

*Digital Transformation Planning Based on Big Data Technology
(Case Study at XYZ Bank)*

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Abstract

Bank XYZ is one of the regional government-owned banks which as of August 16, 2021 has a total percentage of customers who have dormant accounts reached 50.43%. This happens because currently the development of the marketing strategy used by Bank XYZ is still based on the products and services owned by Bank XYZ, not referring to customer needs. For this reason, the purpose of this research is to make a digital transformation plan that can be used by Bank XYZ in order to become a customer-centric bank using Big Data technology. The method used to carry out this research is to use the Big Data Framework for Agile Business (BDFAB). The results of this study includes mapping data requirements and Big Data technology for Bank XYZ, the impact to business processes, proposals for changes in information system architecture, planning for quality control mechanisms, to changes in organizational structure so that the benefits obtained by Bank XYZ are a more personalized marketing approach to customers, increased accuracy in offering bank products and services based on customer profiles, needs, behavior, and interests, as well as increased customer engagement and customer satisfaction.

Keywords: Digital transformation strategy; Customer-centric bank; Big Data Framework for Agile Business.

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I. INTRODUCTION

Digital innovation can provide an increase in the value of existing products or services. However, on the other hand, digital innovation can make existing business models obsolete, disrupt business value, ask companies to rethink who their customers are, and lead customers to rethink the products or services they want [1] otherwise known as disruption. In facing this era of disruption, incumbent companies must carry out digital transformation, namely the use of new digital technologies (such as social media, mobile applications, or analytics that are integrated with devices) to produce business improvements (such as improving customer experience, simplifying operational processes or creating new business models) [2].

Disruption due to digitalization also occurs in conventional functions in the financial sector because digitalization has changed the transaction patterns of both individuals and corporations. This can be seen from the strengthening of the role of non-banks (financial technology and e-commerce) in providing business models of financial services provided by conventional banks such as payment transactions or lending, which was followed by the declining role of banks [3]. The digital disruption that occurred in the banking sector has also led these banks to incorporate digital transformation into one of their business strategies. Digital transformation can be defined as a new paradigm in the context of implementing technology to produce new products and services and changing the mindset in delivering these products/services to the global market [4].

Bank XYZ is one of the providers of banking services in Indonesia. As of July 18, 2021, Bank XYZ has a total of 9,649,244 individual customers and 962,427 corporate customers. However, of the total customers owned by Bank XYZ, only 49,37% of individual customers are included in the active category (having at least 1 active savings account) and only 37,72% of non-individual customers are included in the active category. The large percentage of inactive customers shows that the level of product use by Bank XYZ customers is quite low and this will also have direct implications for the level of use of transaction features/services owned by Bank XYZ.

Currently, customer satisfaction can not only be obtained by offering various products or services. Customers expect various new innovations that they can get from the bank, such as speed and accuracy of service [5]. Based on the results of an interview with the Director of Information Technology in Bank XYZ, there is a need for Bank XYZ to carry out digital transformation with the aim of changing to a customer centric

Bank from a product centric Bank. The form of customer centric bank that will be achieved is as follows: 1. Improved customer experience through digital services with personalized products and services; 2. Product development and marketing to the right customer segments; 3. High and fast business growth, including the achievement of fifteen million customers within three years.

Companies must be able to obtain information early on if there are changes in customer needs and customer preferences so that companies can produce personalized products and services for each customer so that in the end they can have a positive impact on company growth [6]. To be able to produce an integrated customer information system to become the basis for developing a customer-centric business model, banks need to retrieve, integrate, and analyze various data sources both internally and externally so that banks can identify customer needs and provide relevant solutions when needed [7] and acquisition of customer data is a top priority for building a customer-centric business model [8]. One form of technology that is the main supporting tool to create a customer-centric bank is big data technology.

Big Data is the collection and analysis of large volumes of structured and unstructured data that can be processed in real-time to generate value for the company [9], [10]. Big Data can generate customer profiles because Big Data has the capability to monitor every business activity carried out by customers, from knowing purchase history to customer conversations about the products or services they use [11]. The main sources of data that can be processed in Big Data technology are customer activities/transactions both on offline and online channels as well as social banking activities or insights from customers obtained from activities on social media [12]. After the data is collected in the Big Data platform, the next stage is advanced analytics processes which include tools for data mining so that they can turn all the data into models to look for patterns and relationships to predict customer behavior [13]. By using data from both internal and external sources as well as selecting the right application, Big Data can help banks to achieve their desired goals, from developing 360-degree customers, designing new business models, to providing new products and services that meet customer needs [14].

Currently, the condition of data processing technology at Bank XYZ is still using traditional technology and has not used Big Data Technology where: 1. Data collection technology from data sources can only be done in batches/periodically on a daily basis; 2. The current data storage technology owned by Bank XYZ can only process structured data with a limited capacity; 3. The company's internal data and external data are not yet integrated; 4. Limited output that can be generated from data processing in the form of static reports and descriptive dashboards; 5. Limited knowledge and expertise of Bank XYZ's internal Human Resource (HR) regarding processes and technology that can be used to process large data sizes, various types, and has a fast data flow frequency.

In relation to the objectives of the Information Technology Director of Bank XYZ who will carry out digital transformation in the form of implementing a customer-centric bank, a journal about digital transformation carried out by a bank has been reviewed. The journal explained that the bank that became the case study had carried out a digital transformation process and became a customer-centric bank and this was able to make the bank the most successful financial services group in Asia. The journal also explained that digital technology provides significant opportunities for banks to increase value for the bank's business and provide better services for customers [15]. Furthermore, the second journal that has been reviewed is a journal on digital technology that can be used by the Bank to be able to carry out customer-centric strategies. This journal discusses that there are various forms of using Big Data Analytics to improve customer experience in the retail business, such as creating customer profiles to optimizing pricing. The method used in this journal is to use secondary data sources [16]. The difference between this research and the two journals is in the amalgamation of digital transformation strategies to become a customer-centric bank by utilizing digital technology, namely Big Data and by using the Big Data Framework for Agile Business method.

Referring to the benefits of Big Data technology in supporting customer-centric business processes, and the lack of Big Data Technology in Bank XYZ, this research will focus on developing transformation digital Bank XYZ to become customer-centric bank using the Big Data framework.

II. RESEARCH METHODS

This research focuses on planning for digital banking transformation using the Big Data framework. Figure 1 is the framework that will be carried out in this research. Based on the research framework in figure 1, the following are the stages of the research carried out:

1. Identification of problems experienced by Bank XYZ which is divided into two, namely the need for developing a planning process to adopt Big Data technology and making an implementation roadmap
2. Literature review to support this research includes journals and research related to customer centric banking in banking as well as Big Data technology implementation framework

3. Data collection consisting of:

a. Interview

The interview was conducted with the Business Intelligence & Analytics Group Head who acts as the developer and operational implementer of all data processing Technologies including Big Data Technology that will be used.

b. Document review

The company documents needed in this research are the 2016-2021 Corporate Plan documents, 2017-2022 Information Technology (IT) Strategic Plan documents, 2020 Company annual reports, and document of big data project that contain:

- Interview result with the Director of IT, Treasury & International Banking and the Head of the Information Technology Division who acts as the owner of all Information technology systems at Bank XYZ including the owner of the Big Data Technology that will be used.
- Focus Group Discussion (FGD) result with 10 Business Divisions representing the Divisions that will utilize Big Data Technology. This FGD document contains what problems have been experienced by business units so far in relation to the use of data and what business questions they hope to answer by implementing Big Data Technology.

4. From the data obtained, Bank XYZ's digital transformation strategy was made to become a customer-centric bank using a customer-centric framework.

5. The next stage is to plan the adoption of Big Data technology using the Big Data Framework for Agile Business (BDFAB). Within the BDFAB framework, there are 5 (five) main building blocks/modules that formulate a comprehensive Big Data technology adoption strategy.

6. Furthermore, as the last stage, a roadmap for the implementation of digital transformation and adoption of Big Data technology was developed which will be divided into 3 phases, namely the foundation phase, development phase, and transformation phase.

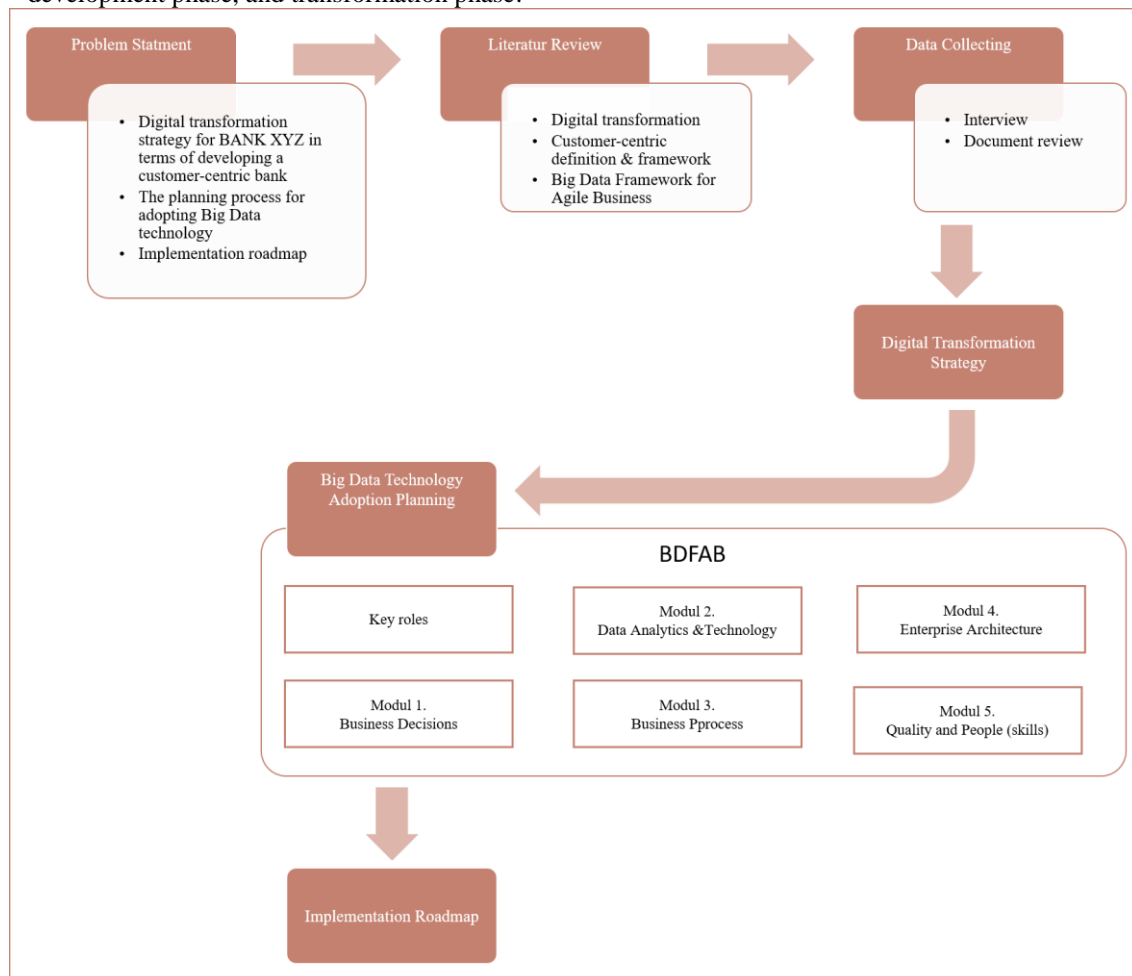


Figure 1. Research Framework (Source: Researcher Design)

Conceptual Framework

Customer-centric Framework

To become a customer-oriented company, there are three main initiatives that need to be carried out by companies which are described in the figure 2:

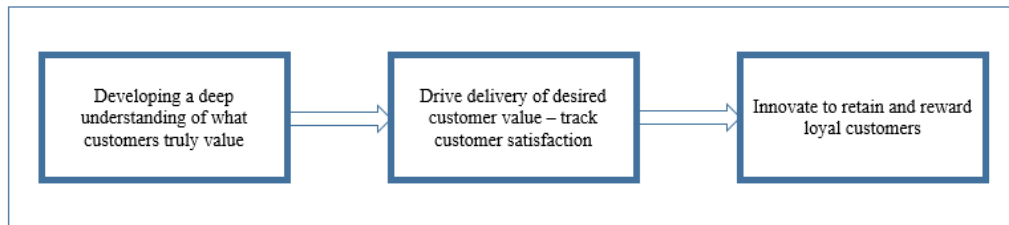


Figure 2. Framework for creating a customer-oriented organization [17]

1. Developing a deep understanding of what customers truly value
 Companies must know customer needs and develop strategies to meet those needs. To gain a deep understanding of customers requires a sharp analysis of customer behavior.
2. Drive delivery of desired value – track customer satisfaction
 A customer-oriented company will focus on ensuring that customers get the value they want. The company will pay great attention to customer satisfaction and tracking satisfaction is built into the company's business processes. The development of tools to measure customer satisfaction is an important thing for banks to do [18].
3. Innovate to retain and reward loyal customers
 Customer preferences will change/evolve over time and a customer-oriented company must be able to keep up with these changes and adapt their offerings to meet current customer needs. Customer satisfaction has a positive impact on customer trust and customer trust has a significant impact on customer loyalty [19].

Big Data Framework for Agile Business

Big Data technology has revolutionized financial companies because this technology has been proven to be able to produce various analyzes and insights to speed up manual processes, monitor financial performance, control growth, increase revenue and customer satisfaction [20]. The process of adopting Big Data technology requires a framework at the enterprise level and is a process that involves all factors within the company synergistically to support the varied needs of organizations. The framework must be able to reduce the risk of adoption of Big Data technology starting with making investment decisions, focusing on business agility as expected results, formulating roadmaps and conducting gap analysis on technology and analytics. All of these are the basis for the Big Data Framework for Agile Business (BDFAB) that consists of five modules, each of which manages areas of the adoption of Big Data by enterprises as follows: [21]

1. Business decisions: this module explores the conditions/capabilities that will support organizations to adopt Big Data.
2. Data science – analytics, context, and technology: this module focuses on data analytics – mapping volume, velocity, variety and veracity with structured, unstructured, and semi-structured data types.
3. Business process: this module focuses on documenting the desired output of each business process. For this reason, this module will use use case diagram to document use cases and business process model diagram
4. Enterprise architecture: this module is the architectural building block of BDFAB
5. Quality, GRC (Governance, Risk, and Compliance), and people: this module focuses on overall quality aspects and human resources.

TABLE 1
 PREVIOUS RESEARCH MATRIX

Research Title	Researcher Name	Research Method	Research Result
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Reshaping Banking Industry Through Digital Transformation	Vladimir Mirkovic, Jelena Lukic, Vesna Martin (2019)	Using literature study and case study of Singapore's DBS bank	To maintain the level of competition, traditional banks must be more agile, accept new innovations, and focus more on simplifying the process of providing banking services for all customers. Digital transformation changes the banking world in various aspects such as changes in organizational structure, business processes, including the number and expertise of employees [15].
Digital transformation in the banking sector: surveys exploration and analytics	Fadoua Khanboubi & Azedine Boulmakoul (2019)	Survey to financial specialist and analyze the result using data mining tools, fuzzy dissimilarity, and R ecosystem	Digital transformation is important for banks to carry out but in its implementation it is important to have clear goals and strategies. To be able to achieve digital transformation, banks must know the bank's internal and external factors and most importantly understand the real needs of customers [22]
Using Big Data Analytics to Develop Marketing Intelligence Systems for Commercial Banks in Egypt	Mohamed Asaad El Banna & Makram Labib (2019)	Analyze customer transaction data from several banks using Apache Hadoop	Big Data analytics can be used to create Marketing Intelligence in the bank which includes profiling customers, segmenting customers based on historical transaction data, predicting customer behavior, creating new marketing strategies, and providing the right offers for customers [23].
Role of big data in retail customer-centric marketing	Mahajan & Lohare (2017)	The research was conducted using secondary data sources such as journals, news articles, and survey reports and based on the results of interviews with experts in the field of using Big Data to create a customer-oriented retail company	Companies can gain competitive advantage from using Big Data Analytics. Companies can sell and promote products using raw data that is processed by various metrics. In addition, companies can also make decisions more quickly and flexibly. This will improve the customer experience which in turn can increase conversion rates and customer loyalty [16].

Table 1 contains previous studies with topics related to banking, digital transformation, and big data. From the results of these previous studies, it can be seen banks need to carry out digital transformation to be able to maintain the level of competition where one of the things that bank need to do to achieve the goals of digital transformation is to understand customer needs. In addition, from previous research, it is also known the relationship and benefits of Big Data Analytics to be able to support companies in understanding customers to increase customer loyalty. Based on the results of these previous studies, this research combines the creation of digital transformation strategy to become a customer-centric bank with planning for the adoption of Big Data technology.

III. RESULT AND DISCUSSION

After collecting data through interviews and document review, the next step is to formulate a digital transformation planning strategy for Bank XYZ by utilizing Big Data Technology.

Digital Transformation Strategy

The formulation of a digital transformation strategy will be carried out based on the Framework for creating a customer-oriented organization in Figure 2.

Understanding customer needs

Bank XYZ must know customer needs and develop strategies to meet those needs. To gain a deep understanding of customers requires a sharp analysis of customer behavior. This means compiling transactions made by customers and developing customer profiles based on the behavior of those transactions. Table 2 contains the strategies proposed by this study so that Bank XYZ can understand customer needs.

TABLE 2
 UNDERSTANDING CUSTOMER NEEDS PROPOSED SOLUTION

No	Proposed Solution	Benefits
1	Customer Lifetime Value Analysis of the calculation of the value of each customer	Provide an overview to management regarding the value generated by customers from the beginning until now
2	Customer Segmentation Divide Bank XYZ's customer base into several groups that have similarities and are relevant in terms of marketing such as age, gender, preferences and shopping patterns	Increase sales of products and services from deep customer segmentation knowledge
3	Customer 360 View A portal that will be used by bank XYZ to see the customer side more broadly (360 degrees). This includes the integration of the core banking system with customer information, devices, channels, and products to improve the experience in interacting with customers and maximize the value that will be provided to customers.	Increase knowledge about customers as a whole
4	Customer Leads data Data on potential customers to become targets for product or service marketing	Increase revenue from selling products or services to the right customers
5	Next Best Offer Offering highly customized services, goods or information to customers/customers at the right price and at the right time through the most appropriate & convenient channel for customers	Increase sales and customer/customer acquisition

Customer satisfaction tracking

Bank XYZ should be focus on ensuring that customers get the value they want, pay great attention to customer satisfaction and tracking satisfaction should be built into the company's business processes and the solution proposed by this study to achieve this is in table 3.

TABLE 3
 CUSTOMER SATISFACTION TRACKING PROPOSED SOLUTION

No	Proposed Solution	Benefits
1	Customer Sentiment Analytics Analysis to find out whether reviews/feedback/responses from customers on a product or service are positive, negative, or neutral.	Improving the quality of services and products based on suggestions and input from customers
2	Customer Churn Prediction It is a predictive analysis technique on the possibility of turning customers/customers away to competing companies	Minimizing the possibility of shifting customers/customers to competing companies

Customer loyalty improvement

Customer preferences will change/evolve over time so Bank XYZ must be able to keep up with these changes and adapt their offerings to meet current customer needs. Bank XYZ should aim to retain loyal customers because the cost of retaining customers is cheaper than the cost of acquiring new customers. Bank XYZ also needs to ensure that the rewards given to loyal customers are in accordance with the customer's wishes. The solution proposed by this study for Bank XYZ can increase customer loyalty as shown in table 4.

TABLE 4
CUSTOMER LOYALTY IMPROVEMENT PROPOSED SOLUTION

No	Proposed Solution	Benefits
1	Customized loyalty program Combining existing loyalty programs with analysis of customer transaction profiles and behavior so that Bank XYZ can provide information on vouchers that can be exchanged for points according to customer profiles. For example, customers who often make transactions at supermarkets will be given information about vouchers that can be used in supermarkets.	By creating a specific loyalty program according to customer profiles, customers will feel more cared for and their satisfaction and loyalty can increase

Big Data Technology Adoption

To be able to support the digital transformation process of Bank XYZ as well as the strategy that has been prepared previously, a plan for the adoption of Big Data technology is made that will use the BDFAB framework.

Key Roles/Stakeholders

Based on the results of interviews conducted, the following table 5 and table 6 are mapping matrix of stakeholders related to the implementation of Big Data Technology at Bank XYZ.

TABLE 5
INTERNAL STAKEHOLDERS

No.	Stakeholder	Responsibility	RACI
1	Board of Director	Act as a project sponsor who makes decisions regarding investment in Big Data implementation projects in BANK XYZ's digital transformation	R, I
2	IT Division	Act as the owner of the Big Data platform who is responsible for procuring, developing, and operating the Big Data platform end-to-end, starting from the data retrieval process from the source system to the process of creating data visualization and data analytics.	R, A
3	Digital Banking Division	Act as an SME in the use of the Big Data platform to be able to provide output that provides additional financial and non-financial benefits for the development of BANK XYZ's digital banking business	C, I
4	Network & Service Division	Act as an SME in the use of the Big Data platform to be able to provide output that provides additional financial and non-financial benefits for the development of the performance of all BANK XYZ Branch Offices	C, I
5	Branch Office	Play a role in maintaining and improving the quality of data to be processed on the Big Data platform	A, C

TABLE 6
EXTERNAL STAKEHOLDERS

No.	Stakeholder	Responsibility	RACI
1	Customer	Provide views from the customer side that can be combined with the company's internal processes in relation to changes in business processes that utilize the Big Data platform to improve service processes for customers	C, I
2	Principal / Vendor	Serving as a provider of Big Data platforms (hardware and software) as well as providing implementation services for Big Data platform development at BANK XYZ	R, A

The matrix used is the RACI matrix where R: Responsible (the party who has the responsibility to complete an activity), A: Accountable (the party who will be responsible for decisions on an activity), C: Consulted (the party who becomes the consultant in the implementation of an activity), I: Informed (the party who will obtain information from the progress status of an activity).

Module 1 – Business Decisions

After conducting interviews and reviewing company documents, then an analysis of the company's internal strengths and weaknesses as well as opportunities and threats from external companies is carried out. This analysis is very important to help provide an understanding of the position of Bank XYZ as a whole in relation to the adoption of Big Data technology. Table 7 contains the results of the SWOT (Strengths, Weaknesses, Opportunities, and Threats) from Bank XYZ related to the implementation and utilization of Big Data technology.

TABLE 7
 SWOT ANALYSIS

Strength	Weakness
<ul style="list-style-type: none"> • Having a customer base of Civil Servants in the Java area, which if an in-depth analysis of the customer data is carried out, various business benefits can be obtained • Has many forms of cooperation with various Regional Governments in Java Province which can be a source of data to obtain the market potential in Java area • Already has various kinds of digital channels that will continue to be developed where these channels can be used as output channels for Big Data analysis to customers • Ongoing Office Automation project development. With this project, more and more business processes will be automated so that they will be able to provide additional data sources that can be analyzed, for example, for the sake of increasing the effectiveness and efficiency of various operational activities. • Have an Enterprise Data Warehouse system so that data from internal systems is integrated in one place • Increased customer interest in conducting transactions through digital channels such as Mobile Banking, Internet Banking, or SMS Banking • More and more companies are providing external data sources that companies can use to integrate with internal data, such as social media platforms or telecommunications provider company provider • The increasing number of vendors providing Big Data processing platforms so that companies have many choices of platforms that can be used • Opportunity to get new customers by utilizing Big Data to integrate external data with internal data 	<ul style="list-style-type: none"> • There is still a lot of manual data owned by the business unit that is not in the system but in the form of work papers such as excel or word • The level of quality of customer data in the Core Banking system is not good enough where in terms of completeness, only 41.4% of customers have complete data. This data does not pay attention to the validity side • Existing human resources do not yet have the knowledge and expertise in Big Data Technology • There are still Business units that carry out data processing independently and separately from data processing carried out by the IT Division • The absence of a special unit or division that focuses on processing data on an Enterprise scale • Increased level of competition between banks and with financial service providers other than banks • Data leak
Opportunities	Threats

Referring to the results of the SWOT analysis, it appears that there are many opportunities and strengths that Bank XYZ has to adopt Big Data technology. Meanwhile, the weaknesses and threats that may be faced by Bank XYZ from the implementation of Big Data can be overcome, including by making data quality monitoring and SOPs (Standard Operating Procedures) for branch office officers to clean/update data and provide training for human resources regarding the use of Big Data technology.

Module 2 – Data Analytics & Technology

The following table 8 is an inventory of sources and data structures at BANK XYZ, both currently processed and unprocessed but will be used in the Big Data Analytics development process to support BANK XYZ's digital transformation:

TABLE 8
 DATA SOURCES MAPPING

No	Data Source	Description
1	Core Banking	Customer data, savings and loan accounts, book transactions, debit card masters, branch masters
2	Core Banking Front End	Teller and Customer Service activity data
3	Switching system	ATM and EDC transaction data
4	Mobile Banking	Mobile banking user and transaction data
5	Internet Banking	Internet banking user and transaction data
6	SMS Banking	SMS banking user and transaction data
7	E-money application	E-money user and transaction data
8	Treasury system	Treasury transaction data
9	Human capital system	Employee data
10	Loan Management system	Loan origination data
11	Payroll files	Payroll data
12	Call center	Call records
13	ATM machine	ATM transaction log
14	EDC machine	EDC transaction log
15	E-channel clickstream	Customer interaction data when using e-channels such as mobile banking, internet banking, and e-money applications

To be able to support the implementation and development of various use cases that will be developed in planning for BANK XYZ's digital transformation, BANK XYZ must have Big Data Technology that has the following capabilities:

1. Capable of storing and processing data, both structured and unstructured, as well as those originating from the internal source system and from external sources
2. Able to increase the volume of data for analysis needs easily, quickly and at an efficient cost
3. Able to process data for analysis needs in real-time or near real-time
4. Able to process data and apply machine learning for descriptive, predictive, and prescriptive analysis needs
5. Able to support data exploration process by data scientist
6. Has a visualization function to display the output of the analysis results that are descriptive, predictive and prescriptive & AI/ML (Artificial Intelligence/Machine Learning)
7. Able to support the implementation of comprehensive data security
8. Able to support the implementation of data governance which is a must in the big data era

Module 3 – Business Process

Referring to the results of the Focus Group Discussion (FGD) and the results of interviews, there are various needs conveyed by business users related to customer management, such as:

1. The need to obtain an overview of customer needs,
2. The need to improve service to customers,
3. The need to increase the growth of funds and credit,
4. The need to increase the effectiveness of product marketing activities.

These needs are in line with the goal of digital transformation of Bank XYZ as conveyed by the IT Director, which is Bank XYZ can become a Customer Centric Bank. In connection with this need, through the use of the Big Data system which allows to collect data from various sources and various forms as well as in large quantities, Bank XYZ can obtain various insights related to customers and various insights related to these customers will be combined in the form of development and implementation of business use case Customer 360 View.

The considerations for selecting this business use case are:

1. The scope of use cases is quite broad, namely the creation of customer segmentation, product recommendations, to targeted marketing programs
2. Output that can be used by various parties, ranging from the Business Division, Supporting Division, Call Center, Regional Office, to Branch Offices
3. Value of the use case which includes:
 - a. This view can be used by customer service officers to improve service to customers by providing appropriate product recommendation and in the end will be able to increase customer satisfaction

- b. Increased customer satisfaction will also have an effect on increasing business income because it will also increase the level of utilization/use of banking products and services by customers
- c. An increase in utilization/use of banking products and services will result in an increase of fee-based income for the bank

Mapping the use of Customer 360 View will be done using Use Case Diagram. Use Case Diagram is a form of modeling that can describe the interaction between the user and the system so that it can provide understanding in the process of implementing a system.

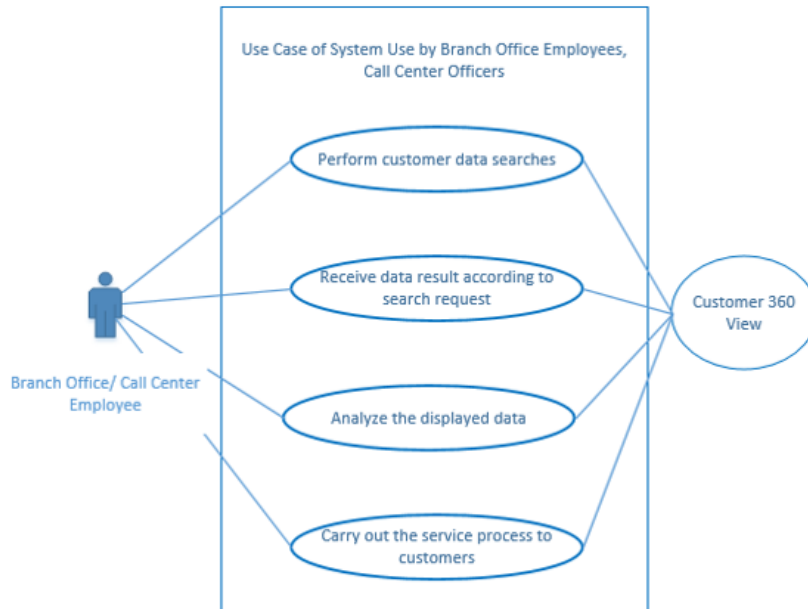


Figure 3. Use Case Diagram of System Use by Branch Office / Call Center Officers

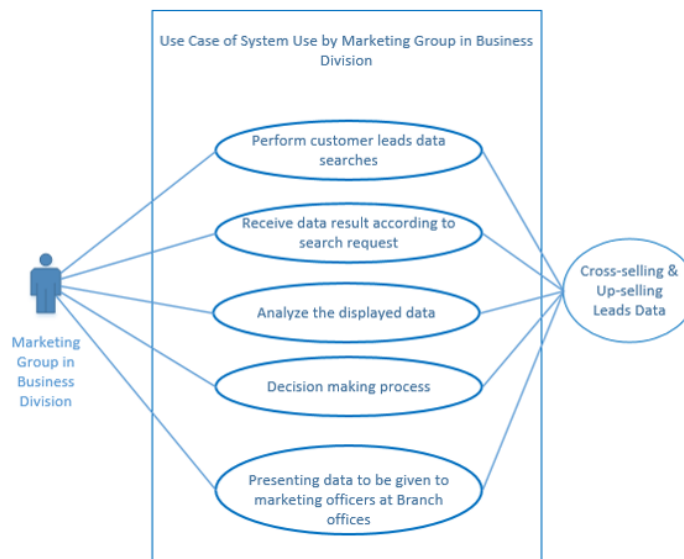


Figure 4. Use Case Diagram of System Use by Marketing Group in Business Division

Referring to figure 3 and figure 4, the Customer 360 View can be used in various activities such as:

1. Usage by Customer Service (CS) at Branch Offices when serving customers. If the customer served is an existing customer, the CS Officer can open this View and search for the customer's data. Furthermore, the View will display a complete customer profile, starting from the customer's name, occupation, telephone number, residential address, customer segmentation, products and e-channels owned, to product recommendations and promo programs to be offered.
2. Usage by Call Center Employees when serving customers by telephone or by Tele Marketing Employees when making product offerings.

3. Based on the product recommendation insights contained in the Customer 360 View, the data can become data leads/prospects for the Marketing Group Business division to carry out the Cross-selling and Up-selling processes of the Bank's products and services. These Data Leads can also be forwarded by the Division at the head office to the officers at the branch offices to conduct product marketing so that the officers at the branch can devote all their time and effort to marketing products, no longer doing manual work to obtain customer data that needs to be contacted to do business. product marketing

Module 4 – Enterprise Architecture

The design of the information system architecture for Bank XYZ for the implementation of Big Data Technology will refer to the need for Technology to support the development and implementation of various business use cases that will be carried out. Using the Big Data architecture reference from [24], here are the results of the author's design for the form of Information system architecture with Big Data Technology which includes Data Source to Information Delivery as shown in figure 5.

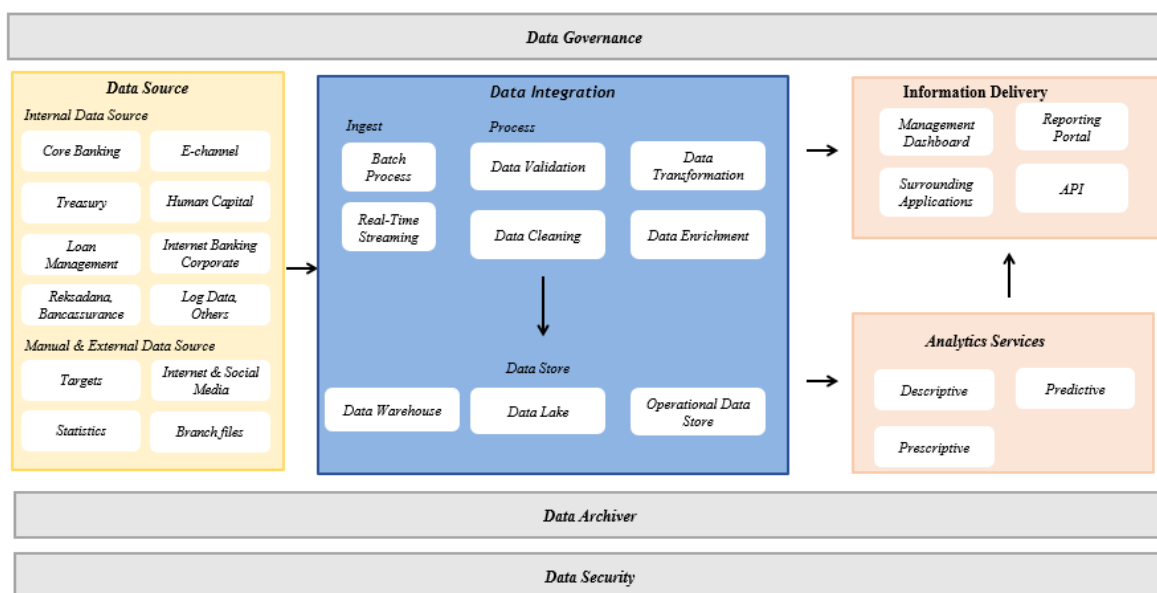


Figure 5: Proposed Information System Architecture

Module 5 – Quality & People

1. Quality

In order for the adoption process of big data technology can carry out the digital transformation process, it must be supported by data that has good quality and the data processing process is protected from errors. Here are some initiatives that can be carried out by Bank XYZ in order to improve data quality management:

- a. Making data profiling
- b. Creation of standardization data
- c. Create automation tools to calculate the matching score for customer data that is suspect duplicate
- d. Create monitoring tools

2. People

In the management of Big Data Technology, because this technology is not currently used by Bank XYZ, it needs to prepare human resources who have the expertise to be able to carry out the entire Big Data management process so that the technology can accurately and quickly provide value and support the decision process what the Business Division needs to do. Figure 6 is a proposed design of the structure for managing Big Data technology going forward.

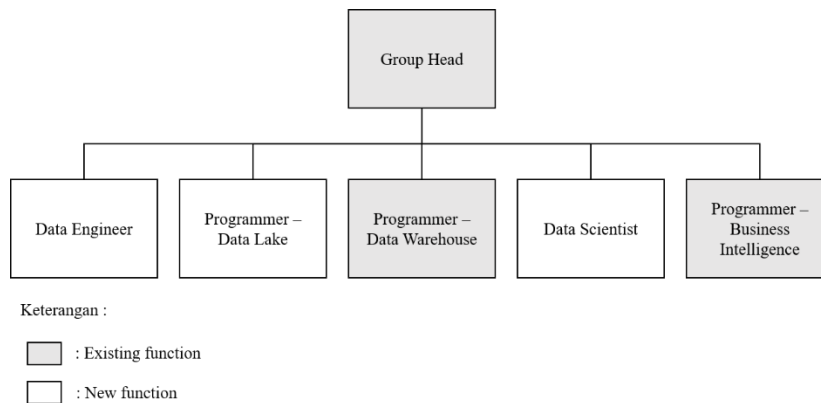


Figure 6: Proposed Big Data Development Team Structure

Implementation Roadmap

The following in figure 8 is a roadmap for Bank XYZ's digital transformation implementation which is in line with the development of Big Data Technology within a period of 5 (five) years.

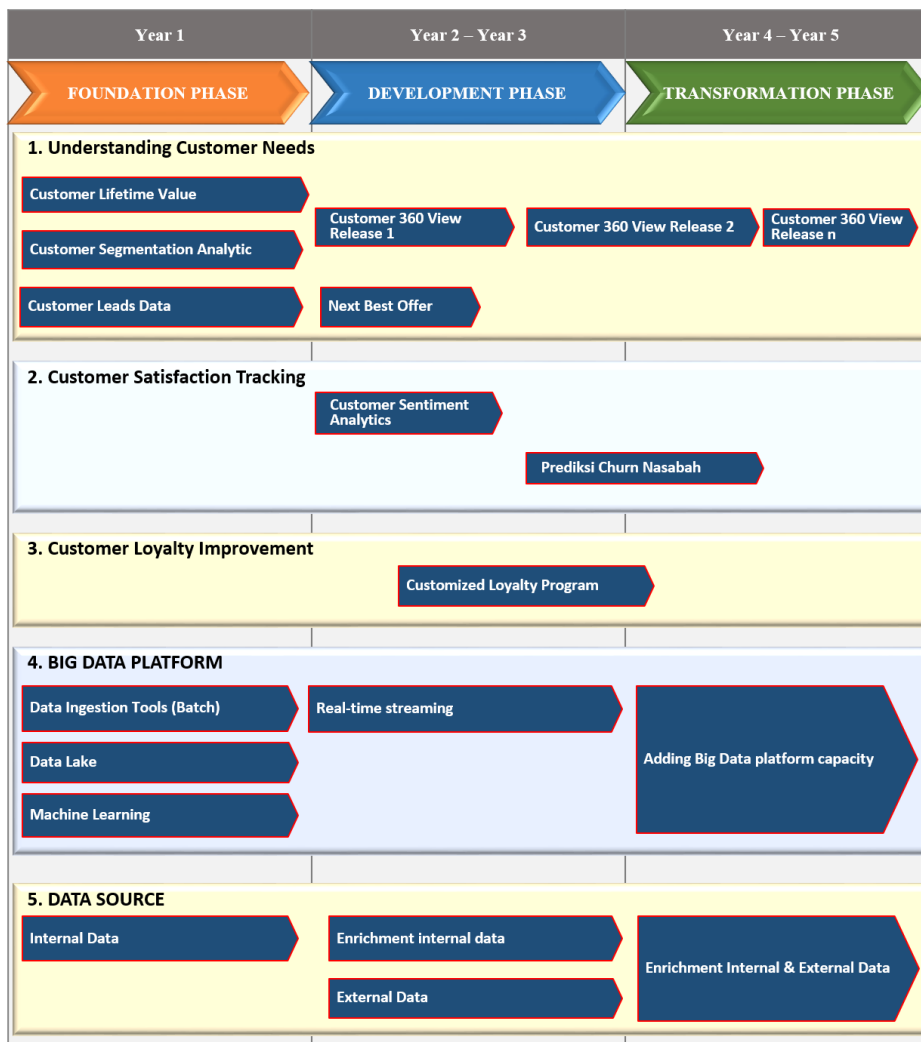


Figure 7. Implementation Roadmap

Bank XYZ's digital transformation roadmap to become a customer-centric bank and implementation of Big Data technology adoption was made with a period of 5 (five) years which is divided into 3 (three) phases as follows:

1. Foundation Phase

This phase is the first phase that Bank XYZ needs to carry out, namely building the foundation of the digital transformation process. In this phase, internal data collection into Big Data technology begins, which at least includes the development of data ingestion tools, data lake platforms, and machine learning tools to be able to carry out strategies related to understanding customer needs. The expected output from this phase is that Bank XYZ can obtain information about customer profiles, not only in terms of demographics but also in terms of transaction behavior, can obtain customer information that provides more value, can carry out customer segmentation processes and make various marketing strategies or products and services in accordance with the profile and needs of customers in each segment. In addition, in this phase, Bank XYZ is also expected to have an interface tool that displays a Customer 360 View where this interface tool can be accessed by all employees, both employees at the Head Office, Regional Offices, Branch Offices and Call Center officers.

2. Development Phase

This second phase is the development phase of the first phase where in this phase, Bank XYZ needs to add data from internal sources and start collecting external data. This data enrichment will support the development of more advanced analysis related to customer-centric strategies. An example of adding internal data that needs to be done is logs from the Call Center to get data on complaints from customers and data on customer responses to promotions carried out. Another example of data is a document from the Loan Management System, one of the documents that can provide value to Bank XYZ is a scan of a family card document where from the document it can be seen the number of dependents of the debtor and the relationship between the debtor and other customers who are family members can be obtained. To support the strategy of tracking customer satisfaction, in this phase additional external data must also be added, such as retrieving data from Twitter or the Play Store to obtain data on feedback from customers on Bank XYZ products and services.

3. Transformation Phase

This phase is the last phase on this roadmap where the development of Big Data technology and customer-centric strategies carried out by Bank XYZ has become more advanced. In this phase, Bank XYZ has implemented various strategies to become a customer-centric bank and already has Big Data technology with complete capabilities and data from various sources to meet the needs of implementing these strategies. By utilizing all the capabilities that have been built, Bank XYZ will be able to achieve the objectives of the digital transformation strategy carried out such as improving customer experience and customer satisfaction, developing products and services that are in accordance with customer needs, as well as increasing the number of new customers.

IV. CONCLUSION

In order to carry out digital transformation to become a customer-centric bank, the strategies that can be carried out by Bank XYZ are to create Customer Lifetime Value, Customer Segmentation, Customer 360 View, Potential New/Top Up Debtors, Next Best Offer, Customer Sentiment Analytics, Prediction of Customer Churn, Customized loyalty programs. Big Data Technology is needed to be able to support all these strategies and the planning process for the adoption of Big Data Technology that needs to be carried out by Bank XYZ starting from determining stakeholders, making SWOT analysis, making an inventory of data sources and data processing technology, determining business use cases and creating business processes that new, designing the Big Data system architecture and making a quality control strategy and the last is determining the human resources and expertise needed. The roadmap for implementing digital transformation and adopting Big Data technology is made within a period of 5 (five) years which is divided into 3 phases, namely Foundation phase, Development phase, and Transformation phase. The digital transformation that will be carried out by Bank XYZ can provide business benefits for Bank XYZ including adding new customers, increasing satisfaction and loyalty of existing customers which will directly increase the utility of using products and services offered by bank XYZ so as to increase bank profitability. Suggestion that can be given for further development is that the scope of this research is only limited to the planning stage, for further research it can be carried out at the design stage of a decision support system for example making customer segmentation analysis or next best offer using Big Data analytics.

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