DEVELOPING DATA DRIVEN PRODUCTS IN THE EMERGING MARKETS

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Abstract: The expansion of the digital economy and the rapid developments of technology induced the creation of new products and industries and drove a significant increase in data resources. The information products industry, including products based on data, information and knowledge, is intensely dynamic in terms of growth and the pace of new product introduction. The complexity in the variety of product offerings and the number of firms offering those products in this industry is increasing exponentially every day. Data-driven innovation forms a key pillar in the 21 century sources of growth. Large data sets are becoming a core asset in the economy, fostering new industries, processes, and products and creating significant competitive advantages (OECD, 2015).

The past two decades have brought several reconfigurations of the information and knowledge economy. The recent technological breakthroughs have driven the emergence and the exponential growth of a digital economy with vast data assets. The changes have been accompanied by ongoing attempts to make sense of all the data through the use of analytics. Analytics add substantial value to intangible assets by making them easier to understand and apply. In a world in which information alone has become ubiquitous and somewhat commoditized, analytics provide a means of making information more useful and valuable.

In this paper, we focus on new analytical capabilities and data assets that together form value-added information product offerings and new possibilities for emerging markets. These offerings are often called data products. In general, a data product is digital information that can be purchased. Data products incorporate data science into the operation of a product or service, using data in smart ways to provide value. In research, a data product is a large data set in a format that requires little or no processing or programming. Typical data products are predictive, descriptive or prescriptive models, as well as insights. The future of new product development reflects both developing new innovative products and data driven products typical for emerging markets that are large economies.

For any organization, there is not only revenue, but competitive advantage to be gained in developing data products and new innovative products. Creating an effective development process for data products requires following well-established steps and data analytics helps adding a few new ones, which are explained in the paper. Further, this paper will focus on three important decisions for innovative process: decision 1- key enablers of emerging market innovation (R&D capability, market opportunity and executive champions), decision 2 - what product to develop (market need, portfolio fit, and product-capability fit) and decision 3 - how to develop the product (the decision matrix and bootstrapping). Organizations can follow several approaches to monetize their data like improving internal business processes and decisions, focusing information around core products and services, and selling information offerings to emerging and existing markets. Few remarks for our country will be made as further paths of development.

Keywords: data driven product, information economy, new product development, emerging markets.

1. THE PROCESS OF DATA DRIVEN PRODUCT DEVELOPMENT

The past two decades have brought several reconfigurations of the information and knowledge economy. The recent technological breakthroughs have driven the emergence and the exponential growth of a digital economy with vast utilization of data assets. Digital technology is redefining business and society at an astonishing pace and scale. (Accenture, 2016). While analytics is the engine, data is considered as the fuel of today's digital economy (Morvan, 2016). The amount of data produced is growing exponentially. Gathering and extracting data from different sources (for example internet, mobile, satellites, digital payments, information systems, administrative data, etc), transferring, securing, cleaning, structuring, analysing and using analytical products for data-driven decision making and data-driven goods/services development becomes essential for companies of all industries and size. In the literature, the data economy is defined as an economy based on data, data technologies, products, and services. The term refers to the ability of organizations and people to leverage data as valuable asset (Wikipedia).

The data-driven economy stimulates research and innovation based on data, and increases business opportunities and availability of knowledge and capital across Europe. According to the European Data market study (2017), the data economy value is almost € 300 billion in 2016. By 2020, the EU data economy is expected to increase

to € 739 billion with an overall impact of 4% of the overall EU GDP (EC Report, 2017). The European data market comprise 6.16 million data workers (workers who collect, store, manage and/or analyse, interpret and visualise data) in 2016, with prediction of reaching 10.43 million by 2020. The number of data companies has reached 255,000 in 2016 and it is estimated that this number will grow up to 359,050 by 2020. The European market of digital products and services ("data market") in the EU was at EUR 54.4 billion in 2015 and at EUR 59.5 billion in 2016. According to the high growth scenario, the value of the EU data market will reach € 106.8 billion by 2020 with a compound annual growth rate of 15.7% since 2016. A data economy holds enormous potential and opportunities in various fields ranging from health, food security and climate, as well as resource efficiency to energy, intelligent transport systems and smart cities. Leveraging data, the opportunities are enormous.

An increasing number of companies worldwide are creating products that combine data with analytical capabilities. The combination of new analytical capabilities and flourishing data assets together form value-added information product offerings. In the literature, generally, these offerings are often called data products. Simply, a data product is digital information that can be purchased. According to the McKinsey Global Institute, data is a $300 billion-a-year industry. In research, a data product is a large data set in a format that requires little or no processing or programming. Although, data and analytics were historically employed for one purpose: improvement of internal decision making, indeed, the big data revolution offered companies another use for data and analytics. Beginning with online companies such as Google and Facebook, companies start to develop data products for customers based on data and analytics more often. For example: Search services from Yahoo, Google, and others were among the first ones. Another example of these data driven product offerings is Linkedin "People You May Know," "Jobs You May Be Interested In" and "Groups You May Like" (Davenport, 2013). Other online companies have developed similar data products. Facebook has its own "People You May Know" product. Another example of descriptive analytics based data product offerings is Google Analytics offering which represent a free set of data products that informs customers about visits to their websites (Davenport and Harris, 2007). Generally, data driven products, which can be described as services, are not sold separately to customers but are used to attract customers for advertising, draw attention to unknown products in large product pools, and enhance revenue through cross-selling and upselling. They have powered rapid growth in the value and success of the online companies that developed them in order to create a much larger user base as well as to gain competitive advantage through differentiated offerings.

Successful new product introduction is the key to business success. It is increasingly important for all organizations, big or small, to develop and introduce new products more effectively. This can be done through an agile and successful product development process that focuses on retrieving and using data, information and knowledge continuously to tackle challenges. Organizations have recognized the importance of data analytics in product development. Originally, in a 1996 Marc H. Meyer and Michael H. Zack examined the design and implementation of information products in their article titled "The design and development of information products". Two decades later, Thomas H. Davenport and Stephan Kudyba in 2016, in their article titled "Designing and Developing Analytics-Based Data Products" raised the importance of data product design and development on a different level. Based on the comparison of these research, the goal of this paper is to present the developments and opportunities in this field. We will focus on the combination of new analytical capabilities and flourishing data assets that together form value-added data driven product offerings. But, despite the economic importance of the information products industry and the rapid pace of innovation, research examining the design and development of information products is not abundant but is in its proliferation.

Today, data product development activities rarely take place in a traditional product development sequence that involves identifying the need, developing the product, and then taking it to market. But, in spite that, relatively little is written or known about developing new generations of data products. A common interest in the field is what leading companies are doing to create, refine, and generate value from data products. While Meyer and Zack (1996) examined the design and implementation of information products starting from traditional product development process, Davenport and Kudyba (2016) take the discussion on a further level, and describe the process of data driven product design and development, upgrading further what Meyer and Zack (1996) can't predict two decades ago. According to Davenport and Kudyba (2016), creating an effective development process for data products requires following well-established steps, most of them defined as Meyer and Zack (1996) described, but it is necessary to add few new ones, since the economy has reshaped a lot under the influence of the recent technological developments. Analytics and data require and provide at the same time adding a few new steps in a typical information product development process, which provide companies and product developers with opportunities to gain competitive advantage over rivals by designing and developing analytics-based data products.

According to Meyer and Zack (1996), an information product development process, where raw data sources or repositories provide inputs to the process of producing a product, is comprised of five-steps: *acquisition, refinement, storage/retrieval, distribution, and presentation) to turn data inputs into information products.*

Davenport and Kudyba (2016) confirm that these five step model continues to be valid in the data driven economy, but the evolution of various technologies and corresponding data sources in today's digital economy implies a need for adjustments and augmentations to accommodate increased volumes, velocities, and varieties of data, as well as the corresponding storage and accessing activities required to manage the assets in the product creation process. Davenport and Kudyba (2016) suggested additional steps to Meyer and Zack's original five-step model. At the front end, they add a step that involves *conceptualizing the product*; at the back end, they add *the establishment of a market feedback mechanism*.

The first step is *conceptualizing the product* meaning that at the beginning of the development process, the organizations must identify a product that meets a need from the marketplace. It requires conceptualizing the information product, along with identifying the required data resources. The process involves product definition, data investigation accompanied with careful data sourcing (Barton and Court, 2012) and establishing the framework necessary to produce a prototype. Once the conceptual model has been elaborated, the second step - *data acquisition* can be pursued in a more efficient manner. Given the vast amounts of data being generated by different information systems/devices and the data available from public sources, this step needs to connect the requirements of the conceptual model to data that will create the product. Besides acquiring structured data (like customer purchase records), companies should also consider using unstructured sources (for instance, social media comments) that will add value to acquisition. The third step is *refinement*. Davenport and Kudyba (2016) augmented this step from the primary refinement step defined by Meyer and Zack's (1996), in order to facilitate new data sources and to take advantage of advanced analytic methods (like realtime machine learning and algorithmic processing of data elements). The forth step is *storage and retrieval storage*. Davenport and Kudyba (2016) recognise them as important as ever and point out that retrieval must incorporate advancements in query and search processing capabilities by using algorithms, in order to access more granular levels of data. Traditional storage techniques need to be augmented by new technologies such as map reduction and parallel processing capabilities to manage larger and faster-moving data sources. The fifth step is *Distribution*. Distribution options for information products have shifted dramatically. In the digital economy, online media fully address the required level of continuous accessibility to information products, although web access via traditional computers is overtaken by mobile access via smartphones, tablets, and apps. Therefore, providers of information products need to renovate their content formats and design suitable for mobile. Distributing data products through the cloud is also a new opportunity. The sixth step is *Presentation*. In the original Meyer-Zack's model, information products gained value from the context of their use, meaning that the easier products were to use, the more valuable they were. But, in the data driven economy characterised by vast use of data analytics more advanced analytics-based products such as forecasts, predictions, and probabilities (such as real-time calculations generated through machine learning) can lead to differentiation and competitive advantage. Last but no least, the seventh step is *Market Feedback*. Adding this step at this stage of the analytics-based data product development process is consistent with the iterative nature of product development and implied by the development of new technologies and new market research opportunities that has provided a mechanism for facilitating a feedback and information extraction process from the marketplace. The future of new product development reflects both developing new innovative products and data driven products typical for emerging markets that are large economies.

2. THE FUTURE OF NEW PRODUCT DEVELOPMENT IN EMERGING MARKETS

Emerging markets, also known as emerging economies (or developing countries), are states that are investing in more productive capacity in general. They are moving away rapidly from their traditional economies. They are rapidly industrializing and adopting a free market or mixed economy. Emerging markets have five characteristics - lower-than-average per capita income, higher rate of economic growth, high volatility lead by rapid social change, less mature capital markets, the higher-than-average return for investors (Amadeo, 2019). They don't have sufficient demand at home, so they produce lower-cost consumer goods and commodities for developed markets, for export. Not all emerging markets are good investments. They must have little debt, a growing labor market, and a government that isn't corrupt. There is no a single list of countries that are characterized as emerging markets. Emerging markets global companies (EMGCs) are defined as companies whose competitive advantages measured by trans-national, growth, and profitability indices are higher than the average competitiveness advantages of all companies from EMs (Kim, Jung, 2009).

In the last 15-20 years, multinational enterprises from developed countries have been moving a substantial part of their R&D to emerging markets (India, China, etc.). The location of R&D points has been driven by well-established markets or specific expertise available in the local ecosystems of the developed countries. However, the location of R&D in *developing countries* has been driven mainly by the availability of skilled manpower at low cost. Nowadays, the dynamics of multinationals' R&D are rapidly changing as emerging markets are new growth drivers of the global economy. Many innovation centres in emerging markets are evolving to accumulate advanced technical capabilities, pushing their employees to fight for higher-value-added work and to seek

responsibility for a complete product or technology, especially in countries with huge local markets, such as India, China, Brazil or Indonesia. The essential question is - what factors facilitate innovation by subsidiaries in emerging markets (Srivardhini et al, 2017). In the study, the authors combine a quasi-participatory action research and especially the case study method in order to understand the evolution of Cisco India R&D from the time of its establishment to the initiation of the ASR 901 project, as well as the activities during the project itself. The first decision managers should consider is – What are the key-enablers of emerging market innovation. First and foremost, the R&D unit needs to have well-developed R&D capabilities and in-depth of technical knowledge required to undertake complete product development (for example, the availability of a large pool of English-speaking engineers and low operating costs). The second enabler is the size and uniqueness of the market opportunity (Indian economy saw a major transformation in the telecom sector). As a result of deregulation in the 1990s, a number of telecom service providers (both domestic and foreign) entered the market. The free-market forces triggered above-average growth. The market opportunity was reflected in Cisco's strategy and Cisco's Globalization Center East and the centre started receiving feedback on the lack of appropriate products for the local market. It became increasingly evident that Indian and other emerging-market customers had unique requirements with respect to price, network scalability and subscriber monetization. To wrap-up, an extra-large market opportunity combined with unique customer requirements is a key enabler of innovation for emerging markets. The uniqueness of customer requirements that creates a compelling need to innovate. The third key prerequisite for innovation by subsidiaries in emerging markets is the support of executive champions who believes in the centre's ability can mitigate these challenges, both at the subsidiary and at corporate headquarters. Cisco India R&D had built credibility with key executives at the company's headquarters through its consistent performance over the years. In sum, Cisco India's R&D had all three enablers of innovation in place: a critical mass of end-to-end product development capability, a growing market with unique needs, and executive champions. Therefore, R&D managers need to evaluate where they stand vis-à-vis these factors before embarking on innovation in and for emerging markets.

Once the key enabling factors are in place, the next step is to identify a suitable product to develop, therefore that is decision number 2. This demands careful examination of market needs and an assessment of both internal capabilities and the overall fit of the chosen product and its category with the company's product portfolio. Three enablers should be analysed. The first one is market need of customers in emerging markets and Cisco found that the mobile-subscriber explosion was fuelling rapid capacity expansion by service providers and therefore these trends indicated that there was an opportunity to develop a mobile backhaul router. The second factor is if the product fill a gap in the company's product portfolio. This is very important because that can generate new revenue streams and increase the chance of internal support for the product. The third enabler is product-capability fit. This means that the proposed new product should ideally be reasonably complex and that can be developed within a relatively short period. As a result, those characteristics helped the core team to choose a product that could be developed from the India R&D centre. The last decision a subsidiary company should make is how to develop the product. Product development is a resource-intensive activity, requiring head count, equipment, and other infrastructure. The headquarters is prioritizing the proposals, and there is a chance that the proposal may not be supported. The second approach is to develop the prototype with locally available resources. This approach is bold, but and risky because limited resources can challenge it.

Following the research, the authors created design matrix to help companies from emerging markets to follow the road to success to design new data based products. The horizontal axis captures the relative strategic importance of a given geographic market to the company vis-à-vis other markets, which could be high or low. The vertical axis is project specific and expresses the essence of the business case for the proposed product. The business case can have a strong quantitative orientation (for example, total addressable market, estimated market share, estimated revenue for one to three years, and return on investment). On contrary, a qualitative business case, supports elements (mind share in a new market, gaining early-entrant status, countering growing competitor dominance in an emerging market, and the total addressable market over a longer period). Every business case will have both quantitative and qualitative elements. When the business case is predominantly quantitative, it is easier to communicate it. Therefore, any such product with a quantitatively strong business case (top-right quadrant) is likely to be headquarters' top priority. If there is a quantitatively strong business case for a product, local R&D unit, by virtue of its proximity to the market, is more likely to be the winner. On the contrary, the qualitative orientation of the business case makes it difficult to quantify the return on investment and get product development approved by headquarters. In such cases (bottom-right), the R&D centre needs to creatively mobilize resources to develop a working prototype. The authors refer to this as "bootstrapping." Finally, if the relative importance of the geographic market is low and the business case is qualitative (bottom-left), it is better to abandon it. The core team In Cisco decided to take a bootstrapping approach (bottom-right in the matrix) to develop the prototype. The engineering team had to be staffed up considerably and with minimal seed funding at its disposal, the team decided to engage with an engineering-services partner. Instead of the traditional time and materials model, where payment is made at the time the

services are provided, the new model involved payment as a percentage of revenue as the product started selling. This new revenue-sharing model had several advantages. First, it postponed the nonrecurring engineering cost when the product had wider acceptance, thereby stretching the minimal seed funds available. Second, it helped develop deeper partnerships with local companies and strengthen the local ecosystem through technology transfer. Third, it was a much faster way of staffing the team than hiring from the labour market. This novel approach to product development provides a viable alternative to the more common structured product development process. They needed to bootstrap with the limited resources to build a prototype. For codevelopment, physical proximity and constant engagement with the partners was extremely important. To sum up, the team creatively mobilized all types of resources necessary for prototype development and it worked like a startup within a large company. This approach can be a feasible approach for domestic companies, by using all available resources and innovation capabilities.

Figure 1. A decision matrix for product development by a subsidiary
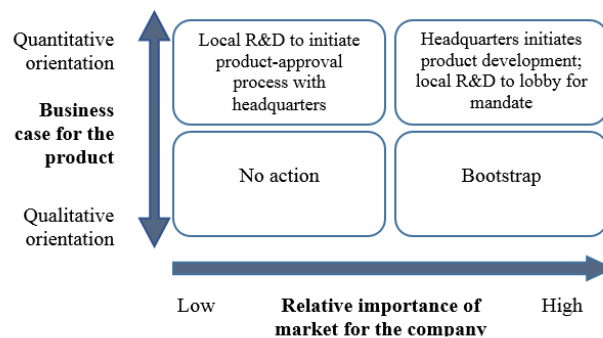
Source: Srivardhini K. J, Parulkar, I., Krishnan,T.R., and Dhanaraj, C., (2016), Developing New Products in Emerging Markets, MIT Sloan Management Review, Vol. 57, No. 3, Spring 2016, pp. 55-62 p. 56

3. CONCLUSION

The biggest barriers companies face in extracting value from data and analytics are organizational; many struggle to incorporate data-driven insights into day-to-day business processes. Another challenge is attracting and retaining the right talent—not only data scientists but business translators who combine data savvy with industry and functional expertise. Creating data driven products is both a necessity and a challenge not only for developed economies but for emerging markets as well. Today, data product development activities rarely take place in a traditional product development sequence that involves identifying the need, developing the product, and then taking it to market. The extension of five step methodology for information product development originally proposed by Meyer and M.H. Zack (1996), with two additional steps defined by Davenport and Kudyba (2016), is one of the latest and to our knowledge one of the few methodologies in the field of data driven product design and development.

In the last 15-20 years, multinational enterprises from developed countries have been moving a substantial part of their R&D to emerging markets (India, China, etc.). The process of product development at Cisco India can represent as a solid example of market success. As a result of these developments, the product became part of the mainstream engineering organization. The future of new product development reflects in developing innovative new products for increasingly global and digital markets. Bootstrapping can be used in our business practice having in mind fractured and limited resources of the country's economy.

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