Rethinking the role of IT for CPG companies
Using cloud computing to help escape the constraints of existing business economics
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Technology advances in the decade of the 2010s require rethinking the role of IT for consumer packaged goods (CPG) companies. Technologies underlying cloud computing like computer processing power and communication network connectivity continue to accelerate. Furthermore, information technology is amplified by adjacent technologies like social business and predictive analytics, and absorbed by consumers via mobile devices and by companies via pay-per-use business models. The virtuous cycle of technology acceleration, amplification, and absorption is driving a step change in the economic possibilities for large consumer product companies. Cloud computing constitutes a transformative opportunity that can help consumer product companies escape the constraints of existing business models in three areas.

First, cloud computing plus adjacent technologies have the potential to deepen consumer and customer relationships at a lower cost. For consumer product companies, customer relationship economics are a natural starting point to leverage the cloud. Cloud computing could improve the business impact of direct-to-consumer storefronts — perhaps even commoditizing them. Furthermore, this confluence of technologies has the ability to significantly improve marketing ROI as marketers more narrowly target consumers with personalized marketing. Also, cloud-based interfaces with retailers — which can help synchronize demand and supply — have the potential to reduce transaction friction of interacting with smaller retailers and small-footprint stores.

Second, cloud computing has the potential to increase agility related to new market growth with less upfront investment in IT. Cloud computing could help efficiently deploy and scale IT infrastructure and sales capabilities in new markets, channels, and geographies. Additionally, cloud computing could improve the economics of working with smaller suppliers with exchange platforms for visibility to demand and supply with smaller suppliers. For consumer product companies, the ability to reconfigure their supply chains to embrace a broader array of small, local suppliers is increasingly important.

Third, cloud computing has the potential to drive faster, shorter innovation cycles by increasing accessibility of computing power during product design, formulation, and testing. Also, cloud computing could reduce cycle time for IT application development by bypassing in-house infrastructure setup times.

Cloud computing combined with social computing, mobile technologies, and data analytics could play a prominent role in deepening customer relationships, increasing agility to achieve new market growth, and accelerating innovation.
Summary of considerations for consumer product companies

Customer relationship economics

Direct-to-Consumer: Revisit direct-to-consumer efforts and other online channels. Think about niche consumer segments as well as broader targets.

Marketing: Build out capabilities to narrowly target consumers based on predictive analytics of contextual information, including demographics, behaviors, and attitudes.

Retailers: Use technology to drive down the costs to serve your smallest customers including small retailers and small-footprint stores.

Economics of growth

Agility: Use new market growth – organic and M&A driven – as an opportunity to build a cloud-based infrastructure to rapidly serve new markets, channels, and geographies.

Suppliers: Use technology to decrease the cost of synchronizing with small suppliers.

Economics of innovation

Computation: Scrutinize R&D processes during product design, formulation, and testing to identify areas where access to computing power can accelerate time-to-market.

Application Development: Consider cloud-based platforms to accelerate application development across an IT project portfolio.
Introduction

It began as a challenge. A consumer product company executive asked a few straightforward questions about the potential business impact of information technology. First, what is the cloud computing opportunity for large consumer product companies? Second, how can cloud computing (intertwined with social computing, mobile technologies, and data analytics) help address the key CPG industry challenges? Third, what are the potential benefits and risks associated with cloud computing, and how might the risks be mitigated? Fourth, to what extent can cloud computing transform the broader business economics of a consumer product company? And finally, she asked that the answers to these questions be answered in a way that the entire executive suite could understand—not just the CIO.

The Deloitte Center for the Edge started the journey to answer these questions several years ago with a historical analysis of technology performance and adoption. Information technology improvements are “under the hood” of cloud computing. For example, computing power performance per dollar has improved 54x over the past decade. Similarly, digital storage performance per dollar has improved 87x and network bandwidth per dollar has improved 15x over the past decade. The number of internet users in the United States has nearly doubled; wireless subscriptions have more than doubled; and wireless activity, as measured by minutes and texts is approximately 10x from just a decade ago. Furthermore, social media as a percentage of Internet time continues to rise. These trends were analyzed for the consumer product industry as part of the 2009 Deloitte Shift Index research.

In a nutshell, the pace of information technology improvements outpaced the extraction of value in terms of labor productivity and asset profitability. Subsequent analysis of the 2011 Shift Index data supports this performance extraction gap from information technology (see figure 1). Cloud computing has the potential to close this gap.

Cloud computing and companion technologies could combine to help consumer product companies escape the constraints of existing business economics. The possibility of information technology moving from a cost-focused topic to a driver of new business economics underlies the four questions addressed in this report. Consumer product companies that embrace the cumulative effect of these technology advancements could position themselves to achieve a significant competitive advantage.

Figure 1. Performance extraction gap as shown in the 2011 shift index

**Foundation index** includes computing power, digital storage, bandwidth, internet users, wireless subscriptions

**Flow index** includes wireless activity, internet activity, social media activity

**Impact index** is a measure of company performance. Includes: return on assets and shareholder return

Source: The 2011 Shift Index: Measuring the forces of long-term change, Deloitte Center for the Edge
A brief introduction to cloud computing without acronyms

Cloud computing can provide three broad services for businesses:

- **Infrastructure**, including storage and computing power for data centers
- **Development platforms** with tools and an environment to rapidly develop and operate software applications
- **Software applications**, which can be delivered on-demand across Internet or private networks

Another way to think about cloud computing is the business model with which it provides services.

**Definition:** "Cloud computing is a model for delivering on-demand, self-service computing resources with ubiquitous network access, location-independent resource pooling, rapid elasticity, and a pay per use business model."

Cloud computing provides almost-immediate access to information technology applications and services, platforms, or a pool of hardware resources that can be allocated and provisioned on-demand. The key characteristic of a cloud service is the ability to seamlessly scale services up or down based on demand by dynamically provisioning and de-provisioning resources. Also, third-party cloud solutions typically do not require upfront capital investments for services. Payment for computing services is directly linked to the metered use of resources, which often shifts expenses from capital expenditures to operating expenditures.

Cloud computing is more than mere virtualization — a method to hide complexity when separating or combining server or storage resources — or a service-oriented architecture design that allows for interoperability of software functionality. Some publicly-announced private clouds are essentially an aggressive virtualization program on top of traditional enterprise information technology.

Cloud computing can also provide the key quality of flexibility, scalability, and on-demand provisioning. While cloud computing and traditional hosting share many characteristics, cloud computing is scalable and elastic, where purchasers only pay for as much or as little of the service as they use.

See the Appendix for additional information including a description of the most prominent layers and an overview of primary approaches to cloud deployment, including public, private, and hybrid clouds.

Under the hood of cloud computing

Fueling the cloud computing trends are several underlying technology advances. First, information technology, including improvements in computing power, digital storage, and bandwidth (see figure 2), is advancing. In the United States, computing power and digital storage cost 98 percent and 99 percent less, respectively, than they did just ten years ago. Similarly, network bandwidth performance per dollar is 93 percent less expensive than a decade ago. These are longstanding trends that many expect to continue for years to come.

Figure 2. Computing power, digital storage, and bandwidth cost performance have significantly improved this decade

<table>
<thead>
<tr>
<th>Computing power</th>
<th>Digital storage</th>
<th>Bandwidth</th>
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<tbody>
<tr>
<td>54x improvement</td>
<td>87x improvement</td>
<td>15x improve</td>
</tr>
<tr>
<td>in per dollar performance</td>
<td>in per dollar performance</td>
<td>in per dollar performance</td>
</tr>
<tr>
<td>$ per 1 MM transistors</td>
<td>$ per Gigabyte (GB)</td>
<td>$ per 1,000 Mbps</td>
</tr>
<tr>
<td>2010: $0.13</td>
<td>2010: $0.06</td>
<td>2010: $47.04</td>
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98% reduction in cost

99% reduction in cost

93% reduction in cost

Source: The 2011 Shift Index: Measuring the forces of long-term change, Deloitte Center for the Edge

Secondly, consumer usage is rising in terms of the number of internet users, wireless activity, and social media (see figure 3). The number of internet users has nearly doubled in the United States over the past decade, and social media as percentage of internet use is also rising. The number of consumers with mobile phones has risen to the point where the vast majority of the U.S. population has a wireless subscription. More telling is the 8.7x increase in number of wireless minutes and text messages.
A third trend is the emergence of cloud businesses where sellers offer pay-per-use models without significant upfront capital expenditures. Scalable cloud services can be purchased with on-demand provisioning and with significant economies of scale across multiple users. It is difficult — if not impossible — to discuss cloud computing in isolation.

Cloud computing can be viewed as a key element of the Post Digital Enterprise — the convergence of analytics, mobility, social business, cloud computing, and cyber intelligence. The impact of these technologies in isolation is a subset of the aggregate impact. For consumer product companies, data analytics can help decode consumer shopping behaviors and contextual information to allow companies to target more relevant communication and offerings by moving from descriptive to predictive and prescriptive intelligence. The impact of mobile devices and functionality extends to both consumers and business performance by un-tethering the enterprise and empowering shoppers wherever they may be.

Some cloud computing executives believe that mobile devices "will use the cloud to decide what content should be pushed to you," and they think there will be a “convergence of devices and analytics.” Similarly, social computing can enable collaborative networks that benefit consumer product companies by transcending organizational silos and connecting companies with third-parties as well as enabling a bi-lateral connection with consumers. In the Post Digital Enterprise, cloud computing has the potential to help consumer product companies move past the constraints of a static ecosystem and empower a dynamic value chain that can scale up or down. Underlying any discussion of information technology security is cyber intelligence to address access control and management, digital identity, and cyber threat intelligence across these technologies.
These technologies have the potential to significantly change performance.

This decade represents a period of information technology acceleration, amplification, and absorption (see figure 4). The second half of the 20th century experienced similar performance and cost improvements in computing power, storage, and network connectivity; however, the cumulative potential of technology convergence today is much higher than during previous growth cycles. The primary difference today is that the acceleration of underlying technologies of computer processing power and communication network connectivity are amplified by adjacent technologies in social business and predictive analytics and absorbed by consumers that use mobile devices and by companies that use pay-per-use business models. Social business, mobile devices, and analytics amplify the impact of cloud computing and increase the ability of consumers and companies to absorb newfound value. A decade ago, amplification and absorption were nascent. For example, now that internet use and wireless subscriptions cover most consumers in the United States, and wireless activity is rapidly rising, the value of technology improvements can be more readily absorbed by consumers. Furthermore, companies can benefit from the pay-per-use business model that lowers the barrier to absorbing benefits from these technologies. Together, the virtuous cloud computing cycle of technology acceleration, amplification, and absorption has the potential to significantly improve consumer product companies’ economic possibilities.

Figure 4. The virtuous cloud computing cycle of technology acceleration, amplification, and absorption has the potential to drive a step change in the economic possibilities.
Consumer product companies and cloud computing

Broadly speaking, cloud computing adoption by consumer product companies lags behind other industries.

Technology understanding: IT organizations are increasing their familiarity with cloud-related technologies such as virtualization and multi-tenancy. There is healthy skepticism of the differences in public vs. private vs. hybrid cloud economics, given existing economies of scale within large CPG companies. Additionally, there is concern about security across infrastructure, platform, and vendor cloud services. Finally, consumer product executives are concerned with cloud provider lock-in, which could make switching cloud vendors more difficult in the future.

Business impact understanding: Many consumer product executives today are primarily focused on IT cost impact, rapid development and deployment of services, and scalability, but they are less focused on the potential business impact of cloud computing based on executive interviews. Fortunately, what started as a purely technological discussion is beginning to address the potential business and competitive advantages. According to one information technology executive, “It is more important to look at cloud as a business model innovation than a technological innovation.” However, leveraging cloud computing services across siloed business functions is still rare. For example, human resources professionals tend to be aware of HR cloud applications, and sales and marketing professionals tend to be aware of or have experience with cloud-based CRM systems.

According to one cloud computing technology provider, “many CIOs are still quite unaware of what clouds can do, and what the benefits are.”

Pace and level of adoption: Broadly speaking, consumer product companies lag other industries in adopting cloud computing. In the consumer product industry, current adoption and experimentation frequently are driven by necessity in data center infrastructure (IaaS, Infrastructure-as-a-Service) and functional applications (SaaS, Software-as-a-Service). Although the use of cloud-based development platforms (PaaS, Platform-as-a-Service) is nascent in the consumer product industry, it is growing quickly. Risk and security were cited as impediments to more rapid adoption, but there is some optimism among information technology executives that “benefits will outweigh security concerns.” Furthermore, one information technology executive cited Internet banking as an example where “convenience wins over initial discomfort” in driving adoption.

The consumer product industry faces many challenges where the maturation of information technology could play an important role. Consumer product companies confront a number of common challenges across food, beverage, personal goods, household goods, and apparel (see figure 5). Each challenge is an opportunity to rethink the role of IT and harness cloud computing to escape the constraints of existing business models.

Figure 5. The consumer product industry faces challenges ranging from declining brand loyalty to a dearth of innovation

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<thead>
<tr>
<th>Consumers and Retailers</th>
<th>Growth</th>
<th>Innovation</th>
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<tr>
<td>• Declining brand loyalty</td>
<td>• Increasing importance of new geographies</td>
<td>• Dearth of innovation in consumer products</td>
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<tr>
<td>• Enduring consumer frugality</td>
<td>• Increasing regulatory environment</td>
<td>• Growing importance of rapid experimentation in new product development</td>
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<tr>
<td>• Growing prevalence of online and mobile commerce</td>
<td>• Rising and volatile commodity costs</td>
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Rethinking the role of IT for CPG companies: Cloud adoption has the potential to transform the economics of the enterprise

John Hagel and John Seely Brown of the Deloitte Center for the Edge believe cloud computing can power changes in three distinct categories: the economics of customer relationships, growth, and innovation.¹⁶

Deeper consumer and customer relationships at lower cost:
For the consumer product industry — where the consumer is paramount — customer relationship economics are a natural starting point for CPG companies to leverage the cloud. Cloud computing has the potential to deepen customer relationships at a lower cost by improving the business economics of direct-to-consumer storefronts — perhaps even commoditize them. Cloud computing also provides the opportunity to more narrowly target consumers based on contextual information collected from mobile devices and the Internet. This improved targeting of consumers has the potential to dramatically improve marketing ROI. Potential benefits include broader customer relationships that could lead to more profitable interactions based on analytics and new revenue streams from adding services with products. Also, cloud-based interfaces with retailers, which can help synchronize demand and supply, have the potential to reduce the costs of interacting with small and large retailers.

Growth enabled by faster ROI, less up-front investment in IT.
From a growth perspective, cloud computing may yield a faster ROI with less up-front investment in IT. For example, cloud computing has the potential to increase agility related to new market growth, particularly in setting up an IT infrastructure in new geographies or related to acquisition integration. As higher-growth economies like Brazil, India, and China contribute more to revenue and profitability of global companies, cloud computing provides the ability to rapidly grow infrastructure and sales capabilities in new countries with fewer capital expenditures. Additionally, cloud computing could improve the economics of working with smaller suppliers with exchange platforms for visibility to demand and supply with smaller suppliers. For consumer product companies, the ability to reconfigure their supply chains to embrace a broader array of small, local suppliers — particularly in developing economies — is increasingly important. Potential benefits of using cloud computing in new geographies include more efficient coordination of disparate supply networks, accelerated market penetration, faster scalability, leading supply chains, and reduced risk and lead-time.

Faster, shorter innovation cycles.
Finally, in terms of the economics of innovation, cloud computing can lead to faster, shorter innovation cycles by increasing the availability of tremendous computing power. For consumer product companies, the declining cost of computing power may improve product design, formulation, and testing. In terms of application development, cloud computing could reduce time for IT application development by bypassing in-house infrastructure setup times. Potential benefits include reduced up-front investment, accelerated completion of computation-intensive tasks during product development, reduced failure rates and risk, and increased open innovation and collaboration.
Customer relationship economics and cloud computing

Consumer product companies face the challenges of declining brand loyalty, enduring consumer frugality, growing prevalence of online and mobile commerce, and the growing importance of dollar and discount retail channels (see sidebar for more information). Cloud computing has the potential to improve direct-to-consumer economics, marketing ROI, and the economics of working with small retailers (see figure 6).

Cloud computing with regard to consumer interactions is a topic of particular importance for both chief information officers and chief marketing officers. Increasing technology performance, rapidly deployable computing power, social computing, and mobile-enabled shoppers are profoundly changing the way marketers connect with and sell to consumers. Consumers use the heightened computing power on mobile shopping applications and social media to maintain relationships with brands. Cloud computing could change the ways that consumer product marketers build brand loyalty, understand consumer needs and attitudes, drive innovation to develop new products, promote and price products, and manage consumer interactions across channels. Cloud platforms and services are empowering CPG manufacturers by providing an opportunity to accelerate deployment of services and improve the fundamental economics of selling directly to consumers.

Figure 6. Three considerations to harness changing customer relationship economics from cloud computing

Considerations for consumer product companies

- Direct-to-Consumer: Revisit direct-to-consumer efforts and other online channels. Think about both niche consumer segments and broader targets.

- Marketing: Build out capabilities to narrowly target consumers based on predictive analytics of contextual information, including demographics, behaviors, and attitudes.

- Retailers: Use technology to drive down the costs to serve your smallest customers including small retailers and small-footprint stores.

Consumer and Retailer related challenges

- Declining brand loyalty
- Enduring consumer frugality
- Growing prevalence of online and mobile commerce
- Growing importance of dollar and discount channels

Potential impact of cloud computing on customer relationship economics

- Improving direct-to-consumer storefront business economics
- Improving (digital) marketing ROI
- Improving economics of working with smaller retailers
For large retailers and CPG manufacturers, advances in cloud computing seem to be dissipating the traditional competitive advantages that come from economies of scale in developing a direct-to-consumer channel. Marketers can benefit from cloud-based scalable technology infrastructure, platforms to rapidly develop direct-to-consumer online and mobile capabilities, and services to deploy e-commerce sites. The typical cost-per-transaction curve that declines with higher transaction volume — whether online or in physical stores — is shifting downward (see figure 7).

The shift began with individuals and small companies using channels like eBay, and now Etsy, to increase reach and decrease transaction costs for relatively low volumes. In fact, eBay recently purchased GSI Commerce to expand its ability to provide cloud-based, storefront, e-commerce solutions. Web-based services like Shopify, Goodie, Storenvy and Weebly have the potential to lower the cost curve, and some are scaling up to support a large number of transactions.

Large CPG companies have used cloud-based solutions to rapidly launch direct-to-consumer storefronts like the Gluten Freely Website, which sells General Mills’ products alongside other brands. General Mills launched the e-commerce storefront targeting niche segment of consumers, those with medical conditions like celiac disease, with gluten-free product offerings using a cloud platform in 2011. According to Dom Alcocer, a marketing manager at General Mills, “Gluten Freely was brought to market about twice as fast and at about half the cost of what we were expecting from a traditional IT development.” The storefront uses social media and CRM analytics to sell much more than General Mills’ products, so there is potential for learning a lot about this customer segment’s preferences to help with future product development. As another example, Nambé, a consumer products manufacturer of luxury household goods developed a new retail e-commerce site using a cloud-based solution that improved customer experience and resulted in higher retailer traffic.

Consideration 1: Revisit direct-to-consumer efforts and other online channels. Think about niche consumer segments as well as broader targets.
Consideration 2: Build out capabilities to narrowly target consumers based on predictive analytics of contextual information, including demographics, behaviors, and attitudes.

The return on investment (ROI) for digital marketing has the potential to significantly exceed traditional marketing, thanks to the combined powers of cloud computing, social media, mobile devices, and analytics. Marketers have the ability to narrowly and precisely target consumers with predictive models based on attributes like past purchases, prior responses to promotions, demographics, and location (see figure 8).

As a result, marketers are better able to personalize interactions with consumers, including the delivery of target communications, which may increase awareness, build brands, cost-effectively promote products, increase revenue, and reduce unintended margin loss. Personalized marketing often results from faster and cheaper computer processing, data storage, and network connectivity. Combined with mobile devices and social networks, improved targeting capabilities may create more bang for a company’s marketing buck. Marketers are increasingly able to increase incremental revenue and margin dollars at a lower marketing cost with more targeted advertisements and promotions that improve a company’s ability to target consumers and exclude consumers who would purchase a product in the absence of a discount from unnecessary promotions.

Figure 8. Moving from rough consumer segmentation to more discrete consumer segmentation and personalization
Consideration 3: Use technology to drive down the costs to serve your smallest customers, including small retailers and small-footprint stores.

Cloud computing technology has the potential to drive down the costs to serve small retailers and small-footprint stores. Today, large retailers’ economies of scale are driven by high volume and inventory velocity, which reward scale in manufacturing operations, packaging, and logistics and distribution. Supply chain information technology capabilities are in place for many large retailers and consumer product companies to synchronize supply across a network of distribution centers with demand from individual stores. Small-footprint stores with relatively lower volumes and inventory velocity are of growing importance to consumers in the United States. Similarly, in many emerging economies, retail is much less consolidated, and small stores are much more prevalent.

In addition to supply chain synchronization via information technology, customer relationship management (CRM) tools can improve forecasting.
Economics of growth and cloud computing
Consumer product companies face the challenges of expanding to new geographies, adapting to tighter regulatory environments, and managing volatile commodity costs (see sidebar for more information). Cloud computing has the potential to improve agility to grow in new markets with less capital expenditures, and improve the economics of working with smaller supplier (see figure 9).

Many consumer product companies seek growth from countries like Brazil, India, and China by pursuing and integrating acquisitions, developing market-specific brands and products, and building a local supply base. Cloud-based services can be less capital-intensive and more cost-effective than on-premise technologies because companies pay per use as their businesses scale up. For example, Chiquita Brands International implemented a cloud-based global HR system, resulting in a 30 percent reduction in upfront costs compared to traditional on-premise ERP systems. The system was deployed across 26,000 employees and 42 countries. Cloud computing can help companies build flexibility for future expansion. For example, Domino Foods migrated existing ERP applications to a cloud-based infrastructure where applications run twice as fast. The new infrastructure provides Domino Foods more flexibility for growth.

Cloud computing also has a role in easing acquisition integration. For example, manufacturer Brady Corporation, which acquired over 50 companies in recent years with a range of IT systems, used cloud services to migrate systems and infrastructure to common applications. Volatile commodity prices have spurred some consumer product companies to expand their supply base with more small suppliers around the world. Over ten years after the euphoria over b2b hubs and the subsequent dot com bust, cloud-enabled systems have the potential to reduce friction in interactions with small and local suppliers around the world. Therefore, consumer product companies should try to synchronize their demand with even the smallest suppliers.

Figure 9. Three recommendations to harness changing economics of growth from cloud computing

Consideration 4: Use new market growth — organic and M&A driven — as an opportunity to build a cloud-based infrastructure to rapidly serve new markets, channels, and geographies.

Consideration 5: Use technology to decrease the cost of synchronizing with small suppliers.

Growth-related challenges in consumer products
- Increasing importance of new geographies
- Increasing regulatory environment
- Rising and volatile commodity costs

Potential impact of cloud computing on the economics of growth
- Agility in new market (geography) growth — speed and less capex investment
- Improving economics of working with smaller suppliers

Agility: Use new market growth organic and M&A driven — as an opportunity to build out a cloud-based infrastructure to rapidly serve new markets.

Suppliers: Use technology to drive down the costs to serve and synchronize with small suppliers.
Economics of innovation and cloud computing

Developing differentiated, market-creating products is a longstanding challenge for consumer product companies. A seemingly unending proliferation of minor product extensions and “me-too” offerings are crowding out investment in innovative products that could expand markets and compel consumers to change the way they enjoy and emotionally connect with brands. Furthermore, there is a growing importance of rapid experimentation in new product development to quickly develop and launch new products in test markets. Cloud-based computing power has the potential to accelerate product innovation during design, formulation, and testing, and develop and launch information technology applications faster.

Figure 10. Two considerations to harness changing economics of innovation from cloud computing
Companies striving to increase the success rates of new products and accelerate their time to market can apply computing power across each step of the product development process. Each step that includes data collection or analysis should be scoured for opportunities to accelerate discrete tasks and integrate traditionally independent steps. The first step of product development for many companies begins with consumer needs analysis based on voice-of-the-consumer data, including consumer demographics and attitudes, and behavioral data from retailers. In aggregate, this data is helpful, but the resulting insights could be stronger by integrating additional data like post-purchase consumer input. For example, Newell Rubbermaid improved contact center response time and efficiency with a cloud-based solution while also increasing the value of consumer feedback to product development. Furthermore, advanced analytics can improve segmentation of this consumer data to help brand and product teams tailor products to well-defined, targeted consumer groups.

Similarly, analytics and predictive capabilities can also improve the concept-testing and market-forecasting steps of product development. Early efforts by companies in the pharmaceutical, manufacturing, and technology industries have used cloud-based computing power to accelerate computationally intense tasks in the development of products, formulas, and packages. For example, Eli Lilly accelerated time to market, by shifting R&D resources from a 12-week process to procure and install a 64-machine cluster to operating a cloud-based cluster for 20 minutes at a cost of $6.40.

Early adoption of cloud computing by consumer product companies has focused on reducing capital expenditures, improving flexibility, and enhancing customer experience. The platform-level of cloud computing — in between the application and infrastructure levels — provides an area for consumer product companies to expand use while learning more about the capabilities of cloud solution providers. Application development on cloud-based platforms has helped companies shift internal information technology resources from setting up and maintaining development environments to higher-valued tasks like tailoring existing technologies to business needs. Cloud-based development platforms are rapidly improving and supporting more types of development. Consumer product companies should evaluate their IT project portfolios to identify opportunities for cloud-based development platforms to accelerate projects.

**Consideration 6:** Scrutinize R&D processes during product design, formulation, and testing to identify areas where access to computing power can accelerate time-to-market.

**Consideration 7:** Consider cloud-based platforms to accelerate application development across an IT project portfolio.
Realizing benefits and mitigating risks

Consumer product companies have the potential to realize important benefits while mitigating risks from cloud adoption. Traditional benefits of cloud computing — reduced capital expenditures, cost economies, development efficiency, flexibility, and speed — are only the beginning of the story. The heart of the story are the business-transformation benefits, including customer relationships, innovation, and growth. Some prominent consumer product CIOs are bullish on the potential of cloud computing. According to Mark Dajani, senior vice president and chief information officer of Kraft Foods, “Cloud services is another way to expand what your company does, who you collaborate with, and stop limiting your company with physical and technical boundaries.” Furthermore, he said: “If I built Kraft from the ground up today, I would leverage the cloud even more.”

Mitigation strategies are available to help address traditional risks like security and encryption, ownership of data and data controls, backup and disposal, availability and reliability, disaster recovery, and legal compliance. It is important to understand where cloud computing has affected strategies for mitigating risk. According to Filippo Passerini, chief information officer at P&G: “No longer can we pick a hardware platform and expect to live with it exclusively, or even for very long. IT leaders must conceive a technology architecture flexible enough to deliver enterprise applications - sometimes even the same single application-in several ways. It’s not so much about the application itself but about being able to deliver what the business needs.” Consumer product companies should consider cloud solutions when there is variability in demand (e.g., periodic surges), deployment speed is important, capital expenditures need to be reduced or avoided, and data security needs can be met. For information technology executives, the balance of benefits and risks drives the need for flexibility.
Cloud computing constitutes a transformative opportunity that could help consumer product companies lessen the constraints of existing business models in terms of customer relationships, growth, and innovation. For consumer product companies, the potential to deepen customer relationships at a lower cost with cloud computing presents an interesting opportunity. Cloud computing combined with social computing, mobile technologies, and data analytics could play a prominent role in helping companies meet industry challenges like declining brand loyalty, enduring consumer frugality, growing prevalence of online and mobile commerce and the growing importance of dollar and discount retail channels. Furthermore, cloud computing has the potential to help companies grow in a dynamic environment where new geographies are increasingly important, regulatory requirements are more demanding, and commodity costs are volatile. The potentially transformative benefits can outweigh the risks traditionally associated with cloud computing, and the risk of inaction.
Challenges related to consumers and retailers

Brand loyalty: Broadly speaking, brand loyalty is declining, and consumer power is increasing because of increased product information and the availability of alternative products, including store brands. Thanks to the proliferation of mobile devices and online reviews, consumers have access to information about a widening array of products. Tough economic conditions have caused consumers to reassess their shopping choices, and the schism between brands they really care about and everything else is widening. According to a recent survey, 80 percent of respondents have reassessed which brands they really care about and which ones are less important to them. Furthermore, across the 29 surveyed food, beverage, and household product categories, less than one in three product purchases would have occurred regardless of sales or promotions.

Consumer frugality: The recent recession seems to have left an enduring sense of frugality and price-sensitivity among many shoppers. Furthermore, diverging consumer segments due to income bifurcation are manifesting themselves in segmented consumer behavior. At the low end of the income continuum are consumers that still feel the lasting sting of the Great Recession and have embraced frugality out of necessity. At the high end, affluent consumers are searching for discounts, shopping across channels, and selecting store brands. They still purchase premium and luxury products, but they are becoming increasingly selective.

Online and Mobile: Sales and product research using the online channel have become a more prominent aspect of the overall landscape. Not only have dedicated online retailers experienced growth, but also the e-commerce arms of traditional brick-and-mortar retailers. Eighty-eight percent of consumers surveyed in the United States have purchased a product online in the past year, and 20 percent of respondents purchased products online on a weekly or more frequent basis, according to a 2011 consumer survey. Furthermore, a sizeable segment of consumers surveyed (42 percent) purchase products online every other week or on a monthly basis. As smartphone adoption increases, mobile devices and shopping applications are impacting the pre-store planing, in-store experience, and post-purchase shopping process for many consumers. Consumers who own smartphones are more likely to purchase online — with 26 percent on a weekly basis or more frequently, and 49 percent on a monthly or bi-weekly basis.

Dollar and Discount: Accelerated by the recent recession, the growth of dollar and discount stores is washing away basis points of market share from traditional retailers with their prices and convenient locations. Incumbent national brands also face competition from a growing portfolio of private label goods across product categories in the dollar stores. The current dollar store expansion plans include new store locations and larger storefronts across the United States.
Growth-related challenges

New Geographies: Many consumer product companies have been seeking growth from countries like Brazil, India, and China as market consumption rises and developed economies like the United States and Western Europe become a more difficult environment to grow revenue. In developing markets, income has been rising for a broad group of middle class consumers, allowing them to purchase products they have not in the past. These markets are experiencing per consumer consumption growth in packaged food and household goods like laundry detergent. Consumer product companies are developing market-specific brands and products, pursuing acquisitions, and building out a local supply base to further underpin growth in these markets. As a result, revenue and profit contribution from developing geographies are top-of-mind for many large consumer product companies.

Regulatory environment: Regulation and consumer expectations related to food and product safety, sustainability, and manufacturing and labor practices are expanding. Consumer product companies are responding to new laws rising related to efficacy, quality, and traceability throughout an extended global supply chain, and emerging consumer expectations of sustainability.

Commodity costs: Consumer product companies have been facing high and volatile commodity costs due to supply and demand uncertainty and imbalances across food, beverage, apparel, personal goods, and household goods. Over the past decade, agricultural commodity prices for broad range of crops, including wheat, corn, and cotton have risen. In aggregate, the IMF Food Commodity Price Index has more than doubled over the past decade, and the IMF Beverage Commodity Price Index has tripled. Similarly, crude oil prices, which cascade throughout the supply chain in packaging, plastic, manufacturing costs, and transportation costs, are much higher than they were a decade ago.
Appendix: Cloud computing basics

There is a wide variety of cloud computing service models driven by the specific technical and business needs of customers.

There are many levels of service models, however, the three key levels are:

**Software-as-a-Service (SaaS).** This service level provides finished software applications for customers to run on a subscription basis and limited operational control. Some of the areas where cloud computing could be applied include CRM, HR, payroll, finance, productivity applications, and email.

**Platform-as-a-Service (PaaS).** This service level provides a platform for customers to load and run software through a subscription service without visibility to the underlying server environment. Some of the areas where cloud computing could be applied include custom development, and extensions to application environments.

**Infrastructure-as-a-Service (IaaS).** This service level provides customers storage capacity and database services with direct operational control through a subscription service. Cloud computing candidates include development and test environments, high computation calculations, and Web servers.

There are also several different ways cloud can be delivered:

**Public cloud:** Public clouds are external to a company’s premises. The cloud provider owns and manages the client infrastructure. Public clouds are multi-tenant (e.g., multiple companies sharing of resources) and subscription-based based on metered use. They are also scalable and accessible via Internet.

**Virtual private cloud:** Virtual private clouds are external to a company’s premise. The cloud provider owns and manages the client infrastructure. The solution is multi-tenant, but virtually private. Access is via a dedicated private link to public cloud that is segmented, secured, or compartmentalized for the client. They are also scalable and accessible via Internet.

**Private cloud:** Private clouds are usually internal and delivered on company premises, although they can be hosted by a third-party provider. The solution is only used by internal customers and can be accessed internally or via private links. While private clouds are scalable, they have elasticity constraints. The company retains control and ownership of the solution.

**Community cloud:** Community clouds are similar to private clouds; however, infrastructure resources are shared with communities or groups of companies with similar requirements.

**Hybrid cloud:** Hybrid clouds are a mix of private and public cloud environments with data stored on private premises while other infrastructure is shared in public cloud.
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