SCB
Economic Intelligence Center

Insight

Decisive Edge: Win Big with Big Data

EIC Online

www.scbeic.com

Economic and business intelligence for effective decision making

For more information, please contact us at eic@scb.co.th or call 0 2544 2953.
www.scbeic.com
@SCB_Thailand

EIC Online offers in-house macroeconomic and up-to-date sectorial analyses, aiming to equip you with valuable insights for effective strategic planning and business execution.

01 Insight

In depth analysis of business issues and implications, with medium- to long-term perspectives

02 Outlook

Analysis of macroeconomic outlook, key indicators and business drivers.

03 Flash

Update and analysis of current issues affecting the Thai economy and business sectors

04 Note

Short articles on topical events

Privileges:

- E-mail notifications of EIC publications and activities
- Access to past publications

Decisive Edge: Win Big with Big Data

Contributors:

SUTAPA AMORNVIVAT, PH.D.
VITHAN CHAROENPHON
SIVALAI KHANTACHAVANA, PH.D.
ISSARASAN KANTAUMONG
NAPONG CHEERASUWANKIT
NITHI KAVEEVIVITCHAI
VEERAWAN CHAYANON

Published in November 2017

Executive Summary

More and more of what happens in the real world these days generates a vast, ongoing flow of digital information, a kind of parallel universe made of data. Now this data has become a valuable new resource for business, thanks to "Big Data" analytics.

The data are "big" in the sense that they comprise a large, complex mass of raw datasets that lack any single defined structure or format. In our new digital age, Big Data proliferate from a wide variety of Internet technologies, data-sharing smart devices and everyday platforms such as call centers, text messages and social media. Through intensive use and constant connectivity, new contents are continually generated in all textual, visual and audio formats. This huge variegation, breadth and continuity is how Big Data is so different from traditional data types that rely on single datasets collected at a given time, such as sales statistics or a customer database.

Analysis of Big Data can boost a company's potential by uncovering hidden patterns and relationships in behaviors and events. Big Data is thus predictive and diagnostic. By contrast, traditional datasets are constrained by their structure and therefore of relatively limited usefulness in forecasting. For example, a customer survey only represents the customers' attitudes and intentions, not their actual behavior. With Big Data, a company can tap not only its own internal data but also a vast universe of online data about factors like customer lifestyle, weather and competition data. This helps analyze existing relationships, generate new insights and make accurate predictions. Big Data illuminates consumer preferences and tastes to enable new marketing strategies and sales tactics.

EIC's survey of over 60 top firms in Thailand found that more than half have begun to employ Big Data, a trend that began within the past three years. Both the service sector and manufacturing sector use this tool especially to maximize their sales and marketing potential, e.g., to optimize prices and personalize campaigns and promotions. In businesses characterized by high competition and relatively similar products, such as telecommunications and real estate, companies can deploy Big Data to differentiate their offerings. In manufacturing, makers of electronics, appliances, autos and auto parts utilize Big Data to improve productivity.

Big Data are likely to play much bigger role in the Thai private sector during the next three years, in line with the global trend for companies to get smarter about consumers, on the one hand, and their own operations, on the other. The "smart consumer" concept is about catering to today's demanding, digitally immersed consumer. The "smart company" model is about using Big Data and other advanced technologies to enhance manufacturing, service and administrative operations. Our survey finds that among the Thai firms that do not already use Big Data, some 70% plan to do so in the near future. Gearing up to use this process takes about one to three years, however. On the sales and marketing side, companies should develop Big Data analytics to cope with complex consumer behavior, high expectations and minimal brand loyalty, as social media ramp up these pressures in the marketplace. To improve internal operations, companies should use Big Data to save costs, improve productivity and enhance human resources.

Formerly easy to please, Thai customers have become highly sophisticated and demanding. EIC found that over 80% of Thai consumers now expect that products and services will fit their preferences in an optimal way, and they prioritize quality. Yet they have little brand loyalty. Fortunately, Big Data can help. Data analytics on signals like images and comments posted on social media, search engine keywords, and Internet of things (IoT) data can lead toward strategies that meet individual customer needs via personalized marketing, price optimization, cross-selling and so on.

Thai corporates now face pressures from higher operating costs, shrinking productivity, and high staff turnover. Once again, data analytics can help. It starts with switching to digital storage of relevant data. One example is installing sensors in the assembly in order to collect a large data set, which can help prevent defects and enhance productivity. Analyzing data on employees' behavior and interests can help identify the best candidates and prolong their tenure.

EIC believes that the business sectors that are best positioned to take advantage of Big Data are retail, transportation & logistics, and telecommunication & media, since they already possess an abundance of relevant data and can easily access more. Other companies can get started by digitizing their existing data. EIC studied how various Thai business sectors differ in their Big Data potential in terms of readiness and benefits. The study examined three indicators: data preparedness, potential business benefits, and preparation time. Retail, transport & logistics, and telecom & media are in a superior position because they are service-oriented businesses that interact extensively with customers. As a result, all the customer data they already collect every day -- e.g., for online purchases, GPS, voice calls and mobile internet use -- can be harnessed in sales and marketing strategies that constantly refashion products and services to suit emerging needs. Companies that believe they should move toward adopting Big Data should embrace digital platforms in order to collect real-time data, e.g., by developing the company website, establishing a social-media presence, installing sensors in the assembly line, and incorporating external data into internal data for analytical purposes. These digital platforms help a company deploy relevant data to stay competitive and grow.

Businesses are becoming ever more data-driven. But applying Big Data successfully requires clear objectives, appropriate data sources and knowledgeable analysts. Entrepreneurs and executives often rely on their own experience and instinct when making decisions. But now the abundant availability of useful data together with effective analytic tools help minimize personal bias. The key is to select the right data, adopt the right thinking process, and use the right analytical tools. But Big Data is not a short cut to success. Companies need to aim for long-term sustainable growth, which requires keeping ahead of fast-changing trends and adapting strategy proactively.

1

A brave new world beckons Thai companies

Data is becoming the air that business breathes. In the era of digitization, vast quantities of information are being generated every day, providing a wealth of data on which companies can capitalize. The Internet and social media have become the primary tools that consumers use to communicate, find information about products, compare prices, and, increasingly, make purchases. Consumers' everyday activity thus generates an ocean of . So does the Internet of things (IoT), the technology that lets smart electronic devices connect to the Internet and communicate among themselves automatically. Thailand's leading businesses are now starting to adopt the Big Data technology that lets them consolidate and understand this information so as to improve performance.

The difference between **Big Data** and **Traditional data**

Big Data stand out from traditional data in their size, variety and speed of data, thus promising greater insights for businesses.

Traditional data		Big Data
Large volume of data that can be stored in traditional storage equipment	Volume	Huge volume of information that needs to be stored in high-capacity data storage
Constant structure or form of data	Variety	Unstrutured form of data
Constant frequency of data	Velocity	Data is generated in real-time
Reliable data	Veracity	Data needs to be verified
Requires basic equipment and skills	Complexity	Needs specialized equipment and personnel
Income, inventory and customer base	Example data	Social media, sensors and GPS
Products customers purchased	Example insights	Products customers will buy and why they need these products

Source: Analysis by EIC using data from McKinsey Global Institute and IBM

The Evolution of **Big Data**

Big Data were initially limited to information generated inside the businesses, but in the 4.0 age, Big Data consists of all information surrounding us.

4.0

- Internal company data
- Online data
- Data from social media
- Data from connections among devices and machines
  - Wearable items
  - Sensors and information in the form of sound
  - Videos or pictures

3.0

- Internal company data
- Online data
- Data from social media
  - Posts
  - Likes
  - Shares

2.0

- Internal company data
- Online data
  - Websites visited
  - Duration of time spent on website
  - Types of online clicks

1.0

- Internal company data
  - Sales
  - Delivery
  - Financials
  - Staff

1.1 Understanding Big Data: information in a new age

The term "Big Data" refers to a large volume of information that is diverse, dispersed, formless, unstructured and real-time. Big Data are defined by 4 Vs: 1) Volume - the quantity of information is huge, requiring high-capacity storage technology. 2) Variety - the information features many different types, and is sourced from both inside and outside a company. 3) Velocity - the data are generated at a fast pace, so they can be used immediately. 4) Veracity - the accuracy of the data has to be verified. Big Data originates from sources like call centers, text messages, social media and point-of-sale transaction records. The data are thus extensive in reach, which is how they differ from the information that might have been considered "Big Data" in the past, which were simply large internal databases that a company might have at a certain point in time, such as data on warehouse inventories, product deliveries, financial records or employees.

New data flow continuously from consumer behavior on smartphones, computers and social media as well as from automated communications among networked electronic devices and systems. Over 2.5 trillion gigabytes of new data are generated worldwide every day. Online information in the form of text, pictures, sound and video is generated instantly by Internet technology and smart devices that communicate among themselves. One example is when you use a mobile application to remotely control an appliance or view a closed-circuit TV feed of activity in your home. Another example is when a company uses sensors in its factory to collect data from the production line. Social media users generate new data whenever they like or share pictures, check in at a location or post comments online.

The ongoing digitization of business tasks, processes and tools paves the way for accumulating Big Data that can be analyzed. A company can start simply by creating a store website or page on social media such as Facebook, Instagram or Twitter. It might also consider setting up an email system for customer relationship management or marketing. A manufacturer might begin by gradually automating its production line, introducing machines into the process and using sensors to scan products during production. This will collect data in real time. Soon a tremendous amount of usable business data will be generated.

Unlike Big Data, traditional data often have a fixed structure and a clear pattern. But this limits their usefulness. Examples of traditional data are a company's monthly sales data, its number of employees in each age group, their gender, and their workplace roles. Since the method of data collection is fixed according to a narrow purpose, the information only indicates what is happening, not why. The data might show that one brand is outselling another, but they don't help explain the cause. Even data from surveys and focus groups only reflect subjective opinions and intentions, not actual behavior and actions.

Big Data tends to involve lots of raw information that appears to lack structure. The key is to use appropriate analytical tools to identify patterns hidden in this data, discovering the relationship between consumer behavior and surrounding conditions. Nowadays, companies that sell us products and services are in a position to know a lot about us as customers. In the future they'll know even more. Convenience stores and supermarkets will know what types of products each of us likes, which branches we visit, and how often.

An auto manufacturer can track each driver's behavior via on-board diagnostic devices (OBD). An insurance company can use OBD data to determine how much each customer's premium should cost according to a usage-based insurance (UBI) model. The legacy model for policy pricing relies on group factors like gender and age to set premiums. This technology also allows the insurer to offer a policy that is personalized to the client.

Another example: a manufacturer of golf clubs can find out where you usually play, and whether you're a pro or an amateur, using information from sensors embedded in the equipment. The company can analyze what types of equipment golfers are interested in, which products they'll buy first and where they will buy them. These insights can be used in developing new designs and materials for clubs of different weights and styles. It can also help in determining the right sales channels to reach the target customers.

The Big Data difference is not mere bigness but meaning. Big Data is diagnostic and predictive. Given today's fiercely competitive marketplace, a company can't form effective strategy by relying only on its own internal data. Success requires extracting intelligence from the far-flung Big Data scattered around the web, including information on consumers' lifestyles, the weather, road traffic, even comments on competitors' products. Using Big Data analytics, a business can identify relationships that help predict market trends, such as consumer demand, popular products, and which products are bought together. This kind of understanding can give a competitive edge.

1.2 Thai companies are just getting started on Big Data

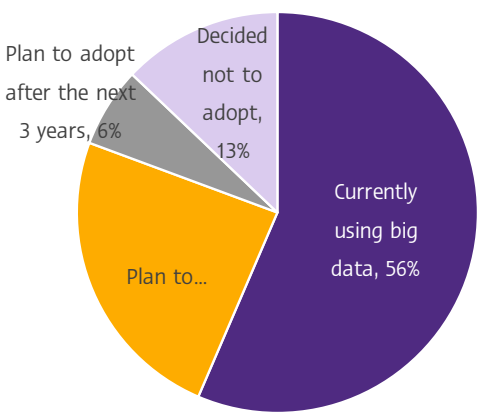
Many leading Thai corporates are beginning to make use of Big Data, but they are still relying primarily on their own internal databases. Interviews with managers at more than 60 leading Thai companies across different industries reveal that over half of the firms began using Big Data for business analysis, with the earliest having started three years ago. The most widely used sources of data are internal databases recording sales, profits, inventories, costs and POS data, followed by data from mobile applications or sensors. So far, real-time data on factors like weather, traffic and GPS have been little tapped.

EIC recommends that companies start using external data, such as social media comments, photo posts and numbers of likes and views, as well as data from their own websites, such as viewing statistics, number of clicks, bounce rate, and other real-time data, to provide in-depth analysis of customer behavior and business efficiency. This will lead to insights that are deeper than analysis relying solely on internal data.

1 Leading Thai firms have started using Big Data, but still mostly from internal sources

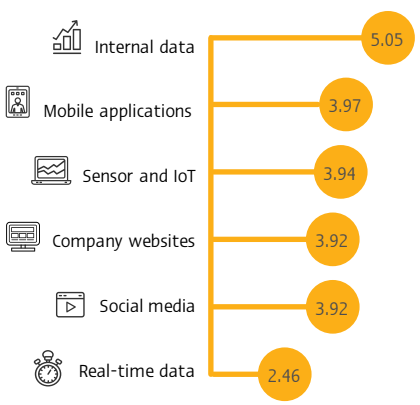
The adoption of Big Data among Thai companies

Unit: %



Relative importance of each Big Data source

Unit: points (out of 6)



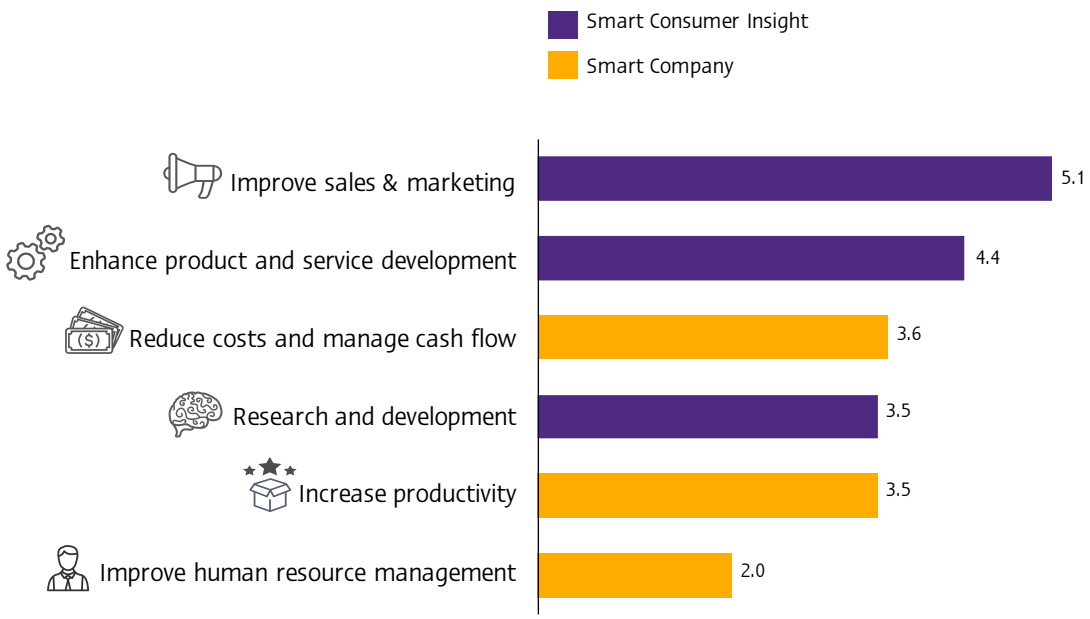
Source: EIC analysis based on interviews of 62 leading Thai companies in September 2017.

Businesses report that the biggest payoff from Big Data is in sales and marketing. Both manufacturing and service businesses focus their Big Data analysis mainly on improving sales and marketing strategies, such as to help in pricing or to plan promotions for target customers. The second most common application is in product development, helping track fast-changing preferences. Manufacturing firms are using Big Data analysis to improve production processes and business operations, such as by raising output and reducing errors.

2 Thai businesses use Big Data mostly to enhance sales and marketing

Big Data benefits, ranked

Unit: Points (out of 6)

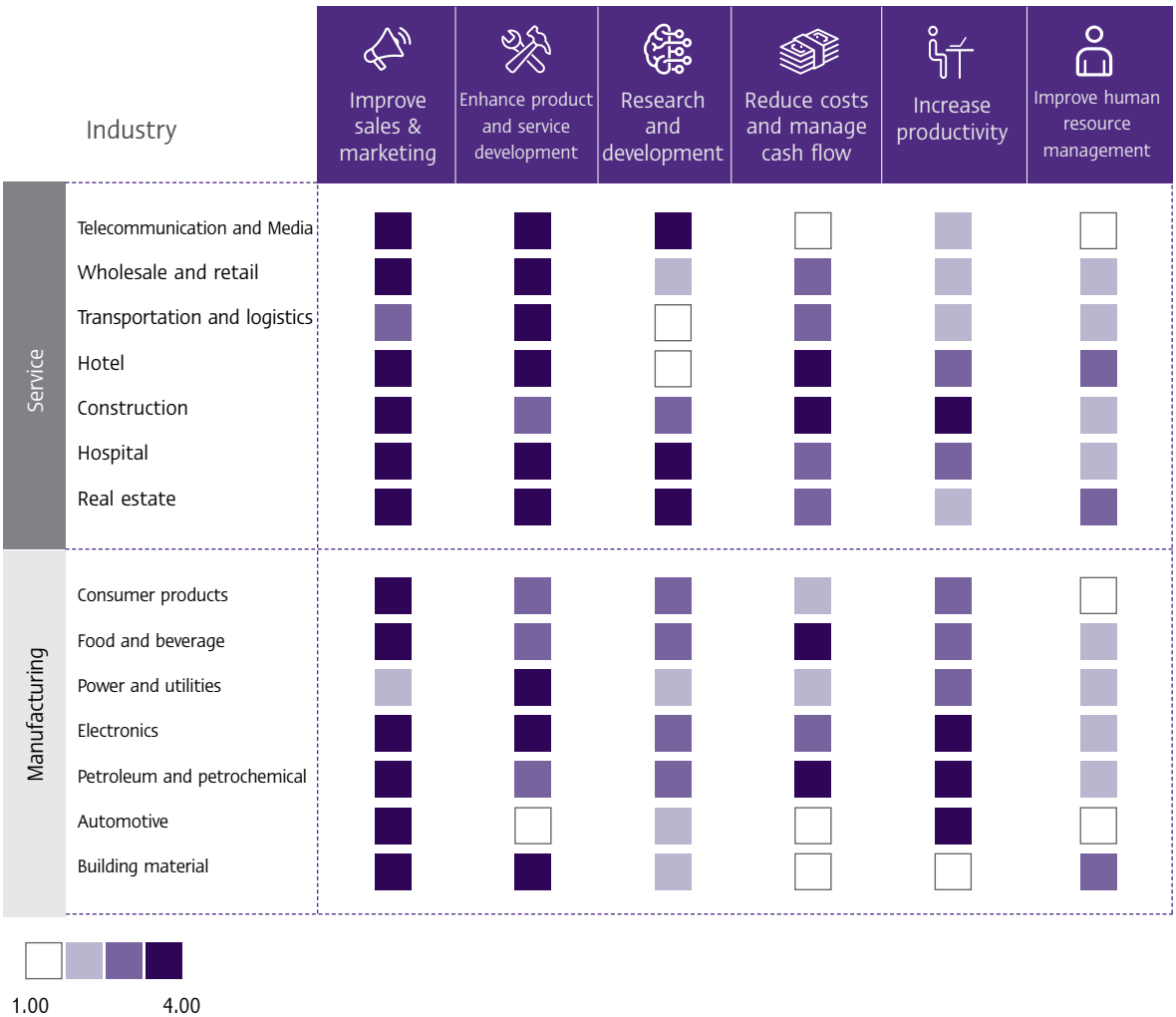


Source: EIC analysis based on data from interviews of 62 leading Thai companies in September 2017.

Businesses in highly competitive industries that make standardized products believe that Big Data can help differentiate their offerings, while labor-intensive industries want it to lift productivity. Industries that provide relatively generic goods and services, such as telecommunications, hospitals, real estate, energy and utilities, tend to focus their Big Data analysis on improving their products, creating more value-added, and distinguishing themselves from competitors. Industries such as electronics, electrical appliances and automotives use Big Data mainly to improve manufacturing productivity.

3 Big Data can improve sales, product R&D and factory productivity

Benefits of Big Data analysis by industry



Source: EIC analysis based on interviews of 62 leading Thai companies in September 2017.

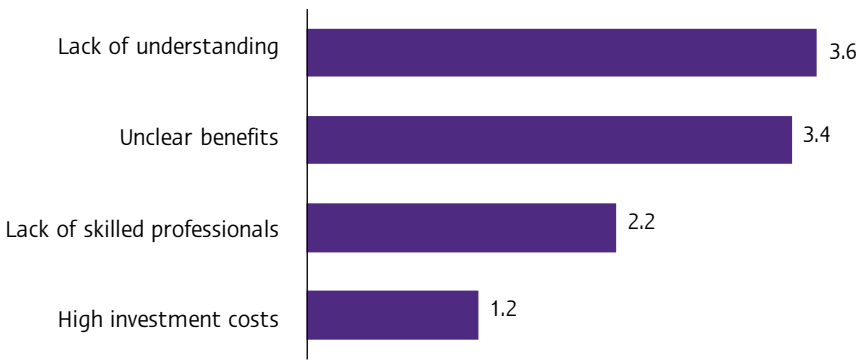
Many more Thai businesses will join the Big Data bandwagon in the coming three years. Among companies not yet using Big Data, 70% said that they will do so in the future, and that they need around 1-3 years to get going with it. The same group of companies report that they will use Big Data mainly to improve sales and marketing, as well as to improve products and services. EIC believes that the industries that are most likely to adopt Big Data are wholesale & retail trade, transport & logistics, telecommunication and media, thanks to the ready availability of relevant data that can be used for multiple purposes.

But the remaining 30% of companies said they do not expect to use Big Data in the future. Their top reason is lack of Big Data skills and understanding. For example, some said that they don't know about Big Data, have never looked into it, and don't know where to start or where to find the data. Other companies said that the benefits seem unclear and that existing data are already sufficient.

4 Some Thai companies skip Big Data because they don't understand it

Factors impeding use of Big Data

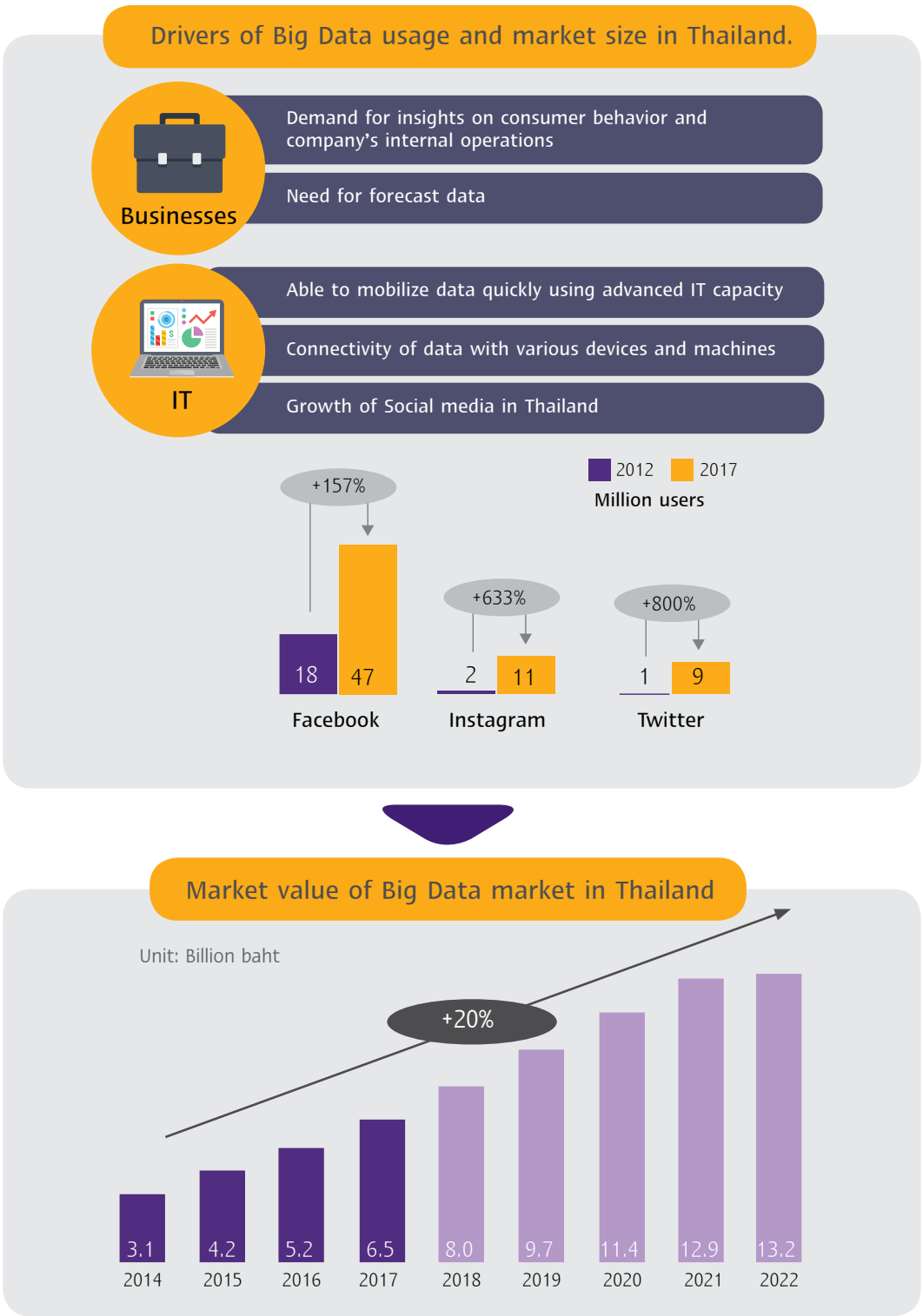
Unit: points (out of 4)



Source: EIC analysis based on data from interviews of 62 leading Thai companies in September 2017.

EIC believes that the Big Data market in Thailand, as measured by service revenue and sales of software and hardware, will expand by 20% annually, tracking the rise of IoT and social media as well as the global uptrend. There are two important growth drivers: (1) demand for Big Data analysis from companies and (2) growth of IoT and social media in Thailand, which are fast generating a gold mine of useful data. Thailand ranks among the world's top 10 societies in use of social media. EIC estimates that the spending on Big Data in Thailand will surge from 6.5 billion baht in 2017 to 13.2 billion baht in 2022, or 20% average annual growth. The biggest share of growth will go to fees and salaries for Big Data professionals as well as sales of data. Both raw data and value-added content, such as processed social media messages, will be sold via business contract and/or exchanged via business partnerships.

5 Thailand's Big Data market is projected to grow 20% a year



Note: Estimated Market value includes services and sales of software and hardware.

Source: EIC analysis based on data from information from Thoth Social, Wikibon and Statista.

Big Data are displacing traditional data as a more powerful tool for business planning. Insights into consumer behavior can help develop sales and marketing strategies and improve products and services. Big Data on production and operations can help raise productivity, cut costs and better manage financial and human resources. The following chapter explores the use of Big Data in two different spheres: understanding consumers and improving internal operations.

2

Figuring out the "smart consumer": Big Data comes to the rescue

Consumers today have high bargaining power thanks to their ability to continually communicate with each other, conveniently access information and choose from a vast range of products and services. Their decision-making has therefore become more complex, prompting businesses to look for new tools to improve their marketing strategies, production and service as well as research and development. Big Data meets this urgent need to understand consumer behavior and forecast demand. A company can use this tool to better meet expectations and provide a good experience throughout the customer's journey, from first getting to know a brand, to choosing to buy a product, to returning for a repeat purchase.

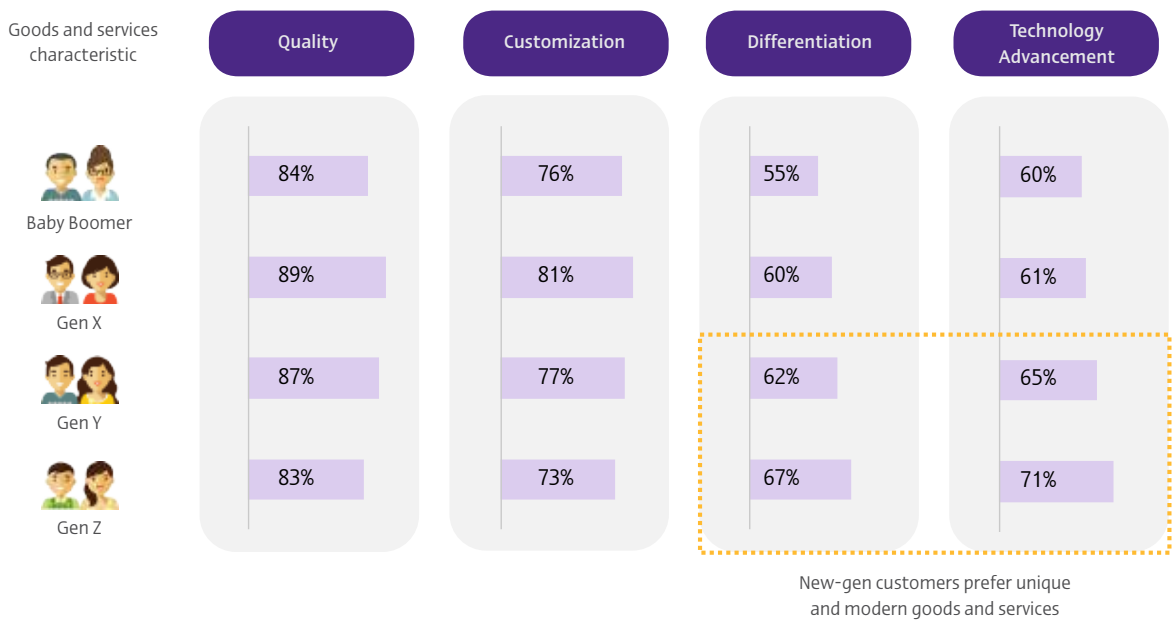
Businesses face a big challenge because today's picky customers have such high expectations. Consumers' shopping decisions have been transformed. The factors that influence the purchase decision extend beyond rational considerations to also include social influences, context and mood. Companies have to study consumer behavior in depth and in detail, then redesign their business strategies accordingly. EIC believes that companies should especially focus on responding to three new trends in young consumer behavior:

1) Thai consumers now make a greater effort to choose the best products and services as well as to select distinctive, trendsetting ones. EIC's own survey of Thai consumers found that over 80% are willing to pay a premium for their choice of high quality products and services. Compared to older generations, Gen Y and Gen Z consumers have a greater preference for distinctive goods and high tech products. This trend is driving companies to innovate or adopt new technology to add more value to their products. They are improving production planning and designing services tailored to meet demand from customers in different age groups. Most importantly, product quality remains a fundamental consideration in all customer age groups.

6 New-gen shoppers favor distinctiveness, new technology and high quality

Characteristics of products and services that command premium prices

Unit: % of respondents in each generation



Note: Gen Z: below 17 years of age. Gen Y: 17-35. Gen X:36-50. Baby Boomer: over 50.

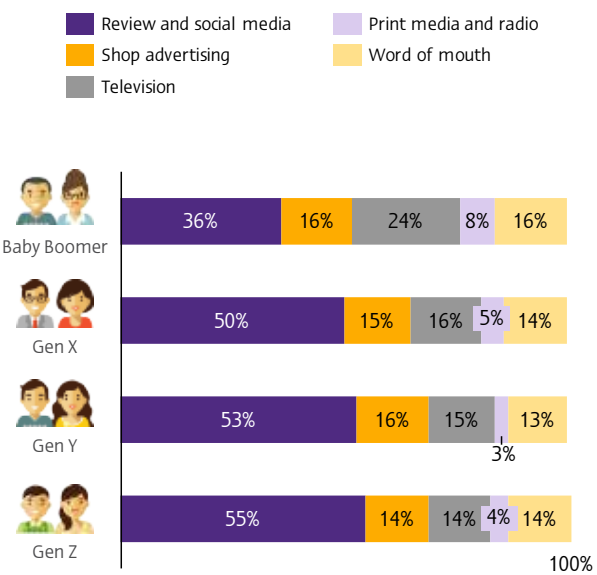
Source: EIC analysis based on data from survey conducted by EIC in February 2017 (sample size of 5,701 persons).

2.) Thai consumers gather information and shop through a variety of channels, especially social media. For baby boomers, the most influential media are traditional ones like television, radio and print. But over 50% of younger consumers, especially Gen Y and Gen Z, are strongly influenced by social media. Compared to Gen X and the baby boomers, these consumers shop via more channels, both in store and online. Armed with lots of information about products and services, these younger consumers have a lot of bargaining power over businesses. Fortunately, companies can more easily keep up to date on market needs because consumers increasingly share information among themselves.

7 New-gen consumers are immersed in social media and shop via multiple channels

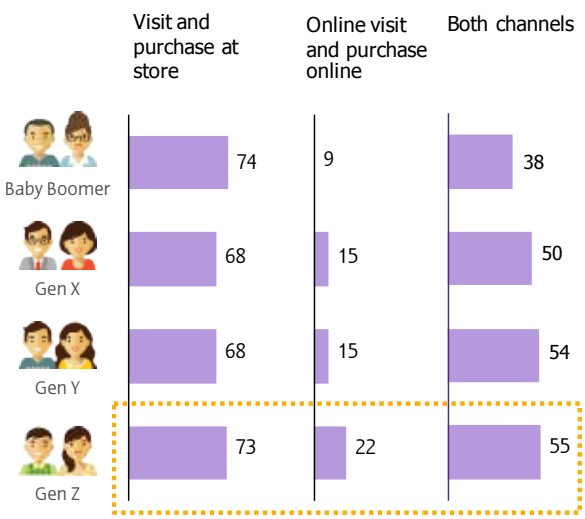
Media exposure prior to purchase

Unit: % of respondents in each generation



Shopping channels

Unit: % of respondents in each generation



New-gen shoppers are influenced by the Internet and they shop via multiple channels

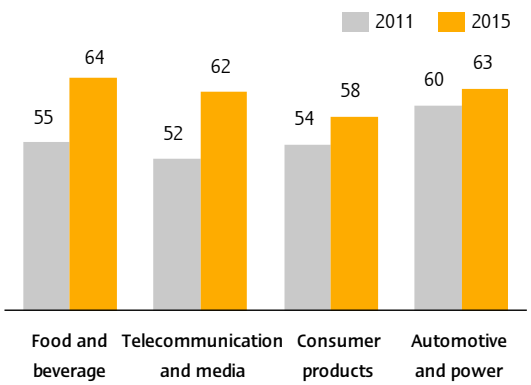
Source: EIC analysis based on data from survey conducted by EIC in February 2017 (sample size of 5,701 persons).

3) Brand loyalty is in decline as consumers chase novelty. A recent study by Deloitte shows that among consumers around the world, brand loyalty has declined from past levels, especially in food & beverage, telecommunication and consumer products. This is particularly the case for products and services that are easily substitutable, since consumers can choose from such a wide variety of brands when shopping. A Nielsen survey found that brand loyalty among Thai consumers is below the levels seen in many countries in the region and that loyalty is likely to decline further due to intensifying competition. It is therefore a big challenge for businesses to capture consumers in order to sustain sales growth.

8 Thai consumers are surprisingly brand-agnostic

Index of lack of brand loyalty

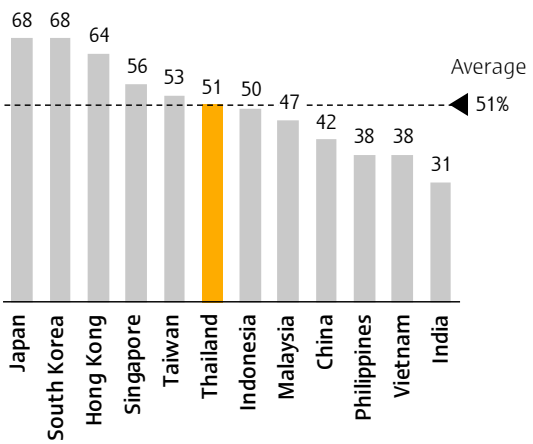
Unit: Index



Source: EIC analysis based on data from Deloitte (2016)

Lack of brand loyalty in Asia

Unit: % of survey respondents by age group



Source: EIC analysis based on data from Nielsen (2014)

In coping with these new-age Thai consumers, Big Data can be a powerful tool. Used together with relevant fundamental information such as demographic structure and household income, Big Data analytics on actual consumer behavior enables a company to better understand needs and tendencies. It can use the findings to devise business strategies in three dimensions: 1) sales and marketing, 2) production of goods and services, and 3) research and development.

2.1 Big Data in sales and marketing

Analysis of consumer behavior using data from social media platforms and the Internet provides a clearer understanding of customer preferences, enabling the development of more effective marketing strategies. In the past, consumer behavior analysis primarily used conventional statistical data collected from standard sources such as demographic and spending records, while in-depth data were gathered from focus-group interviews. But with Big Data, businesses today are encouraged to take advantage of new information in the digital world that is beyond the boundaries of a traditional statistical framework. Examples of such data include location sharing on social media, entries on search engines, interactions on chat platforms, and social media posts. These data reflect real activities in which users are engaged, whether it's building a house or getting married or changing jobs. Processing such data to identify linkages and new consumer behavior patterns can provide insights into designing more effective sales and marketing strategies, with an aim of increasing sales of goods and services as well as improving the customer experience to better ensure brand loyalty.

The personalization of marketing enables businesses to offer goods and services that best meet the individual preferences of each customer. The most common method, called customized message, uses consumer behavior data gathered from search engines and social media platforms to deduce each consumer's preference. Relevant marketing material is then sent to target customers afterwards. A recent study conducted by Teradata, a data analytics and marketing firm found that more than 80% of 1,500 surveyed marketing and communications executives worldwide think personalization is the future of the business and want stores to pay more attention to customer-specific needs. Amazon's product recommendation engine is one of the cornerstones of its epochal success. Using a large pool of consumer behavior data, the function performs an analysis to identify customer groups with similar preferences. This finding is then used to predict the books or other products a customer is most likely to want to consider next. With such data, Amazon is able to make suitable suggestions for each type of customer, which is one factor that has helped its sales climb by more than 30% per year.

Businesses can optimize prices by analyzing internal data, competitors' prices and customer behavior to predict each customer's willingness to pay. Amazon is a leader in price optimization, with an array of dynamic pricing rules that track such variables as competitors' prices, inventory and number of product views. These factors are used to calculate customers' willingness to pay, which is later used to set optimal prices. Amazon offers promotional deals that bundle top-selling products together with less popular items. This approach gives sharp discounts on top-selling products to draw in customers and profits by setting relatively high prices on less popular items that are subject to looser price competition. This model has raised Amazon's profits by more than 25%.

With Big Data, businesses can increase sales by classifying consumers into groups and designing sales promotions specifically for each group. Target, the U.S. chain of discount retail stores, integrates customer purchase records from loyalty cards and multiple databases on customers' ethnicity, employment, education, income, credit card usage, migration, frequently visited websites, types of magazines read and number of cars owned. These data help predict the types of products each customer would demand at various stages of life, providing a golden opportunity to design effective marketing and sales schemes. For instance, a woman in her 20s during the first week of pregnancy often buys supplements for calcium, magnesium and zinc. Target can use this information to identify pregnant women and send them discount coupons on other items that are popular among expectant mothers. Later it can promote products that mothers tend to use after a birth, such as perfume-free lotion and soap and cotton balls.

In EIC's view, the businesses that should prioritize adoption of Big Data are consumer-facing companies and those in highly competitive industries. Predicting consumer demand will help these companies raise competitiveness. The businesses include clothing shops and food stores. They face fierce competition and have a large customer group that is constantly on the lookout for new experiences. Big Data will enable these businesses to understand new patterns of behavior in terms of group-specific needs, combinations of products that are often bought together, as well as other products and services that each category of customer might also want. For example, a restaurant should not only use location data to send ads to people in nearby areas, but also tap data from social media and search engines. With Big Data, consumers are grouped into highly specific categories, such as consumers who don't know of the restaurant, customers who have searched for the restaurant but haven't yet visited, customers that have had good impressions of a restaurant's other branches, and customers that have written negative reviews. With the ability to categorize consumer groups in such great detail, the restaurant can deliver promotions tailored to each group. And it can reach out to them through their preferred contact medium.

2.2 Big Data in product and service development

Analysis incorporating external data helps improve quality control and product standards. For example, Coca-Cola had problems in controlling the quality of its orange juice in the U.S. because the fruit has a short harvest season of only three months each year. To improve its harvest predictions, the company now uses satellite data on orange grove sites, weather forecasts and some 600 flavors that have an impact on taste. The company also factors in consumer taste preferences in each area using data from social media posts and point of sale data such as top-selling orange juice mix and number of juice bottles sold per transaction at a given store. With this information, the company is now able to plan production more effectively and maintain a consistent quality standard throughout the year. It also has information on consumer tastes and the right mixes of orange pulp suitable for each location.

The use of data from social media is transforming the way new products are developed and advertized. Coca-Cola placed 40,000 Coca-Cola Freestyle drink mix machines around the U.S. and simultaneously launched a mobile application that allows customers to design their own beverages, and record and share their favorite flavors on social media. In just over seven years, this machine has helped the company track data on over 5 billion drinks, identifying a preference for cold fizzy drinks with lemon and cherry flavors. Sprite had not offered this flavor for over 10 years, but the findings persuaded Coca-Cola to launch Sprite Cherry and Sprite Cherry Zero at the end of 2016. This case highlights how Big Data can pose a threat to traditional marketing methods that simply trial new products among a comparatively small group of tasters and reviewers. That conventional approach might not provide an accurate picture of real customer preferences or guarantee the success of new products after reaching the market.

Using real data, analysis of consumer behavior patterns enables businesses to better understand the complexities of consumer preferences. For example, Spotify, the music streaming service, recommends new songs to its over 100 million diverse users around the world. To provide the right recommendation, Spotify analyzes a customer's play lists, artist preferences and favorite music genres, then compares them to other customers in nearby locations who have similar preferences or who are closely linked via social media. The data are used to analyze customers' preferences in terms of music genre mix, such as pop with tempo changes, pop-rock or pop-reggae, which provides the basis for suggesting new songs to other customers. Spotify's methodology has proven effective, since over 50% of its customers listen to the recommended song when using the application. This has helped Spotify win the largest market share of paid music-streaming subscribers, at 43% in 2016.

Businesses can utilize Big Data to make improvements and retain target customer groups by identifying early warning signs in customer behavior when they start becoming interested in products and services from other companies. . This is particularly useful in industries with intense competition, such

as telecommunications, where losing subscribers to competitors is a nightmare. A prime example in the U.S. market is T-Mobile, which lowered customer attrition by 50% within just three months. It succeeded by using Big Data to predict the likelihood of a customer changing service provider extrapolated from phone call history, Internet usage, messaging records and number of call failures. With Big Data insights, the company offers relevant promotions to each customer to prevent switching. T-Mobile also focuses its campaigns on groups of consumers that influence other users. These "influencers" are identified by their number of social media friends and followers as well as frequency of shares and responses. This information has enabled more efficient budgeting of marketing costs.

Call center businesses can analyze customer voice and speech to enhance the user experience for each group of customer. . A call center is first-level assistance when a customer makes an inquiry, reports a problem or asks for information. A business can collect data from the first instance a customer makes contact, analyzing his or her tone of voice, speech pattern and problem at hand. This data can be combined with information on the customer's purchase history, occupation, income, address and social media activity to make real-time predictions of possible events and problems. This lets call centers be prepared in advance and prioritize which phone calls to pick up first. Each customer can be matched with a call center staff member with appropriate skills so as to deliver a superior customer experience. A study conducted by Mattersight found that pairing call center staff with customers having similar personalities can help double the sales of a business.

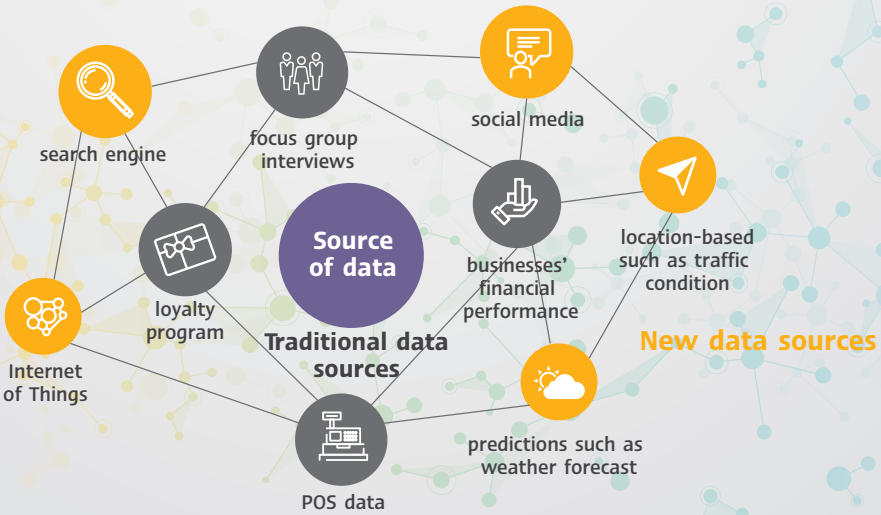
Big Data collected from many types of products can be used to forecast product depreciation and damage and to improve after-sales service. This is particularly the case for products that require frequent maintenance such as cars, electric appliances, electronics and software. Volvo Trucks, for instance, has been able to analyze Big Data from devices installed in trucks and cargo trailers used in logistics. With over 100 data entry categories such as driving behavior, purpose and equipment conditions, the company is able to predict the deterioration rate for each vehicle and spot problems that may incur, enabling the company to provide 30-day advance notice. This also allows Volvo service centers to determine the cause of a breakdown 70% faster than before. Customers save 25% on their time and money because they don't need to interrupt tasks.

Health service providers can exploit a wide range of data to improve existing services and create add-on services that help customers take better care of themselves and protect against future sicknesses. In the U.S., Parkland Hospital and the University of California San Diego Hospital analyze a patient's medical history and EHR (Electronic Health Record) of previous illnesses, treatments, medication and side effects along with physical fitness data transferred in real time from a wearable fitness tracker. The data are then compared to other patients with similar symptoms in order to provide a suitable warning or arrange for an appointment if an existing illness worsens. New illnesses can sometimes be predicted. The hospital's services extend to advising on self-care and medication. This service improvement has helped lower the patient readmission rate by 26% and speed up rehabilitation by 30%.

Adoption of Big Data provides new information that can help a company adjust its business model. EIC believes that Big Data will create new revenue channels even if customers are not on site, as seen in the automotive and healthcare applications described above. A company can develop IoT to link customer data with other databases. Using such data, analysis can be done to raise quality and develop new business models that can generate income in the future. For instance, a hospital can adjust its business model to become a wellness center by using analysis of real-time data and offering on-demand health advisory services via wearable device, since health experts can access a patient's data instantaneously.

Big Data

will be an important driver in business development to provide better customer experience.



Previous Strategies

- Promote products according with company policies
- Offer promotions and communicate with various groups customers similarly
- Develop products based on preferences of a sample group of consumers
- Resolve problems after customer complaint

Customer Journey

Product selection

Product usage

Repeat purchase

New Strategies

Product selection

- Personalized marketing
- Price Optimization
- Cross-selling

Product usage

- Develop products and services that respond to consumers demand that are complex and diverse

Repeat purchase

- Predict possible problems that may incur so to enable business to provide advanced notice to customers
- Able to retain target customer group

Case Studies

Product selection

- Amazon sets price/promotions according with customer's willingness to pay
- Target recommends products that matches customers' needs

Product usage

- Coca-Cola controls quality of orange juice to be consistent and maximizes customer satisfaction
- Spotify suggests new songs that are in line with each customer preferences

Repeat purchase

- T-Mobile retain customers by focusing campaigns via influencers
- Volvo Trucks alerts customers for a check-up in advance of a possible breakdown

Source: EIC analysis

2.3 Big Data and R&D

The proliferation of Big Data has changed the face of research and data collection planning, paving the way for new data-centric research methodologies. The use of IoT will directly affect the business models of almost all industries. According to Gartner, more than 25 billion pieces of equipment will be connected to the Internet by 2020. This will lead to enormous usage of data, with IoT efficiently collecting a variety of information that was not previously recorded or connected to networks. To improve the quality of their products, world-leading companies such as Caterpillar, Rolls Royce Aerospace and Tesla have all invested in using sensors to collect data for further analysis against variables on their main, large-scale databases.

The medical, pharmaceuticals and medical supplies sectors are now leaders in data-driven predictive analytics, moving toward treatment based on genetic profile. Previously, medications were dispensed on a trial-and-error basis. Doctors would analyze a patient's symptoms and prescribe drugs accordingly, with periodic follow-up to adjust the medication and dosage. Thanks to new medical developments in genetics and a better electronic health records system, data scientists are able to forecast more accurately the probability of illness based on genetic factors. Personalized medicine, with medications developed and prescribed for individual genetic profiles, will also enhance treatment outcomes.

Big Data helps enable virtual experimentation in product development, especially for chemicals and biomedical products. Researchers can test out hypotheses about new products through use of electronic statistical data (e-science). For example, a computer program can run a virtual test of different molecules' chemical reactions. Big Data can also be used to develop machine-generated hypotheses, cutting down human bias in the selection of variables and methodology. Used in conjunction with artificial intelligence and virtual reality technologies, Big Data analysis is poised to transform future research and development.

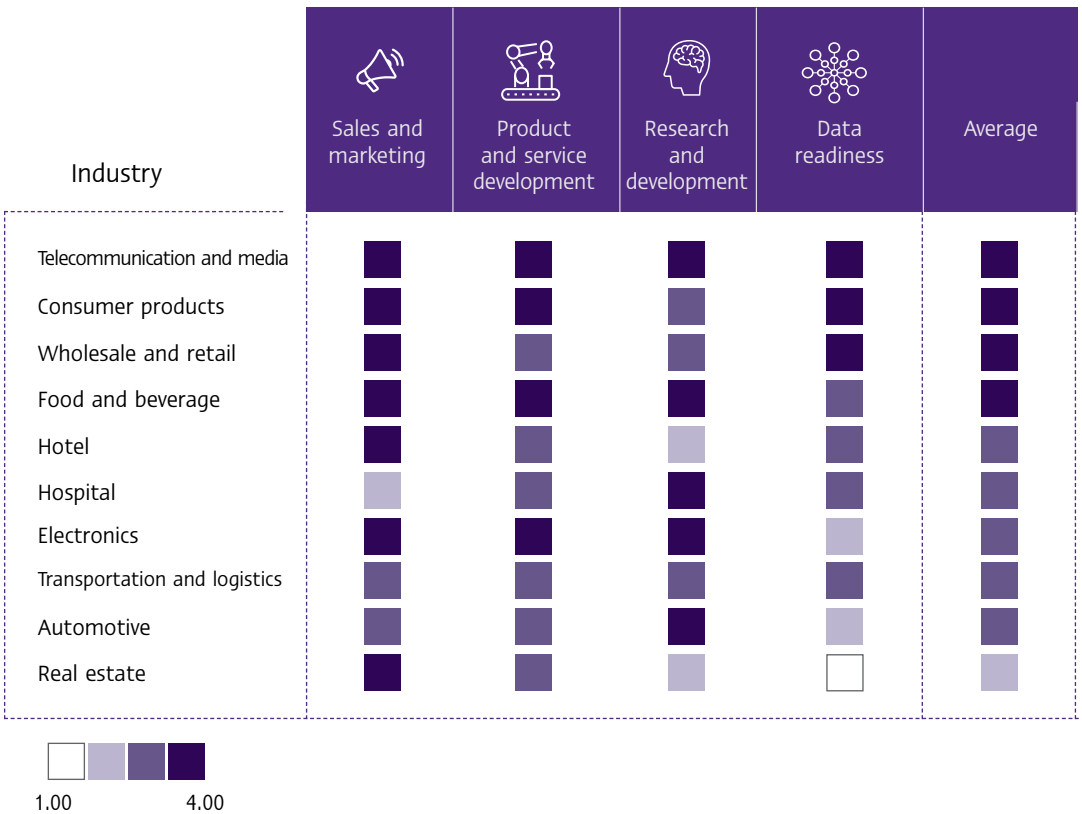
Big Data help cater to today's "smart consumer"

In EIC's view, the sectors most likely to benefit from Big Data are telecommunications, consumer products and wholesale and retail trade. This is due to their close contact with customers and fierce competition, which requires intensive marketing. These companies need to be able to crack the code of consumer behavior. A business that grasps new behavior patterns as they emerge will gain an upper hand, and analysis of multiple data sources can help. Indeed, each of these sectors already has a major database advantage to build upon, owing to the massive data they are already collecting—as in the case of mobile telecom networks—and usage and spending data from their e-commerce platforms.

Companies in other industries can benefit from Big Data analysis by cooperating with platform providers. For example, hotel operators can better understand travelers' behavior by joining hands with accommodation booking platforms. This is crucial today when hotels have to compete on price and offer promotions to entice customers in order to maintain market share. Reservations data can be combined with social media data, such as travel-related posts and photos of attractions, to give a better picture of customer behavior. Similarly, real estate and construction businesses can make use of sales data, including price per unit, unit type and design. They can then analyze the data against users' search history on different platforms and websites such as reviews of real estate projects, platforms for locating properties that fit customer criteria, the secondary market, etc. Images of locations or buildings posted and shared on social media can further enhance the analysis, leading to targeted property developments that meet the demands of specific customer groups.

9 Telecom companies, consumer product makers and wholesale-retail trade are most likely to benefit from Big Data

Table comparing benefits of Big Data in different industries



Source: EIC analysis

At a time when methods of data collection and analysis are undergoing rapid change, a business-as-usual approach to running an enterprise or designing a product may not be sufficient. Big Data is re-defining competitive advantage through its ability to help businesses pose new questions about consumer behavior. Some of these questions are ones that companies have probably never before considered. The data may reveal more about consumers than they know themselves. Nevertheless, the road to Big Data is not paved with gold. Challenges range from capturing data to crafting the right strategy based on the analysis. The first step is to understand how Big Data can be used to better meet consumer demand. The final step depends on how businesses make use of the analysis and to what end.

Matrix: Scoring the Big Data payoff, by industry

Smart Consumer Insight

Attributes	EIC's weight	Key variables to compare
Sales and marketing	25%	● Degree of contact with customers ● Degree of competition in sector ● Impact of pricing and promotion on sales revenue
Product manufacturing and service provision	25%	● Quality of products or services and its impact on customer's purchase decision ● Degree of substitutability of product or service ● Importance of after-sale service
Research and development	20%	● Rate of change in product and service trends ● Impact of technology and innovation ● Level of customer expectations of new products and services
Data availability	30%	● Quantity, variety and speed of data available in each industry

Research methodology:

1. Each variable is weighted on importance as scored by industry experts.
2. Each variable's score is calculated on a scale of 1 to 4, with 1 being the worst and 4 being the best.

BOX

Big Data: a bit challenging

The use of Big Data promises to bring about countless positive changes to many industries, ranging from new insights into consumer behavior to gains in operational efficiency. Yet many challenges remain. EIC recommends businesses focus on overcoming four key limitations:

1) Cost

Businesses might see the potential of Big Data but are constrained by infrastructure cost. To make the most of Big Data, a company needs the appropriate technology. Having ready infrastructure is a must, and this spans data storage and processing, sensors and wireless equipment. But data storage and processing technology remains expensive, ranging from $100 to $80,000 per terabyte of data. Cloud storage may be the most economical option, but is limited by slow upload speed. Massively parallel processing can handle an enormous amount of data in a flash, but is very costly. Businesses looking to invest in Big Data have to evaluate the risks by assessing whether the investment will be worth the cost in the long run, especially when it might not bear fruit in the short term.

2) Customer privacy

Businesses conducting analysis of customers' personal data have to take precautions and find the right balance between individuals' rights and profit-seeking activity. The issue of data protection is a perennial one in the digital age, particularly the question of data ownership, pitting users against platform owners. This is also the case with Big Data. Although there is not yet any legal protection on personal data in Thailand, it is likely to be regulated in the near future, along the lines of, for example, the General Data Protection Regulation (GDPR) currently in effect in the European Union. Data protection is, of course, crucial for a business's reputation. But stricter data privacy means reduced access to data that may be useful for businesses.

3) Human resource squeeze

Big Data is useless without data analysts who can parse the information in a sophisticated manner. Companies need to find data experts having a background in science, mathematics and statistics who can explain, diagnose, and model the data for effective business tactics and strategy. There is huge demand for these analysts today, and the need will continue to rise. IBM projects that by 2020 there will be a need for 2.7 million data experts in the U.S., a 12% increase from 2015. A vacancy in this line of work takes on average 45 days to fill, higher than for other occupations. This is another challenge facing Thai businesses looking to use Big Data.

4) Need for practicality and relevance

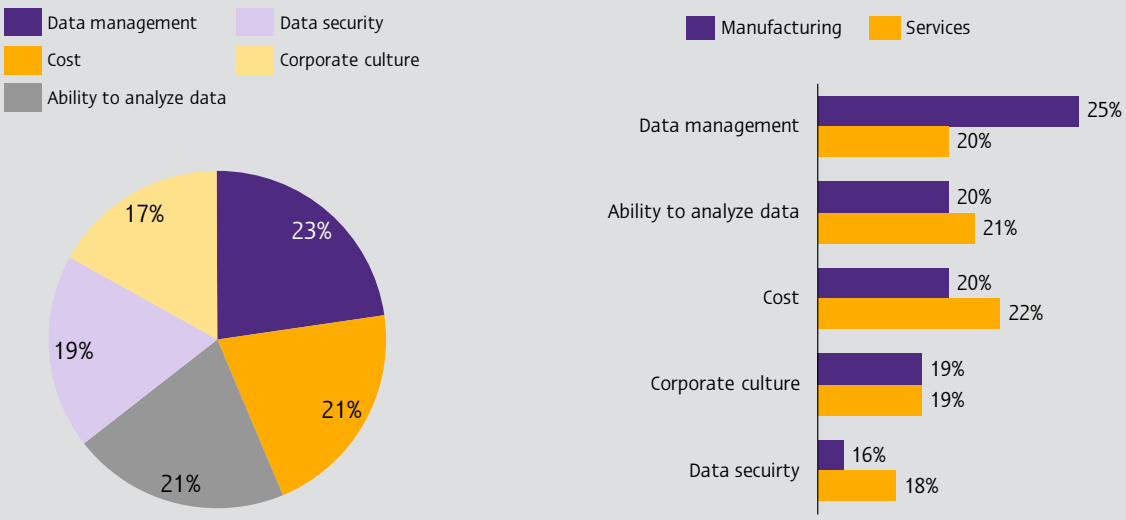
Having the right technology and infrastructure in place means little if the data don't yield relevant, practical insights. There are still several limitations to insights gained from Big Data analysis. For example, if the data used are not actually relevant to the problem at hand, then the findings won't be useful. EIC recommends setting a clear objective before choosing relevant data for analysis. This will increase the likelihood of gaining targeted insights that can make a difference and raise business value-added.

Data management is the number one concern among Thai businesses, as many still lack an organized data storage and quality control system. Without a well-managed data system, a company will find it difficult to digitally link up data for analysis. This issue is especially big in the manufacturing sector due to the complex layers of data within the supply chain, unlike in the service sector. Among service businesses, many are deterred by concern about investment cost because they believe that the returns will not cover the cost in the short run.

10 Lack of effective data management is an obstacle for many Thai businesses

Level of concern among Thai businesses

Unit: %



Source: EIC analysis based on interviews with 62 top Thai companies in September 2017.

3

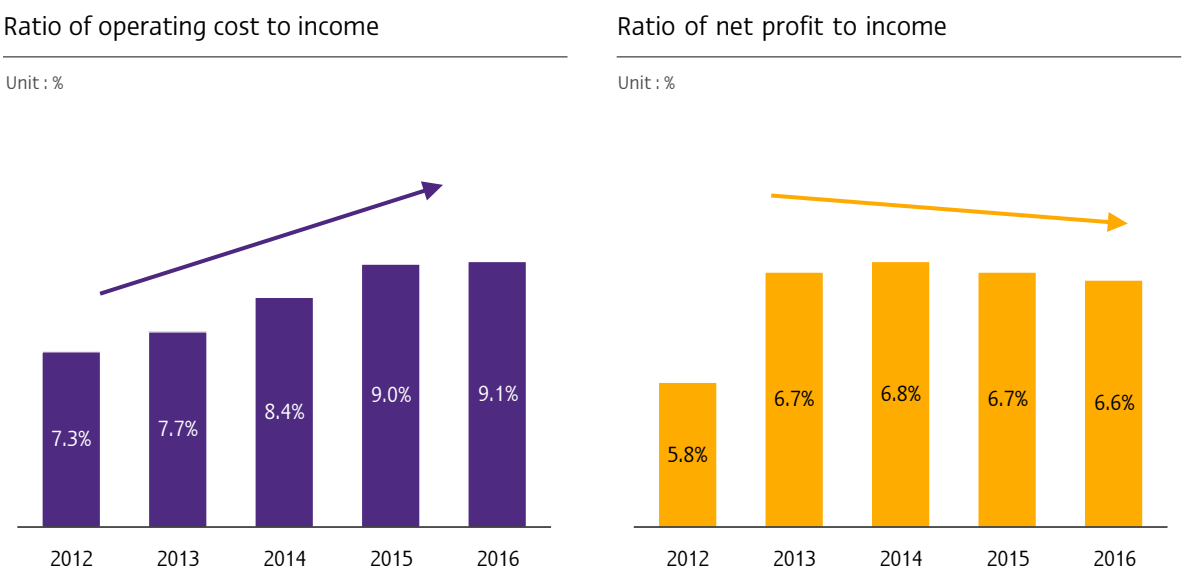
The "smart company": solving big problems with Big Data

Leading companies around the world are deploying Big Data as a key tool for organizational management in areas like reducing costs, improving productivity and developing human resources. In these applications, Big Data can, if used appropriately, help Thai companies greatly strengthen their sustainability.

Today's fierce competition means local businesses are facing challenges in multiple arenas that could hinder their long-term growth. EIC's in-depth analysis has identified three main challenges that Thai firms are now grappling with: costs, labor productivity and human resources.

1) Cost and liquidity pressures rise Thai firms' ratio of operating cost to revenue has been on the rise, increasing from 7% in 2012 to 9% in 2016. One reason might be the higher average cost of labor, which has escalated by 6% per year during that period. And higher competition in many industries has prompted Thai firms in to spend more on marketing, resulting in thinner profits, with minimal growth during the past three to four years. If costs cannot be contained, the growth prospects of Thai firms will suffer in the long run.

11 Thai firms' rising cost-to-income ratio and falling profits



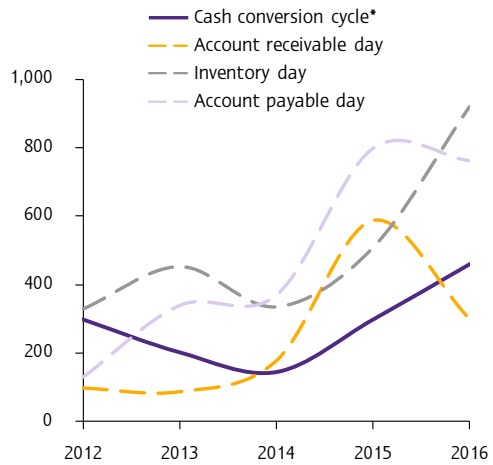
Source: EIC analysis based on data from Ministry of Commerce and Enlite.

Liquidity management presents another challenge to Thai firms. Efficient management of cash flow plays an important role in a company's success, by ensuring smooth business operations. Any break in liquidity can put a business at risk, halting many of its operations. Financial data on Thai firms show that liquidity in the private sector has, unfortunately, become rather strained during the past three years. Worse yet, it has come under still greater pressure because the cash conversion cycle has been significantly prolonged, with businesses holding inventories longer. At the same time, the period of debt payment (i.e., the payables conversion period) has shrunk. As a result, businesses require higher cash flow to carry on their operations. The longer cash cycle is associated with a greater burden in interest payments and financing costs.

12 Thai firms report longer cash conversion cycle, shorter payables period

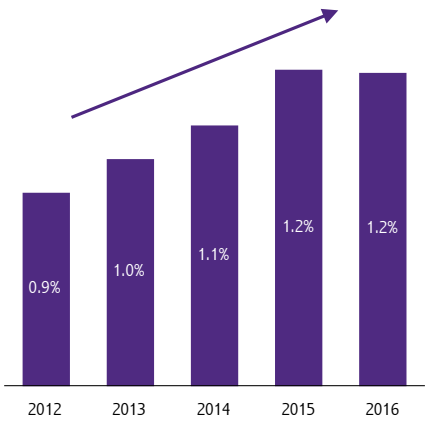
Cash cycle

Unit: days



Debt-to-income ratio

Unit: %



Remarks: cash cycle = receivables conversion period (RCP) + inventory conversion period (ICP) - payables conversion period (PCP).

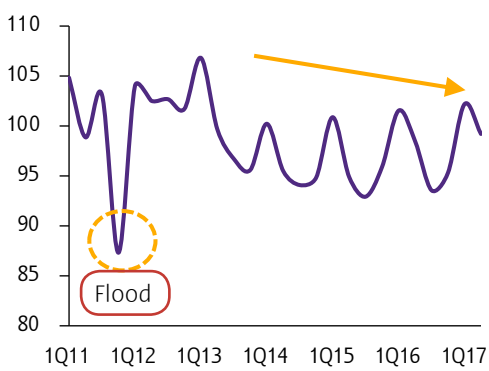
Source: EIC analysis based on data from Ministry of Commerce

2) Productivity declines The productivity of Thai firms has been in decline during the past five years, particularly in terms of labor productivity. The decline is caused in part by the country's increasingly severe shortage of labor, particularly in general labor and skilled labor. One factor behind shortages is the overall shrinkage of the workforce as Thailand's population ages. Another important factor is the declining quality of labor, as Thai workers today lack technolgy-related skills. Given their lack of appropriate technological knowledge, Thai workers are becoming less competitive and relevant in today's changing business environment, which is evolving in line with the advance of technology. In a global ranking on labor productivity by International Labor Organization in 2016, Thailand ranked 99th out of 188 countries surveyed.

13 Thailand's declining labor productivity

Thai labour productivity index

Unit: index



Output per worker in 2017

Unit: USD (GDP constant 2011 international $ in PPP)

Source: EIC analysis based on data from Office of Industrial Economics and International Labor Organization.

Moreover, capital productivity is a chronic problem in Thailand's manufacturing sector. One main culprit is a heavy reliance on foreign technologies, since the majority of Thai manufacturers are simply original equipment manufacturers (OEMs). As a result, their own technological development is somewhat limited, holding back these firms from creating value relevant to today's increasingly sophisticated business environment. One telling indicator is Thailand's spending on research and development, which currently accounts for only 1% of GDP. By contrast Japan and South Korea spend 3-4% of GDP on R&D. Thailand's meager spending on research is a deep-rooted, far-reaching problem that will hinder the local manufacturing sector's future growth and competitiveness.

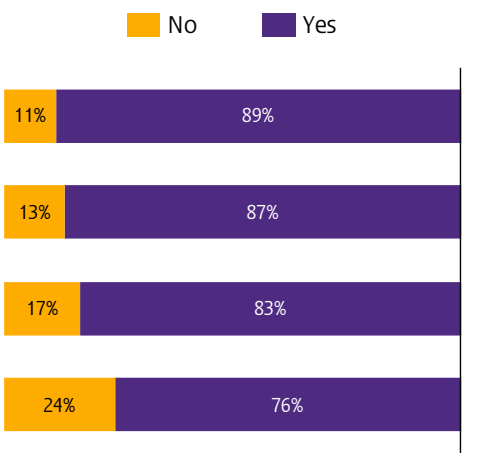
3) Human resources fall short A study by Aon Hewitt, a leading human resources consultancy, found that Thailand's employment turnover rate is a high 13% per year. Young employees are the group with the highest turnover rate, at 15%. This indicates that Thai firms face rising HR risks in the near future. If high turnover persists, it will certainly impact overall work efficiency. Worse yet, it will incur higher costs from the need to recruit new staff and pay more overtime due to staff shortages. A research report by Deloitte shows that the cost of staff turnover is 1.5 to 2 times as expensive as costs needed to retain staff.

Another concern is Thai workers' growing preference for self-employment. We found that salaried employees in all age groups want to switch to self-employment, a trend that may lead to labor shortages in the future EIC's own recent survey of more than 10,000 respondents found that 80% of salaried employees are interested to switch to freelancing and self-employment in the next five years, since this type of work affords greater freedom and flexibility in time management. As far as firms are concerned, this new trend and lifestyle choice will inevitably affect the efficiency of human resource management.

14 Young employees are keen to go freelance

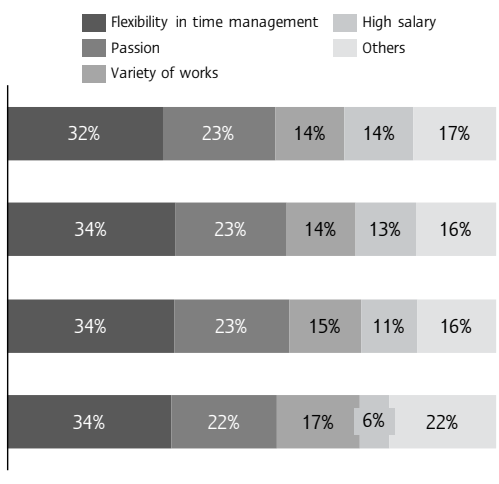
Are you interested in switching to freelance or self-employment in the next five years?

Unit: % of survey respondents by age group



What factors influence your wish to change to self-employment?

Unit: % of survey respondents by age group



Source: EIC analysis based on data from EIC survey in August 2017 (10,828 respondents).

To address their growing problems around costs, productivity and human resources, Thai companies need to substantially improve their organizational management. Fortunately, Big Data can serve as an important tool in strengthening corporate sustainability even in the midst of the challenges of the digital age.

3.1 Big Data and cash flow management

Big Data analytics can play a major part in the cash flow cycle. The first step is to introduce technology into a firm's financial system The company should develop an electronic system that facilitates efficient financial management. An electronic system will save costs and provide real-time information rather than day-end or month-end. The Thai government and commercial banks are now encouraging the adoption of online financial transactions. Private firms should take advantage of this concerted effort to migrate transactions online.

A company can apply Big Data to its transaction history in order to improve liquidity and save cost. While credit sales can help boost revenues, they do involve risk of non-payment. Debtor analysis can help the company to prioritize, classify and forecast bad debt. Big Data can also help analyze the discount rate between cash purchase and credit purchase given by the trade partner. In analyzing the big picture of these transactions, business operators can stay abreast of their current liquidity situation and better plan their future operations.

An initiative by Toyota shows that Big Data can be used to tailor-make solutions for debtors. During the economic recession of 2008, Toyota's U.S. operations experienced a liquidity crisis in sales of cars on credit, one of its major businesses. In 2009, its number of debtors that fell behind on payments by more than 60 days soared to a record high of 25% of accounts, or a daily increase of 100,000 debtors. Then Toyota collaborated with Experian, a credit information consultancy, and FICO, a credit scoring specialist, to introduce Big Data in solving the problem, helping the company better understand each debtor's risk profile. For example, for some customers, the debt default was only temporary or was caused by an unexpected life incident. Big Data provides excellent predictive analytics to tailor a solution for each specific debtor. Thanks to Big Data, Toyota managed to help 10,000 customers avoid delinquency. This successful outcome won the company the FICO Decision Management Award in 2015.

Companies can apply Big Data to cost saving, from operations planning to scenario projection A prime example is Vodaphone, one of Europe's major cell phone network operators. The company aggregated data on phone use and shopping behavior in each location in order to plan its expansion of 4G network coverage. Predictive analytics helped the firm install its costly communication mast towers in places with the highest expected number of users and thus the highest source of revenues. This helped the company cut operating costs by 10% while keeping growth on track.

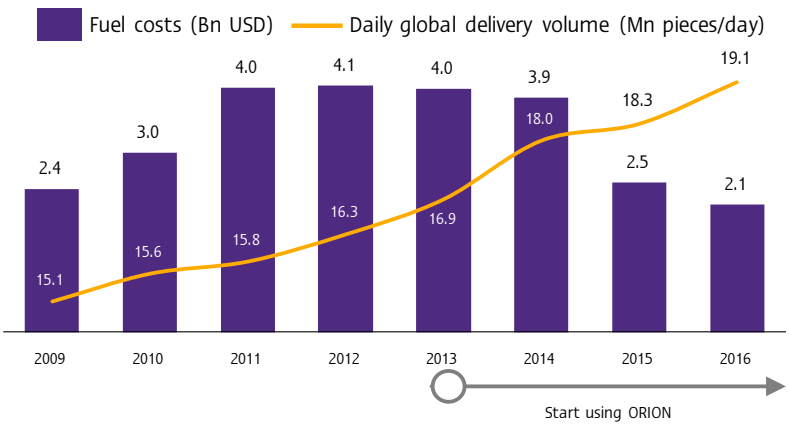
Big Data can help revamp back-office operations to significantly reduce costs. Considering the many success stories around the world, Thai firms should move toward incorporating Big Data in more processes in order to eliminate bottlenecks, e.g., in equipment maintenance forecasting, inventory management and route planning. If integrated in a smooth manner, these proactive strategies will help a firm minimize overall operating costs. For example, Caterpillar, the construction and transport equipment maker, found that clients were struggling with dirty, inefficient ships, incurring a major opportunity cost and a huge maintenance cost of over $5 million per year. So the company drew upon data from boat sensors that recorded oil use and other information, helping size up potential solutions. This showed that more frequent engine clean-ups were needed, and so Caterpillar shorted the schedule to every 6.2 months, from every 2 years before. Although cleaning might seem minor, this shift helped Caterpillar's clients save $400,000 per boat per year on average.

A case study on UPS, the courier service, shows that the more sources of data a firm is connected to, the more costs it can save. In the past, UPS only employed basic data on transportation routes, types and sizes of products in determining the type of carrier, placement and specific route required. This conventional method enabled the company to save approximately 3 million gallons of gasoline per year. But starting in 2013, UPS deployed a new system it called ORION (On-Road Integrated Optimization and Navigation), which mobilizes data from a greater variety of sources, e.g., engine operating data, GPS data and various sensor data. In combining and analyzing multiple sets of data, UPS can accurately select the optimal route for each product shipment. Thanks to Big Data analytics, the firm now saves 10 million gallons of gasoline per year, or a threefold increase from the old method.

15 UPS used Big Data to triple its savings on gasoline

	Traditional		Big Data era
Data sources	Maps, Product size	Data sources	Maps, Product size, machine, GPS, sensor
Route selection	Transportation routes are selected in advance and cannot readjusted despite change in circumstances	Route selection	Suitable transportation route is updated in real-time taking into account factors such as - Engine conditions - Driving patterns - Road speed limits
Gasoline savings	~3 million gallon per year	Gasoline savings	10 million gallons of gasoline per year

Fuel costs and daily global delivery volume



Source: EIC analysis based on data from Bloomberg and UPS

But more data is not always better. The key is to record only the types of data appropriate for operations. Otherwise, Big Data can become a costly burden in itself. A company should simply take advantage of data sets that can be easily analyzed and used for real purposes. For example, RFID data can be used for both inventory management and cargo transport.

EIC believes that businesses can use real-time data for multiple purposes in prediction and forecasting. For example, we can use weather data and sensors embedded in vehicles to forecast the period during which a breakdown is most likely to occur. With this valuable information, a company can effectively plan its maintenance schedule. A company can draw upon its real-time transaction data, inventory data, and cash-to-credit ratio data in order to prepare a preliminary projection of revenues, profits and cash flow. This kind of proactive, data-led approach can help a company better manage its cash flow to sustain growth.

3.2 Big Data for productivity

The rise of the "smart factory" allows a company to capture a larger amount of data that helps raise productivity. Manufacturing industries today are moving toward a fourth industrial revolution in which digital technology and the Internet play a transformative role. In the future, all details of production processes, from upstream to downstream, will be interconnected. Comprehensive data will be transmitted through wireless networks to make each factory operation "smart." This will let a company better manage its resources in the factory and improve production line efficiency.

Insights from Big Data analytics covering every little detail of production processes will enable manufacturers to focus on the right areas to improve efficiency, while reducing losses and saving resources. Production line problems can damage goods and delay deliveries when conventional data tools fail to respond quickly. Legacy systems take time to investigate the causes of a problem. Big Data collects and analyzes input from sensors to identify abnormalities in real time. This allows a company to quickly spot production problems and find solutions.

Intel discovered that Big Data can speed up fixing problems by a factor of 480. Intel had long faced difficulties in semiconductor production, requiring lots of time and money to resolve. Making semiconductors involves complex processes and utmost precision. Intel's engineers revamped its production technology by installing more than 5 billion sensors in the factory and connecting them to systems that collect and report data. This lets huge volumes of real-time data be used for advanced analytics. Engineers can now prioritize whatever problems arise in the production line, reducing the resolution time from 4 hours to just 30 seconds. The system trims production time by 160 hours per quarter.

Service businesses, too, can utilize Big Data. Sprint, a U.S. mobile phone network, analyzed Big Data on user behavior including call duration and location, Internet use and user movements. The data were analyzed in order to plan an optimal network structure. This helped the company increase network capacity by 90 percent for the same amount of budget.

EIC advises manufacturers to start applying Big Data analytics in the production lines where problems have been identified and are most urgently in need of solution. In practice, transforming a conventional factory into a smart factory involves high costs. A company can start by installing monitoring systems first in the machines or devices most prone to errors. Next, the company can expand by recording data throughout the key processes—inputs, processing and outputs—until the result is satisfactory or more budget is available. The installation can gradually be expanded to other sites and operations. As for data analytics, a firm can begin by employing basic analytical tools such as cloud-based services, which could be sufficient for basic data that are not too complex.

3.3 Big Data and human resource management

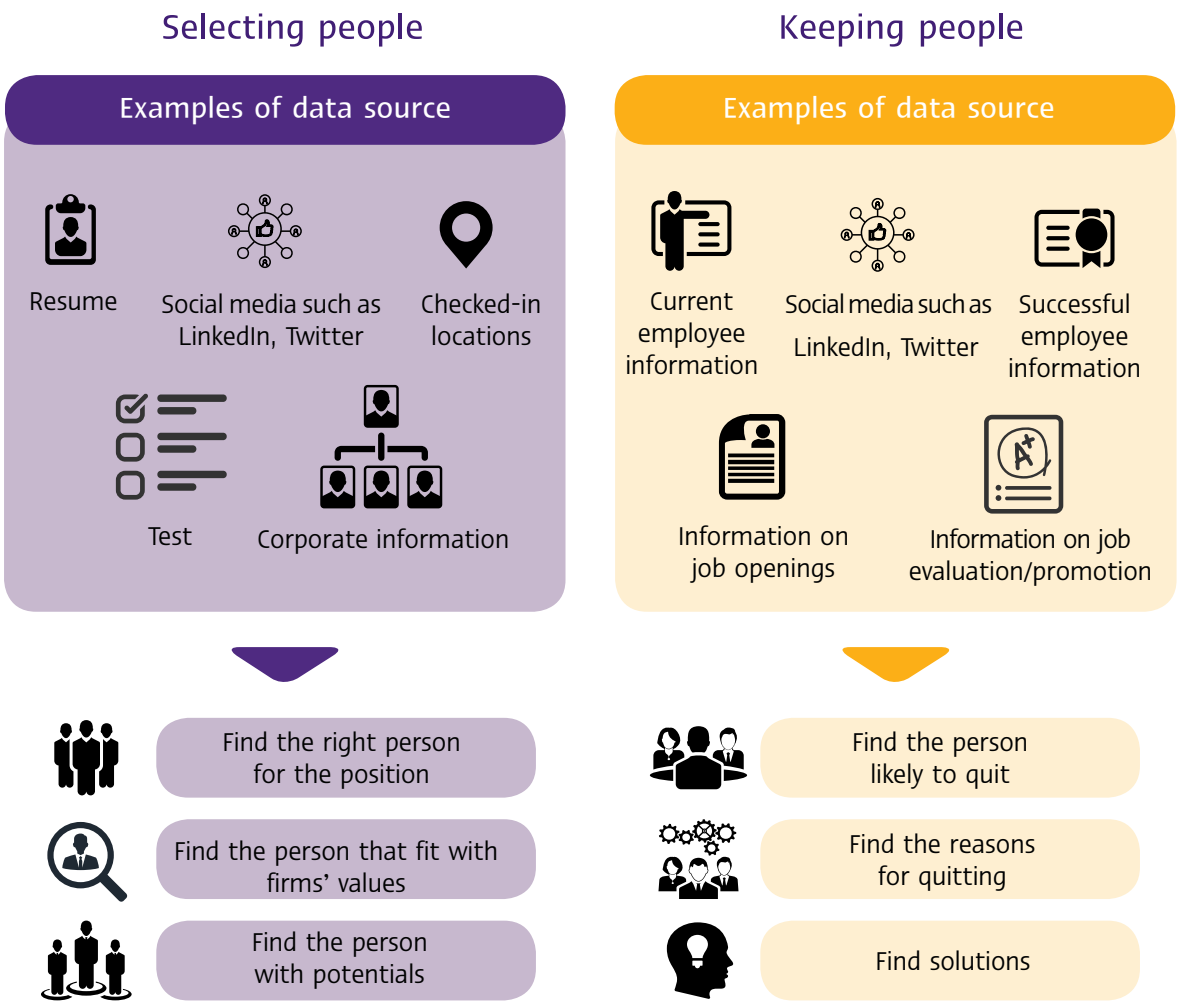
Big Data has revolutionized choosing the right job candidate. A company can utilize information from various sources such as social media, demographic data, government data, online tests and data on current employees. All of these can be analyzed in order to find the right person for each job, and who is most apt to stay with the organization for a long time. This method is probably more effective than selecting a candidate solely from a resume or by instinct via interview.

Google has succeeded in hiring qualified personnel by utilizing a huge volume of data in the decision-making process. Google believes that grades or educational background don't fully guarantee on-the-job success. Thus the company uses various data linkages from both online and corporate data in conjunction with intense interviews in order to screen for the right person that has the highest potential to succeed. These Big Data analytics helped Google discover that an appropriate job interview process should not take more than four rounds. Now Google can find the right person in a shorter period of time, even though it receives more than 2 million applications per year. Google also benefits by getting personnel with high performance that can generate income for the company as high as $1 million per year.

More importantly, Big Data can become an important piece in the jigsaw puzzle of factors that retain people at an organization. In the past, companies often strategically increased salaries or offered job promotions just to keep staff on board. But Big Data enables firms to know their people better and take the most appropriate action. For instance, Nielson, the market research firm, uses over 150 pieces of information about their employees such as age, commuting time to work, data on social media and holiday lifestyle to analyze the risk that an employee might resign and the determining factors. Nielson found that job mobility is as important as job promotions. Thus, it developed solutions such as a "Ready to Rotate" program to cater the needs of the new generation. It held discussions with risk groups to find solutions together. These approaches increased the retention rate by 48%.

16 Big Data plays key role in picking and keeping the right employees

Examples of Big Data in selecting and retaining employees



Source: EIC Analysis

However, using technology in human resources requires buy-in by everyone involved. EIC observes that the use of Big Data in human resources takes more effort than in other applications. The company will need to change the mindset of management and the HR department to trust data more than their own instincts. It also requires shifting toward electronic storage of employees' resumes and job descriptions. And it involves enlisting coordination among system developers, the data analytics department and HR department in order to find ways to manage people appropriately.

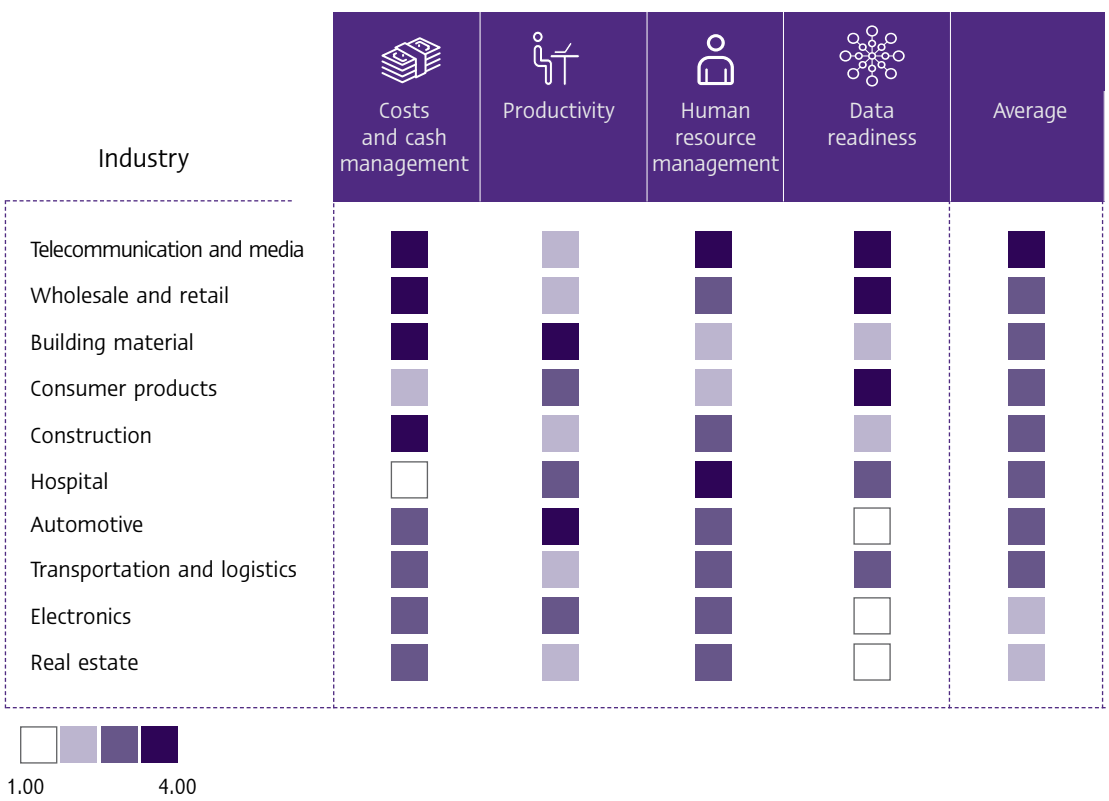
Which industries can best utilize Big Data?

EIC has determined that the telecommunications industry is likely to benefit most from the use of Big Data in organizational management. This is because the industry already has extensive databases and complete information on subscriber behavior. At the same time, telecoms operators face higher costs than other industries due to the need to spend continually on network expansion and new licenses. Telecoms companies also require knowledgeable and specialized personnel. Thus, it is crucial for these firms to make good use of a huge amount of data to manage cash flows, increase productivity and manage human resources to achieve top performance.

Most other industries, too, cannot afford to overlook Big Data. They should use it strategically, according to the right place and application, while taking into account the tradeoff between cost and benefit. For example, a construction company might employ Big Data with an initial goal to reduce costs. Businesses in this industry do not have high margins, and most of their costs depend on supplies such as steels that have volatile prices. Meanwhile, automotive companies may need to use Big Data mostly to boost production efficiency in order to increase their global competitiveness. Along these lines, Big Data analytics can help prevent Thailand's existing production bases from being shifted to other countries. Hospitals can use Big Data to select employees, since their services require highly specialized personnel. Using Big Data to build a more solid business foundation will help strengthen a company in the long run.

17 Telecoms operators should use Big Data in organizational management

Comparing Big Data benefits gained by each industry



Source: EIC Analysis

In short, Big Data is a technology that meets business needs and improves efficiency. The first movers using Big Data are likely to gain a competitive edge and capture opportunities. But each company still needs to consider the specific challenges in areas such as cost, the analytics process itself, and data storage issues, to ensure that it reaps the full benefits.

Matrix: Four key factors help EIC forecast Big Data's potential gains for each industry

Smart Company

Attributes	EIC's weight	Key variables for comparison
Costs and money management	25%	● Percentage increase in costs during 2013-2016 ● Rate of change in costs of interest payments relative to income and change in cash cycle during 2013-2016
Productivity	25%	● Change in total factor productivity during 2010-2015
Human resources	20%	● Importance of labor skills and quit rate in 2016
Data availability	30%	● Volume, variability and velocity of data of each industry

Research methodology:

1. Each variable is weighted on importance as scored by industry experts.
2. Each variable's score is calculated on a scale of 1 to 4, with 1 being worst and 4 the best.

BOX

SMEs go large with Big Data

Big Data's obstacle for the small or medium-size enterprise is cost. SMEs are also challenged by the Big Data talent shortage since hiring an expert or creating an analytic team within a small business can be difficult. So how can SMEs harness Big Data to strengthen and sustain their growth?

To deal with financial constraints, an SME can start by utilizing open-source Big Data tools to identify the characteristics and behavior of its target market. SMEs do not always have to pay for expensive data analytics and data acquisition software. If a company already owns its own website or runs an e-commerce business, it can register for useful online tools like Google Analytics (GA) to get started on collecting and analyzing Big Data. GA provides information about numbers and behavior of online customers and website visitors.

GA also offers many other useful features. For example, it documents various characteristics of website visitors, e.g., gender, age, location, whether they are newcomers or returning visitors, as well as their behavior—web access channel, length of online visit time, and the number and sequence of web pages browsed.. An SME can learn from this heap of data if its online visitors are indeed its target customers. Alternatively, a company can gauge the characteristics of its potential target market in order to set the right market strategy for each consumer group in terms of pricing, brand positioning and store location.

E-commerce SMEs can use Big Data to improve the customer experience and increase sales volume. In addition to collecting sales data, GA provides a more in-depth analysis, like identifying bundles of products customers usually buy together. This information can help in developing a sales promotion strategy. To help improve the purchasing process, GA identifies the specific web page where customers tend to abandon their shopping carts and leave the website. If that page turns out to be, for example, the billing information, then simplifying the process or offering additional payment options—such as bank transfer, credit card or payment on delivery—might help. Or if customers leave the website at the order confirmation page, the vendor should figure out why. Perhaps it would help to display additional images and price of each selected item as well as total spending. These kinds of improvements can help a business raise its volume of sales over the long term.

Any SME having a Facebook Page can tap the Big Data analytic tools called Facebook Insights.

Every company website should include a search box, which can help discover contents that would increase customer satisfaction. Neglecting a seemingly minor detail like a search box can handicap a business. Big Data from a search box reveal what visitors are looking for, whether the search words change, and whether visitors continue browsing or instead leave a website after changing search words. SMEs can learn what customers really want from visiting the website, which web pages require improvements, and what specific contents should be added to attract visitors and customers.

For manufacturing SMEs, Big Data can also improve product quality, production, worker efficiency and the supply chain system. A company can utilize information gathered from production line sensors to spot and fix the most common defects instead of discarding faulty products after they are made. And the firm can assess worker efficiency at every stage of production. After identifying the most and least productive platforms and the most effective time and duration for production, a company can enhance work efficiency by controlling the number of workers for each production shift and specifying an appropriate break time. Big Data can also help reduce transportation and inventory costs by forecasting demand and supporting inventory management throughout the supply chain.

Some SMEs in Thailand are already engaging with Big Data. One software and IT security company in Thailand has already used Big Data to gain insights from clients who follow technology news and search for the company's product information. By developing a better understanding of these clients, the company reduced its customer acquisition cost by more than 35%. A company that makes aseptic fluid has applied Big Data to reduce production losses, develop supply-chain strategies and create its own "lean operations management." This cut production costs by more than 10%.

SMEs can explore the use of BDaaS (Big Data as a service), which is data processing and analytics provided via cloud-based services. A major challenge in Big Data is the massive scale of data, which is beyond the processing capability of commonly used software tools and hardware. More than 2.5 billion gigabytes of data are created around the world every day. A large SME might have to handle terabytes or even petabytes of data. It often makes sense, therefore, for an SME to deploy BDaaS, which significantly saves costs on infrastructure, technology, and data management. Tapping BDaaS means the client does not have to invest in large-scale servers for data analytics, hardware for data storage maintenance, and a data security system. The SME only has to pay service charges, billed by package or volume usage. Moreover, the SME can conveniently access this Big Data anywhere, anytime, which supports real-time decision-making.

"It's time for SMEs to go big with Big Data"

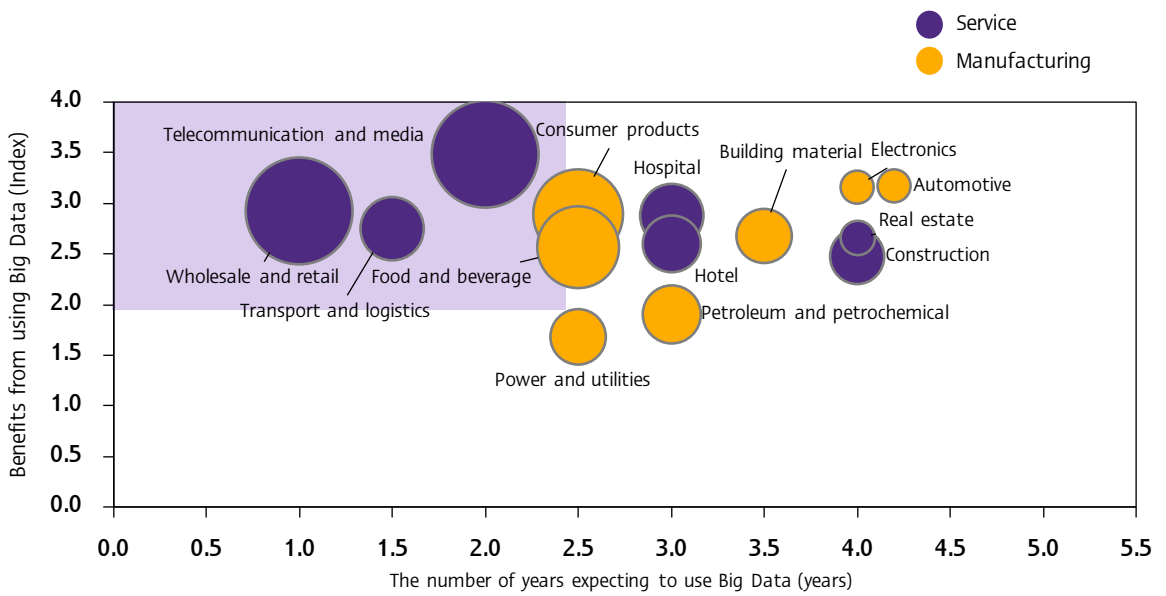
Epilogue: Big Data all in one

EIC expects that companies involved in wholesale & retail trade, transportation & logistics, and telecommunication & media are likely to make heavy use of Big Data because they already have data available to be used and it offers substantial benefits. EIC's analysis employed a number of key variables on readiness of Big Data at the sector level; potential benefits from Big Data in coping with the smart consumer or in becoming smart company; as well as the average time needed to get started with this tool.

We find that the wholesale & retail, transport & logistics, and telecommunication & media sectors are likelier than other sectors to benefit from Big Data. This is due to their close contact with customers; fast rate of data generation (such as for online sales); GPS data from both voice and data cellphone services; and so on. These data show great potential in multiple dimensions, especially for sales and marketing strategies and development of products and services tailored to target customer groups. Manufacturing businesses will need more time to get ready to use Big Data, partly because of the high cost. For instance, a company would need to invest in installing sensors on the production line to raise productivity and save operating costs.

18 Wholesale & retail trade, transport & logistics, and telecommunication & media will be first sectors to tap Big Data

Outlook of Big Data analytics for business purposes, by sector



Note: Size of bubble shows size, diversity and velocity of Big Data in each industry.

Source: EIC Analysis

EIC recommends that a company build an internal digital database and also utilize external data in business decision-making processes. Digitization of internal data involves generating real-time data from a company's own website, social media page and call center system as well as from sensors installed in the factory. High potential sectors like wholesale & retail can start by seeking new sales channels through online platforms and offering loyalty cards in order to gain more insights about each customer. Businesses in transportation & logistics can install GPS, RFID or sensors in warehouses in order to increase efficiency of transport and inventory management. Moreover, external data can be useful in data analytics, such as social media data and data on competitors as well as comments and reviews among a target customer group. Such information can help predict business trends and give a company an edge.

Big Data applications are not always successful because they depend on how you set objectives, ask questions, select data and perform the analysis. Businesses should keep in mind that Big Data is only one of the many tools available to raise competitiveness. A company with Big Data in hand has an advantage over one that doesn't. But it depends on how the data are analyzed and applied in order to make a difference in business results. The company should be selective about which data are appropriate for each analysis and employ sound analytical frameworks and tools. This will make it possible to achieve the objectives set at the beginning.

Big Data analytics cannot guarantee success if a company is not well informed about the industry landscape or is falling behind trends. Sears Department Store of the U.S., known for home appliances, has adopted over 100 million Big Data to forecast potential problems with their products. In order to preempt a breakdown, the company sends a technician to do maintenance and increase customer satisfaction. But the company has been too slow in adopting e-commerce, which is reshaping retail. Their revenue fell to $2.2. billion in 2016, down from $40 billion in 2012. Sears has closed more than 570 branches, leaving 1,500.

A business must adjust its mindset to be more data-driven, with humans still playing the key role of implementing the findings of analytics. A company might have a wealth of professional expertise that it uses to make decisions, but it should use data to reduce personal bias, cope with the new consumer trend, and keep up with the changing business environment. Although automation is increasingly dominant in Big Data analytics, humans are needed to understand emotions and common sense, where artificial intelligence falters. Humans are the drivers of all Big Data analytics because we make the assumptions, consider various factors, test the solutions and finally use the findings to take action.

Contributors

Sutapa Amornvivat, Ph.D.
Chief Economist and FEVP
Economic Intelligence Center

Sutapa Amornvivat is Chief Economist and First Executive Vice President at Siam Commercial Bank (SCB), where she leads the Economic IntelligenceCenter. She previously set up and led Risk Analytics Division under Risk Management Group. Sutapa currently sits on Subcommittee on Finance, Banking, Financial Institutions and Capital Markets, The National Legislative Assembly.

Before SCB, Sutapa founded Risk Analytics and Research Group at TMB Bank during her secondment from ING Group, where she worked in various departments in risk management. Prior to joining the banking industry, Sutapa was Economist at the International Monetary Fund (IMF) in Washington, DC. She had also served as Director of MacroeconomicAnalysis Section at the Thai Ministry of Finance.

Sutapa's academic contribution includes lecturing at various universities in Asia including Hitotsubashi University, the Indian Institute of Technology, Chulalongkorn University, and National University of Singapore.

Sutapa holds an undergraduate degree in Applied Mathematics from Harvard University and a doctorate degree in Economics, Management,and Policy from Massachusetts Institute of Technology (M.I.T.) She wasa recipient of Thailand's most prestigious King's Scholarship, awarded to five scholars in an annual nationwide competition.

Vithan Charoenphon
Head of Service Cluster

Vithan has previously held positions at the Fiscal Policy Research Institute, Ministry of Finance, working on the development of the medium-term government expenditure framework and the budget allocation model as well as conducting studies on fiscal policies. He also worked in the Research and Information Department and the Strategy Development Department at the Stock Exchange of Thailand.

Vithan received his Bachelor of Arts with Honors in economics from Chulalongkorn University and a Master of Science in economics from Thammasat University.

Sivilai Khantachavana, Ph.D.
Senior Analyst
Areas in charge: Petroleum and Energy

Sivalai has prior work experience in conducting research and analysis in economic, monetary, and fiscal policies as well as transport infrastructure at the Ministry of Finance, NESDB and Department of Highways. She was also an advisory staff member for the Minister of Transport. Her research interests include entrepreneurship and financial market risks.

Sivalai received her Bachelor of Economics (First Class Honors) from Chulalongkorn University. She was awarded the Royal Thai Government Scholarship to pursue MSc program in Policy Economics at the University of Illinois at Urbana-Champaign, and the World Bank Graduate Scholarship to pursue MSc program in Economics at the London School of Economics. She completed her doctorate degree in Applied Economics and Management at Cornell University.

Issarasan Kantaumong
Analyst

Issarasan has prior work experience at the Ministry of Transport, working on the development of the transport infrastructure development plan under the ASEAN and APEC Frameworks. Prior to that, Issarasan had experience working at Proctor & Gamble Manufacturing (Thailand) as a supply and distribution planner. While working at Procter & Gamble, Issarasan received the Star Award, an award given to employee that have achieved distinctive performance improvement.

Issarasan graduated with Bachelor's degree in Environmental Engineering from Chulalongkorn University. He was awarded the Royal Thai Government Scholarship to pursue MSc in Industrial and Systems Engineering at the University of Florida.

Napong Cheerasuwankit
Analyst

Napong started a banking career as a credit analyst and later a relationship manager with specialized fields in infrastructure and electronics business.

Napong graduated from Chulalongkorn University with a Bachelor's degree in Economics and a Master's degree in Economics from University of Manchester (Distinction)

Contributors

Nithi Kaveevivitchai
Analyst

Nithi has prior work experience in commercial banks in research department and corporate strategy. He was also a journalist for Asia focus section of the Bangkok Post newspaper, where he covered market-moving news, changing trends of businesses and including socio-political issues in the region. Prior to that, Nithi was a news anchor at Money Channel, an economic and investment television channel of the Stock Exchange of Thailand.

Nithi received his Bachelor's degree in International studies and Communications from Monash University, Australia and Master of Science in International Political Economy from Nanyang Technological University, Singapore. During his time in Singapore, he had also worked as a business analyst at Industrial Growth Platform, Inc., a private equity and consulting firm.

Veerawan Chayanon
Analyst

Veerawan previously worked for Mitsubishi Motors (Thailand) as a product planner in the marketing division where she was responsible for eco-car projects and automotive market analysis. She has also participated in the 'LongD with DTAC' trainee programme at Total Access Communication and the 'New Investor Program' (NIP) held by the Stock Exchange of Thailand.

Veerawan was awarded a Master of Business Administration (MBA) degree with merit from Lancaster University Management School. She received her Bachelor of Arts in Economics with First Class Honors from Thammasat University.

Economic Intelligence Center (EIC)

E-mail: eic@scb.co.th Tel.: +66 (2) 544 2953

Sutapa Amornvivat, Ph.D.
Chief Economist and FEVP
sutapa.amornvivat@scb.co.th

Economic and Financial Market Research

Phacharaphot Nuntramas, Ph.D.
Head of Economic and Financial Market Research
phacharaphot.nuntramas@scb.co.th

Kittipong Rueanthip
kittipong.rueanthip@scb.co.th

Krasae Rangsipol
krasae.rangsipol@scb.co.th

Thanapol Srithanpong, Ph.D.
thanapol.srithanpong@scb.co.th

Wachirawat Banchuen
wachirawat.banchuen@scb.co.th

Jiramon Sutheerachart
jiramon.sutheerachart@scb.co.th

Kunyaruk Naiyaraksaree
kunyaruk.naiyaraksaree@scb.co.th

Pang-ubon Amnueysit
pangubon.amnueysit@scb.co.th

Pimnipa Booasang
pimnipa.booasang@scb.co.th

Yuwanee Ouinong
yuwanee.ouinong@scb.co.th

Export Cluster

Chotika Chummee
chotika.chummee@scb.co.th

Konjanart Thueanmunsaen
konjanart.thueanmunsaen@scb.co.th

Lerdsak Sangasilpa
lerdsak.sangasilpa@scb.co.th

Nantapong Pantaweesak
nantapong.pantaweesak@scb.co.th

Narithtorn Tulaphol
narithtorn.tulaphol@scb.co.th

Pharadon Heemmuden
pharadon.heemmuden@scb.co.th

Infrastructure Cluster

Pimjai Hoontrakul
pimjai.hoontrakul@scb.co.th

Sivalai Khantachavana, Ph.D.
sivalai.khantachavana@scb.co.th

Supree Srisamran, Ph.D.
supree.srisamran@scb.co.th

Apinya Aksornkij
apinya.aksornkij@scb.co.th

Issarasan Kantaumong
issarasan.kantaumong@scb.co.th

Kanit Umsakul
kanit.umsakul@scb.co.th

Nattanan Apinunwattanakul
nattanan.apinunwattanakul@scb.co.th

Punyapob Tantipidok
punyapob.tantipidok@scb.co.th

Teerayut Thaiturapaisan
teerayut.thaiturapaisan@scb.co.th

Service Cluster

Vithan Charoenphon
Head of Service Cluster
vithan.charoenphon@scb.co.th

Pranida Syamananda
pranida.syamananda@scb.co.th

Wirongrong Wirotrat
wirongrong.wirotrat@scb.co.th

Kanchanok Bunsupaporn
kanchanok.bunsupaporn@scb.co.th

Pullawat Pitigraisorn
pullawat.pitigraisorn@scb.co.th

Puripat Sophonkeereerat
puripat.sophonkeereerat@scb.co.th

Tanyaporn Laosopapirom
tanyaporn.laosopapirom@scb.co.th

Sectorial Strategy

Napong Cheerasuwankit
napong.cheerasuwankit@scb.co.th

Nithi Kaveevivitchai
nithi.kaveevivitchai@scb.co.th

Panjarat Kitticharoonwit
panjarat.kitticharoonwit@scb.co.th

Valairat Rachatawan
valairat.rachatawan@scb.co.th

Veerawan Chayanon
veerawan.chayanon@scb.co.th

Knowledge Management & Networking

Kallaya Suwannakall
kallaya.suwannakal@scb.co.th

Nattida Intaramayoon
nattida.intaramayoon@scb.co.th

Rata Waraviriyapong
rata.waraviriyapong@scb.co.th

Sorodda Upamai
sorodda.upamai@scb.co.th

Vanutpreeya Sangwisut
vanutpreeya.sangwisut@scb.co.th

Wanitcha Nateesuwan
wanitcha.nateesuwan@scb.co.th

Worawan Wannaprapan
worawan.wannaprapan@scb.co.th

NOTES

ธนาคารไทยพาณิชย์ จำกัด (มหาชน), Economic Intelligence Center (EIC), เลขที่ 9 ถนนรัชดาภิเษก แขวงจตุจักร เขตจตุจักร กรุงเทพมหานคร 10900 **Email : eic@scb.co.th**