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Enterprise Architecture: Digital Transformation of BPRCCo SMEs Using TOGAF 10

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Abstract

Digital Transformation (DT) is a challenge for banks in Indonesia. Previous research has shown that IT strategy and architecture is one of the key governance mechanisms that play an important role in the success of DT in the Indonesian banking industry. However, this research has not been proven for the small-scale banking sector, in particular BPRCCo as an SME bank. Enterprise architecture (EA) is a method that can be used to align business and IT strategy. This research uses the Design Science Research (DSR) method, which includes problem explication, requirement specification, design and development, demonstration, and evaluation. Data was gathered through semi-structured interviews, validated using document triangulation, and analyzed using the TOGAF 10 framework, from the preliminary phase through technology architecture, producing blueprint for BPRCCo roadmap 2024-2026. This research contributes to the knowledge base of EA in DT for SMEs and guidance for BPRCCo and similar organizations in implementing prioritized artifacts for successful DT.

Keywords: *BPR, Digital Transformation, Enterprise Architecture, SMEs, TOGAF*

1. Introduction

Due to digital technology's disruptive impact, organizations are driven to expedite their digital transformation (DT) [1]. DT is a strategic step in managing organizational structures and barriers to achieve value-creation opportunities [2]. It enhances services and efficiency [3] and significantly changes organizational business models [4]. Organizations must promptly adapt to new changes to remain resilient against competitors [4]. Managing organizational changes requires adjustments that align with organizational DT, enabling them to capitalize on opportunities [5].

IT Governance (ITG) is an important mechanism in an organization. “ITG is an integral part of corporate governance for which the board of directors is responsible. It involves the definition and implementation of structures, processes, and relational mechanisms to enable business and IT stakeholders to carry out their responsibilities in aligning business and IT and the creation and protection of IT business value" [6]. The findings from a research literature review, there are agile ITG mechanisms that affects DT [7]. Subsequently, another study found that traditional ITG still has an impact on DT [8]. Later on, the next study showed the importance of ambidextrous of traditional and agile ITG in DT towards achieving organizational performance (OP) [1]. Even the latest research shows the importance of IT strategy and architecture as one of the key mechanisms for a large bank DT success in achieving OP [9], extended by a survey in many large banks and insurance

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[10].Additionally, prior studies have highlighted the significance of an IT service-based enterprise architecture grounded in ITIL and TOGAF frameworks [11]. Moreover, specific IT governance mechanisms that impact DT and OP in a large bank have been identified [12]. These insights were further developed by exploring various models that influence digital transformation in subsequent research [13], [14]. [1], [7], [8], [9], [10]Furthermore, previous research also found the contribution of IT Services [15], IT Risk [16], information security [17], and DevOps [18] for successful DT in large banks, based on COBIT 2019 specific focus areas. However, the knowledge gap still remains for enterprise architecture contribution in SME bank context such as BPRCCo. One method that can be implemented in aligning business and Information Technology (IT) strategies is Enterprise Architecture (EA) [19]. EA involves describing the company from both a business and IT point of view [20]. EA design discusses architectural frameworks to develop the scope of discussion in terms of business, application, data, and technology fields [19].

In recent years, designing and developing a suitable EA has posed a significant challenge for many companies, especially SMEs [21].[21] Considering the significant role of SMEs in the world economy, small businesses in the United States represent 99.9% of all companies [21]. Small businesses employ approximately half of all private-sector employees, and small businesses pay 47.5% of the total private-sector wages in the United States [21]. Therefore, focusing on EA is essential to designing adaptive frameworks that SMEs can adopt to achieve business success [22].

Indonesia is a country in the ASEAN region that is predicted to experience significant growth in the digital economy, starting from USD 44 billion in 2020 and projected to reach USD 124 billion by 2025 [23]. Indonesia offers a promising market for digital services, particularly in the banking sector [23]. BPR is a conventional banking institution in Indonesia that does not engage in payment traffic services [24]. In this research, BPRCCo was selected as a case study. BPRCCo was established since 1992. Currently, BPRCCo has 23 offices in various regions in West Java including one operational office, 14 branch offices, seven cash offices, and one non-operational office. In line with its vision, to be the best and most trusted BPR in West Java in serving the economic needs of the technology-based community. Innovative digital products make BPRCCo one of the leading BPRs in Indonesia in digital banking services.

To sustain their operations, banks rely on their ability to undergo DT by managing four EA aspects: business, data, IT, and regulations [25]. This is reflected in several policies, such as the Master Plan for the Indonesian Financial Services Sector 2021-2025 (MPSJKI) Pillar 3 and the Indonesian Banking Development Roadmap 2020-2025 (RP21) Pillar 2, which direct banking institutions to undergo DT promptly [25]. This is further reinforced by POJK No.75/POJK.03/2016 [26] and SEOJK No.15/SEOJK.03/2017 [27] regarding IT Service Provider Standards for BPR and BPRS. In line with this, BPRCCo has a strategic IT plan to enhance and develop technology-based banking products and services. This step is part of DT's efforts to improve the quality of BPRCCo's products and services to remain competitive in the evolving banking industry.

Banks must design EA frameworks to achieve maximum results in DT [25]. In EA design, the TOGAF Standard is an appropriate framework for implementation in SMEs [21]. The Blueprint for Banking DT advocates EA design using TOGAF with strategic principles and best practices [25].

This research discusses the design of EA at BPRCCo using the TOGAF Standard 10th Edition framework and aims to answer the research questions, "*How to prepare enterprise architecture solution recommendations based on the results of the TOGAF Standard 10th Edition business process coverage assessment gap analysis and artefact prioritization for the digital transformation of BPRCCo SMEs? How to design an enterprise architecture blueprint based on TOGAF Standard 10th Edition that is prioritized for the digital transformation of BPRCCo SMEs?*" This research produces an EA blueprint and IT Roadmap that can guide BPRCCo and similar organizations toward successful DT efforts.

2. Research Methodology

The conceptual model guides research understanding, implementation, and evaluation [28]. This model comprises three main parts: Environment, Information System (IS) research, and Knowledge Base [28]. In this study, the conceptual model adopts the Design Science Research (DSR) framework which includes problem explication, requirement specification, design and development, demonstration, and evaluation. **Figure 1** is a conceptual model in this research.

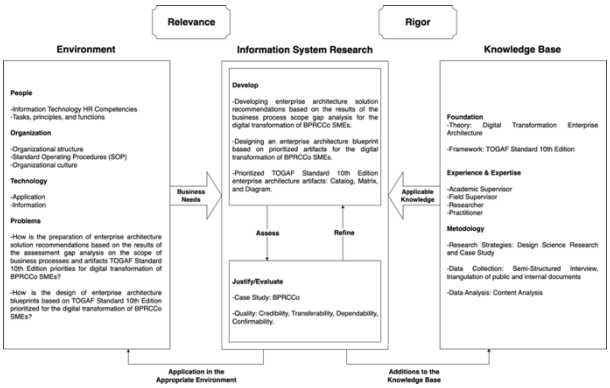

Figure 1. Design Science Research adopted from **Hevner** [28]

This research adopts a case study approach by selecting an object used for this research. The case study approach is one of the most optimal approaches because this approach investigates the problem issues in depth as a reference in determining steps in overcoming the complexity of the situation [29]. The stages in this research as a guideline in developing recommendations for EA solutions using Hevner's DSR method, which includes **problem explication, requirement specification, design and development, demonstration, and evaluation** [28]. This method is used because the results of this research are EA improvements that can be applied to related companies.

2.1. Data Collection

Data collection is categorized into two types: primary data, which is obtained directly from primary sources, and secondary data. To fulfill the research needs, the researcher conducted semi-structured interviews with BPRCCo as the main method of data collection. This research submitted a research request letter to BPRCCo. Subsequently, BPRCCo provided feedback in the form of a research acceptance letter. Primary data in

Table 1 was obtained through interviews and observations. This research used a semi-structured interview method and direct observation of the object under study for three days, namely two days conducted offline at the BPRCCo head office and

one day online through the Zoom platform. Interviews were conducted until data saturation was reached with a focus on gaining perspectives on specific topics [30]. Individual perspectives need to be explored deeper and group perspectives become relevant. This strategy can be used to collect a lot of data in a short time [30].

Table 1. Primary Data

Data	Respondent	Position
DT issues and company strategy	Respondent 1 (R1)	Operational Director
	Respondent 3 (R3)	Head of IT
BPRCCo's existing business process	Respondent 2 (R2)	Human Resource Staff
	Respondent 3 (R3)	Head of IT
	Respondent 4 (R4)	Compliance Staff

The results of field observations and interviews conducted with BPRCCo employees explain the needs of BPRCCo which are steps in DT. Respondent 1 and Respondent 3 said "If there is a plan to develop features, we want to build e-banking ... Actually, we are going in that direction more to digitize to provide services that can be used by customers ... we can't develop mobile banking to catch up with other banks ... if we are still there, that's why we have to transform [31]." This also refers to the urgency of BPRCCo's products and services as also outlined in the IT strategy plan. Furthermore, secondary data is data obtained from existing sources described in

Table *2*.

Table 2. Secondary Data

Data	Data Resources
Secondary Data	Functional Requirement Document
	Organization Structure Document
	Information Technology Document
	Official Website BPRCCo

2.2. Analysis and Design of Artefacts

The analysis and design phase are conducted through a case study using the TOGAF Standard 10th Edition, adapted for SMEs at BPRCCo, to ensure DT's success. The artefact development using TOGAF adapted for SMEs [22]. **Figure 2** illustrates the activity cycle in the TOGAF framework.

Figure 2. Architecture Development Cycle [32]

This research involved a gap analysis of TOGAF Standard 10th Edition artifacts that were prioritized based on a business process scope assessment from semi-

structured interviews with BPRCCo representatives. The phases in this research include the preliminary phase of technology architecture.

3. Result and Discussion

3.1. Preliminary Phase

The Principle Catalog consists of principles that encompass effective solutions or architectures. These principles are used to evaluate and approve matters related to architectural decisions.

Table 3 is a principles catalog of the success of DT.

Table 3. Principle Catalog

Architecture	Principle
Business Architecture	Primacy of Principles
	Maximize Benefit to the Enterprise
	Information Management is Everybody's Business
	Business Continuity
	Service Orientation
	IT Responsibility
	Compliance with Law
Data Architecture	Data is an Asset
	Data is Shared
	Data is Accessible
	Data Trustee
	Common Vocabulary and Data Definitions
	Data Security
Application Architecture	Technology Independence
	Ease-of-Use
Technology Architecture	Requirements-Based Change
	Responsive Change Management
	Interoperability

3.2. Architecture Vision

Architecture Vision is the initial phase in EA design using the TOGAF. This phase delineates the scope, identifies stakeholders, and facilitates decision-making regarding EA. The resulting artifacts include the Value Chain Diagram and Solution Concept Diagram. **Figure 3** is a Value Chain Diagram that defines the organization's high-level value based on business activities and external interactions. It outlines primary activities and supporting activities based on business activities.

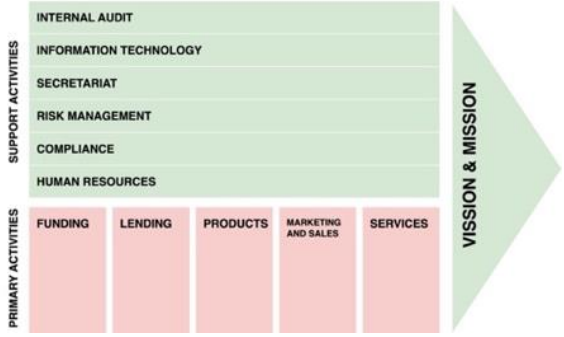

Figure 3. Value Chain Diagram

Figure 4 is the Solution Concept Diagram that illustrates a high-level orientation to meet the EA goals of BPRCCo. This artefact details stakeholders, business processes, applications, and technology solutions pertinent to this study.

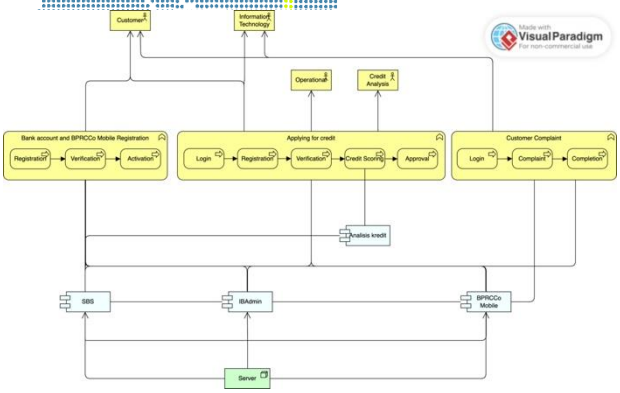

Figure 4. Solution Concept Diagram

3.3. Business Architecture

Business Architecture is the phase that identifies the current business architecture of the company in managing its business functions to achieve each corporate target. This phase also serves as a reference in understanding, planning, and managing the company's business architecture to achieve its objectives. **Table 4** is the Business Service/Function Catalog that details the business services of each corporate function in detail. In this study, the elaboration of business services focuses on the operational services of BPRCCo.

Table 4. Business Service/Function Catalog

Business Service	Business Process
Savings administration service	Bank account registration
	BPRCCo Mobile registration
Credit administration service	Applying for credit
Complaints	Customer Complaint

3.4. Data Architecture

Data Architecture identifies the current and future state of the company's data architecture. The resulting artifacts include the Application/Data Matrix and Conceptual Data Diagram. Application/Data Matrix is an artefact that describes mapping the relationship between the application and the required data entities that described in **Table 5** focuses on BPRCCo's operational services and consists of logical application components, entities, and types.

Table 5. Application/Data Matrix

Application	Entity	Type
SBS	Customer	Master data
	Account	Master data
	Transaction	Transactional data
	Credit	Transactional data
	User Management	Master data
	Report	Transactional data
IBAdmin	User Management	Master data
	Customer	Master data
	BPRCCo Mobile Account	Master data
	Products and Services	Transactional data
	Credit Agreements	Transactional data
	Complaints	Transactional data
	Customer	Master data
	Account	Master data

Application	Entity	Type
BPRCCo Mobile	BPRCCo Mobile Account	Master data
	History	Transactional data
	Products and Services	Transactional data
	Credit Agreements	Transactional data
Credit Analysis	User Management	Master data
	Credit	Transactional data
	Analysis Result	Transactional data
	Risk Criteria	Master data

Conceptual Data Diagram is an artefact that describes the relationship between data entities in applications that have been previously defined and described in **Figure 5**. This conceptual data diagram includes SBS, IBAdmin, Credit Analysis, and BPRCCo Mobile.

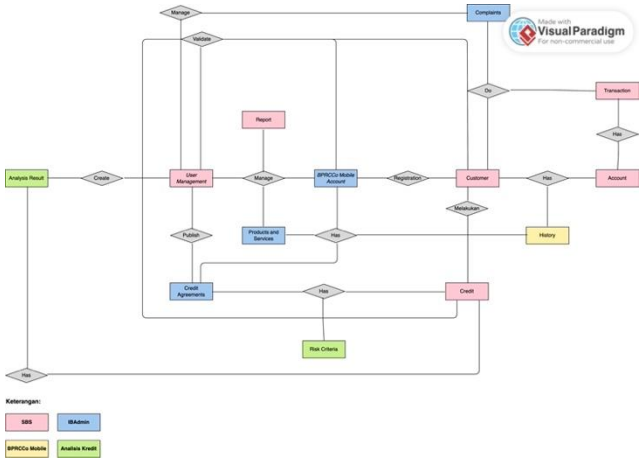

Figure 5. Conceptual Data Diagram

3.5. Application Architecture

This phase identifies the current and future state of the company's application architecture. The resulting artifacts include an Application Portfolio Catalog and an Application Communication Diagram. Application Portfolio Catalog is an artefact that describes all existing applications and target applications as proposed to achieve company goals described in

Table *6*.

Table 6. Application Portfolio Catalog

Physical Application Component	Description
SBS	Manage all banking services (funding and lending) is integrated into a centralized system and stores related documents.
IBAdmin	Manage and monitoring BPRCCo Mobile includes all available products and services, related documents, and customer interactions.
BPRCCo Mobile	Used by customers in banking transactions available at BPRCCo using the internet downloaded on cell phones are equipped with a security system.
Credit Analysis	Analyzing loans submitted by customers and storing related documents.

Application Communication Diagram is an artifact that explains the relationship between BPRCCo applications, both existing applications and targeting applications described in **Figure 6**.

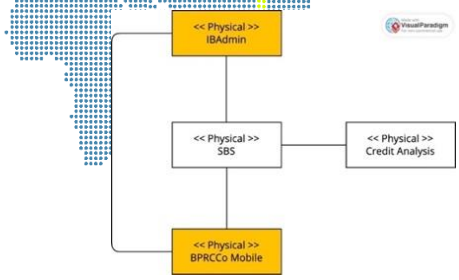

Figure 6. Application Communication Diagram

3.6. Technology Architecture

Technology Architecture is a phase that focuses on the company's technology architecture. The Technology Standard Catalog is an artefact that describes the technology standards that the company must have. This catalog consists of logical technology components and physical technology components described in **Table 7**.

Table 7. Technology Standard Catalog

Logical Technology Component	Physical Technology Component	
Platform	**Technology Component**	**Standards**
Server Platform	Server DC	CPU E5-2630
	Database Server	PostgreSQL
	VM Server	2-4 Core
		Java
		Red Hat Linux Enterprise
	OS Server	Windows
	Cloud	Google Cloud Platform
Data Distribution	Switch	Switch 3com
	Core Switch	Juniper
	Router	Mikrobits
		Mikrotik
		Juniper
		Fortigate
Security	Firewall	Fortigate
	VPN	VPN
Data Transaction	Mail Server	Gmail
	Internet	100mbps
Integration	API	JSON

To sum it up, the findings of this literature review can directly influence the Indonesian banking ecosystem and insurance industry, which is specifically being conducted by [1], [9], [10]. Previous study shows the influence of hybrid/ambidextrous ITG mechanisms on DT dimensions [1]. Ambidexterity is an ability to position the banking organization accordingly to have a competitive advantage, and therefore it is necessary to pay attention to the development process of internal capabilities and quick response to external pressures as well in implementing ambidexterity theory [33], particularly the key mechanism of IT strategy and architecture, in which both play a critical role in successful DT process [9]. The implementation of a balanced and adaptive IT strategy and architecture has become a mandatory requirement for major banking companies in Indonesia nowadays [10].

This study highlights the importance IT of strategy and architecture since modern digital infrastructure has been proven to provide such effective integration. This allows BPR to adopt the latest technology while maintaining the stability of existing systems. New technological upgrades, both for front-end and back-end, are instilled to ensure a sustainable operational system. Moreover, the microservices and middleware approaches give BPR a significant advantage in overcoming digital barriers in data exchange with the enhancement of API standards. Despite several differences in the type of technologies being used, the process of data integration can run smoothly. This kind of strategy, combined with cloud services that offer a practical solution for managing and storing company data, could make BPR become an exemplary company in terms of efficiency and smart-focused on their core business.

This study contributes added value to the industry by providing an extensive point-of-view about the role of adaptable and agile EAs that can fully support DT of banking SMEs. It also helps to elucidate a digital model that can be applied to a specific need of the company with the utilization of the TOGAF Standard 10th Edition Framework, which in turn will produce an EA blueprint based on a gap analysis of business process scope assessment and priority.

The valuable lesson learned from BPRCCo's DT process is the importance of IT strategy and architecture in the success of DT. This is especially important for BPRs or similar organizations in the face of digital changes that must be responded to quickly to ensure the BPR's sustainable business continuity, as well as to remain competitive in the digital era according to changing market needs. This research provides knowledge about EA in DT in SME BPRs and guides BPRCCo and similar organizations in achieving DT success.

4. Conclusion

To address the research questions, this study utilized the TOGAF Standard 10th Edition, focusing on prioritized artifacts from the Preliminary Phase through to Technology Architecture. The research developed enterprise architecture (EA) solution recommendations by conducting a gap analysis of the business process scope, specifically aimed at facilitating the digital transformation of BPRCCo SMEs. This process produced an EA blueprint that aligns current operational services—including savings administration, credit administration, and customer complaint services—with the targeted digital transformation goals.

The designed EA blueprint maps the existing conditions against desired outcomes, providing a structured approach to leveraging information system technology in developing BPRCCo products and services according to IT strategy, thus supporting overall business needs. This blueprint serves as a practical guide for BPRCCo and similar organizations in successfully achieving digital transformation.

However, it is crucial to note the limitations of this research, which focused specifically on banking institutions in Indonesia, particularly BPRCCo SMEs. These limitations are influenced by the unique characteristics of these organizations and the adoption of the TOGAF Standard 10th Edition framework. Future research should broaden the scope to include a wider range of organizations and industries, as well as a more diverse selection of artifacts. Despite these limitations, the research contributes to the understanding of strategy and architecture in achieving digital transformation, especially within SME banking, as demonstrated through business, data, application, and technology perspectives.

This research uses TOGAF Standard 10th Edition priority artifacts that include Preliminary Phase up to Technology Architecture. This research develops recommendations for enterprise architecture solutions based on the results of the assessment gap analysis of the business process scope for the digital transformation of

BPRCCo SMEs. It produces an EA blueprint for the digital transformation of BPRCCo SMEs that maps the existing and targeting conditions based on the results of the assessment gap analysis of BPRCCo's operational services which include savings administration services, credit administration services, and customer complaint services. The design of EA in BPRCCo operational services develops BPRCCo products and services based on information system technology by IT strategy in supporting business needs. This blueprint can be a guide for BPRCCo and similar organizations in achieving digital transformation.

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