

# Research Paper on Data-Driven Business Models: Why the Asia-Pacific Region Serves as an Example for the Western Companies? How Might they Improve Their Business Models in 5 Years?

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**Abstract**—This article is an expansion of Anastasov, T.'s master's thesis (2019) and attempts to give a clear definition and taxonomy of the Data-Driven Business Models (DDBMs) as well as illustrate data challenges and opportunities that come along with this. These definitions were cross-analyzed with 3 cases from the Asia-Pacific region to deliver concrete insights and inspiration for Western companies to reinvent their businesses in the next 5 years. A comparison between Data-Driven and Data-Centric models was given as well, not previously analyzed in the thesis, as a view on the current state-of-the-art data business models.

**Index Terms**—Business models, data-centric, data-driven, data-driven business models, DDBM.

## I. INTRODUCTION

Nowadays, data presents immense possibilities for companies as a result of the big data phenomenon. However, uncertainty caused by the abundance of data rises, and the future of big data is not as clear. Big data's raw material – data, used to be scarce, but in recent years, has been surging with the emergence of new technologies and new ways of working. However, the increasing quantity of data that comes along with it is costly to deal with and if companies don't have a clear vision on their big data goals, they might end up just running pilot projects without extracting the envisaged value out of it.

Key problems for companies arise when they start questioning why they need to pay attention to their data. Although it's obvious that "data can help companies add real value and drive competitiveness" [1], they are still not convinced of its true value and it is especially hard to quantify this. How can companies manage the data they have or manage the continuous acquisition of new data? What are the best change management practices and how to deploy such initiatives efficiently? Ultimately, what can they do to take advantage of the data and improve their performance and business model?

## II. THE ABUNDANCE OF DATA AND THE NEWLY DEVELOPED CAPACITIES TO USE THEM HAVE HELPED THE EMERGENCE OF DATA-DRIVEN BUSINESS MODELS (DDBMS)

Let's explore why it's called "Big data". Comparing the

modern concept of *big* data with data in the past. Let us call it "Small Data". Small data used to be static, with a low frequency of updates and it used to stick around and be used for a comparatively long time – months, quarters, years. If it was updated, usually it happened manually or yearly at a slow pace. Small data was also scarce compared to today. There were the national or research institutes that would gather data periodically or the companies – but keeping it strictly confidential. If there was any personal data about individuals, it was manually collected and poorly managed or not collected at all. It was difficult to cross-analyze multiple and voluminous datasets and even if people wanted to do so, the technologies were not that advanced, and the cost of such endeavors was often out of budget.

Today's data is getting ever more abundant. Google's CEO Eric Schmidt said at a 2010 technology conference that every two days we create information that is the equivalent of from the dawn of civilization up until 2003 [2]. That's something like five exabytes of data. Moving towards a state of "Big data" means flipping the notions of static and scarce. Thanks to the emergence of new technologies and concepts like the Internet of Things (IoT), big data can be characterized by 4 elements: Volume, Velocity, Variety, and Veracity – The 4 V's [3]. Those 4 V's make the data extremely dynamic and abundant. As *Market Data Forecast* put it: Big data generally includes large sets of information that go beyond the capabilities of commonly used software tools to collect, manage, and process within the elapsed time.[4] Big data represents a wide variety of large information assets that require unique forms of information processing for better understanding and decision making. It is a development term that defines a large amount of structured, unstructured, and semi-structured data with the potential of information and knowledge extraction. Big data does not mean a precise amount, but it is commonly used when it comes to large amounts of data and a variety of formats.

Companies may want to pay closer attention to big data accordingly to a couple of numbers. The 2018-2019 Paris Big data Guide shows the size of Big data's market in 2020 at 210 Bn USD [5], on the other hand, Forrester estimates that Big data would allow companies to generate a comparative advantage of around 1200 Bn USD through new and more efficient marketing, financial and logistics Big Data applications over those businesses who don't take advantage of Big Data [6]. Even though they are estimates, those numbers are not unrealistic as Big data is sector agnostic and would have large impacts on both our personal and

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professional lives. Zooming in on Europe, according to a European Commission study and its high growth scenario, the value of the EU data market will reach 106.8 billion EUR by 2020 with a compound annual growth rate (CAGR) of 15.7% since 2016 [7].

So, what exactly is a DDBM? In a nutshell, in a DDBM, data is the main driver for growth. In such a business model, a company is considering data as a main asset across its value chain and it is actively used for enrichment. Depending on the data maturity, strategic decisions across the company are based on data. The data is used for improving products and services, and sometimes is monetized. Data becomes a source of profit.

### III. DATA AS AN ASSET

Data as an asset is firstly a mindset. It is a mindset shift that companies need to do, with the appropriate culture shifts. Managing data as an asset depends on certain supporting elements: “a strong technical foundation, mechanisms to govern the handling of data, and employee accountability for managing data well [8].” One of the easiest analogies that illustrate “Data as an asset” could be with money. Companies are interested where does the money come from; where is it stored; how much are there; who manages it; towards which projects or initiatives the money is spent. Therefore, to consider the data as an asset, a company can substitute the word “money” with “data” and ask the same key questions: where do data come from; where are data stored; how much data are there; who manages the data; what type of data we need for a certain project and towards which selected projects or initiatives we would deploy the data, etc.

Among other responsibilities, managing and leveraging data typically falls to the Chief Data Officer (CDO). In the Big Data Executive Survey of 2017, 41.4 percent of the surveyed executives are in favor of the statement that the CDO’s primary role should be to manage data, leveraging it as an enterprise business asset. However, many organizations in the private and public sectors fail to invest in the resources necessary to realize the data’s inherent value [9].

When data is considered an asset, companies start thinking about it in its whole lifecycle [10]. This lifecycle can be divided into 4 stages:

- Data collection – data is collected from various data sources. They could be: internal, created inside the company as operations data, communications data, applications data; external, created outside the company, as the data that have been acquired through partnerships, client acquisition, or through Open Data initiatives, to name a few. Another source of data could be the Products and Services themselves, as physical products start generating data by being connected with sensors and actuators or services being tracked in real-time and tracked.

Once the data are collected, they would be channeled in their raw state towards a Data Lake.

- Data aggregation - the primary data that are gathered through data collection and give the raw facts about a certain activity are aggregated in a so-called Data Lake. There they could be stored in their raw state and in an unstructured

manner, allowing for various data types to be stored in one place. They’re known as the raw data. Because the raw data cannot be analyzed right away, they need to be processed to obtain meaningful information.

Before they get analyzed, raw data need to be pre-processed. Sometimes during the collection, multiple errors may result in the imperfection of the dataset. Pre-processing is the activity related to cleaning the data, standardizing their format in the data set, fixing problems like missing data or duplicated values.

- Data analysis - To get the most value out of a single or multiple datasets, analytics teams will start analyzing the data through different tools and approaches. They can be summarized in four groups: Descriptive analysis is based on live data and explains what is happening in real-time. It’s accurate for operations management and is easily visualized in dashboards; Diagnostic analysis is often referred to as automated Root Cause Analysis and explains why things are happening. It helps with troubleshooting; Predictive analysis is telling what is likely to happen. It is based on historical data and assumes static business plans or models. Thus, business decisions could be automated through algorithms; Prescriptive analysis is defining future actions answering the question of what to be done next. It is based on current data analytics, predefined future goals, and objectives. This analysis employs advanced algorithms like machine learning and deep learning to test the potential outcomes of each decision and recommends the best course of action.

- Insights and Feedback – once the data has been analyzed and transformed into information and insights, they are delivered to the Data Users. Those can also be internal to the Company, or external as clients, partners, or authorities.

This lifecycle Collection > Aggregation > Analysis > Information is standard and provides primary indications and insights to the Data Users. Insights and analyzed information are also collected and aggregated into the Data Lake. With the evolving big data solutions and the available real-time data, companies started implementing continuous feedback loops for control and optimization through software updates that improve performance.

Data must be used to build a deeper understanding of what value is provided to the end customer, not just collecting data for the sake of collecting it [11].

However, poor data collection and poorly managed data could be a major flaw in the analysis efforts of the companies. Analyzing flawed data sets drives the wrong insights and therefore results in management making the wrong decisions. This could turn into a vicious cycle and be much costlier to be fixed down the road.

### IV. BRIDGING THE GAPS BETWEEN TEAMS

DDBMs allow to decompartmentalize the organizations [12] by bridging the gap between the departments and combat with the existing silos in big companies. Three recently established teams allow for this: Chief Data Officer and a Data team; the Dev team and the Client Satisfaction Management team. Chief Data Officer (CDO) and his/her

team is assuring the aggregation and analysis of data, assisting different functions in their analytics efforts, share information, knowledge, and observation with all other departments. The Dev team increases the collaboration between R&D and IT teams that reflect the new need to integrate IT specialists into the conception of products and services. Possible evolutions could be the integration of Information services in R&D or the creation of a bi-disciplinary product development team. Gathering members from R&D, IT, Ops and Technical assistance can further improve the supervision of products and services' updates, post-sale services, and the efforts for reducing the product conception cycle. Lastly, Client Satisfaction is critical for managing the constant relation and trust that the company is establishing with clients, assuring that they take the most possible benefit from the services.

## V. TAXONOMY OF DDBMS

Even though there are numerous opinions across literature about DDBMs types and classifications, for example, Philipp Max Hartmann, Mohamed Zaki, Niels Fieldman, and Andy Neely describe the DDBMs used by start-up firms to create business value and divide them into 6 types across a 3 by 3 matrix [13]. This study tried to summarize them in 2 core groups – Data Producers and Data Exploiters.

Early data-driven models were focused on gathering data to sell it to B2B customers as insights packages. The initial data-driven businesses put the emphasis on producing data and monetizing on it directly. They started by gathering more data from customers and reselling it as a raw package or an insights package. They would sell the gathered data; advertise as real estate online; or carefully analyze data through predictive analytics with higher added value for B2B customers, looking to understand the consumer behavior better. This model is common for social media, for example.

Then, data-driven models got a bit more sophisticated and they started using the gathered or produced data to enhance their products and services to boost the business and its value proposition. More advanced data-driven businesses started using the gathered data, not only to resell it but to enhance their products and services and become more innovative by improving performance and quality. They even started creating new services through data mining to disrupt their respective industries. However, this strategy required vast resources, so not all companies evolved into this model. Manufacturing companies and service providers are the best examples of this model.

Those two Data-driven business models types are not mutually exclusive and can exist in a combined mix where the company would both monetize on produced data directly and would use it further for its analytics efforts.

Data-driven business models facilitate the value extraction from data; bridge the gap between departments with better communication; promote sharing and co-building; but also open the doors for external partnerships and customer involvement in the operations. In the next three examples of DDBM, we will explore how China Mobile (China) became data-driven through leveraging the internal and external data, shaping the Chinese industry and policymaking through

numerous partnerships. We will also witness how Haier (China) became data-driven through transforming its manufacturing and bringing the customer at the heart of the processes. Finally, how Commonwealth Bank CBA (Australia) became data-driven following a comprehensive transformation with an emphasis on data analytics adoption and culture shift towards tech.

## VI. CASE STUDIES

### A. China Mobile

The advantages of Big data capabilities development for mobile operators come, on one hand, from three main factors – namely, a strong link between the society and the network provider with huge volumes and variety of data flowing between them; substantial coverage of areas, time and people; a collection of a huge variety of data by capturing location, consumer behavior, online behavior, and personal data [14]. On the other hand, data can give an accurate understanding of the customers and a detailed description of their behaviors. Additionally, the operators are like gatekeepers of mobile internet services for customers which gives them the advantages of developing new products and services. In the case of China Mobile, those advantages can be summarized across five principal use cases – network management and optimization; market growth and precision marketing; customer relationship management; enterprise operations management; monetizing of data packages.

Furthermore, telecoms explore different cooperation schemes across multiple sectors to obtain and use data. With agriculture, targeting farmers and helping them with regards to government support and preferential pricing policies. With finance, improving the financial credit evaluation model, and enhancing their decision making. With transport, by sharing location data, improving transport information, and bettering customer marketing.

China Mobile is a company that has the numbers on its side when it comes to data. In 2019, it has around 950 million users [15], which is more than 60% of the Chinese population. With internet traffic of a whopping 40 GB per second, China Mobile invested in its own Big Data applications and cloud, developing its R&D capacities and corporate culture around the data sharing. On top of that, senior management is involved in many Big data initiatives and sponsoring numerous projects. They have decided to invest in a big data Warehouse system as early as 2001. Today, they have more than 20PB (petabytes) of data in their data warehouse.

China Mobile actively promotes the use of big data analytics and the growth benefits coming from it. China Mobile makes also use of policy, communicates openly big data organization responsibilities, and promotes big data applications and products to customers, partners, and collaborators. Thanks to its unified data platform, called NGBOSS (Next Generation Business & Operation Support System), which is a centralized computing system for gathering, integrating, and managing huge sets of structured and unstructured data from external and internal sources, data sharing becomes easier [16]. Data preoccupations are an integral part of the project management processes. Different

services are developed from big data analytics. Scenarios and applications are widely communicated to stakeholders.

Being an early adopter helps China Mobile to improve its internal performance and provide external services. It participates actively in shaping big data standards, focusing on local and international cooperation while emphasizing on data security mechanisms.

It relies on big data to provide customer segmentation and push capabilities. The company's data-driven marketing strategy allowed it to further build a real-time and precision marketing system to help the company's 4G marketing strategy.

China Mobile's data analytics are working to improve the optimized construction planning of network infrastructure. They help in maintaining the uptime of the network and the good quality of provided services.

Enterprise management is improved through data-driven decisions and resource management to better control and mitigate risks. China Mobile has established three evaluation models for customer value assessment, marketing revenue evaluation, network channel evaluation, and other financial integration on the internal data analytics platform to achieve optimization of pricing packages and reduce fraud.

Thanks to such initiatives in analytics, the company can augment internal performance and efficiency, and better justify investments to shareholders.

They leverage their analytics capabilities to develop partnerships across sectors and create customized B2B solutions. For example, China Mobile can help the government in municipal planning for better public services. Public information inquiries are facilitated, and a transportation hub management system is continuously improved for better travel route planning and guidance across China. They have created an emergency regional SMS reminder which helps the government in alerting its citizen.

They provide traffic management, travel route planning, emergency warning, and other proposed services to the government, as well as improvements for the tourism sector. China Mobile can also analyze road passenger flow, which is based on customer location signaling data. It's easy to grasp the traffic flow situation and changing trends of the traffic at different times of the day in a certain area. It helps to better understand the passenger flow and potential congestions at important arteries and hubs.

China Mobile's data analytics can display the dynamics of specific locations and specific groups based on user location, consumption information, and feature data, as well as other comprehensive analysis to serve the government with safety monitoring and precision poverty alleviation. Nation-wide transportation is improved by collecting real-time data from customers' devices.

Thus, China Mobile's data-driven model is an example that the Big data and data-driven models are a conduct of service innovation, which is an idea based on the premise that useful insights can be extracted from heterogeneous sources of data in new ways [17]. China Mobile's model allowed it to optimize its operational efficiency and find new value models by building partnerships with other sectors and augmenting the value of its products and services for its customers, but also for the Chinese citizen.

## *B. Haier (China)*

When it comes to the traditional industry, large-scale production capacities make it harder for companies to transition to a data-driven model and create personalized customization of their products.

Haier got our attention for the study as, according to Euromonitor, it is dubbed the number one brand globally in major appliances for 10 consecutive years 2009-2018 [18]. By 2012, Haier was one of the largest refrigerator producers with an extended product line into air conditioners, mobile phones, computers, microwave ovens, washing machines, televisions. It had 8.6% of the world's home appliances brand share, making it one of the most recognizable Chinese brands [19].

Additionally, Haier was recognized as the most valuable IoT ecosystem brand in the world with a brand value of \$16.3 billion [20]. Currently, the company undergoes its 4<sup>th</sup> business model reinvention.

Haier is a company with some 320 million users, has a transaction volume of more than 40 Bn EUR, and presented a customized order volume of 41 million units in their 2017 report. Digitalizing is a main pillar in their data-driven transformation. They made the whole process of production visible online by merging Information technology with Operation technology in a common system. The integration of the IoT sensors and actuators in the factory is linked to information communication systems and to the post-sales services network in the marketing team. This integration of departments and data flow between them has been made possible through big investments in data infrastructure development and the newly gathered data helps run effective data analytics.

User information visibility requires wider integration and interoperability of data. Internal and external data interconnection improves communication between stakeholders - users, design, and production departments through the Internet to achieve efficient coordination and customer satisfaction.

Improving data interconnection was critical - machine data, product data, and user data merged. In the real-time interconnected factory, the customer's data inputs, and personalized preferences directly influence the processes and production, logistics, choice of materials and suppliers.

Haier's new business model embraces customer satisfaction and the well-being of the users through various initiatives. The reduction of the steps between the enterprise and the end-users and enabling them to connect with the manufacturer through an internet interactive platform allows users to participate in the whole process of product design and production. For example, the company now uses Internet access to customize every product it sells in China, whether bought in a physical store or online. Customers choose the color combinations, appearance features like the number and layout of shelves in the refrigerator, and ancillary design elements - for example, the pattern of sparkles on a high-end appliance. Some products allow for deeper performance and structure configuration. Factories routinely make them to order. The process is not unlike choosing the accessories on a new car, except that there tend to be more choices [21]. Users can talk directly with the operators at the factory production

line and thus personalized requirements are fed back to the production line. Haier improves its entire process of acquisition, purchase, distribution, and reception of products. The Shenyang Refrigerator Interconnected Factory was the first interconnected factory of its kind and was put in operations in 2014. There, data-driven decisions allowed to create the whole factory around the user.

Through the tailored products and services, Haier aimed at the full satisfaction of users' life needs through its new data-driven business model, thus greatly enhancing the user's brand loyalty. On top of that, Haier is looking at the future and aims at building the best experience in a Smart City ecosystem through promoting healthy food, family appliance services by having community express logistics and smart home appliances.

### *C. Commonwealth Bank (Australia)*

The banking sector is at the forefront of data transformation. For Commonwealth Bank CBA, data transformation and technology are the main strategic priorities, together with Risk, Compliance, and Cost reduction. Recently, the bank's CEO committed 5 billion Australian dollars to "keep improving systems and services" at the annual general meeting [22]. In the bank's annual report for 2019, the CEO states also that "being best in digital" is a key pillar of their strategy [23]. In addition to providing growth and revenue opportunities, CBA uses data and analytics as cost reduction tools.

As one of their four critical capabilities, data and analytics are strategic to CBA's future success. They created a competitive advantage from scaling capabilities and unique datasets. Data and analytics are the main drivers for risk control and customer experience.

Australian customers demand greater personalization and tailored insights, but at the same time expect their personal information to be secure and private.

Commonwealth Bank complies with the Open Banking and Comprehensive Credit Reporting that are currently undergoing in the industry. Financial organizations will be able to share financial data with the customer's consent. Improving their data security and privacy, CBA is ready to explore the Open Banking sources to provide new services and products that improve customer's well-being.

Innovation is another key priority that helps engage the bank's stakeholders to deliver sustainable outcomes. They started managing innovation as a portfolio, ensuring that there is a balance between nearer-term and longer-term innovation investments. Heavy investments in digital assets, resulted in 7 million active digital users and 7.4 logins per day in the application. CommBank app is used by 5.6 million customers and has a Net Promoter Score of +37.2 [23].

CBA initiated digital offerings to improve the financial well-being of their customers allowing them to manage spending, avoid fees, save more, and use credit prudently.

They show that a data transformation is inevitable to satisfy customers, but an internal culture shift is even more necessary. Commonwealth Bank has undergone a cardinal culture shift through the rehiring of tech-savvy management, attracted from tech companies [24]. Thus, increasing the "futureproofing" and the probability of new technologies

adoption, significantly increasing the technology leadership and the capacity for anticipating future technological trends [25]. This transformation will be about the bank using its technological capabilities to empower its customers to make improvements to their lives and financial wellbeing, primarily through better data sharing, monitoring, and removing known friction points [26].

They have created special governing teams on executive level that pilot projects on data topics.

Analyzing and extrapolating findings from data allows CBA to completely re-engineer key monitoring and trend identification activities, such as financial crimes compliance, cybersecurity, and fraud. Additionally, data and analytics are also helping managers to make informed decisions.

The strategy is focused on modernizing the operations and the concept of banking. For them, the future is mobile-first and user experience is multi-channel. To enhance the customer experience, they created multiple chatbots, available through CommBank App and NetBank website 24/7. Answering to 282 banking tasks in 85,000 different ways of asking, they are AI-powered for continuous improvement and are smoothly transferring to an agent for the more complex enquiries [27].

Robotic Process Automation was a central part of the process reinvention. It allowed for improvement in home loan process settlements, for example, where almost 90% of the financial transactions were automated, furthering the "no paper policy" and overall productivity gains of about 100 human hours per day [28].

They built a Customer Engagement Engine that allows them to create 40 million offers per month based on 30 billion data points about their customers. It also allowed them to create personalized experiences by thanking 4.6 million customers for their loyalty [28].

Those advancements in both digital technology and data capabilities pushed CBA further to change its focus on competitors from banking peers to the current tech leading companies. It is normal for them to compare the performance of their financial services to the recommendation engine of Netflix or Amazon. This sets the tone for a bigger shift in the financial sector towards broader adoption of technology and enabling further smarter solutions for improving the lives and financial well-being of the customers.

## VII. DATA-CENTRIC

For the most part, a Data-Driven business is leveraging systems and data to deliver insights for a sustainable competitive advantage and greater value to the customers. This approach is making the decision-making process fact-based, rather than intuition based. To understand data-centrism it would be critical to look at its current predecessor – the application-centrism. Most of the companies are still taking an application-centric approach in their operations and that creates many problems. In a nutshell, the Application-Centric approach represents the current paradigm which is to buy or create a specific tool or a solution that serves a specific end-user, resulting in the proliferation of enterprise solutions. Those applications bring narrow functionality and eventually limit the organization's

flexibility to ask questions across the larger enterprise. The created redundancies and subsequent system maintenance incur excessive costs.

An application-centric approach embraces the narrowly specialized view of enterprise solutions. They store the needed data for a specialized purpose in proprietary dedicated systems without regard to how other processes or functions may need and explore that data. Decisions are based on the application's limited scope of the specific data sources. These applications are partially integrated through middleware and data sharing is far from optimal [29]. Companies have spent years in creating and collecting dedicated systems, that answer specific questions in the business department, but when those environments proliferate data becomes redundant, duplicated across systems, and stored in different dedicated databases. Furthermore, each application system has its own data model and its architecture is tied to it. The change of data model is extremely complex because of the application's code dependency [29]. In big organizations, those old and reliable systems are what we call legacy systems. The way to integrate those systems is by creating middleware like the application programming interfaces (API). Thus, the cost of maintenance stacks and skyrockets. The data is not real-time and the total performance of ownership to the total cost of ownership (TPO/TCO) ratio is low. Resources are used inefficiently. Such application-centric approaches add up to an unintegrated vision of systems and deepen the departmental silos. In such an environment, business units create projects or buy a solution for a specific deadline, ignoring KPIs as Data Control, Data Quality, Reusable architecture [30].

Some companies go a step further in their data-driven efforts by turning to a data-centric approach, thus overcoming the application-centric model, and putting data at the core of their development and operations. This integrated approach to enterprise information management enables decisions based on a broad set of information sources, resulting in increased flexibility at the lowest possible cost. Data-centric refers to an enterprise data architecture that is based on a Single or Unique Data Model. Business units create projects and applications based on this Single Data Model, which is a « unified and integrated vision of the data [30] thus: no data misunderstandings, a simplified system, and applications map, bridged silos, unified governance of data and processes [30]. That reflects a logical view of data, independent of the defined processes, yet inclusive of business rules that are shared across the enterprise.

In a data-centric company, data is at the center of the enterprise, applications are created around the unique data model allowing more agile operations and scalability. Applications are visitors to the data [31]. It is a nimble approach where the data enables the answering of any question, including those that users did not think of asking.

This shift would allow for projects to tap into existing data stores as opposed to the current practices to add big data conversion projects. Data would be globally integrated, sharing a common meaning, being exported from a common source into any needed format as opposed to having a wide variety of heterogeneous formats, structures, meaning, and terminology. Data integration of internal and external sources will be almost free as opposed to now – when data integration

consumes between 35% and 65% of the IT budget [31].

The disadvantages of the data-centric model are the high cost of entry, the need for enormous change management efforts, the value returns of a shift to a data-centric model would be in the long-term. Costs are high from the start. One of the first steps in building a data-centric company is the creation of a unified Data Dictionary, for example, which can cost anywhere in the 7 or 8 digits. Change management is essential. To tell employees that from now on, they need to consider data related KPIs when starting a project, thus taking time to describe what data they would need, use, create and store is not so easy. A shift towards a data-centric mindset will not only put the value of data in the agenda of the business leaders but further accentuate on the value of the single source of truth (SSOT) [32]. Explaining how those efforts would facilitate future projects in the reusability of data is critical for the necessary mindset shift. Returns on investment will be in the long-term. The value from the Data Dictionary example is intangible in the short-term, as it takes time to develop and deploy the meta-data and data management teams, specific data owners, and a company culture that would keep a clean and rigorous data dictionary.

In the long-term, however, clarity of what data the organization has; how data are defined; where they are; how they are structured, is proving to be beneficial and a creator of future added value from the organization's data.

#### VIII. WOULD WESTERN COMPANIES WANT TO BECOME DATA-CENTRIC AND BE AT THE FOREFRONT OF DATA CAPABILITIES DEVELOPMENT

In a Data-Centric model, data science needs to be put at the core of the company's operations. Data Scientists need to be organized in a transversal team that operates in a commando-like unit with people from different departments. Putting analytics in silos only limits their capabilities.

The data lifecycle needs to be rigorously managed in different divisions, decision-makers need to have a 360-view on the whole business and how data is used, data engineers are considered a different department, data scientists are focused on the analysis of data and research only. There is a Chief Data Officer, who ensures strict communication channels between data scientists and decision-makers so that Proof of Concepts are industrialized regularly.

A company may or may not want to develop its data maturity. Data-centric and data-driven models are still at an early stage, so even if they look good in the long-term with high ROI, early investments need to be made and this could be counter-productive.

Western companies could find it difficult to invest a considerable amount of funds to be at the forefront of Data-centric development. However, investments in technology should not stop and if they are not a priority for the companies, they need to become one. Partnerships are also critical, whether it is between companies for mutual enrichment, between a company and its partners across its value chain, or between a company and its customers. Data creation and exchange during the partnership must be a key topic to discuss. In the customer relationships field, the transition from marketing-driven insight generation towards a

product and services co-building by inviting customer focus groups can prove beneficial for the company in terms of product-market fit, but also in terms of creating organic brand ambassadors.

## IX. CONCLUSION

Data helps companies empower their employees and customers as well as increasing the company's value proposition to external players. However, data culture is critical to onboard the entire organization in this transformation. Western companies need to pay attention to trends in China and in the upcoming AI development.

There is a need for companies to focus on the creation of win-win partnerships based not only on acquiring customers and business but also on acquiring more data. China Mobile focuses on the integration of various datasets. It creates mutually beneficial partnerships based on data exchange, increasing data collection, and data sharing capabilities.

They also need to create an environment where the customer is involved in the production and foster the co-building of future products and services like Haier did. Customers could help Western companies create more personalized and inclusive products that are desired.

Change management is critical. Commonwealth Bank proves that a transformation is inevitable without a shift in the mindset of the management.

Lastly, in the next decade, Artificial intelligence will enter its industrialization phase, impacting our lives, and work much more compared to the current experimental scale. Heavy investments early in this process would help Western companies become an early adopter and allow for big returns, however further questions related to data ethics, AI code, data management, and quantifying the value of data need to be addressed as soon as possible, in order to pave the way for this incoming transformation.

## CONFLICT OF INTEREST

The author declares no conflict of interest.

## AUTHOR CONTRIBUTIONS

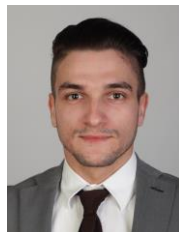
Tsvetelin Anastasov has conducted the case studies research in 2019 during his thesis work at Université Paris-Dauphine PSL. In partnership with BNP Paribas Personal Finance, he analyzed the companies in order to propose key insights on how companies in the Asian region and Australia have reinvented their business models. Subsequently, in 2020, he wrote the present paper and added part VII on Data-Centric models. The author had approved the final version.

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