



# BIG DATA, BRAND EQUITY, AND SUSTAINABLE PROFITS IN THE CHINESE AUTOMOTIVE INDUSTRY

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## EXECUTIVE SUMMARY

In many ways, the growth and change in the Chinese automotive industry parallels the growth and change in the Chinese economy as both respond to a volatile economic world.

Most notably, a rapidly growing Chinese middle-class is demanding value—safety, quality, reliability and style at an affordable price—at the same time as a flooded market is driving prices down and giving consumers a dizzying menu of choices. In a market roughly the same size as that of the United States, China boasts twice as many auto manufacturers.

Analysts believe, therefore, that those companies that will thrive in the next decade will be the ones that create a powerful brand that brushes aside current assumptions about Chinese cars being cheap and unreliable and, rather, delivers automobiles tailored to consumer needs in specific markets. The trick is Chinese car companies must do this, even as they create new levels of efficiency in producing such autos.

The good news is that the advent of big data analytics—the ability to quickly and cost-effectively integrate massive volumes of rich and disparate data structures to produce timely analyses and game-changing insights—can deliver all that's needed to grow innovation, brand equity and profits. Today, all of the necessary technological factors are in place: automated data collection, centralized and sophisticated data warehousing, collaborative information sharing, and the ability to deploy a wide range of analytics right within the warehouse.

So the market is there. The technology is there. And if companies can make a commitment to big data analytics—and ultimately structure their operations to turn data-driven insights into the type of automobiles that will find their way into the hearts and minds of Chinese consumers, the rewards will likely be powerful and lasting.

To do so, companies will need executive leadership prepared to implement big data analytics on a step-by-step basis, with each step creating a successful platform to build on the next one. Beginning with one aspect of the operation—perhaps sales or warranty programs—companies will be able to conduct precision analyses that

lead to a deep and rich understanding of the customer's voice, as well as of cost and profit variances and their root causes.

Better decisions almost surely will follow—the types of decisions that create brand equity and long-term success.

## INTRODUCTION

Faced with a series of challenges that are shrinking profit margins, automobile manufacturers around the globe are looking for ways to more precisely design, source, build, sell, and service their products.

In China, where manufacturers have been producing cars more economically than anywhere else and where the industry is experiencing staggering growth, there is a twist to this scenario. With affordable cars and a glut of manufacturers flooding the market, Chinese companies must do more than continue to improve efficiency; more importantly, they must build a powerful brand that will differentiate them from competitors. To do so, Chinese companies must understand in extremely granular detail how every component part and process contributes to the building of the company's brand in the eyes of consumers—and the impact on the bottom line.

The key to such understanding is big data analytics, which enable companies to quickly and cost-effectively integrate massive volumes of rich and disparate data structures to produce timely analyses and game-changing insights. In turn, those insights foster stronger innovation, brand equity and profitability.

This paper discusses why Chinese automotive manufacturers need big data analytics and how they can use them to build brand equity and enhance the profitability of every unique product they manufacture, sell and service.

## A GLUTTED MARKET

The Chinese automotive market is the largest and most dynamic in the world with sales expected to exceed 19 million units in 2011. The growth rate of China's automotive market is second only to India's and most analysts expect continued growth to nearly 100 hundred automotive brands that produce over 300 vehicle models. Competition is unusually fierce; with a market similar in size to the US, China has twice as many automotive companies operating in it.

Perhaps the most dramatic challenge in this red-hot market is the ability to stand out and articulate one's brand value given the vast number of competitors. Many manufacturers fail to generate substantial profit margins, because they struggle to meet customer demands for value—economy and gas-savings combined with aesthetics and reliability for a reasonable price.

The Chinese automotive market also is complicated by factors that include:

- ~ Genuine competition from a robust public transportation system.
- ~ A high cost of entry, which means overseas entrants tend to be the large international companies, such as General Motors and Volkswagen.
- ~ The aforementioned excess capacity is driving prices down.
- ~ New government regulations have taken aim at controlling overproduction. This means companies need to establish new markets, either at home or abroad.
- ~ The rapid growth of the Chinese economy, which has created an expanding pool of middle-class consumers who are strongly influenced by powerful brands. This, therefore, is where the greatest opportunity lies.

## THE RISE OF CHINA'S MIDDLE-CLASS CAR CONSUMER

Many analysts believe that a good percentage of automotive manufacturers operating in China today will not survive the next decade. Those that do will have built a strong brand, based on reliably designing cars that meet the needs of middle-class consumers who are desperate for affordable, stylish cars that are also reliable and fuel-efficient.

Thus building brand equity—the premium that a company realizes from creating products and services that have a recognizable name and reputation—depends on Chinese auto manufacturers producing cars that have the above qualities. Doing so demands these companies turn to the type of data-driven innovation that enables them to produce such cars efficiently enough to offset the costs of the necessary additional features.

## TECHNOLOGY, MARKET, AND ORGANIZATIONAL READINESS

Three factors determine whether car companies are in a position to employ big data-driven innovation.

First, the market must be ready. As we've already discussed, in China there is clearly an emerging middle-class consumer market hungry for a Chinese automotive brand they can trust. Chinese companies must respond—and soon.

Second, the organization must be ready. Successful, big data-driven companies have a culture openly committed to using data to succeed. Senior management sponsors this idea and organizes the company to make it so. At the moment, many Chinese companies are waking up to the fact that this is an area that can be exploited.

This brings us to the third factor: technological readiness. Today, big data technology vendors can provide end-to-end packaged solutions that companies can adopt at a price point they can afford. Such solutions can enhance brand, lower costs and improve profitability by facilitating:

- ~ **Descriptive Analytics**, which deliver insights into what occurred within various operations.
- ~ **Predictive Analytics**, which are built on descriptive analytics and give companies insights into possible outcomes of future initiatives.
- ~ **Prescriptive Analytics**: When the insights of predictive analytics are applied to a company's day-to-day operations to optimize outcomes, it can be said that the company is using prescriptive analytics.

Employing these analytics on big data means decisions are timelier and incorporate deeper, richer insights into how each component and step in a product lifecycle contributes to profitability and brand equity. Companies understand customer needs in more detail and have more opportunities to fully test ideas before investing in innovative new product designs, operational models or services that build brand equity.

This plays out in every aspect of a company's business.

**Finance and Budgeting:** A major American manufacturer expects the enhanced speed and accuracy enabled by big data analytics for VIN profitability will reduce the

cost of its finance and budgeting function from 0.7% of total revenue to 0.4%, which translates into \$500 million in savings.

**Product Design and Development:** Big data analytics shorten the time and improve the reliability involved in gathering, integrating and analyzing the data required to understand what customers want and whether or not the company can profitably build it. It allows companies to quantify assumptions using detailed visibility into projected performance. The clear insights into customer needs and product costs enable profitable development of innovative products and significantly enhance brand equity.

**Procurements and Purchasing:** When purchasing departments view procurement in a siloed manner and cost cutting becomes the primary focus, the result tends to be that products meet initial cost cutting goals but fall short on delivering both value—which damages brand equity and, therefore, long-term profits. Big data analytics draw on enterprise-wide access to spend data, as well as to the effects that procurement and purchasing activities have on lifecycle costs. This enables better decisions for both the short- and long-term.

**Supply Chain Management:** Big data analytics help companies build stronger, more cooperative and more profitable supply chain partnerships by enabling companies to precisely track the effects of their actions. For example, indisputable insight into the effect of cheaper and less durable parts on the long-term profitability and brand equity of both partners enables mutually beneficial decisions for each stage of the process.

**Manufacturing:** Big data analytics provide a data driven framework to measure the effect of a whole range of manufacturing programs on customer value creation, brand equity and overall profitability.

**Distribution and Logistics:** Issues such as delivery delays and the volatility of fuel costs have made rapid response times an absolute essential. Long delivery times are one of the key reasons that Chinese customers reject a purchase. They also back off out of fear they will not have a dealership close by to service their vehicle—a concern that can only grow as more dealers go under in this crowded and highly competitive market. The ability to deliver and service cars in a timely way is a major

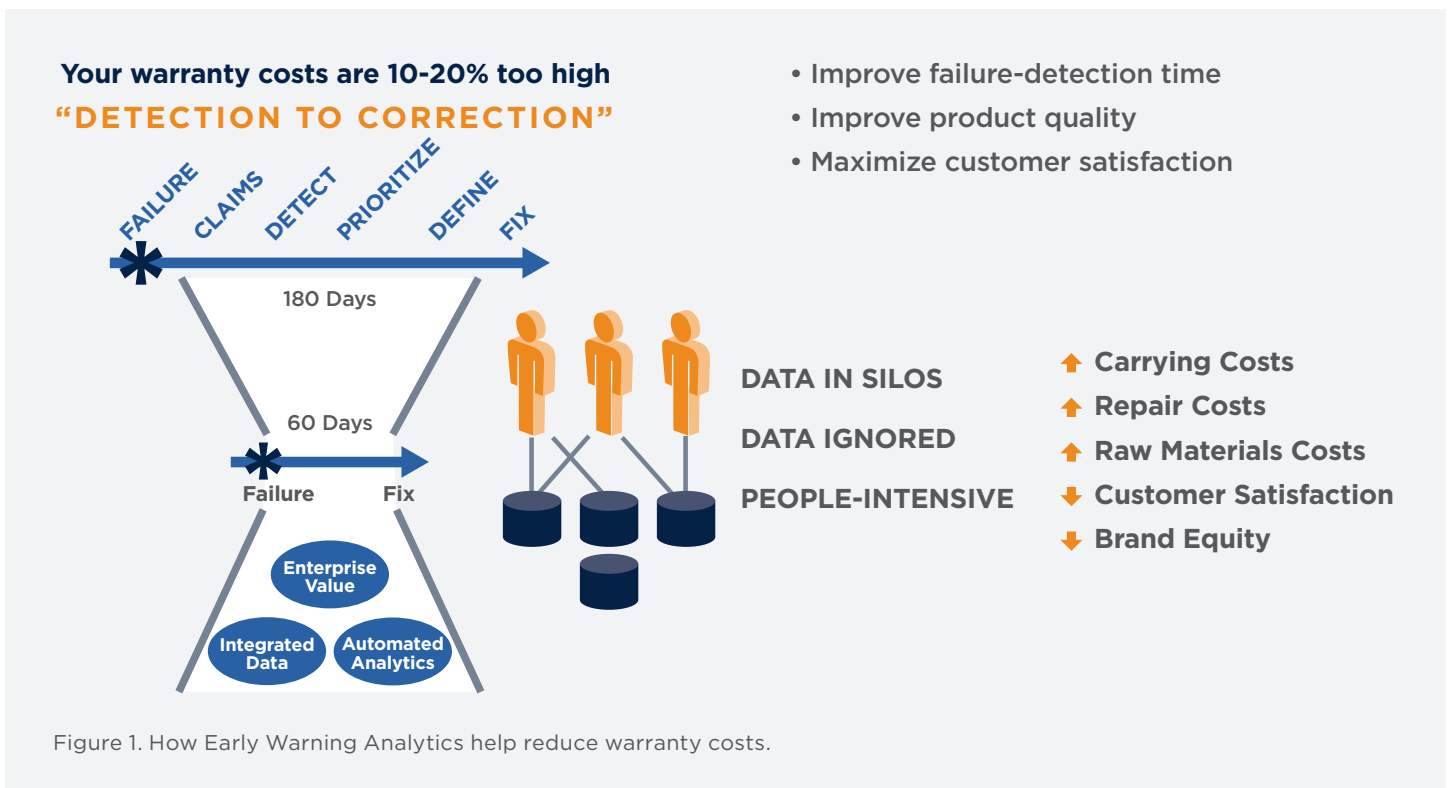
component of brand equity. By analyzing such items as vehicle sales data, vehicle registration data and demographics data—even traffic patterns—Chinese auto manufacturers can build detailed target segments and determine the right number and types of dealerships they should have for each market. In addition, big data analytics enable companies to modify existing logistics on the fly and develop new delivery options that ensure efficient distribution at the lowest possible cost.

**Sales and Marketing:** In China, oversupply is a major concern that can affect both sales and brand equity; the sales incentives associated with oversupply imply a car that nobody wants, as opposed to one that is delivering value. Having visibility into markets, sales projections, pipeline and production schedule can enable companies to better sync demand and supply. In addition, at a time of shrinking marketing budgets and rapidly evolving sales strategies, companies can use iterative analyses and detailed product and market segmentation to capture in exquisite detail today's rich mix of marketing activities and channels, as well as the dizzying array of

organizations—both internal and external—involved in executing the activities. This enables small, effective trials that reduce investment risk as well as detailed visibility into the efficacy and return-on-investment of marketing spend. Timely insights make it possible to quickly fine-tune initiatives.

**Warranty and Maintenance Services:** Warranty and maintenance offers can be wildly successful in the sales and marketing stage—and be instrumental in building brand equity—but carry significant risk in the latter stages of the product lifecycle. Especially in light of new requirements in 2012, Chinese manufacturers can use these warranties and maintenance offers to successfully build brand equity with less risk by using big data analytics to improve vehicle reliability and creating innovative guarantees and services that profitably engage consumers.

The principle measure of how well a manufacturer is doing in terms of creating high quality vehicles without excessive costs is the detection-to-correction (DTC) metric: the amount of time between when a manufacturer



first becomes aware of a quality issue to the time it takes to correct it. By gathering detailed data on the quality and reliability of the various parts and components early, companies can have enough time to correct an issue when only a select number of vehicles are involved. Some estimate that adoption of a big data analytics solution can reduce the detection part of the DTC cycle by as much as 40%.

In addition, the more timely and complete picture of product quality through the entire lifecycle means that warranty policies are informed by facts. They allow companies to create more innovative services offerings, such as extended warranties, which will both enhance their brand and increase their profits. The same data—and additional analyses—help companies determine precisely how much money to set aside to meet long-term warranty obligations.

## THE COMMON THREAD: FINDING AND RESPONDING TO THE VOICE OF THE CUSTOMER

To build a lasting and powerful brand, all of the analyses described above must be informed by a detailed understanding of customer need: they must find ways to truly hear the voice of the customer.

Traditionally companies identify customer needs with market research surveys. Big data analytics can speed this process and incorporate other sources such as social media and Internet data that tap into customer preferences and attributes about a firm's products and those of its competitors.

So for example, in China, 90% of buyers search online for vehicle information, using vehicle information portal sites, search engines, video sites, online forums and social media. Some studies have shown that Chinese consumers rejected some brands because they perceived the models to be less reliable than those of competitors, even though actual reliability performance was better in some cases. In other cases, consumers rejected a car because the price was more than they would pay for any vehicle. Big data analytics would allow Chinese manufacturers to better understand and respond to these customer perceptions and the role that various influencers have on brand equity.

Types of analysis include:

- ~ **Influencer analysis** – By analyzing social media data, manufacturers can understand whose actions influence the behavior of peers to purchase, sell, or consider vehicles.
- ~ **Virility analysis** – Manufacturers can analyze the flow of interactions across a social network to understand breadth and speed of influence on customer sentiment.
- ~ **Engagement analysis** – Manufacturers can gain insights into customer interests that lead to more successful customer engagement strategies.

Hearing and understanding the voice of the customer also provides critical insight into pricing strategies, especially at a time in China when price sensitivity is high and its link to brand equity is critical. By integrating detailed data from sales operations, voice of the customer analytics and customer data and demographics, companies can carefully segment their customers and price their cars appropriately.

## HOW TO CREATE A BIG DATA-DRIVEN ORGANIZATION

As noted earlier, implementing a big data-driven organization demands executive and organizational commitment to the idea that detailed, data driven insights can improve decision-making throughout the enterprise—from strategic decisions in the executive suite to day-to-day tactical decisions on the front line. The insights require technology that can reliably clean and integrate data from disparate sources within and outside the organization, as well as a powerful, scalable analytical platform that can handle workloads of any size.

Implementation can be a staged process, with each initial success justifying next steps. Companies can and often should start small, typically in the stage of the product lifecycle that has the greatest margin variability from VIN to VIN (the squeaky wheel), and/or where data is easiest to obtain and has the broadest application.

So, for example, sales are often a key area because all of today's incentives can create remarkable variability from car to car, location to location. In addition, sales data is often readily available and can be applied to many different aspects of the operation, such as warranty and services

agreements and fraud prevention efforts. As companies begin the process, they can look as well at sub-segments, departments, and process areas within sales. This can continue in a serial fashion or in parallel depending on the need and resources available to tackle the issues.

## WHICH DATA AND FROM WHERE?

One of the first critical questions that companies confront is what data to use and how and where they should obtain it? A series of “screens” can answer that.

- ~ **Level of Allocation** – In the initial stages, the fewer number of allocations the better. How much VIN level allocation of revenue and costs needs to be calculated to get the needed answers? Can you get it directly from source systems? Do you need detailed data right away or will high-level allocations do?
- ~ **Data Reusability** – Is the data useful in its own right and can it be easily repurposed for other reporting and analytical purposes?

- ~ **Variability** – Is there enough variability from one serial number to another to be useful for increasing margins at the VIN level?
- ~ **Data Availability** – How hard is the data to get and how easy is it to source unchanged from the source systems? In the initial stage, the easier the better.

## A CUSTOMIZABLE ROADMAP

Though every company must tailor its implementation to its own needs, there are certainly common threads that run across all automotive manufacturers. Typically, the area with the greatest variability is sales and marketing and so it represents a logical first step and a good opportunity for seeing quick results. From there, most companies would move on to Service, Distribution, Manufacturing, Purchasing and Design. Figure 2 is a high-level look at the VIN-level data needed for each of these areas.

|                                | VIN A        | VIN B        |                        |
|--------------------------------|--------------|--------------|------------------------|
| <b>Revenue</b>                 |              |              | <b>Variance (ABS)*</b> |
| New Sale – List Price          | 23500        | 23300        | 200                    |
| Servicing & Parts – List Price | 300          | 300          | 0                      |
| Less Discounts/Rebates         | -1500        | -600         | 900                    |
| Customer Revenue               | 22300        | 23000        | 700                    |
| Less Sales Commissions         | -3545        | -3660        | 115                    |
| <b>Total Net Revenue</b>       | <b>18755</b> | <b>19340</b> | <b>585</b>             |
| <b>Costs</b>                   |              |              |                        |
| <b>R&amp;D</b>                 | 1000         | 1000         | 0                      |
| <b>Manufacturing Costs</b>     |              |              |                        |
| Materials                      | 9000         | 8700         | 300                    |
| Labour                         | 4200         | 4300         | 100                    |
| Rework                         | 100          | 0            | 100                    |
| <b>Distribution</b>            |              |              |                        |
| Freight                        | 500          | 500          | 0                      |
| Repairs                        | 1000         | 0            | 1000                   |
| Preparation                    | 350          | 200          | 150                    |
| <b>Warranty</b>                |              |              |                        |
| Materials                      | 150          |              | 150                    |
| Labour                         | 150          |              | 150                    |
| Other Costs                    | 300          | 0            | 300                    |
| <b>Total Costs</b>             | <b>16450</b> | <b>14700</b> | <b>1750</b>            |
| <b>VIN Profit</b>              | <b>2305</b>  | <b>4640</b>  | <b>2335</b>            |

SALES  
VARIABILITY

R&D,  
MANUFACTURING  
COST VARIABILITY

DISTRIBUTION  
COST VARIABILITY

SERVICE COST  
VARIABILITY

Which of these areas have greatest Variability, has biggest impact on profitability, and is most in need of analysis?

Figure 2.

|                             | DATA NEEDED                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | OTHER USES                                                                                                                                                              |
|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Sales</b>                | <ul style="list-style-type: none"> <li>~ Detailed Sales Data - Wholesale and selling price</li> <li>~ Incentives Data</li> <li>~ Vehicle Master</li> <li>~ Sales Channel Master</li> <li>~ Customer Master</li> <li>~ Bill of Materials (BOM) Integration data</li> </ul>                                                                                                                                                                                                                                                                                                            | <p>Global sales dashboard<br/>Global sales forecasting</p>                                                                                                              |
| <b>Service</b>              | <ul style="list-style-type: none"> <li>~ Warranty Claims at VIN level</li> <li>~ Replacement Parts Detail</li> <li>~ Labor Costs Detail</li> <li>~ Parts Master</li> <li>~ Service Technician Data (Name, Certification etc.)</li> <li>~ BOM Integration, as serviced for each VIN at the part level</li> </ul>                                                                                                                                                                                                                                                                      | <p>Early warning system<br/>Supplier cost recovery<br/>Fraud reduction<br/>Reserve forecasting</p>                                                                      |
| <b>Distribution</b>         | <ul style="list-style-type: none"> <li>~ Vehicle Shipments at VIN <ul style="list-style-type: none"> <li>- Ship/Ocean, Truck, Railroad Shipments</li> <li>- Shipment allocations to VIN level</li> </ul> </li> <li>~ Transportation Supplier Master</li> <li>~ BOM Integration - Port Installed options at VIN level</li> </ul>                                                                                                                                                                                                                                                      | <p>Early warning system<br/>Supplier cost recovery<br/>Fraud reduction<br/>Reserve forecasting<br/>Service cost optimization</p>                                        |
| <b>Manufacturing</b>        | <ul style="list-style-type: none"> <li>~ Manufacturing Costs <ul style="list-style-type: none"> <li>- Labor</li> <li>- Materials</li> <li>- Fixed Costs</li> </ul> </li> <li>~ VIN detail data (Build data, Shift, Plant, Line etc.)</li> <li>~ Manufacturing Cost allocations to VIN level</li> <li>~ BOM Integration - As built BOM created for each VIN at the part level</li> </ul>                                                                                                                                                                                              | <p>Manufacturing cost analysis<br/>Material planning analysis<br/>Vehicle quality traceability to manufacturing<br/>Manufacturing process analysis and optimization</p> |
| <b>Purchase/<br/>Design</b> | <ul style="list-style-type: none"> <li>~ Development Costs</li> <li>~ Development allocation costs for VIN Nomenclature (part level)</li> <li>~ VIN Level Profitability Analysis can include: <ul style="list-style-type: none"> <li>- VIN Level Design Variability on VIN Level Profitability</li> <li>- Vehicle Product Offering analysis</li> <li>- Accounting for Simulated Vehicles <ul style="list-style-type: none"> <li>- Analysis of Costs and margins of all proposed vehicle configurations using complete design and engineering BOMs</li> </ul> </li> </ul> </li> </ul> | <p>Product development cost analysis</p>                                                                                                                                |

## THE TERADATA ANALYTIC ENVIRONMENT FOR BIG DATA ANALYTICS, AUTOMOTIVE STYLE

To create the necessary analytic environment, a number of factors must be in place: automated data collection, centralized and sophisticated data warehousing, collaborative information sharing, and the ability to deploy a wide range of analytics right within the warehouse.

- ~ The Teradata High Performance Hardware/Database Platform automatically distributes data and balances mixed workloads in the most complex environments while eliminating data latency. Scalable to 186 petabytes, the symmetric multiprocessing and massive parallel processing—unique Teradata features—mean that multiple queries race efficiently through mountains of integrated data to deliver a single, consistent and trustworthy view of the product lifecycle. Because Teradata embeds all analytics within the database, it can accommodate any and all queries easily, so companies can quickly identify problems or areas for improvement within their supply chain.
- ~ Teradata's Master Data Management (MDM) provides a unified view of data across multiple systems to meet the analytic needs of a global business. MDM creates singular views of master and reference data, whether it describes customers, products, suppliers, locations, or any other important attribute.
- ~ The Teradata Manufacturing Logical Data Model (MLDM) provides an industry template and data relationships for defining the company data model. The template defines direct traceability data and other lifecycle data associated with traceable components (assembly processes, manufacturing equipment, operators, time stamps, test results, shipping/transportation, service/repair, and warranty claim information). As such, the MLDM provides a comprehensive and flexible blueprint of how data is organized within a Teradata Database, diagramming the relationships of data extracted from disparate sources to provide an industry-specific, enterprise view of the value chain that enables companies to achieve the deepest answers as quickly as possible.
- ~ Teradata Value Analyzer (TVA) improves profitability analytics by calculating a behavioral-based, enterprise-wide view of value—by customer, product, sales channel or organization. Instead of traditional value averages and summary information, TVA uses detailed activity data to create more accurate measurements of profitability and help you make better strategic and tactical decisions for all critical enterprise functions.
- ~ More than 3,000 Professional Services consultants—all of whom bring industry expertise and top-level experience with data warehousing and business intelligence—enable a uniquely tailored solution. Teradata consultants are expert in creating a comprehensive analytical environment that makes a VPMA effort—in fact, the entire enterprise—more responsive to customer needs and changing regulatory requirements.

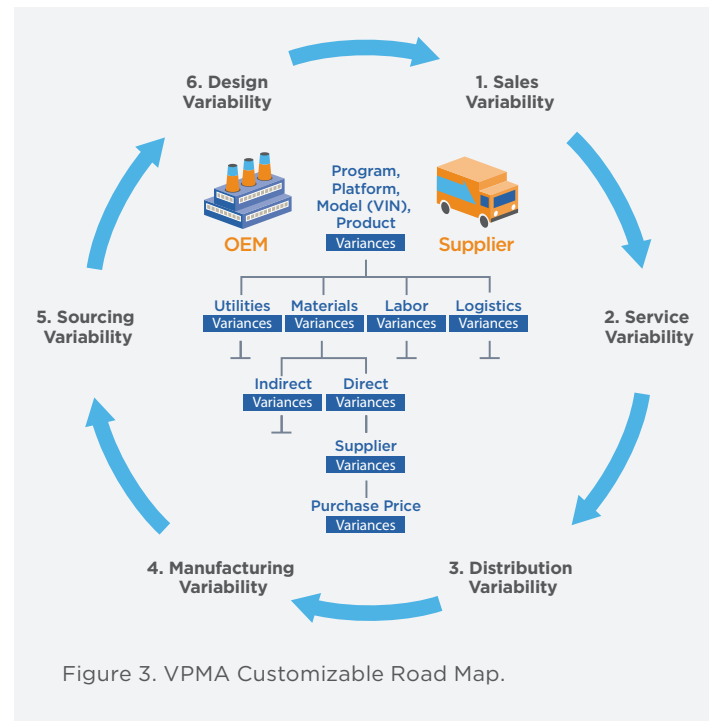


Figure 3. VPMA Customizable Road Map.

## A LASTING AND POWERFUL BRAND LEADS TO SUSTAINABLE PROFITS

Increasingly, success in China's auto industry relies on the ability to build and sustain brand equity that will resonate with China's exploding middle-class. Companies must build that brand efficiently enough to maintain a healthy profit margin.

The key is being able to conduct precision analyses of customer, program, platform, and VIN/product profitability data that lead to top-down/middle-out/bottom-up

understanding of the customer's voice, as well as of cost and profit variances and their root causes. The right big data analytics solution can deliver reliable insights into complex variables that include design, component purchase price, production labor and materials, transportation, logistics, incentives, rebates, post-sales support and other attributes.

And in a fiercely competitive marketplace with consumers hungry for value, those manufacturers that possess the technology capable of delivering game-changing insights—and a company culture committed to big data analytics—will be the ones that can profitably build a successful brand.



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POSSIBLE™

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