Abstract

Decision making process has become more fact and data driven in today’s dynamic global environment. The conventional methods of forecasting are unable to understand “GEN Y” customers who are having much better access to information for decision making. Now is a right time for manufacturing companies to invest in Big Data techniques and extract intelligence for revitalizing entire value chain and optimize the resource utilization.
Introduction

Big data is high volume, high velocity, and/or high variety information asset that require new forms of processing to enable enhanced decision making, insight discovery and process optimization.

Manufacturing generates about a third of all data today. Big Data is going to play a vital role in developing digital enterprise strategy in the near future along with growing Internet of things.

In today’s dynamic global environment, IT companies are now preparing new skills and techniques to unlock the hidden data value on a real time basis, leveraging social platforms, smart phones and creating digital enterprise. There needs to be a clear understanding of capturing customer footprints in the digital world and accordingly mobilizing internal resources.

It takes longer for a push-based supply chain to respond to changes in demand, which can result in overstocking or bottlenecks, delays (the bullwhip effect), unacceptable service levels and product obsolescence. Big data is helping manufacturers to produce as per customer pull rather than push strategy and help mass customization.

Manufacturing companies can track the usage pattern of valuable resources and optimize the resource utilization across the globe.

GE is planning a new breed of “Connected Equipment,” including its jet engines, CT scanners, and generators armed with sensors that will send terabytes of data over the internet back to GE product engineers. The company plans to use that information to make its products more efficient, saving its customers billions of dollars annually and creating a new slice of business for GE.

Leading manufacturing companies, especially in automotive domain, have invested in Big Data analytics. North American companies are leading the investments followed by European companies.

The Big Data analytics investments have helped these companies to come closer to the customer by understanding their real needs and perceptions to improvise their products and services. Machine data and transaction data are currently being utilized for deriving business intelligence.

There is a growing focus on advance analytics to build predictive manufacturing and anticipatory sourcing capabilities.

Manufacturing companies are facing challenges in terms of defining investment strategies and right resources for nurturing this trend.

Reduction in cost of sensors and automation hardware, improved communication technology has made real time data collection a reality.

Ford Motor Company today received the “2013 INFORMS” prize from the Institute for Operations Research and Management Sciences. The award recognizes Ford’s long-running, company-wide effort to use data science and predictive analytics to improve overall operations and performance.

Analytics is used widely in diverse applications at Ford, including research, product development, manufacturing, supply chain, marketing and sales, finance, purchasing, information technology and human resources. Throughout the company, Ford is using data science to create smarter business strategies, make better product decisions, assist dealers to be more successful, and improve customer satisfaction.

Consider the plug-in hybrid Ford Fusion Energy. The vehicle generates about 25 gigabytes of data every hour and this data is useful for further improvements in fuel economy and vehicle emission reductions. Yet, Ford researchers are already experimenting with vehicles that generate 10 times that much data, 250 gigabytes per hour.

Trends & Challenges

GE is planning a new breed of “Connected Equipment,” including its jet engines, CT scanners, and generators armed with sensors that will send terabytes of data over the internet back to GE product engineers.

Applying rigorous analytics, including machine learning, operations research, data mining and big data throughout the business has played a key role in the resurgence of Ford in the past seven years.
**Business Imperatives**

- With priority of profitable and sustainable growth there is an increasing stress on fact and data based decision making by top management.
- Traditional methods of demand forecasting are losing its effectiveness and investing Big Data analytics as a better approach to control market uncertainty.
- Understanding customer decision making, as customer has better access to information. Web traffic data when combined with existing business intelligence applications and sales data provide new insights.
- Integrated product development along with the voice of customer; based on customer sentiment analysis using digital footprint on social and e-commerce portals.
- Improve customer service using predictive techniques leading to better loyalty. Predictive techniques can help understand buying patterns, improve after sale service and readiness to provide prompt service.
- Productivity improvement and efficient supply chain management.
- Risk and Strategy Management with growing competition and globalization challenges.
- Designing to meet regulatory requirements require analysis of actual performance data using telematics.

**Business problem**

With ever growing competition and failure of traditional forecasting methods it is necessary for companies to invest in Big Data and Analytics for profitable growth. It is challenging to manage, analyze and view key business trends across geographies and quickly respond to meet the changing customer preferences.

If we make a “Fish Bone” diagram for Big Data, the following would be the key data points for a manufacturing organization –

- **Enterprise Big Data**
  - Yield
  - Grade
  - Efficiency
  - Gender
  - Age
  - Output/hour
  - Downtime
  - Uptime
  - Temperature
  - Health/Maintenance
  - Defect rate
  - Sales & Marketing
  - Accounts & Finance
  - Procurement
  - Human Resources
  - Design Engineering
  - Strategy & Planning

- **Manpower**
  - Quality checks
  - Cycle time
  - Cp/Cpk
  - Technology

- **Machine**
  - Inventory level
  - Shelf life
  - EOQ
  - Type
  - State/Form

- **Material**
  - Method
  - Speed
  - Uptime
  - Downtime
  - Efficiency
  - Grade

- **Management**
  - Efficiency
  - Grade
  - Age
**Potential application areas and use cases:**

Big Data can be well leveraged to improve the Design to Value process encompassing multiple enterprise functions.

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**Product research**

- Based on the customers’ key preferences bulk of the company’s production can be categorized to match the preferences and optimize the variety. It comes down to building products that are most demanded by the customers.
- Monitoring social media channels where people give elaborate views to understand the preferences and views of the customer.
- It will improve the assembly plant schedules and parts forecasts significantly.

**Shop floor**

- Fault tolerance and detection on the shop floor: Whenever a machine fails, its sensors trigger the rest of the system to prevent it from breaking down completely.
- The embedded sensors monitor the health status and help to understand the accurate failure reasons.
- Automated plants, remote plants and hazardous operations can be monitored for improving reliability of production processes.

**Supply chain optimization**

- Now it is possible to find out exact status of consignments which can help in reducing delays and updating customer on real-time basis.
- Optimizing usage of warehouse space, distribution and delivery methods using RFID.
- Dealership service with the right set of products with required features so that the customers’ visit turns into a real purchase.

**Building intelligent enterprise**

- Urgent strategic and tactical turnaround decisions, working on projects that ultimately decide issues such as which brands and models to discontinue, where to procure parts and materials and how to enable dealers to tweak their inventories to improve sales.
- Forecasting the price of commodities to figure out what consumers want, what the company will build, where it should source parts from and how to power its line up of cars and trucks.

**Advance capabilities**

- Predictive manufacturing is a smart combination of Big Data and Analytics for optimizing manufacturing operations and processes along with predictive manufacturing. Advance data modelling techniques will help to optimize production cost and product pricing for profitable growth. Shop floor fault management, customer sentiment analysis, quality check and machine to machine data are going to increase manufacturing efficiency to a new level.
- Based on the predictive trends around economy, raw material prices, oil prices, inflation, population and consumer preferences, even enterprises can build advance predictive sourcing capabilities.

**Our investments**

Tech Mahindra is also working with leading manufacturing companies on building the digital enterprise strategies leveraging Big Data, Analytics and M2M for profitable growth.

For automotive industries we have comprehensive telematics solutions which are helping in tapping vehicle data for improving product design, remote diagnostics and designing infotainment services.

Real-time Big Data from machine around multiple health parameters like temperature, vibration, noise and pressure can help to improve operational excellence and reduce operational uncertainties by pre-empting critical equipment failures. We are building innovative solutions for discrete, process and aerospace customers to bring considerable savings by reducing downtime which helps them earn considerable revenue over their high cost of fixed assets.
Tech Mahindra’s Offerings

EnterpriseXpert, powered by iDecisions™

EnterpriseXpert, powered by iDecisions™ is a well-designed Business Intelligence solution with intuitive and sophisticated analytics providing manufacturing companies with a distinct advantage. It helps to effectively organize and analyze the complex barrage of information generated in their business, provide analytical engines for efficient analysis, generate required reports and facilitates to identify their most profitable customers, manage inventory, optimize stock levels, assess performance of vendors, have a better production planning and control, manage risk, create a more efficient business model and facilitate knowledge based decision making across all business units.

Integrated Warranty Management Solution

Integrated Warranty Management - a business operations solution from Tech Mahindra is a complete integrated solution for warranty issues in the Automotive and IFE/HE space to support their overall business processes. It is an agile business solution that is capable of catering to the requirements raised by the vendors and business environment.

Conclusion

It is a critical time for manufacturing companies to leverage IT to crunch data and derive meaningful information for smart decision making for being 'Future Proof and Future Ready'.

Tech Mahindra has more than two decades of association with manufacturing companies across the globe with fortune 1000 companies. Tech Mahindra is a valuable partner to identify and prioritize areas for Big Data investment and blend it with analytics to develop meaningful business insights specific to manufacturing industries.

For more information, see www.techmahindra.com
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