competitor.

A firm that has successfully embraced omnichannel carefully ponders its presence in each channel and the role of each channel in the customer journey to properly adjust its marketing mix. For instance, traditional manufacturers have been pursuing vertical integration. An interesting example of this transition is in the sports apparel sector. Today, Adidas and Nike are not merely manufacturers; they have seriously expanded footprints in direct-to-consumer (DTC) channels. DTC provides them with full control over the offered product assortment *plus* unprecedented access to consumer data. One aspect of this vertical integration has involved opening flagship stores that emphasize omnichannel experiences (e.g., buy online and pick up in store, augment product information using an app). These stores allow firms to amass richer data that help them develop and launch new products faster and more effectively.

The online DTC channel, on the other hand, allows brand manufacturers to exploit online customer journey data. Observing clickstream data from online customers allows firms to detect consumer preferences—a critical input for the NPD process. In the past few decades, such data have been hoarded by platforms, thus restricting manufacturer access to a large part of the insight potential otherwise obtainable by tracking the complete online customer journey.

Consequences for the NPD Process

To capture omnichannel consumer preferences, companies need to combine several data sources. The task is demanding since a company needs to merge data distributed across its own organization (e.g., brick-and-mortar and online data) with information from external sources (e.g., search engines, review websites, and platforms).

Besides data integration, successful product innovation requires more cross-functional coordination within the firm. Coordination must especially invoke an "operations perspective" throughout the NPD process. Traditionally, operations have not been involved in the early stages of the NPD process—unlike R&D, marketing, and sales. Modernizing this view, Bijmolt et al. have argued that aligning customer and product flows calls for a more intimate connection between the marketing and operational functions of the firm.[10]

This new topology challenges the traditional NPD process. First, customer journeys are no longer linear and simple to follow. Second, firms have expanded to emerging channels in an attempt to be closer to their end customers. Third, information on consumer preferences is scattered across a vast array of data sources, many of them out of the firm's control.

Revisiting the NPD Framework

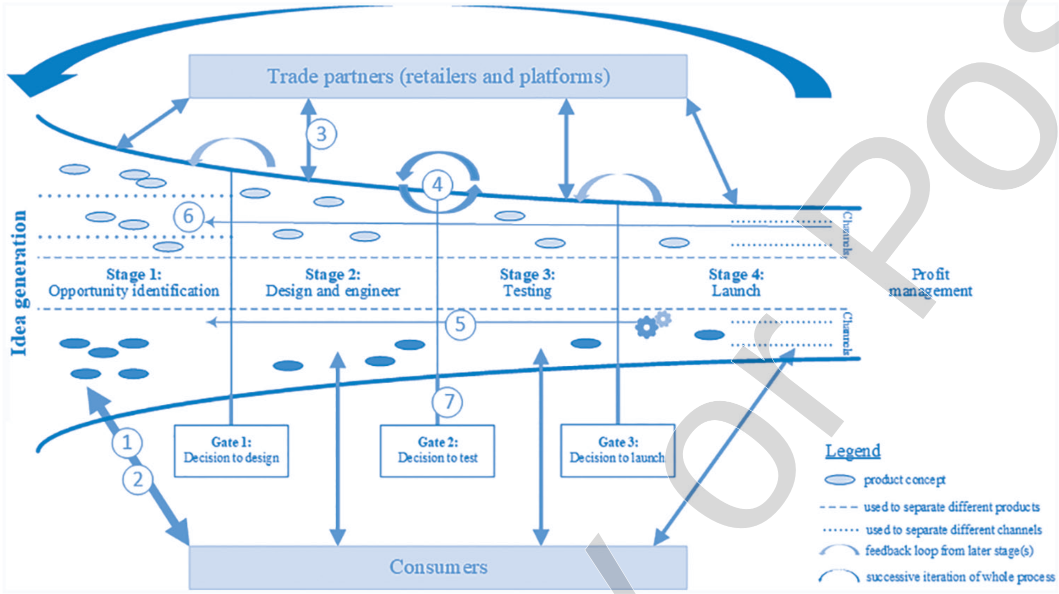
Traditional Stage-Gate Process of New Product Development

The product development funnel. Traditionally, the NPD process has been depicted as a funnel representing the "stage-gate" process[11] shown in Figure 1. The route from idea to product launch maps a series of sequential stages: identify opportunities, design and engineer, test, and launch. In the first stage, several concepts are conceived. By the end of each stage, concepts have been screened to eliminate those deemed unfit for the next stage.

The resulting funnel-shaped flow of product concepts can benefit from feedback loops between stages. What is learned in one stage may lead a firm to step back, adapt the concept, and resume with a revised idea better suited for later stages. At every stage, the process is enriched with customer input. Firms using feedback can reiterate the process, accelerating the flow with every pass. This is called a spiral process.[12] It is also common for the stages to be distinguished as three types: concept development, product development (consolidating "design and test"), and implementation (launch).

Cross-functional coordination. Previous research has identified three important firm functions involved in the NPD process: research & development (R&D),

FIGURE 1. The NPD process.



Note: Enhancements: (1) More consumer input, earlier on. (2) Consumer co-creation. (3) More input from trade partners. (4) Skipping steps to leverage feedback loops. (5) More room for operations perspective earlier on. (6) Channel-specific product development. (7) More data-driven decisions. Our depiction of the traditional perspective on the NPD process is based on Cooper (2017) and Hauser et al. (2006). We assume the firm adopts a project portfolio approach to new product development; the different colored ovals represent product concepts for different products. There is no hard separation between different products, they are closely related, achieving synergies by sharing input (e.g., from customers and trade partners) and resources. Consequently, we use dashed lines to separate the different products. Similarly, we use dotted lines to separate different channels within a product. This separation is also not hard, within a given product there is input and resource sharing across channels. This is merely used to visualize that channel-specific considerations are factored in during increasingly early stages of the funnel (enhancement 6). NPD = new product development.

marketing, and sales. While the sales function exerts a strong consumer orientation and prioritizes the short term, marketing focuses more on products and markets from a long-term orientation.[13] Ernst et al. define cross-functional coordination as the level of involvement and information-sharing among members from different firm functions.[14] Their study of German companies in a variety of B2C and B2B industries shows a positive effect from cross-functional coordination among sales, marketing, and R&D on overall NPD success, but with varying impact across NPD stages. For example, the positive effect of R&D and sales cooperation tends to be more pronounced in the pre-launch stages. Here, the sales department ensures that product concepts are aligned with customer preferences to feature a clear benefit over rivals. Marketing, on the other hand, is typically tasked with concept-testing and assessing the expected market performance of ideas prior to actual launch.

Enhancements to the Traditional NPD Process

Figure 1 highlights the changes that companies—driven by omnichannel consumers and structures (i.e., channels, relationships between channels)—are introducing to improve the NPD stage-gate process.

Table 1 relates the changing features of the NPD process to specific dimensions of omnichannel consumer behavior and omnichannel structures. It also lists cases that highlight certain effects. The following sections each describe an important enhancement to the NPD process in Figure 1, illustrating these with the case studies cited in Table 1.

1. *More input from consumers, especially early on.* Sparse consumer feedback is an important reason product innovations fail. In the race to market, firms are tempted to shortchange development time and consumer research. Fortunately, the rise of new technologies, such as digital and social media, and advances in marketing research have increased both the frequency and quality of consumer insights. Therefore, consumer input is increasingly sought by firms *earlier* in the NPD process.

Online survey software such as Qualtrics, coupled with crowdsourcing platforms such as Amazon MTurk, has enabled firms to rapidly and cheaply solicit measurable input from large groups of customers fitting a target profile. There are also many interesting developments in the domain of online *qualitative* data collection. Either directly or through third parties, firms are establishing research "communities." Communities of consumers are usually private and by invitation only. Members of the community interact, exchanging thoughts and ideas while online moderators guide the whole process—a virtual focus group 2.0. Participants tend to enjoy this kind of setup more than traditional on-site focus groups or surveys, interacting with fellow customers from the comfort of home.

The insights these communities generate are rich and cost-effective. They open new avenues that support ideation. Moreover, group members provide feedback on product ideas throughout the process since they are part of the journey from start to finish. A leading example of a research community is InSites Consulting's consumer consulting board, which has been used by such companies as Air France-KLM, Heineken, Heinz, IKEA, and Vodafone.[15]

Today's firms can also collect data about consumer preferences online in subtle ways. For instance, text-mining techniques applied to consumer reviews can reveal how products perform on key attributes. Mining the "voice of the consumer" has been shown to provide valuable insights about the current market structure.[16] These observations can serve as the foundation on which to build the NPD process.

The emergence of direct-to-consumer (DTC) channels also raises more possibilities for consumer input in the NPD process. Under a DTC model, brands sell directly to consumers, either by opening their own stores or by developing e-commerce capabilities. Beyond securing higher margins, DTC directly taps customers and their preferences without intermediaries. DTC channels are mostly operated under a brand name, but DTC can also be more discreet. For instance, Heineken is the sole major investor in Beerwulf, an online store for specialty beer, using this DTC platform to strengthen its e-commerce capabilities and detect consumer

TABLE 1. The Influence of Omnichannel Consumer Behavior and Structures on the NPD Process.

Features of the NPD Process	Influence of	
	Omnichannel Consumer Behavior	**Omnichannel Structures**
Input in each stage	▪ More and more customer journeys (or parts thereof) take place on platforms ▪ Easier for consumers to provide input/feedback through digital and social media; a lot of the resulting data (e.g., reviews) publicly available can be mined for input in all stages of the NPD process, including early ones ▪ Advances in online marketing research (e.g., crowdsourcing platforms, online research communities) allow firms to more easily seek consumer input pre-launch ▪ Consumers eager to partake in co-creation efforts (e.g. innovation contests)	▪ Dominant position of (a smaller number of) multi-sided platforms ▪ Owing to the wealth of the data platforms possess, they are increasingly becoming marketing research agencies as well ▪ Traditional brands are expanding their presence in DTC channels (e.g. online e-commerce, own stores) ▪ New business models such as Retail-as-a-Service (RaaS) growing in presence
	▪ Consequences: – Manufacturers seek more consumer input, earlier on in the process, through their own DTC channels (*cases*: Heineken's Beerwulf, Nike House of Innovation) – Manufacturers co-create products with consumers through smart input collection (*cases*: Lego Ideas, IntelligentX Brewing Co.) – Platforms and online retailers jumpstart innovation by mining their data (*cases*: Mars-Tmall collaboration on Spicy Snickers, unique Apple MacBooks sold at Coolblue)	
Sequence of stages	▪ With multiple channels at their disposal, consumers are exposed to a wider range of brands and products ▪ Consumer expectation with respect to product features has risen sharply, expectations of firm innovativeness as well	▪ Hyper competition and a push for more firm innovation from trade partners ▪ Large online traffic volumes (esp. platforms) drives rapid assortment changes • Online channel becomes a fertile testing ground (e.g. large-scale A/B testing)
	▪ Consequence: – Manufacturers skipping steps (e.g., testing) to speed up the time to market – Manufacturers skipping (part of) the design and engineer stage to first test (virtual) products on platforms and leveraging feedback loops (*case*: Unilever-Tmall collaboration on Purifi personal care line)	
Stage-Gate decisions	▪ Novel marketing research and analytics ▪ Easier to reach consumers for feedback on product concepts ▪ Consumer touchpoints increasingly digital, facilitating data collection	▪ Power rebalance between manufacturers and trade partners (esp. platforms). ▪ More scrutiny in new product introductions from trade partners ▪ Industry-wide emphasis on data-driven (evidence-based) decision making

(continued)

TABLE 1. (continued)

Features of the NPD Process	Influence of Omnichannel Consumer Behavior	Influence of Omnichannel Structures
	▪ Consequence: – Stage-gate decisions more data-driven – Need for more analytics capabilities (*case*: digitizing innovation by P&G)	
Channel differentiation	▪ Consumers increasingly switch channels or use multiple channels simultaneously, combining their strengths in terms of information provision, transaction possibilities, and fulfillment options ▪ Increased consumer expectations with respect to product fulfillment	▪ Firms more focused on product-channel fit when deciding on assortments ▪ Operational excellence (e.g. last-mile delivery and returns handling) becomes a key competitive advantage
	▪ Consequence: – Channel-specific NPD processes, moving channel considerations to earlier stages of the process (*cases*: Picnic-Heineken collaboration on the KwartKrat and Tide's Eco-Box)	

Note: NPD = new product development; DTC = direct-to-consumer.

preferences for specialty beer. This is a growing beer subcategory where Heineken holds a weaker position than for its well-known pilsners.

Expanding further in DTC channels, brands offer broad arrays of customized options. For instance, companies such as Adidas and Nike allow shoppers to customize many aspects of a sneaker, mostly through an online configurator platform. Besides directly generating higher sales and profit margins owing to the fees consumers pay for the customization privilege, the companies unearth many consumer preferences and trends. Firms can thus mine the data to see what features or combinations are attractive in the market—valuable insights, indeed, when designing new products.

Mirroring the success of online customization, firms increasingly offer this feature as part of their physical stores. Nike's customization space is the centerpiece for any of Nike's new flagship stores, dubbed "House of Innovation." Part of the customization space is the Nike Expert Studio that allows for what the brand calls communal customization. In this space, the consumer can partner with a Nike expert at the fully furnished customization station to create a personal look.

Rapid improvements in the speed and quality of three-dimensional (3D) printing also hold much promise toward product customization.[17] For example, Volkswagen has announced plans for mass customization using this technology,[18] aiming for 100,000-plus 3D printed units each year.

2. *Consumer co-creation.* Consumers are no longer constrained to simply providing feedback along the different stages in the NPD process. They have taken a more central role as *co-creators*. New technologies and marketing research techniques

further facilitate this co-creation. When co-creating, the firm and the consumer design a product together that eventually will be offered in the market. A key question is, "Which consumers are the right ones to use in the new development process?" Hoffman et al. show that, as opposed to using lead users or innovative consumers as usual, firms should look for a consumer *superior in emergent nature*, defined as "the unique capability to imagine or envision how concepts might be further developed so that they will be successful in the mainstream marketplace."[19]

One popular method of co-creating is to crowdsource innovation ideas from consumers through innovation tournaments.[20] Camacho et al.[21] describe an innovation tournament as one where idea generation and development are first outsourced to a large, undefined group in the form of an open call.[22] Finally, some predetermined time after the call, at least one winning idea, is selected.[23] Using innovation tournaments has many benefits.[24] First, it is a fast and inexpensive "outside-in" form of innovation that leads to a more diverse process of ideation that supplements internal knowledge.[25] Second, contests spur the generation of larger sets of competing concepts in the ideation phase that boost odds of launching a blockbuster product.[26] Third, tournaments force the pruning of low-quality ideas as part of the selection mechanism.[27] Using two randomized field experiments, Nishikawa et al. have shown increased performance when marketing crowdsourced products as such.[28] In two controlled follow-up studies, they attribute quality inference: consumers feel "customer-ideated" products better meet their needs.

One successful example of a consumer-driven innovation tournament is LEGO Ideas. On this platform, registered participants suggest an idea for a LEGO box that fits a certain pre-specified theme. They must provide a picture plus a description of the box. They can construct the picture using actual LEGO pieces or digital tools made available by LEGO. Next, people can vote for the concepts. Those receiving at least 10,000 nominations advance to a formal review by LEGO with the chance to go into production. If so, the user is credited inside the box's manual and receives 1% of revenues.

It is interesting to envision how technology will spur future co-creation with consumers. For example, the use of 3D printing could be extended from customization to co-creation. Rayna et al. provide an interesting taxonomy of 3D printing platforms and the ways in which they enable co-creation.[29]

IntelligentX Brewing Co. has introduced a highly innovative form of co-creating beers with customers. It claims to have created the world's first beer brewed by artificial intelligence (AI). Its AI approach consists of three steps. First, the consumer buys one of the four beers it currently produces. Second, using what it calls Automated Brewing Intelligence, consumers provide feedback by answering 10 questions using the Facebook Messenger app.[30] These questions range from "How do you rate your knowledge of beer?" to "Would you like the beer to have more, the same, or less hop aroma?" These data are fed to an AI algorithm, which next adapts the recipe in Step 3.

In co-creation, the relationship between the omnichannel customer and the firm starts to resemble that of close trade partners in a B2B context. Here, the role of the customer and the manufacturer in the NPD process is more collaborative than seen in the traditional B2C setting. Both parties fully view the collaboration and information flow as crucial for the NPD process. In today's co-creative B2C context, customers are ready and eager to give feedback to firms and get involved in the design and development of new products. Customers see themselves as active agents in the relationship as opposed to simply buying products pushed by the firm. Innovative companies should be eager to listen and attune their NPD processes to successfully navigate this new relationship.

3. *More input from trade partners.* Manufacturers more actively seek input from their chain partners, from the opportunity identification stage all the way to the launching stage. This is driven by their realization that, in today's omnichannel world, a large portion of the key data required to innovate successfully resides with retailers and platforms. Furthermore, since consumer touchpoints are increasingly digital (e.g., online sales, online reviews, and hand scanners in supermarkets), data captured by trade partners have proven super-rich in nature.

Traditionally, trade partners share data only in aggregated form (e.g., chain-brand level in case of a supermarket), and almost exclusively with leading manufacturers. These data are primarily used to evaluate the success of (new) products and to gauge promotion effectiveness. Large manufacturers (such as Coca-Cola, Heineken, and Philips) have stated to us that today's retailers are more willing than ever to share disaggregated data. This is not a naïve move, the driver being that retailers hope these data will allow manufacturers to extract richer insights, leading to more successful introductions of new products. Using methodologies designed to tap valuable data, manufacturers can craft new products promising traffic for the focal retailer. For instance, the methodology Rooderkerk et al. have designed to optimize SKU-level retail assortments can easily be extended to search for optimal product-line extensions.[31] This new dynamic results in a "pull" perspective toward new product development versus the old push-driven mode of innovation.

Today, retailers are also proactively jumpstarting the NPD process with manufacturers. Coolblue, a Dutch omnichannel retailer, carries an exclusive MacBook line in its assortment. These products are the result of Coolblue identifying the need of a specific customer segment and partnering with Apple. Coolblue provides a set of specifications attractive to its customers derived from search, browse, and purchase behavior on Coolblue's online channel.

E-commerce platforms, such as Amazon and Alibaba, are very well positioned to aid manufacturers with product innovation since these platforms accumulate massive amounts of data from people searching, buying, and sharing. As part of the "New Manufacturing" strategy, Alibaba has established a market research arm, Tmall Innovation Center (TMIC), to derive consumer insights from its vast data.[32] This has resulted in a number of innovative products. For example, Spicy Snickers is a product conceived after Alibaba used its data to reveal that chocolate buyers also like spicy snacks. This led Mars and Alibaba to co-create Spicy Snickers featuring Sichuan peppercorns. This collaboration let Mars fast-forward its development window from an average of 36 months to less than a year, and Snickers reached its yearly sales target within six months.[33] Moreover, this product now proliferates in major supermarkets and convenience stores throughout China.

In what Alibaba refers to as the "idea-to-shelf" (end-to-end) process, TMIC not only measures consumer preferences, but also uses marketing intelligence to steer pricing, merchandising, and packaging decisions.[34] And Alibaba's efforts are not restricted to candy. VF Corporation, the parent company of The North Face, Vans, and Timberland (among many others), partners with Alibaba's TMIC to obtain consumer analytics in China. This type of collaboration between manufacturer and platform surpasses the mere soliciting of input from a trade partner. It is an example of co-creation. The benefit for Alibaba's platform? Being first to market with a new product launch.

It is true that platforms may threaten brand manufacturers when they offer their own in-house brands using consumer insights obtained from selling national brands to strengthen these private labels. Amazon, for example, owns more than 100 of these types of private brands.[35]

Using retailer or platform data as the basis for product innovation can be seen as a shift toward a consumer-to-business (C2B) model. Extending this line of thought has prompted other new business models that redefine the relationship between retailer and manufacturer. For example, b8ta offers retail as a service.[36] This Silicon Valley startup manages retail outlets where novel technological brands showcase their products. The brands buy real estate space at b8ta with the promise to obtain detailed consumer insights based on information collected in the b8ta stores.

Another interesting trade channel for manufacturers seeking input in new product development involves millions of nanostores in Latin America, Africa, and Asia. These mom-and-pop stores are most common in dense urban areas where millions of poor consumers live and in very isolated areas where no modern alternatives could be profitable. Their pervasiveness offers consumer packaged goods (CPG) manufacturers access to a large group of customers not served by traditional channels. Financial benefits here include higher margin and immediate point-of-sale cash collection. Nanostores enjoy a large market share for CPG (~50% worldwide, upward of 80% in Sub-Saharan Africa).[37]

A mix of technology providers, startups, and venture capital is rapidly embedding these nanostores into the omnichannel world. For example, the largest Chinese players JD.com and Alibaba are integrating nanostores into their omnichannel arrays to serve as pickup points for online orders placed on their platforms. With this move comes further digitization of stores and an accumulation of rich data tracking omnichannel consumer behavior. Manufacturers would do well to closely observe these trends and even stimulate them. For example, a joint venture of Grupo Bimbo, one of Mexico's largest manufacturers of baked goods and snacks worldwide, and a South African telecom provider are equipping nanostores with digital payment solutions through the Red Qiubo system.

4. *Leveraging feedback loops to consolidate NPD stages.* In the hypercompetitive reality of omnichannel, firms are looking for ways to speed up the NPD process. One way to do so is to skip steps in the process by exploiting feedback loops. Data from later stages may guide a more efficient selection or revision of early-stage concepts.

Traditionally, firms have used feedback loops in the NPD process. New technologies now allow firms to move through a certain phase very quickly, even bypassing it altogether in favor of obtaining insights from the next stage. This enables companies to fully tap the power of feedback loops to streamline the process and reduce development time—critical advantages in the hypercompetitive omnichannel world.

An interesting illustration of this strategy is how Unilever conceived its Purifi pollution-fighting, "deep-cleansing" personal care products.[38] In concert with Alibaba's TMIC, Unilever uncovered a broad need among urban Chinese consumers. Products serving this need were quite expensive. The goal was to develop a mid-priced product line. Acting on this insight, Unilever's researchers and designers developed 48 different prototypes of antipollution skin cleansers at different prices. However, rather than go into elaborate testing, they showcased the prototypes as actual products on Alibaba's Tmall platform. Whenever consumers would try to buy a product, a pop-up message informed them that they were participating in a consumer test and offered them vouchers. Based on the resulting "launch" data, Unilever decided which concepts to fully design and launch.

This "pseudo-launch" approach enabled Unilever to decide what concepts to actually bring to market based on tens of thousands of actual purchasing decisions instead of using traditional marketing surveys that would measure, at best, mere intention, not actual behavior. This approach not only improved decision making, but virtual launching allowed Unilever to dramatically consolidate the complete NPD process to just six months.

5. *More room for the operations perspective.* As noted, the NPD process has traditionally been a cross-functional endeavor. To facilitate a pull-strategy to innovation (outside-in), so vital in the omnichannel world, even greater cooperation is required among different firm functions. This heightened coordination should aim at integrating the increased input (data and perspectives) that various firm functions obtain from other channel actors. As part of the increased collaboration, there will especially be a role from an operations perspective. Since operational efficiency is key in omnichannel, trade partners are demanding manufacturers to think "operations." New products should satisfy customer needs in superior ways

while achieving operational excellence among partners when making and delivering the product. This forces manufacturers to give much more consideration to the operations perspective *early* in the NPD process, and always in relation to other functions. This consideration can strengthen relationships with retailers and platforms, and ultimately merchandise brands preferentially in their assortments.

A good example of "operational thinking" can be found in the Dutch online grocery industry. The market share of online grocery channels is rapidly increasing and approaching 4.5%. Much of this involves home delivery. A relatively new and fast-growing player in this domain is the pure online player Picnic. Its business model is built around operational excellence. Compared with the largest player in the online market, omnichannel grocery retailer Albert Heijn (part of Ahold Delhaize), Picnic manages a substantially smaller assortment while offering unrivaled free delivery at a low minimum order amount.

Picnic achieves operational excellence mainly through operating a fleet of small electric delivery vehicles. These mini-trucks deftly navigate historic Dutch inner-city alleys better than rival Albert Heijn's delivery trucks. Driving a milkman route, Picnic is thus visiting almost twice as many customers per hour. Still, the small truck has its drawbacks. It cannot transport crates filled with 24 bottles of 0.33 L Heineken beer. But the Heineken crate is one of the top sellers in Dutch grocery retail, both offline and online. Realizing this problem for both Picnic and Heineken, the chain partners decided to collaborate. Together, they developed the idea of the KwartKrat ("Quarter Crate"), a six pack of Heineken bottles secured by a cardboard holder. Instead of the bulky crate, consumers could now order multiple KwartKrats that could easily stack in the small truck while offering beer drinkers more flexibility in terms of order quantity.

Another interesting example of a more dominant operations perspective comes from global fashion retailer Zara. This example centers on the operations of the NPD process itself. Zara is a vertically integrated fashion giant that sells clothing through its own website and more than 2,000 stores, as well as designing and producing items in-house. Zara's whole supply chain and NPD process are geared to be ultra-responsive. Instead of outsourcing production to China, the company uses highly robotized factories in Spain and a network of small shops in Spain and Portugal for finishing (e.g., dying the leather).[39] This way, it takes the company only 10 to 15 days from design to display on the shop floor. This responsive NPD process is also tightly connected to Zara's highly integrated sales channels; the company's centralized inventory feeds online stockrooms and distributes twice a week to all 2,000 stores worldwide.[40] In other words, operations act as guiding force in both on-the-spot innovation and the transport of those innovations to the omnichannel consumer as quickly as possible.

Increased room for the operations perspective touches all firm-wide NPD functions. First, operational considerations should occupy an integral place in a firm's R&D activities. Required insights should first come from the sales department, which is best positioned to observe the operational complexities of trade partners. Marketing also plays an important role in mapping key operational developments shaping the way trade partners serve their customers. Finally, it would be wise to involve the firm's own operations department. They may already collaborate with the operations function of the trade partners. In any case, they will often possess knowledge of operational considerations unknown to the remaining functions.

6. *Channel-specific product development.* The channels by which firms interact with customers can differ substantially in terms of product-channel fit. This is due to differences in, for example, spatial limits for products or the capacity to invoke sensopathic experiences (e.g., touch, feel, hear). Channels may also play different roles in the omnichannel customer journey, such as facilitating customers during their orientation phase versus enabling placement of an order. The proliferation of channels, each with its own characteristics and customer mix, has led firms to consider developing products tailored to a specific channel. A good example of a channel-specific NPD process is found in Tide's Eco-Box.

Procter & Gamble,[41] the company that owns Tide, describes the Eco-Box as a shipping-safe cardboard box containing a sealed bag of ultra-concentrated Tide liquid laundry detergent. A perforated cardboard flap peels off to reveal a dosing cup with its new "no-drip" twist tap. To ease dispensing on flat surfaces, the box includes a pullout stand to raise the box's height for cup collection under the tap. The product was designed with "last mile" delivery in mind. It uses less packaging, 60% less plastic, and 30% less water than the comparable 150-ounce Tide press tap. Because of its boxed design, it wastes less space in delivery trucks. This design allows for the most efficient shipment from manufacturing site to retail warehouse to the consumer's front door.

As noted by S. Raman, Vice President of P&G's North America Fabric Care business, development of the Eco-Box was a departure from the traditional product innovation process. For the first time, a product was designed purely from an e-commerce perspective. Adam Clark Estes interprets this as an example of how Amazon is reshaping the way our products look.[42] Estes further illustrates this with the case of Garçon Wines, the creator a flat wine bottle so its packages could fit through standard mail slots in the United Kingdom.

7. *More data-driven decisions.* All above-mentioned enhancements tap an influx of richer data streams throughout all development stages. Data now form an integral part of the new product development process. This means that stage-gate decisions regarding what concepts to advance have the potential to be much more data-driven. Still, there remain steep challenges in truly reaping that potential.

First of all, data should be shared organization-wide. A firm's different functions all play roles in data collection, but data should not be sequestered. This requires improvements to the IT infrastructure, such as setting up "data lakes." Second, manufacturers need to develop the analytics skills to mine the data. Rich, large-scale datasets require advanced analytics to distill useful insights. Advanced analytics must be prescriptive rather than merely descriptive. In line with the call for more fact-based marketing, innovation itself should also become more evidence-based. Trade partners will increasingly push manufacturers to support their new product introductions with data-driven expectations regarding financial performance.

Procter & Gamble is one company setting the tone in this respect.[43] P&G has integrated data into all of its decision making, including new product development. The firm has digitized its innovation process by combining vast amounts of data with analysis techniques such as simulation and modeling. It is leveraging its scale by amassing data from several touchpoints across its 80-nation operational footprint.

Conclusions

We have detailed how firms in B2C settings have faced and responded to the changing omnichannel environment, adapting their new product development processes. These changes are driven by the need to innovate faster and to better serve omnichannel customers. They reflect a transition from a push to a pull model of innovation—collaborative product innovation.

This enhanced NPD process is characterized by firms seeking more consumer input, especially in earlier stages of the process. Firms may even promote consumers to co-creators. Manufacturers also seek closer collaboration with trade partners, from traditional retailers to online platforms. In the hypercompetitive omnichannel world, innovation speed is essential, but not at the expense of prematurely killing ideas or entertaining too many product concepts. To address this tension, some firms use new technologies to consolidate development stages by leveraging feedback loops.

Another consideration is that new products should not only satisfy unmet consumer needs, but also facilitate superior operational performance of the focal firm in step with its trading and logistics partners. The proliferation of channels, each with their own characteristics and consumer mix, has stimulated firms to redesign NPD processes that target a specific channel from the very outset. All of the aforementioned enhancements unleash an influx of larger volumes of richer data used to arrive at more data-driven decisions at the stage gates, especially regarding which product concepts may advance to the next stage of product development.

We have highlighted omnichannel enhancements to the NPD process featuring top manufacturers and retailers active in consumer packaged goods, consumer technology, toys, and fashion. In many ways, these exemplar companies lead the pack. It will be interesting to see how well competitors in the same industries and firms in other segments will follow suit.

We hope to inspire managers to review their current NPD funnel and see whether implementing these changes could improve both the quality and speed of their NPD process. For academics, these changes open new research paths—for example, quantifying the effects of these changes on key innovation metrics, such as time-to-market and firm innovativeness.

Finally, the omnichannel world forces the imperative of improving the interface among the different firm functions of R&D, sales, marketing, and operations in the new product development process. Companies must explore new sources of data and learn how to balance the efficiency of producing standardized products across channels versus the benefits of offering channel-specific ones.

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