Big Data Strategy of Procter & Gamble: Turning Big Data into Big Value

This case was written by Koli Vinodbabu, under the direction of Debapratim Purkayastha, IBS Hyderabad. It was compiled from published sources, and is intended to be used as a basis for class discussion rather than to illustrate either effective or ineffective handling of a management situation.
Big Data Strategy of Procter & Gamble: Turning Big Data into Big Value

The Procter & Gamble Company (P&G), a leading consumer packaged goods company, was regarded as a pioneer in extensively adopting big data and digitization to understand consumer behavior and facilitate quick decision making. All its activities – internal communications, consumer research, product development, production systems, supply chains, marketing and promotions, and customer relationship management – sought to leverage data. According to analysts, this digitization drive had resulted in P&G becoming more nimble and efficient. The individuals mainly credited for this feat were the company’s former Chairman and CEO, Bob McDonald (McDonald), and Chief Information Officer (CIO), Filippo Passerini (Passerini).

With Passerini stepping down in June 2015, Linda W. Clement-Holmes (Linda) who had previously acted as P&G’s Global Information & Decision Solutions Officer, took charge as the new CIO. According to P&G’s top management, digitization and analytics had helped the company save billions of dollars and was a key to its quick launch of products. Experts too thought that P&G “is doing big data right” and “is building tremendous organizational capabilities around big data. While P&G appears to have fully embraced big data, they perhaps uniquely benefited from a forward-thinking CEO and nearly unlimited corporate resources to build out the organizational capability.”

But some experts were skeptical about P&G’s obsession with digitization, however well-intentioned it might be. They felt that the company might consume more time in analyzing the big data and this would hamper the speed of its decision making. Big data processing might even damage the company’s operations and its reputation in the event of a privacy breach of consumer data. The issues before Linda were how to ensure P&G struck a balance between efficiently leveraging big data and ensuring the security and reliability of its systems and how she could work with the top management to reform P&G’s organizational structure according to big data requirements.

BIG DATA ORIGINS

Big data referred to extremely large data sets that may be analyzed computationally to reveal patterns, trends, and associations, especially relating to human behavior and interactions. It denoted the huge amount of data recurrently collected through devices and technologies such as credit cards and customer loyalty cards, social media from the internet, Wi-Fi sensors, and electronic devices. Much of this data was unstructured, that is, not shaped in a specific, predefined data model. According to the Oxford English Dictionary, the term ‘Big Data’ was first used in 1941 to quantify the growth rate in the volume of data – alternatively known as the information explosion. Later, the term became more and more related to information in the digital format and the Information Technology sector.

By 2013, big data had started to gain acceptance as it held promising opportunities for businesses. It was showing its impact on the healthcare, industrial, retail, and financial sectors, to name a few. It enabled companies to run live simulations of trading strategies, geological and astronomical data, and helping stock brokers analyze public sentiment about a company from social media. Emerging technologies such as Hadoop a, NoSQL b, and Apache Storm c made such analytics

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a Hadoop is an open-source framework that allows the storing and processing of Big Data in a distributed environment across clusters of computers using simple programming models.
possible. According to a Gartner survey in 2013, 64% of organizations had invested or planned to invest in the technology, but only 8% of them had actually begun deployment. Many businesses were in the process of gathering information as to which business problems big data could solve for them. In 2015, annual revenue from the global big data market was nearly US$22 billion, with predictions suggesting revenue doubling in size by 2020. 

ABOUT P&G

P&G, headquartered in Cincinnati, Ohio, marketed more than 300 products in over 180 countries. Its entire operations were classified into six categories – beauty, grooming, health care, snacks & pet care, fabric care & home care, and baby care & family care. For the year ended June 30, 2016, P&G had generated net sales of US$65.3 billion and net profit of US$9.93 billion (See Exhibit I).

P&G was considered one of the most innovative companies globally in terms of applying technology to developing products. The company’s innovative culture was attributed to its Connect+Develop (C+D) initiative launched in 2000. The aim of the initiative was to grow the company by tapping innovation from outside, and, using such innovation to introduce new products. The goal was that 50% of new innovations should be sourced externally. P&G deployed information technology to partner with companies, entrepreneurs, and, research institutions. It spotted brilliant concepts globally and used its in-house capabilities to make tangible products. IT operations were outsourced. According to analysts, the biggest and the most enduring benefit that accrued to the company from the C+D initiative was the change in the thought processes of its employees. P&G’s employees became open to experimenting with new ideas and did not shy away from collaborating with external partners to enhance the company’s business.

In 1999, P&G formed its shared services division, Global Business Services (GBS), to provide cost-effective business assistance globally – the company, at the same time, shifted from a regional structure to a product-oriented approach with the creation of four Global Business Units – Fabric and Home Care; Paper; Beauty Care; Food and Beverage and Health Care. GBS had to equip P&G with superior IT, finance, facilities, and human resources. Technology formed an essential part of its operations.

McDonald and Passerini (who was also the Group President of GBS) had singled out 88 specific business processes that steered the company’s activities. For each of the processes the interval between the time the data flowed in and the time it was acted upon was calculated. Utilizing behavioral forecasting models technologies, it was established that the speed of taking decisions could be enhanced and the time lag in implementation condensed. The goal was to operate the business in real-time and enable information access to everyone simultaneously.

BIG DATA AT P&G

At P&G, predictive analytics formed a vital component of all significant decisions which had a bearing on sales and margins (See Exhibit II). P&G started employing analytics in 1992 when it had an excess number of production units in USA and was required to cut down on the surplus production infrastructure and devise mechanisms to right-size its global supply chain. At that time, P&G’s analytics team worked on aspects like the North American Free Trade Agreement’s effect

\( b \) A NoSQL database provides a mechanism for storage and retrieval of data which is modeled by means other than the tabular relations used in relational databases.

\( c \) Apache Storm is a distributed stream processing computation framework written predominantly in the Clojure programming language. It uses custom created ‘spouts’ and ‘bolts’ to define information sources and manipulations to allow batch, distributed processing of streaming data.

\( d \) Predictive analytics comprises a host of statistical methodologies from modeling, computer algorithms, data mining, and interactive decision theories that analyze current and historical facts to make predictions about future events. Models grasp the connections between diverse variables to enable evaluation of risk or prospects pertaining to specific situations and aid choice making.
on the business dealings, trucking deregulation, and excess manufacturing infrastructure, and suggested different condensation possibilities. A number of manufacturing units were closed down, and, by early 2008, P&G had achieved expense reduction in excess of US$1 billion.

By 2004, operations research (OR) was embedded into the decision making architecture of P&G. Analytics was deployed to take decisions on handling inventory, drafting the supply chain, deciding the quantum of stocks to be supplied to retail stores, determining the most favorable hours in a day to display television ads, and the timing of new product roll-outs. According to analysts, P&G was an example of a company for whom big data was capability augmenting. The company had given preference to analytics and had had an analytics group since 1992. Besides, it had been making efforts to understand consumer behavior on a priority basis. As a result, P&G was implementing big data practices ahead of most other companies. The big data initiative was led by Passerini and supported by McDonald. P&G had also modified its hiring practices to fetch in more data scientists. Since 2011, P&G and Google Inc. had been exchanging experts annually. While Google sought to learn about advertising, P&G wanted to learn from Google’s digital intelligence. At P&G, all managers were improving their digital skills, and every manager’s digital and analytical performance was evaluated in the performance management process.

P&G needed to clearly and easily understand its rapidly mounting and huge amount of structured and unstructured data across research and development, the supply chain, and customer relationship operations both from traditional data sources and new sources of online data. In addition, business teams at P&G required access to more data about sales, market capacities, demographics, weather, etc. with more depth to help the experts understand the data. P&G faced challenges in providing a clarifying vision of “why is this happening” in every division to its experts. It also wanted to quickly obtain and assimilate multiple structured and unstructured data sources at big volumes for quick decision making.

P&G also needed to be able to incorporate a variety of new data types to get to know current trends in the markets as the traditional approaches of data analytics were not working. And growing data volumes were leading to rising storage costs. P&G thus needed the intervention of experts to pick the right data at the right time. It was for these reasons that P&G ventured into big data analytics.

P&G checked different data analytics companies and associated with Oracle Corporation (Oracle) in November 2014. P&G and Oracle decided to test with a Big Data Cloud platform for P&G by April 2015. Oracle functioned directly with P&G to help the launch of the service. It agreed to set up a provisional Big Data Cluster by April 1, 2015, with the understanding that P&G would move to the Public Cloud platform. Oracle turned over the Big Data Public Cloud Server to P&G on April 1, 2015.

However, the IT team from GBS had been working with Hadoop (Cloudera on Oracle appliances) since 2014. The first year’s efforts were based on exploratory analytics and proof of concepts while the second year’s activities were based on big data-based applications. In this process, the team recognized a need for a Business Intelligence (BI) tool more appropriate to the Hadoop ecosystem. In 2015, the team boarded on a project to allow 300 users worldwide to start developing insights from 200 Tera bytes of raw data stored in Hadoop. The particular application was built using Arcadia Data’s Hadoop-converged BI technology that permitted the team to construct an application meeting their goals.

P&G was able to find solutions for many business problems with new analytics competencies resulting from the implementation of the Oracle Big Data Appliance, combined with the Cloudera Hadoop ecosystem. The company assimilated vast amounts of structured and unstructured data across customer interactions, customer facing operations, supply chain, and research and development, from both traditional data sources and new sources of online data. The solution

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* Arcadia Data unifies data discovery, visual analytics and business intelligence in a single, integrated platform that runs natively on Hadoop clusters.
helped the company to serve its customers efficiently wherever they were located. The Oracle Big Data Appliance, which was a pre-engineered solution, supported the company’s capability to conduct analysis on multiple data sets including those from industry sources, retail data, and internal enterprise information within no time and to react more quickly. P&G was able to load and integrate data faster and perform trustworthy analysis at scales that were formerly not possible.

P&G had refined its hiring practices to recruit data scientists, digitally skilled experts, software developers, social media experts, and managers who were well versed with quantitative decision practices. In 2015, Guy Peri was appointed as P&G’s Chief Data Officer. His job was to make sure that P&G leveraged data in the best and most secure way. His responsibility was to work with the company’s data science team which applied advanced analytics against P&G’s largest business opportunities across marketing, sales, eBusiness, product innovation, and the supply chain.

MARKETING

P&G made increasing use of Web 2.0 technologies to promote its products and augment their brand recall. An important medium was the factual accounts narrated by consumers about their product experiences. McDonald, who wanted P&G’s brands to have a distinct rapport with each customer, said, “Advertising is very different today. You don’t talk to somebody. You engage them in a discussion and you give them the freedom to participate in that discussion, and actually to advertise for you.”

Though P&G sold its products through about 1500 websites, it sold its products more exclusively through retailers and that made it a tough task for the company to gather customer data. P&G had earlier depended largely on television for promoting its products. But as consumers started spending more time online through smartphones, tablets, and PCs, it realized TV had lost its effectiveness. As part of its efforts to collect customer data, P&G’s global nappy brand Pampers created Pampers.com, a website that offered advice, free samples, and money saving coupons personalized to each stage of a woman’s pregnancy or the baby’s age, which users selected with a graphic slider at the top of the page. In return, consumers had to submit personal details as they logged in to the site. Dennis Devine (Devine), associate director, consumer solutions, P&G, said, “We had huge amounts of data and it was all over the place. There were no standards for it; there was no way to view it. We took it on ourselves to set up a vision of how we could bring all this information together.”

The GBS’s consumer relationship management wing started a conceptual architecture, which positioned the consumer at the center, and enumerated each possible ‘touch point’ around them. A touch point might be online, in a physical store, or on television. Each was classified and put up as a predominant view of consumer interaction. In addition, P&G began to gather data for all named consumers into a single source from consumer websites, with the information of all the choices of customers and about how they wanted to interact with P&G brands or any programs they took part in. For this, P&G selected Teradata to construct and host a data warehouse, campaign management and analytics system in the cloud, on a pay per usage basis. Devine said, “We can look at demographics, which consumers are engaged with a marketing program, what are they engaged with, and what is driving them. We have information on transactions, can see who is most loyal, and see how we can make other consumers more loyal. All these questions we can answer with this tool.”

P&G used Secure File Transfer Protocol to extract transfer and load data to its data warehouse. Master data management was supported by software from Trillium Software. The cloud-based system was built on a Teradata data warehouse, integrating Teradata Customer Interaction Manager, the Retail Logical Data Model, Teradata Master Data Management, and analytics tools including Teradata Warehouse Miner.

Secure File Transfer Protocol is a network protocol that provides file access, file transfer, and file management over any reliable data stream.
P&G made efforts to obtain quicker feedback on the performance of its marketing campaigns and switched to constant tracking and scenario planning. Though it had previously been employing marketing-mix modeling\(^8\) to determine the pay-offs on marketing expenditure, dissections poured in late. P&G moved to specific marketing-mix assessment software and obtained analyses within one and a half months post-initiative.\(^12\)

**DECISION MAKING**

McDonald said, “By getting the right data to the right decision makers at the right time, we can become increasingly efficient and productive.”\(^13\) Data management at P&G was founded on three principles: Openness of data (making the same information available to all concerned employees), well-timed data (giving the data as soon as possible), and transmission of data (making the data available through various media). The company extensively used online tools like high-speed networking, data visualization, and quick assessment of diverse data strands. Alike data was remitted simultaneously on mobile gadgets, desktops, and P&G’s Business Sphere set-up. This enabled the managers to analyze information irrespective of their location. As a result, the time taken for decision-taking was reduced from weeks or months to minutes. P&G was reaching the stage where it could monitor each employee’s competence, where product-wise weekly sales targets could be set, and the manufacturing gauged real-time globally.\(^14\) It had developed the competence to analyze the profit estimates and the unit sale estimates real-time and make amendments immediately.\(^15\)

When Passerini took over as CIO of P&G in 2004, he renamed the IT department “Information and Decision Solutions (IDS)”. The renaming was based on Passerini’s conviction that data and analytics needed to play a more vital role in decision making at P&G. Since then, the IDS unit had planned several initiatives that had changed the way decisions were taken at P&G.

**Business Sphere**

In 2008, P&G’s GBS started looking for BI software with the objective of providing a flexible BI tool to its decision makers and facilitating access to real-time data so that they could perform predictive analytics and answer the ‘what if’ questions that arose in decision making. Another objective was to find a system that allowed P&G employees all over the world to attend the same meetings and view the same data. “Senior executives had been limited to running the business by looking in the rearview mirror, and we wanted a forward-looking focus with better speed and quality of the decision-making,” said Alan Falkingham, director of BI and analytics at P&G. The BI initiative resulted in the creation of innovative meeting rooms called Business Spheres in partnership with Cisco, SAP, Nielsen, and TIBCO Spotfire.

GBS wanted to equip the top management teams with all the information required to reach resolutions during meetings. It developed a conference room called Business Sphere which comprised a round table circumscribed by two television displays, each 32 by 8 foot capable of displaying charts, graphs, heat maps and other visuals (See Exhibit III). The members could view a world map of markets expanding or contracting depending upon their performance vis-à-vis the targets. The view could be narrowed down to specific countries and product categories. By clicking a button, micro-level data from any of the countries that P&G operated in, such as the prices of the company’s skin cream in Brazil and its sales data vis-à-vis other brands, could be displayed. More clicks could lead to the details of its detergent sales in Lebanon, if required.

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\(^8\) Market Mix Modeling is the determination of additional sales resulting from marketing spends like couponing, advertising, promotional price reductions, etc. This is achieved by considering business performance for a specific time-frame, employing advanced mathematical and statistical tools, and ascribing sales variance to the various expenditures.
P&G executives across the globe met in the Business Spheres each week, to appraise the latest results and forecasts available through the Decision Cockpit dashboards. The targets were like adjusting pricing, changing the product mix, changing marketing approaches, or increasing marketing expenditures to regain market share where there were losses or to improve margins where the settings were strong. These might indicate that an additional 770,000 cartons had to be sold to match the previous quarter’s sales. The advancement of the strategy could be monitored by all. Every corner of the Business Sphere room had a mini screen for senior management in remote regions to participate in via video. These managers could view the data images on their laptops or iPads.

P&G experts used the Spotfire BI tool to study data and compiled the reports to present them to the managers at meetings in the Spheres. Spotfire could analyze the agenda of the employees in the Sphere and create ‘what if’ scenarios to exemplify the consequences of different approaches. The program analyzed and connected as much as 200 terabytes of data to answer a set of questions, allowing for in-depth analysis and customization.

**Decision Cockpit**

The Decision Cockpit involved placing the key information on computer desktops of the decision makers to help over 50,000 P&G employees make better decisions quickly. For instance, a salesman might get updates about important clients, sales opportunities that could be pursued, and product performance trends. The objective was to enable employees to concentrate on finding solutions instead of deliberating on what the issues were. The data presented on the heat map\(^b\) *(See Exhibit IV)* explained what was happening in different markets and allowed team members, supported by data analysts, to know why variations in market penetration were taking place so that they could work together to resolve how to increase market penetration.

The technology powering the Decision Cockpit, known as ‘Consumer Pulse’, employed analytics on customer feedback garnered from blogs, tweets, and social networking websites.\(^c\) Remarks were segregated brand-wise and were displayed on the concerned brand manager’s computer screen for an immediate response to the customer.\(^d\) Consumer Pulse used Bayesian Analysis/Bayesian Inference. At P&G, BayesiaLab facilitated superior reasoning by enabling faster establishment of connections between diverse variables in consumer experiments and by instantly breaking down consumer data.\(^e\)

Senior-level managers were equipped with wireless applications to study performance briefs, permit expenses, and be informed if things went off the track, irrespective of their locations. In July 2011, P&G equipped 18,000 of its employees, scattered worldwide, with cloud computing applications to enable information exchange and partnerships. P&G employees could access this data exchange service on any wireless device.

**PRODUCT DEVELOPMENT**

By 2011, P&G was extensively using computer-based simulation to design and evaluate virtual replicas prior to their manufacture. Only when the virtual replicas satisfied the quality parameters did P&G progress to the real-world prototype phase.\(^f\)

P&G leveraged big data effectively in its new product development process by combining consumer data from multiple brand outlets and using it for innovations. It used modeling and simulation tools to minimize prototyping expenses. For instance, it had used them to decide how

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\(^b\) A heat map shows all the markets in which P&G products compete and their relative share (red indicating low market share and green indicating high market share), and also puts in clear perspective the importance of growing the share of any one of those markets.

\(^c\) Bayesian inference is a technique of statistical inference wherein data is employed to revise the imprecision of parameters and estimates in a probability design. As data accrues, the confidence level in a hypothesis either soars or abates.
the molecules in a dishwashing liquid would react over time to improve the product. Apart from this, as of 2013, the C+D program was receiving more than 4,000 ideas a year from around the world for new products and product enhancements.

From creating the blueprint for a product or a container through process manufacturing and the manufacturing unit’s output, modeling and simulation played a crucial part in P&G’s activities.\textsuperscript{21} The objective was to employ simulation to enable the visualization to the maximum extent possible in all activities. For instance, in July 2011, P&G launched a high-end version of its detergent Ariel, which contained ‘micro boosters’ that the company claimed penetrated deep and removed dirt. These boosters were evolved by employing 3D technology, which helped P&G’s scientists view new dimensions, outlines, and tiers of the cloth and devise methods to penetrate deep to give a good wash.\textsuperscript{22} The company used big data tools and testing in product development. For instance, Tide dry cleaners, a branded dry cleaning franchise, was developed by leveraging consumer visions about the shortfalls of the existing dry cleaning products, and P&G’s own insights into consumer household cleaning habits.

P&G’s next goal was to reproduce the whole store and simulate a consumer’s experience with its products (See Exhibit V). These set-ups were equipped with giant-sized video displays, powered by computer modeling, simulation, and 3D technologies on all walls, replicating a retail store. Consumer focus group members looked at and evaluated virtual product depictions. Advanced software enabled documentation of consumer responses to product arrangement, colors, and molds. Eye-monitoring software was used to gauge the product and packing features to which the buyers paid heed. Virtual solutions applications were applied in nearly four-fifths of all the company’s projects. P&G disseminated the findings of its virtual reality studies to its retailers to assist them in arriving at more sensible choices regarding the brands and volumes that they had to stock. P&G also employed these set-ups to construct virtual 3-D shop surroundings. This helped the retailers visualize how product arrangements appeared in their shops and improve the current stacking pattern and in-store promotions. Its eye-tracking software also helped evaluate the store shelf palpability of its products.\textsuperscript{23} Bernard Eloy, Director, Virtual Solutions, P&G, said, “One of the key benefits of virtualization is that we are gathering key data and insights, which we can pull together to create new products and new brand experiences.”\textsuperscript{24}

**SUPPLY CHAIN**

P&G started employing demand sensing\textsuperscript{2} software (DSS) worldwide to increase short-run estimate precision and reduce safety stock. DSS obtained the existent estimation data from the demand plan, synthesized it with the real-time information of every day indents and deliveries, and employed advanced trend identification formulas to make daily estimates for each product line. On its own, it made changes to these estimates each day considering real-time information that was constantly fed into the system. By 2007, in the P&G businesses where DSS was deployed, the reduction in estimation error and safety stock exceeded 30% and 10% respectively, over 2006.\textsuperscript{25}

P&G installed ‘control towers’ to handle its distribution structures globally. A control tower, in the context of a supply chain, was a site that allowed a view of inward and outward movement of goods, akin to an airport control tower that directed the maneuver of an airplane. This technology offered a comprehensive view of the supply chain and removed the flaws in freight arrangement to enable compressed conveyance time and enhanced protection. It also helped in reducing inventory and decreasing the number of inventory cycles.\textsuperscript{26} As of August 2010, the Control Tower know-how had reduced the number of empty load trips by more than 15% when compared to 2009.\textsuperscript{27}

\textsuperscript{2} Demand sensing varies from demand planning as it is about collecting information as quickly as possible from the time of occurrence of the event or in real-time and using it immediately to amend the supply chain.
P&G also used a system called Distributor Connect, which let it manage inventory in real time. Moreover, the firm kept connected to its retailers through a worldwide coordinated data warehouse that allowed it to manage commercial transactions in a completely automatic fashion. These systems aggregated data, which were compiled by data scientists, P&G’s marketers, and engineers to develop new products and improve existing ones. The firm spent US$2 billion annually on R&D, and operated to structure the innovation by forming multiple groups accountable for generating new products and development. To spread the innovation to all departments, P&G assigned business and innovation strategies for senior executive leadership to review.

P&G analyzed consumer-behavior data to forecast orders worldwide to cut its distribution costs. It was implementing Terra Technology owned by supply chain analytics company E2open across its markets. P&G had deployed E2open’s demand sensing analytics in 75% of its global business and had also implemented multi-enterprise demand sensing (MDS), inventory optimization, and transportation forecasting. MDS leveraged downstream data like feedback from point-of-sale (POS), channel inventory, warehouse withdrawals, distributor data, and retailer forecasts to better understand customer demand and quickly respond to sudden shifts in demand.28

P&G announced a partnership with Ecodesk in 2015, to launch a leading edge, cloud-based supplier assessment scorecard system to drive increased engagement and analysis of supplier sustainability performance. P&G had been using a supplier scorecard but in a spreadsheet format since 2010. The scorecard was built based on the association of P&G’s granular, tried and tested approach for measuring supplier sustainability performance with Ecodesk’s know-how in cloud-based sustainable supply chain technology platforms, supplier engagement, and data collection analysis.

RESULTS

In the early 2000s, P&G confronted the problem of rising R&D costs. It implemented the C+D program which leveraged InnoCentive, a web-based platform that invited experts to solve technical challenges that P&G was facing. By 2011, half of the new products had elements that had originated from outside the company, up from 15 percent in 2000. R&D efficiency at P&G was up at 60 percent, and R&D as a share of revenue had tumbled from 4.8 to 3.4 percent.

P&G was among the winners of the 2016 Oracle Cloud Platform Innovation Award in using Oracle’s platform as a service (PaaS), and infrastructure as a service (IaaS) in new and advanced ways to give its business a makeover, drive innovation, and gain a competitive advantage. P&G was able to use Oracle’s solutions to develop marketing insights from growing volumes of point of sale data. Jim Fortner, Vice President of IT Development and Operations at P&G, said, “We can conduct analysis and respond to the data much quicker than ever before.”29

By leveraging big data, P&G was able to save inventory costs of over US$1 billion.30 Commenting on the results of using Oracle Big Data Appliance, Terry McFadden, associate director, GBS, P&G said, “We wanted an end-to-end solution to provide visibility into structured and unstructured data, giving us the bigger picture and details about our products. Using the R language and the broader Hadoop ecosystem on Oracle Big Data Appliance gives us a solution that scales linearly. It is an extremely reliable platform that provides an excellent foundation for an analytics factory. I was convinced that Hadoop was the answer to our big data challenge. We did not want to knit our own cluster. Oracle Big Data Appliance gave us the shortest path to value. We could drop the implementation in and start chopping on problems.”31

Analytics was employed to identify the best supplier for every product ingredient globally. Each supplier was assessed to determine whether it could honor the commitment. As of 2007, P&G USA’s retailers had been expending US$140 million annually on in-store exhibits. Employing analytics, P&G started advising its retailers online on these exhibits.32 It earned US$67 million as fees per annum by cutting retailers’ expenses, and, reduced the lead time for exhibits from five to two months. Due to the continuous movement of its products across countries, P&G had to face substantial currency fluctuations. Analytics software was used to forecast the best exchange rates, and accordingly shuffle production and ingredient quantity procurement between nations.
Analytics was employed to determine inventory requirements and the places where they were required. New warehouses were added to the supply chains to optimize inventory. Analytics was also used to study recruitments, the number of employees resigning, retirements, job rotations, and career advancements, to develop a ‘flow model’ which informed managers about the inflow and outflow of employees during the subsequent period and helped them recruit accordingly. However, P&G’s endeavor to quantify everything also came in for criticism from some observers. A marketing expert doubted the ability of Bayesian analysis to really decode human dynamics and, hence, of reliably measuring customer satisfaction. He felt that consumers wanted to be viewed as individuals and not as numbers and that P&G might not have got its priorities right by applying number-crunching to social networking platforms. Instead, it required brand managers who listened to consumers to really comprehend their wants. Regarding P&G’s efforts to have a one-to-one customer connection through digitization, he doubted whether customers actually desired this or would prefer to simply use social media to convey product aspects that they disliked.

CHALLENGES

P&G sales peaked at US$83.7 billion in 2012 before stagnating and then declining as the company began offloading brands. As of mid-2016, for 14 of the previous 17 quarters, P&G had been losing market share in half or more of its products. The company’s stock had stagnated, inching up a cumulative 6.5% since 2014. In this situation, Linda, who had assumed the role of CIO in June 2015, had the big responsibility of continuing and leveraging the big data initiatives started by Passerini. Linda had varied experience in P&G and had served as Chief Diversity Officer, Senior Vice President of GBS, and as the Global Information & Decision Solutions Officer. Analysts felt that succeeding a successful and long-tenured CIO was a double edged sword as Linda would inherit well run operations and a strong team but might find it challenging to chart her own path. Analysts felt that P&G’s leadership had a vital role to play in adopting a culture of data-driven decision-making within the organization to reverse the situation in which it found itself. The head of analytics at a leading logistics company described his efforts at driving a data-driven culture, “Change management is one of the biggest challenges of Big Data implementation. Analytics needs to be integrated with processes. We had to educate and train our field force over and over again in order to make analytics a part of their daily routine.”

Big data initiatives were needed to be implemented in different departments, which would make it difficult to define implementation goals and deadlines. Highlighting this challenge, Eric Spiegel, CEO of Siemens USA, said, “Leveraging big data often means working across functions like IT, engineering, finance and procurement, and the ownership of data is fragmented across the organization. To address these organizational challenges means finding new ways of collaborating across functions and businesses.”

Even as P&G was on course in its deployment of big data, concerns were expressed about the company’s vulnerability to technological crashes, given that the dependability of big data was still in question. Passerini had earlier said, “...we are at a point where if we had a major outage in our systems, it would be material instantaneously. If we have a security issue on one of our websites, that could have an impact on the company’s reputation instantaneously. We live in a world where there is less margin for error than there was just a few years ago...because just one problem, but the ‘wrong’ one, could be one too many.” However, analysts opined that big data could only advocate trends, authenticate claims, and reduce the amount of human error in decision making procedures; it was the human decisions and strategies that would turn the wheel. David Scott Taylor who became the CEO and President of P&G in 2015 admitted that big data had the potential to change P&G’s fortunes with respect to its lagging revenues. However, he acknowledged, “Until we put up numbers, I don’t expect anyone to believe anything.”
### Exhibit I
**Key Financials of P&G (2012-2016)**

<table>
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<th>Fiscal year is July-June. All values US$</th>
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<th>2015</th>
<th>2016</th>
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<td>4.19</td>
<td>2.48</td>
<td>3.64</td>
</tr>
<tr>
<td>Basic Shares Outstanding</td>
<td>2.75B</td>
<td>2.74B</td>
<td>2.72B</td>
<td>2.71B</td>
<td>2.7B</td>
</tr>
<tr>
<td>EPS (Diluted)</td>
<td>3.18</td>
<td>3.86</td>
<td>4.01</td>
<td>2.33</td>
<td>3.55</td>
</tr>
<tr>
<td>Diluted Shares Outstanding</td>
<td>2.94B</td>
<td>2.93B</td>
<td>2.9B</td>
<td>2.88B</td>
<td>2.84B</td>
</tr>
<tr>
<td>EBITDA</td>
<td>20.29B</td>
<td>18.38B</td>
<td>18.48B</td>
<td>17.87B</td>
<td>17.56B</td>
</tr>
</tbody>
</table>

(M=Million), (B=Billion)

Source: www.marketwatch.com

### Exhibit II
**P&G Predictive Analytics**

Source: practicalanalytics.co
Exhibit III

P&G’s Business Sphere

Source: http://spotfire.tibco.com and www.fusioncharts.com

Exhibit IV

P&G Heat Map

Source: www.practicalanalytics.co
Exhibit V

P&G’s Simulated Store

Source: www.accenture.com
End Notes:

34 “It’s Now Possible to Have a One-on-One Relationship with Every Consumer.,” http://newmediaandmarketing.com, December 1, 2011.