Utilization of Big Data Analytics on State-Owned Enterprises in Indonesia
(Case Study at PT Pos Indonesia (Persero))

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Abstract

Industrial Revolution 4.0, forced all agents to change their business processes. The explosion of data or Big Data now encourages all institutions to move effectively, efficiently and productively. Data has an important role and able to utilize large volumes of data that are fast changing, diverse, and complex, will benefit greatly. Referring to the results of previous research in government institutions on the application of Big Data technology, the author is interested in examining the extent to which Big Data technology is used by State-Owned Enterprises (SOE's), given its strategic role, namely carrying out public services and business missions. The research method used was descriptive qualitative. Data collection was carried out through in-depth interview techniques to officials in the Big Data Analytic Division of PT Pos Indonesia (Persero) Head Office in Bandung. The data obtained were then analyzed by The Data Warehousing Institute Big Data Maturity Model. The results showed dimensions that had been achieved in managing Big Data and in general it could be concluded that PT Pos Indonesia (Persero) was categorized at the stage of company adoption.

Keywords: Big Data, Big Data Maturity Model, Industrial Revolution 4.0, State-Owned Enterprises, and The Data Warehousing Institute.

1. INTRODUCTION

Trends in the Industrial Revolution 4.0 era lead to automation, large and complex data exchange, and in various service and manufacturing technologies. The key to every industrial revolution is productivity (Herčko et al. 2015; Huseyni et al. 2017; Stverkova and Pohludka 2018), namely the existence of cyber physical systems, cloud computing, cognitive computing, and the Internet of Things. Currently, companies that perform well are companies that are able to seek opportunities, use opportunities optimally, are able to withstand changes or turbulence in the environment, especially the internet, and achieve better performance continuously. The current study defines the components of the fourth industrial revolution by looking at the mechanisms for increasing the productivity of big data and its interoperability, in addition to the existence of smart factories, cyber physical systems (CPS) and the Internet of things (IoT) (Kagermann et al. 2013). However, the main focus of this research is only to discuss the extent to which the application of Big Data to government companies (SOE's), namely the extent to which the application of techniques in processing large amounts of data or information, data capture, security aspects, transferability, storage methods, analysis, meeting levels accuracy, search techniques,

privacy safeguards and visualization, apply to data, both structured and unstructured (Xu and Duan 2018).

Big Data technology can be utilized by various parties, both government, State-Owned Enterprises (SOEs) and private. As already utilized by government agencies such as the Government Goods / Services Procurement Policy Agency (LKPP), Bandung City Government, Directorate General of Tax of the Ministry of Finance and Geospatial Information Agency (Sirait., Emyana Ruth Ertha., 2016). SOEs that are established in both sectors, the public service sector that is social in nature and the business sector, which are required to cultivate profits, certainly need the benefits of Big Data technology mentioned above. Several state-owned telecommunications, banking, works and fertilizers have utilized Big Data technology to improve their performance. As a fellow SOEs, PT Pos Indonesia (Persero) has also begun to build Big Data Analytic, as conveyed by Managing Director of PT Pos, 2017, that only 36 percent of Indonesians have bank accounts, while 64 percent of the population lives in remote areas financial inclusion has not been touched because of difficult access to bank in (Kompas.com, 2017).

As is known, PT Pos also has its main services, namely in the field of mail and goods delivery. At present the development of e-commerce business in Indonesia is growing very rapidly. Competition is not only between domestic companies, but followed by the onslaught of foreign companies competing to get market share. Indonesia is the largest e-commerce market in Southeast Asia. In 2018, total e-commerce (Gross Merchandise Value) transactions in Southeast Asia will reach US $ 23.3 billion or around Rp 328.4 trillion. Of that amount, 52 percent of transactions came from Indonesia worth Rp 172 trillion (US $ 12.2 billion). In 2025, the e-commerce market in Southeast Asia is expected to reach Rp 1,455 trillion (US $ 103 billion).

2. LITERATURE REVIEW
2.1 Big Data

The use of data and the need to understand that data have actually been around since time immemorial (Aryasa, 2015). Many parties try to give a definition of Big Data (Chandarana et al., 2014). Big Data refers to 5V: volume, variety, velocity, veracity and value. Volume in this case relates to data capacity and media size which is very large or may not be limited to zettabytes for data storage. Data diversity, the many types of data and data types that can be processed from structured data and unstructured data. Meanwhile, the resulting data processing speed or velocity is very useful in processing data from various sources, in detail and in real time. In terms of the characteristics of veracity (truth), it can be relied on to provide information as it is for decision making. Finally, in terms of value, it relates to the benefits of the information generated, although there is still an element of uncertainty in the data. It takes the use of robust technology in Big Data, to extract and obtain more specific information. This is necessary because the data structure contains very large data, is very fast and is incompatible with conventional architectures.

2.2 Big Data Element

The various stages of data management must be mastered scientifically, how to prepare infrastructure, conduct deepening and further processing into useful information, data processed more sophisticated than before. There are 4 important elements that become challenges in the development of Big Data, namely the availability of competent human resources, processing management, the use of the latest technology and the data itself (Aryasa, 2015).

2.2.1 Data

The main requirement in Big Data technology is data readiness. Data can describe many things, including certain objects in certain events. Data can also describe a variety of activities with various documented transactions. All of these items are grouped and stored in an organized manner where they need it to be retrieved and provide meaningful information for the user (Rainer et al. 2009).

2.2.2 Technology

Technology is a very important issue in Big Data, where the operation of Big data requires a good infrastructure to be optimal in computation and data analysis. Fortunately, technology problems are not difficult to solve because they have become a trend in the era of the Industrial Revolution 4.0. On the market, there are already many offers of various sophisticated technologies. If it is considered beneficial, companies usually make alliances with other parties to increase the value of each company.

2.2.3 Process

Big Data technology will change the conventional decision making process in companies. A new culture will emerge based on information obtained from the results of accurate and relevant data analysis. Conventional decision-making is often based on the intuition of leaders gained from years of experience. By applying Big Data technology, decision making is more transparent because it is jointly managed and accounted for by company managers. Another example, a telecommunications company since using a digital information monitoring system originating from the web, twitter, and others, can more easily find out customer problems related to the product and build a commitment to follow up on the problem within a maximum of 6 hours. In this case a new organizational culture is built about brand tracking, to address the current tendency of customers who prefer to discuss a problem on Twitter rather than submit a complaint directly to customer service. Big Data can help to analyze and predict customers who will stop their service or churn, so that it can be followed up by listening to customer needs and taking precautions at the earliest.

2.2.4 Human Resources

Along with changing cultures and the increasing need for expertise in analyzing and creativity of human resources in managing Big Data technology, the human resources section of the company is very necessary to make strategic efforts. It is necessary to carry out audits and identification of new competencies in achieving strategic business objectives with technical competences in grouping data, interpreting data, and analyzing data.

2.3 Big Data Maturity Model

The Data Warehousing Institute (TDWI) Big Data Maturity Model is the application to demonstrate the evolutionary process carried out by an organization in integrating, managing, and utilizing all relevant data sources both internal and external. This includes creating innovative ecosystems, providing useful business value, and enabling transformations that have an impact. In other words, the maturity of implementing Big Data is not only about having some technology to handle high-volume data or just about using social media to analyze public opinion, but a process that involves building ecosystems such as technology, management of data, analysis, regulation, and components organization (Halper, et al. 2013).

There are 5 stages of Big Data maturity model in TDWI version. Explanation for each stage is as follows: stage 1: nascent, at this stage, organizations generally have a low awareness of

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Big Data technology and the value of its benefits to the organization; stage 2: pre-adoption, at this stage the organization begins to prepare steps for Big Data analytics and will implement them in the near future. Some HR have started to learn about Big Data and organizations have invested in supporting Big Data tools, such as Hadoop, but the scope is still partial; stage 3: early-adoption, this stage is marked by the existence of several concepts (proof of concept/POC) implementation that have started / have been tested. Organizations usually spend more time at this stage, because there are gaps far enough to reach the next level, corporate adoption; stage 4: corporate adoption, at these stage end users have been involved, gained insights and transformed their work processes. Decisions in organizations are made using Big Data analytics; stage 5: mature / visionary, at this stage the organization implements the Big Data program as a machine that is supported by adequate infrastructure, careful planning and strategy and adequate funding.

In analyzing these stages, there are 5 dimensions seen, namely how the company manages Big Data from organizing, preparing infrastructure, managing data, analyzing and managing it.

3. RESEARCH METHODS

This study used a descriptive qualitative approach, with data collection techniques through in-depth interviews with Managers of Information Technology in the research object, namely the Big Data Analytic Division to get an overview of the use of Big Data technology in the agency, as well as the challenges faced in its application. The data were analyzed using TDWI Big Data Maturity Model, evaluated the maturity in application of Big Data technology at the agency. The TDWI maturity model was chosen with consideration that it is easier to understand and accommodate Big Data implementation from the preparation stage to the mature/visionary stage
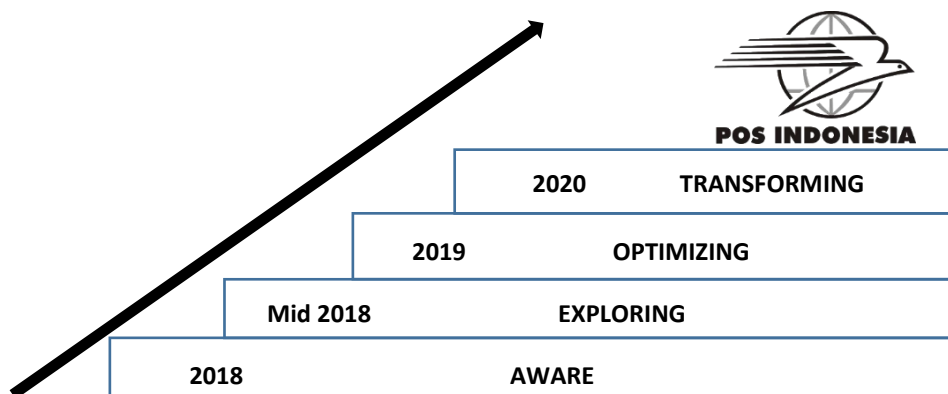
4. RESULTS AND DISCUSSION

Figure 1. Road Map Big Data Analytics
Source: PT Pos Indonesia.2020

PT Pos has formed the Big Data Analytic Project in January 2018, with the Road Map as in Figure 1 with the following explanation:

Stage 1 (2018): Aware, Big data is discussed but not reflected in business strategies or processes outside of historical analysis; stage 2 (Mid 2018): Exploring, a consensus emerged about the potential of big data leading to basic Hadoop experiments and local results; stage 3 (2019): Optimizing, operational performance is optimized in up to three dimensions: customer life cycle, products and facilities. Create a performance dashboard and manage social media data for HR, Marketing and e-commerce needs; stage 4 (2020): Transforming, Data includes currencies, because the flow of business values is created through predictive analysis.

Table 1. TDWI Maturity Model

Dimension	PT Pos	Description
A. ORGANISATION		
1. Leadership	✓	High commitment, forming Division
2. Budget	✓	Included in the Budget Work Plan
3. Strategy		
4. Culture		
5. Value		
B. INFRASTRUCTURE		
1. Development	✓	Provision of hardware and software
2. Technology	✓	Provision of Big Data platforms
3. Architecture	✓	Data Source, Data store operational, Data Warehouse, Hadoop, Data Visualization
4.Integration	✓	It is already done
5. Scope	✓	Internal and External Data
C. DATA MANAGEMENT		
1. Diversity, volume, speed	✓	Transaction data, hundreds of millions of rows, social media data
2. Processing	✓	Data analytics
3. Storage	✓	Data Base Server
4. Quality	✓	Data Reconsiliation
5. Access	✓	Server visualisation
D. ANALYTIC		
1. HR specification	✓	Graduates in statistics and mathematics
2. Mindset		
3. Technic	✓	Data mining skills, statistical analysis
4. Application	✓	Big Data Tools, visualisation tool
5. Delivery method	✓	Data visualization server
E. GOVERNANCE		
1. Policy		
2. Structure	✓	Authority and responsibility
3. Compliance		
4. Service arrangement	✓	SOP for data acquisition
5. Security and privacy	✓	NDA, user and password

Source: Data Processed, 2020

From interviews and on-site checks, an assessment of maturity in Big Data Analytic technology can be seen in table 1. The application of Big Data technology at PT Pos is mature enough so that it is categorized at the stage of corporate adoption. This is characterized by the integrated Big Data supporting infrastructure, where end users are already involved in the system and get benefits. With the existing Big Data analytic system, real conditions in the field can be known to help leaders make decisions and improve the quality of services and facilities to their users. To be able to achieve mature / visionary categories, some things that need to be improved in PT Pos's Big Data analytic system are preparing the company's strategy, culture, values, mindset, policy, and compliance.

5. CONCLUSION

Referring to the TDWI Big Data Maturity ModelPT Pos Indonesa is at the Corporate Adoption stage, this progress is in accordance with the stages in the PT Pos Big Data Roadmap which is already completed the 3rd stage (Optimizing) at the end of 2019.

For further research, it can be carried out on the maturity level of Big Data technology implementation in other SOEs.

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