



Leveraging Architecture Development Methodology to Enhance AfCFTA's Success

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Abstract

This study analyses the application of the Architecture Development Method and the creation of bespoke ADM-based architecture for African Free Trade Continental Area (AfCFTA), using the existing architectural artefacts and TOGAF Architecture Continuum. Central to this objective is the establishment of an AfCFTA customised Architectural Management System (AMS). The AMS integrated application provides an architectural repository, workflow management, collaboration tools, documentation, reporting and analytics, integration capabilities, and robust security measures. The study's research design is qualitative and characterised by the use of a descriptive and exploratory approach. Data analysis methods include content analysis of qualitative data, thematic analysis of TOGAF architecture repository principles, standards, and guidelines on AfCFTA, comparison of different trade agreements for AfCFTA and narrative synthesis on how ADM can enhance AfCFTA's operational framework. The research findings report that the Architectural Development Methodology within TOGAF improves resource distribution, cross-border collaboration and regulatory coherence thereby increasing operational effectiveness. It makes theoretical contributions by embedding directions that can be adopted across AfCFTA for architecture development and regional trade. This paper demonstrated the value of leveraging existing architectural artefacts with practical contributions specifying the necessity of an Architecture Development Methodology supported by an Architecture Management System. The significance of strong business, information and technological architectures, the importance of standards, principles and guidelines which harmonise trading costs and the importance of the stakeholder role in making sure AfCFTA is successful are underlined by the study. Future studies should focus on the quantitative estimation of the impact that ADM has on trade operations optimisation with the introduction of new technologies and full-fledged implementation of AMS and ADM. Designed to suit the peculiar challenges and opportunities of AfCFTA, this research promotes regional trade integration, sustainability and economic growth in Africa that would benefit businesses through increased operational efficiency and competitiveness.

Introduction

AfCFTA aims to significantly increase intra-African trade, enhance industrial growth and global competitiveness. To achieve trade agreements goals, there is a need for the design of architectural frameworks which can enable scalability, compatibility, and consistency with mission critical objectives (Mangeni & Atta-Mensah, 2022). This study analyses the application of the Architecture Development Method and the creation of bespoke ADM-based architecture for African Free Trade Continental Area (AfCFTA), using the existing architectural artefacts and TOGAF Architecture Continuum.

The aim of this paper is to explore the ways through which the utilisation of TOGAF's ADM leads to the streamlining of trade processes, promotion of regulatory harmonisation and the facilitation of cross-border cooperation within the AfCFTA framework. The research hence focuses on four objectives: first, architectural artefacts from present trade agreements such as those of the European Union Customs Union and North American Free Trade Agreement

(NAFTA) are identified to help inform the architecture of AfCFTA. Secondly, in order to extract important principles, standards, and guidelines applicable in case of AfCFTA, the TOGAF Architecture Continuum and Repository are reviewed. The third objective of the study presents an architecture customised to different situations according to ADM, so as to tackle challenges such as cross boundaries cooperation, regulation alignment and infrastructure scalability. Eventually, the research suggests that there should be an Architecture Management System (AMS) of AfCFTA Architecture which consists of all architectural artefacts, process management, interpersonal tools in addition to formal documentation all on one platform with security aspects incorporated within it. So, the whole idea behind this study is to respond to these research questions:

The first question looks at how the existing architectural artefacts can shape and influence the architecture of the African Continental Free Trade Area (AfCFTA). It will examine how existing architectural resources, models and documents can have an effect on and contribute to building AfCFTA's architecture. The purpose of the second research question is to find out the main principles, standards, and guidelines retrieved from TOGAF Architecture Repository that would be applied to AfCFTA. This is intended to determine the significant parts of TOGAF Architecture Repository that can inform on design and setup of AfCFTA's architecture.

The third research question aims to develop an architecture based on Architecture Development Method (ADM) that can help solve challenges and take advantages of opportunities provided by AfCFTA. It aims at using the ADM which is the key process of TOGAF to develop a strong and flexible architecture for AfCFTA. The fourth research question seeks to determine how a custom AfCFTA Management System (AMS) can use the ADM methodology maximally to help the tasks and decision-making process. It intends to find out ways in which performance and cost effectiveness of AfCFTA's goals can be achieved through optimisation of this AMS management tool.

The study results show that ADM can offer much improvement to AfCFTA which will make it become more efficient. Additionally, the findings showed that the use of TOGAF's architecture principles, especially interoperability and scalability, would help AfCFTA in overcoming the issues posed by fragmented trade systems and regulatory discrepancies. On the other hand, the suggested AMS serves a vital function of offering one centralised location for performing architectural artefact administration thereby enhancing partnerships among various actors while managing data securely. Thus, the study emphasises on the importance of a properly constructed architecture framework in bettering the efficiency of AfCFTA and transforming Africa into a global trading bloc.

Literature Review

This literature review section considers fundamental issues concerning the development of architectural frameworks for the African Continental Free Trade Area (AfCFTA). Firstly, it examines different architectural frameworks that are commonly used in complicated enterprise systems' architecture such as TOGAF, the Zachman Framework and the Federal Enterprise Architecture Framework (FEAF). Next, this review touches on the method of recognising architectural artefacts including documents, blueprints and case studies which are fundamental in strengthening AfCFTA's architecture. Additionally, the literature examines TOGAF's Architecture Continuum that offers a systematic way of arranging these artefacts whereas the Architecture Repository is a tool for handling architectural assets and facilitating system flexibility.

AfCFTA was created in response to the critical challenge of boosting intra-Africa trade and fostering more significant economic partnerships. It is set to resolve the problems of badly fragmented trade, lack of market access and a weak coordination among African countries. The African Union instrumentalised this vision into practical realisation (Signé & Munyati, 2023).

The purpose of TOGAF's Architecture Continuum is to offer an effective systematic representation of architectural components in a sequence starting from foundational architectures through to industry-specific fields. In other words, the Architecture Continuum becomes a storage facility which contains different types and levels of assets, principles, standards and guidelines (Kotsev, 2018). There are various architectural frameworks used in trade agreements such as TOGAF, Zachman Framework and Federal Enterprise Architecture Framework (FEAF). Using existing architectural artefacts requires documentation, blueprints, reference models and case studies from comparable trade agreements and initiatives. TOGAF's Architecture Continuum and TOGAF's Architecture Repository form part of a useful resource for organisations new to architectural initiatives and development. The purpose of TOGAF's Architecture Continuum is to offer an effective systematic representation of architectural components in a sequence starting from foundational architectures through to industry-specific fields. In other words, the Architecture Continuum becomes a storage repository which contains different types and levels of assets, principles, standards and guidelines (Kotsev, 2018).

TOGAF is one of many frameworks for developing and managing enterprise architectures, but it's used extensively because it's structured, flexible and scalable in aligning information technology with business goals. Architecture Development Method (ADM) is the main method employed in TOGAF that enables organizations go through all the architecture lifecycle stages from planning, implementation to governance. Apart from ADM, TOGAF has several additional tools to cover complete enterprise architecture management. The Enterprise Continuum classifies and applies architectural models and solutions while Content Framework ensures uniformity in deliverables. The Architecture Repository acts as a storage place for reusable assets thus assisting in administration of architecture documentation. A Capability Framework used by TOGAF serves as an organisation architecture maturity evaluator and Governance Framework that acts as a compliance monitor, risk manager and standards adherent. These approaches make TOGAF a strong instrument in managing enterprise architecture across various sectors (The Open Group, 2018).

One of the fundamental models in enterprise architecture is the Zachman Framework, which gives a systematic approach to comprehending and taking care of complicated systems. It was first put forward by John Zachman in 1987 for developing information systems architecture. However, it has later been widened to accommodate a variety of industry-based enterprise architectures such as trade agreements and large organizations' enterprise-wide processes. The thought of classification is what brought forth the Zachman Framework, which takes the form of a two-dimensional schema or matrix. It has six rows (for different perspectives) and six columns (for different descriptive elements), thus making it a complete and comprehensive model for the analysis of enterprise components. These six aspects (columns) define what, how, where, who, when and why whereas six rows represent different reports from executive planners to detailed system implementations. Zachman's Framework for structured and normative corporate architecture defines six fields: data, function, network, people, time, and motivation as well as six perspectives: executive, management in business, architects, engineers, technician, and enterprise (Giachetti 2016). At the same time, it has a significant influence on these spheres; however, Zachman's purpose is more to organise and to categorise complicated systems than to offer a sequential scheme.

To ensure that business objectives and tech capacities succeed, the US federal government came up with a Federal Enterprise Architecture Framework (FEAF). This points toward standardisation, interoperability and integration based on larger networks of complicated enterprises (Giachetti, 2016). Within trade treaties such as AfCFTA context, FEAF provides clues on how to harmonize trading operations and logistics management. The entire process as set by international organization for standardization (ISO) and international electrotechnical commission (IEC) mainly aims at maintaining uniformity and interchangeability while ensuring safeguarding of business blueprints and other trade related technologies. Information Security Management System (ISMS) guidelines are provided by one of the most significant ISO/IEC 27001:2013 standard. Thus, it assures that risky and sensitive information is properly protected for effective management of information security risks (ISO, 2013). In this sense, it contributes to building trust among trade partners by minimizing data breaches during customs and logistics operations in the case of trade agreements.

TOGAF's ADM is not much researched for AfCFTA although its known advantages prompt its consideration. This paper aims to achieve the goal through the exploration of how ADM can respond to the specific opportunities and threats of AfCFTA.

Leveraging Existing Architectural Artefacts

Architectural artefacts are created to define a system, solution, or enterprise state. A "System" is a set of components put together to accomplish a particular function. System 'architecture' is the system's structural organisation, as embodied in its components, their relationships, and principles governing their design and evolution concerning the environment. Architecture views serve as the main products in an architecture description as per TOGAF. Stakeholders refer to individuals who play crucial tasks in the system or those who are anxious about the system such as use, development and management. Different stakeholders who act in different capacities within the system will have diverse concerns (The Open Group, 2011).

The system's operation, development and functions in any aspect can be a source of worry including its speed, accuracy, data protection, distribution and potential to adapt to new situations. Each of these may be particularly studied under the term "view" which denotes any comprehensive outlook on the system from its different sides. Designing an architectural blueprint would require making one or more other schematic representations (models) that represent how structures should be interrelated based on different scales and dimensions (Giachetti, 2016).

Identifying Relevant Architecture Artefacts

It is critical to choose important artefacts that will inform designing AfCFTA's architectural framework from already existing architectural artefacts. This will entail gathering documentation, blueprints, reference models and case studies on former successful trade agreements and regional economic communities (Kotsev, 2018).

Table 1: Identifying Relevant Architectural Artefacts

Artefact Type	Trade Area	Description	Source
Agreement	North American Free Trade Agreement (NAFTA)	NAFTA is one of trade agreement in between three sides, namely the United States and its neighbors like Canada, Mexico. The purpose of this pact is to eliminate customs duties and minimise trade barriers that exist for goods and services traded across borders. By establishing rules governing trade and investment, enhancing market access; creating an environment conducive to business operations NAFTA promotes economic unity and cooperation. Other subjects under this agreement include intellectual property rights protection, labor standards compliance as well as environmental regulations enforcement.	NAFTA Secretariat, 2024
Agreement	Trans-Pacific Partnership (TPP)	TPP is one of inclusive trade treaties accomplished in the nations around Pacific Rim, Trans-Pacific comprising Australia, Canada, Japan and Mexico and Singapore. The purpose of this agreement is to foster closer economic ties among the member states, eliminate tariffs, reduce non-tariff barriers and set up standardised regulations on various aspects relating to trade. Market access enhancement, protection of intellectual property rights and establishment of a more equitable and transparent trading environment within the region are some other objectives of the agreement.	TPP Secretariat, 2024
Agreement	Central America-Dominican Republic Free Trade (CAFTA-DR)	The CAFTA-DR free trade agreement, in which the United States consents to engage with Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua and the Dominican Republic is intended for removing tariff barriers between respective countries. Its objectives include abolishing restrictions in trade by eliminating tariffs; encouraging economic cooperation among member states; streamlining processes involved in doing business. In a nutshell, the agreement will open up markets, allow for more transparent regulations and increase investment flows into this corner of the world.	CAFTA-DR, 2024
Blueprint	European Union (EU) Customs Union	The EU Customs Union blueprint outlines uniform customs procedures, a shared tariff system, and the Union Customs Code for consistent regulations. It uses modern technology and upgrades border facilities to simplify operations. By aligning standards and establishing mutual recognition agreements, it reduces commission barriers to trade. Moreover, initiatives like the Authorized Economic Operator (AEO) program are implemented to speed up processing and enhance trade facilitation.	European Union Commission, 2024
Blueprint	Gulf Cooperation Council (GCC) Customs Union	The blueprint for the GCC Customs Union focuses on simplifying customs procedures, standardizing regulations, and fostering cooperation among member states, which include Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the UAE. It prioritizes the adoption of uniform processes, the development of modern infrastructure, and collaborative efforts to facilitate trade and enhance economic integration within the GCC region.	GCC Secretariat, 2024
Blueprint	Southern African (SADC) Customs Union	The blueprint for the SADC Customs Union aims to foster customs integration and collaboration among member states of the Southern African Development Community (SADC), which consists of 16 countries in southern Africa. It Community concentrates on aligning customs procedures, removing trade barriers, and boosting intra-regional trade. Key elements include the adoption of standardized documentation, the development of modern infrastructure, and the implementation of joint efforts to simplify trade processes and strengthen economic integration within the SADC region.	SADC Secretariat, 2024
Case Study	Mercosur Case Study	A comprehensive examination of how affiliated nations such as Argentina, Brazil, Paraguay and Uruguay have managed to implement strategies, overcome challenges and obtain results in Mercosur is presented in the Mercosur Trade bloc case study. This study discusses the evolution of Mercosur in terms of its institutional apparatus being	Mercosur Case Study, 2024

		established as well as its impact on national economies of member states as well as the most significant drivers behind the success story of this organization. Trade liberalization, access to market, customs cooperation and institutional framework under which regulations are set up are among topics considered by the study.	
Case Study	European Union Single Market	This case study examines the operations and effects of the EU Single Market. Additionally, it considers how the Single Market facilitates movement of capital, people, goods and services between member nations. The focus is on its establishment history that includes legal framework, harmonisation attempts and regulatory bodies operating within Europe based on economic terms. Moreover, this study tackles topical issues like consumer protection, competition policy along with market integration concept together with role of its organisations such as European Commission and the Court of Justice which ensure smooth functioning for single market. On top of these it explores challenges faced by Single Market including Brexit related problems and member countries' discrepancies within their own legislative systems.	European Commission, 2024
Case Study	East African Community (EAC)	The East African Community (EAC) case study provides an elaborate presentation on the manner in which member countries such as Burundi, Kenya, Rwanda, South Sudan, Tanzania and Uganda have come together to integrate their economies. It outlines some of the challenges they faced like limited resources and political differences as well as their success stories which include the establishment of a common market and customs union. The case study presents opportunities on how integration efforts have influenced trade in the region and investment opportunities available while increasing overall development. It serves as a useful guide for those seeking to comprehend how economic growth can emanate from regional partnerships, hence driving growth and shared prosperity.	East African Community, 2024
Reference Model	Association of Southeast Asian Nations ASEAN Free Trade Area (AFTA)	The reference model of the ASEAN Free Trade Area (AFTA) provides a systematised method for improving trade facilitation, controlling supply chains and rationalising logistics among members of Association of Southeast Asian Nations (ASEAN). It's an all-inclusive approach that aims at standardising procedures, reducing tariffs or barriers, improving trade efficiency among ASEAN countries. The model helps member countries to synchronise their trade policies; thus, making customs procedures simpler and engendering greater economic cooperation in the region.	ASEAN Secretariat, 2024
Reference Model	Pacific Alliance	The reference model of the Pacific alliance is a guideline for enhancing trade integration and fostering economic cooperation among member countries, namely Chile, Columbia, Mexico, and Peru. The model provides general directions and recommendations on how to improve connectivity, reduce trade barriers and foster collaboration among stakeholders such as investments through trade facilitation or regulatory alignment. Its aim is to promote economic growth and development by tapping into the distinctive advantages of member countries while enhancing links with the economies within Asia Pacific.	Pacific Alliance, 2024
Reference Model	Common Market for Eastern and Southern Africa (COMESA)	The reference model of COMESA acts as a roadmap for enhancing trade facilitation and fostering economic integration among member states in the Eastern and Southern African region. This model offers frameworks and recommended practices aimed at aligning trade policies, lowering trade barriers, and stimulating cross-border trade and investment. It emphasizes the importance of improving connectivity, simplifying customs processes, and ensuring regulatory consistency to cultivate a favorable environment for economic progress and prosperity across the COMESA region.	COMESA, 2024

Utilising TOGAF Architecture Continuum and Architecture Repository

The Open Group (2011) emphasised that TOGAF Architecture Continuum and Architecture Repository are the TOGAF framework must-have elements that help organisations develop and control their enterprise architectures. Architectural artefacts are classified into four distinct categories by the TOGAF Architecture Continuum which are: Foundation, Common Systems, Industry-Specific, and Organisation-Specific.

Table 2: Architecture Continuum Source: (The Open Group, 2011)

<p>Foundation Architectures Fundamental principles, frameworks, and models.</p>
<p>Common Systems Architectures Architectural patterns and solutions common across industries.</p>
<p>Industry-Specific Architectures Architecture tailored for specific industries.</p>
<p>Organization-Specific Architectures Customised architecture for individual organisations.</p>

Leveraging Architecture Repository

The TOGAF Architecture Repository provides a systematic collection of reusable architecture resources such as assets, principles, guidelines, and standards. Carrying out these resources would enable organisations to come up with a strong architecture that assimilates benchmark practices and sets standards thus promoting its effectiveness and sustainable growth. Among the critical architectural principles are Interoperability, Scalability, Security by Design, and Sustainability which can be found in the TOGAF Architecture Repository. AfCFTA can use these principles to guarantee such a strong and flexible framework. The Open Group's TOGAF 9.2 Standard is a trustworthy resource for architectural principles (The Open Group, 2018).

The ISO (International Organization for Standardisation) has also put forward international trade guidelines that are meant to help streamline trading processes by standardising customs procedures and the management of transport logistics. For instance, the ISO27001 serves as a standard for information security risk management (ISO, 2013). In addition, there are also best practice guides in the subject of trade marketing agreements implementation, legal harmonisation and architectural norms.

Guidelines on the implementation of trade agreements, harmonisation of regulations and the development of infrastructure are provided by best practices frameworks organisations which include the World Trade Organization (WTO). It is worth noting that, among the most significant ones, is WTO's Trade Facilitation Agreement for trade processes (WTO, 2015).

Methods

The area of research method that this section of the study presents is organised in four fundamental parts: the research design, which is based on TOGAF's Architecture Development Methodology, the data collection techniques, the application of ADM, and lastly the data analysis methods.

The study's research design is qualitative with the application of TOGAF's ADM methodology and characterised by the use of a descriptive and exploratory approach. For this study, the qualitative design is appropriate because it makes it possible to have an extensive examination and inclusion of multifaceted issues concerning the application of ADM in boosting the AfCFTA success. For the descriptive approach, this study seeks to explain how the existing architectural artefacts and the TOGAF Architecture Repository can be used in the enhancement of AfCFTA's architecture by utilising best practices and processes from other trade agreements. For the exploratory approach of this study, new insights and perspectives in developing an ADM-based architectural framework for AfCFTA targeted patterns, themes and relationships in qualitative data to get a thorough understanding of the research questions.

The study collects qualitative data from a variety of sources. Existing architecture artefacts documentation from data sources of trade agreements are identified. Blueprints for customs procedures and regulations about infrastructure that are standard in agreements between countries are elaborated. Reference models which are used to enhance trade, facilitate movement of goods along the supply chain, and optimise logistics that result from global trade initiatives are included in the data. Case studies examples related to problem-solving, practical implementation methods and excellent

performance indicators associated with trade unions and trade agreements are evaluated. Principles, Standards, and Guidelines from the Architecture Repository of TOGAF, which is a repository possessing reusable architectural assets and artefacts, are presented. Architecture Continuum to investigate underlying architectures, typical systems architectures and industry-specific architectures that are in support of the strategic objectives and operational requirements of AfCFTA are included in this study. Data for this study was also through comprehensively reviewing research papers, and articles that were sourced from various academic databases. These academic databases were Google Scholar, JSTOR, IEEE Xplore, SpringerLink, ScienceDirect, and ProQuest.

Application of TOGAF 's ADM

The Architecture Development Method (ADM) of TOGAF offers a guided method for the creation and governance of an enterprise architecture. Adding to this, the tailored architecture for the region can be achieved through the use of the different methodologies within the phases of the ADM of the system considering the challenges and opportunities beneath first the African trade is unveiled. With reference to the Architecture Development Methodology (ADM) in the Open Group Architecture Framework (TOGAF), a view of the methodology includes several stages. Preliminary phase, creation of the architectural vision, formulation of business, data and technology architectures, opportunities and solutions, migration planning, and finally architecture change management and implementation governance (TOGAF 8.1.1, 2006).

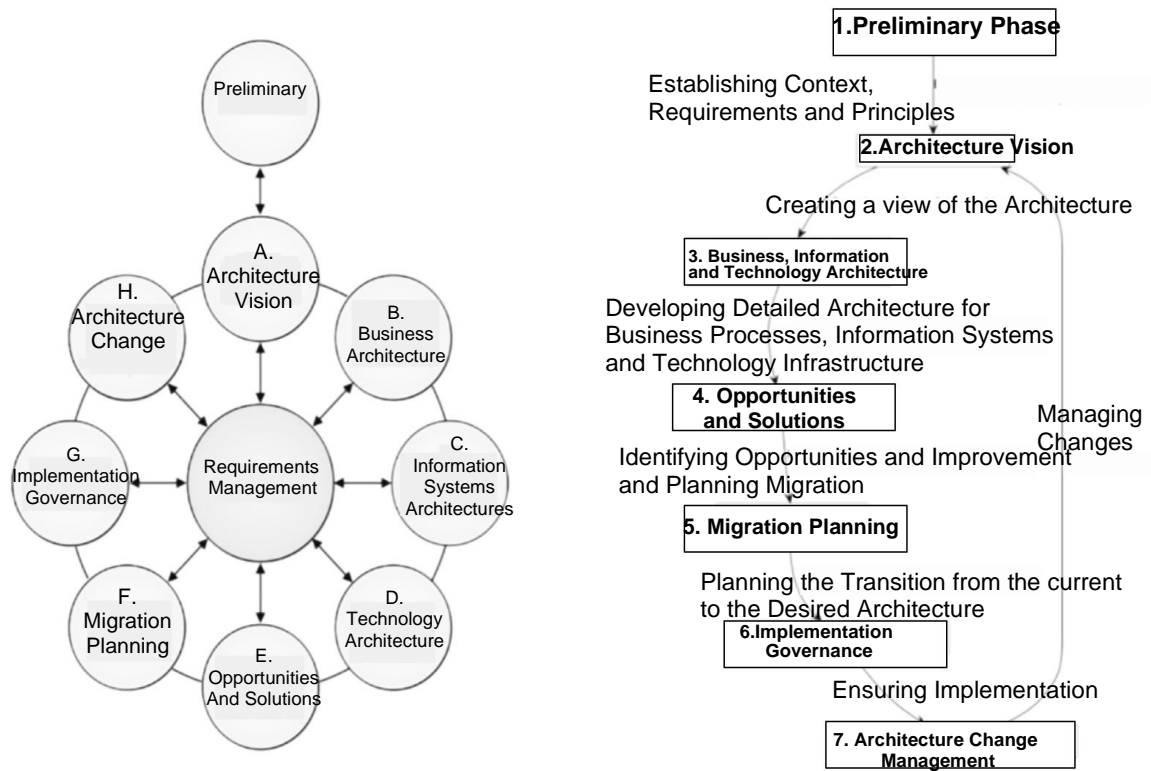


Figure 1: Architecture Development Cycle and Phases
Source: (TOGAF 8.1.1, 2006)

Data Analysis Methods

The data analysis of this study was performed based on qualitative data support to expound the extent to which Architecture Development Methodology (ADM) is applicable on the African Continental Free Trade Area (AfCFTA). This research paper utilised content, thematic and comparative process to analyse trade agreements and identify

architecture patterns and frameworks whilst also undertaking narrative synthesis to give an extensive understanding of the ways TOGAF's ADM can be utilised in restructuring AfCFTA. Content analysis systematically identified the qualitative data contained within existing architectural artefacts, case studies, and trade agreements to examine recurrent themes, patterns, and relationships applicable to AfCFTA. The thematic analysis process involved an analysis of themes within the qualitative data with respect to principles, standards, and guidelines from the TOGAF's Architecture Repository. Comparative analysis was used in the literature to evaluate architectural frameworks and models used in enterprise systems and trade agreements to find the possible changes and best practices for AfCFTA's context. Finally, narrative synthesis was used in this research to synthesise the findings and thematic insights. It is through this technique that different data sources of the study were linked, and a holistic perspective highlighting on how ADM could improve AfCFTA's operational structure.

Results

The results from applying the Architecture Development Methodology (ADM) of TOGAF are presented in the outcomes section in relation to the case of AfCFTA. In this section, the analysis of how ADM can be customised in order to address specific AfCFTA challenges and opportunities is evaluated. It entails examining the relevance of existing architectural artefacts for AfCFTA framework, use of TOGAF Architecture Continuum and integration of key principles, standards and guidelines. Furthermore, the development of a custom system architecture concept for AfCFTA created for this purpose, a custom system framework based on ADM methodology and ultimately an Architecture Management System (AMS) to operationalise it. Thus, through these components, it was shown from the analysis on how ADM could improve operational capacity, legal harmonisation and general effectiveness within AfCFTA. The outcomes of this research showed a vital understanding of how to apply Architecture Development Methodology for boosting success in the African Continental Free Trade Area (AfCFTA). They fall under these categories which include the impact of already existing architectural artefacts, the use of TOGAF principles, standards, guidelines, and tailor-made ADM architecture that is supported by AMS.

Influence of Existing Artefacts on AfCFTA

By integrating existing elements of trade pacts, the AfCFTA framework has been significantly influenced; hence, it was made possible for the development of a customised architecture concept for AfCFTA (The Open Group, 2011). On this basis, some existing frameworks like those employed by the TPP, NAFTA and CAFTA-DR were used as good examples to create the design of the architecture concept of AfCFTA's framework. Architectural artefacts are used to create a system's solution or an enterprise's state, and in this case, they were the core components for building up AfCFTA framework especially reference to areas like trade facilitation, customs procedures and regulation harmonisation. The development of a custom architecture concept using the key architectural artefacts that played a role in AfCFTA's architecture concept design is shown in figure 1.

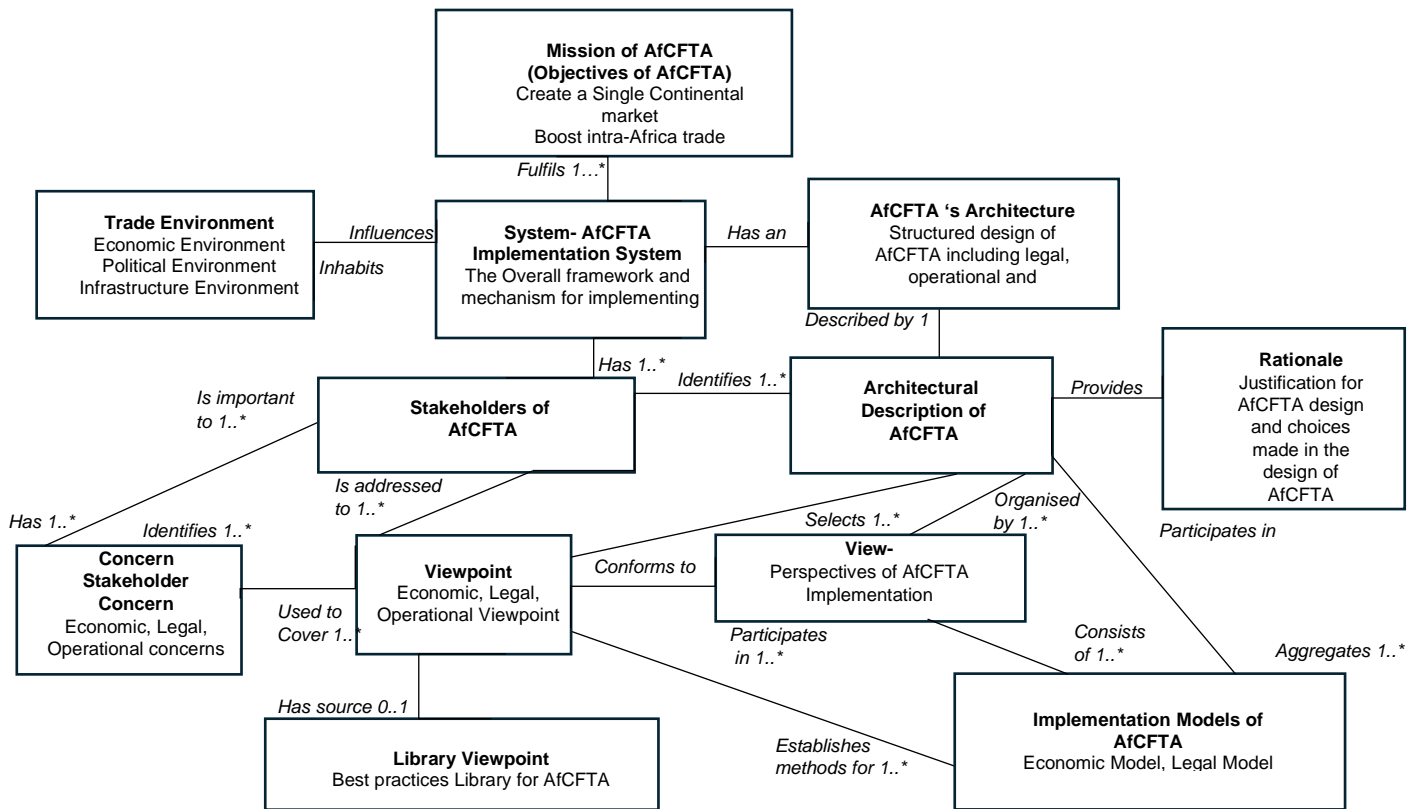


Figure 2: Architectural Artefact: Custom System Architecture Concept for AfCFTA

Source: Author 's Construct (Adapted from TOGAF Standard Version 9.2 and

Application of TOGAF's Architecture Continuum

In adapting these trade agreements and models, in-trade practices within AfCFTA's architecture should be flexible so that it can adjust to new conditions. One thing that was particularly useful at this phase was the use of TOGAF's Architecture Continuum. This was a tool that provided a phased mechanism of categorisation and storage of resources that proved instrumental. Specifically, the TOGAF Architecture Continuum is a systematic method used for ordering architectural resources, starting from foundational to industry-specific, and provided an appropriate link between the objectives and the implementation purpose of the AfCFTA (The Open Group, 2011). Table 2 explains how within the aforementioned themes, Architecture Continuum found its application in the AfCFTA system.

Table 3: Application of Architecture Continuum to AfCFTA **Source:** Author 's Construct

Architecture	Description	Application to AfCFTA	Examples	Identified Resources for AfCFTA's Stakeholders
Foundation Architectures	These are foundation principles, architectures and models that every enterprise architecture stands on.	This provides the basic structure of each member state's standard methods for AfCFTA.	The uses of TOGAF principles have facilitated the design and implementation of trade procedures globally.	Review documents that allow for simplified trade and uniform customs policies.
Common Systems Architectures	This refers to an architectural prototype or model which can be replicated in several sectors or industries.	They are used as reference architectures for specific systems and can serve as reusable	Using standardized patterns for customs management systems to improve efficiency,	Identify generic templates or patterns for trade facilitation or customs

		templates. Therefore, it greatly eases interoperability through streamlining custom practices, trade paperwork, and ICT integrations.	reduce delays, and facilitate smoother cross-border trade. For instance, standard designs can improve customs management systems thus reducing delays and smoothing cross border trades.	harmonization operational requirements. Select systems that will promote stakeholder participation and streamline digital processes.
Industry-Specific Architectures	These are designed to cater for the special standards and challenges of particular sectors such as healthcare, finance, telecommunications as well as transport.	Responds to the particularities of different sectors under AfCFTA, nurturing sector specific growth and integration	Adopting sector-based architectures for agriculture in order to enhance supply chain management, product traceability and international standards compliance.	Pick out industry level models focusing on sectoral challenges and economic integration; promoting documents that promote trade facilitation as well as supporting policy alignment.

Key Principles, Standards, and Guidelines from TOGAF

From the TOGAF Architecture Repository, several key principles were used in the study to show that AfCFTA will only succeed if it is able to interoperate, scale out, have architecture that has secure design which will guarantee its sustenance. To put it another way, interoperability is crucial since it allows real-time communication plus information sharing amongst nations thus making business transactions easier (The Open Group, 2018) and therefore the implementation of the above-mentioned principles is meant to help in realising AfCFTA’s goals. Different principles have been laid down in TOGAF regarding architecture which are applicable in AfCFTA’s architecture, and these principles are examined in Table 4. The standards or conventions applied to the architecture of the AfCFTA are detailed in Table 5. And Table 6 highlights some of the guidelines that have introduced to support harmonisation of trade barriers.

Table 4: Example of Principles Applicable to AfCFTA **Source:** (WTO, 2015)

Principles	Description
Interoperability	Enabling seamless data exchange and effective co-occurrence of systems and components.
Scalability	Designing systems and architectures to meet growth and demand increases without compromising their capacities or efficiency.
Security in Design	A convention for defining RESTful APIs which aids in the interoperability between systems and their integration. Introducing defense mechanisms from the start in order to control the course of events and disasters
Sustainability	Incorporating environmentally friendly processes and efficient technologies into an architectural design to reduce the negative effect on the environment.

Table 5: Example of Standards Applicable to AfCFTA **Source:** (WTO, 2015)

Standards	Description
RESTful APIs	Standard architectural style for designing networked applications that enables for communications between systems over HTTP.
ISO 27001	An international standard on Information security management system (ISMS) which provides guidelines for implementing strong security controls and practices.
OpenAPI Specification	A standardized way of describing RESTful APIs to facilitate interoperability and integration between systems.
OAuth 2.0	An industry-wide accepted authorisations framework securing web and mobile applications, enabling them to access protected resources securely.

Table 6: Example of Guidelines Applicable to AfCFTA **Source:** (WTO, 2015)

Guidelines	Description
Micro services Architecture	Prescriptive guidelines with micro services-based architectures that aid in scalability, modularity, and agility.
Cloud Computing Best Practice	Offers hinting points on how to make better use of cloud computing services and technologies to boost performance and reduce costs while increasing growth potentials.
User-centered Design Principles	Enhancing user-focused design principles with relevant solutions for creating user interfaces (UI) and experiences (UX), which prioritize usability, accessibility, and user satisfaction.
Agile Development Methodologies	Best approaches to adopting agile development methodologies including iterative development, collaboration among team members in carrying out activities and response from clients.

ADM can come into existence, satisfying the customer and the need of change of an organisation (Giachetti, 2016). The custom architecture of AfCFTA was developed by employing TOGAF's Architecture Development Method (ADM), which is a tailored, overlapping strategy conceived to address issues of regional trade facilitation. Nevertheless, the ADM levels which focus on business, information systems and technology architectures are all equally important in the proposed AfCFTA framework development. Implementing and adhering to the ADM system will provide the opportunity to develop a comprehensive and a flexible framework that addresses the objectives of AfCFTA like Trade Regulatory Harmonization, cross-border collaboration and trade logistics improvement. Figure 3 shows the evolution of such a structure, based on ADM levels, showing how different phases help in creating AfCFTA. Figure 4 shows Custom Architecture Management System (AMS) designed for AfCFTA. Figure 5 shows the Custom Architecture Management System Interface design (AMS) for AfCFTA.

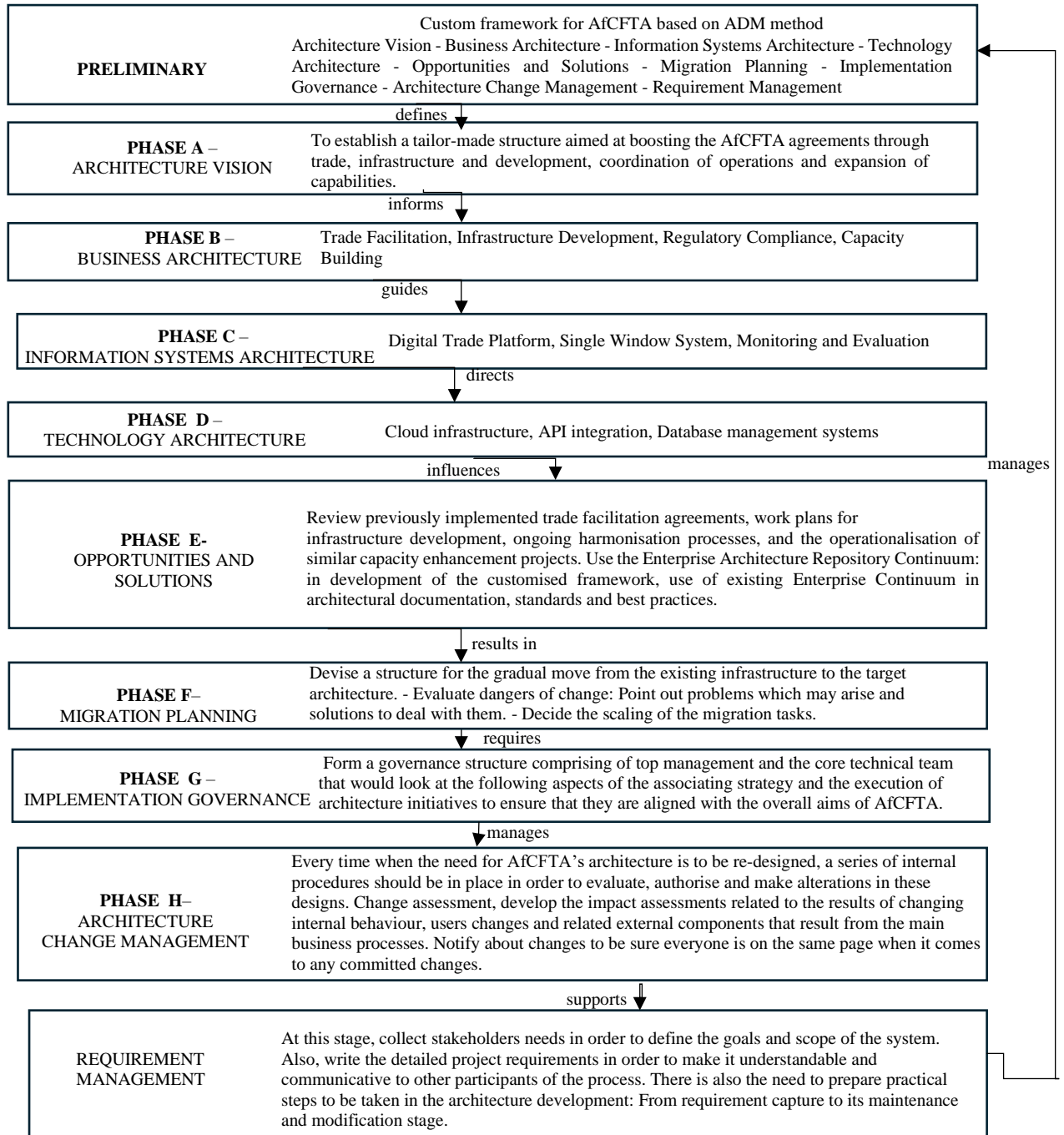


Figure 3: Custom Architecture based on ADM phases, ADM phases, demonstrating how each phase contributes to the development of the overall framework of AfCFTA.

In order to make the custom architecture in Figure 4 into the implementation phase, the architecture cannot be functional without an architecture management system (AMS). This technical solution contains the following components such as an Architecture Repository, workflow management, tools for collaboration, document support, reporting, and information protection measures.

Role of the Architectural Management System

AfCFTA Architectural Management System (AMS) will serve a critical role in implementing and managing architectural frameworks with the AfCFTA with its main responsibilities described below. Tools and functionalities provided by the AMS will make it easy to develop, migrate and implement architectural changes that align with best practices. This will help AfCFTA make architectural decisions as efficiently as possible. The AMS aligns all architectural activities with AfCFTA's strategic goals and objectives by using the TOGAF Architecture Repository and complying with established principles, guidelines and standards. Transparency, accountability and effective decision-making are the key features made possible by collaboration tools in AMS that ensure seamless communication and team working across different stakeholders such as implementers, architects and policy makers (Bremang, 2024).

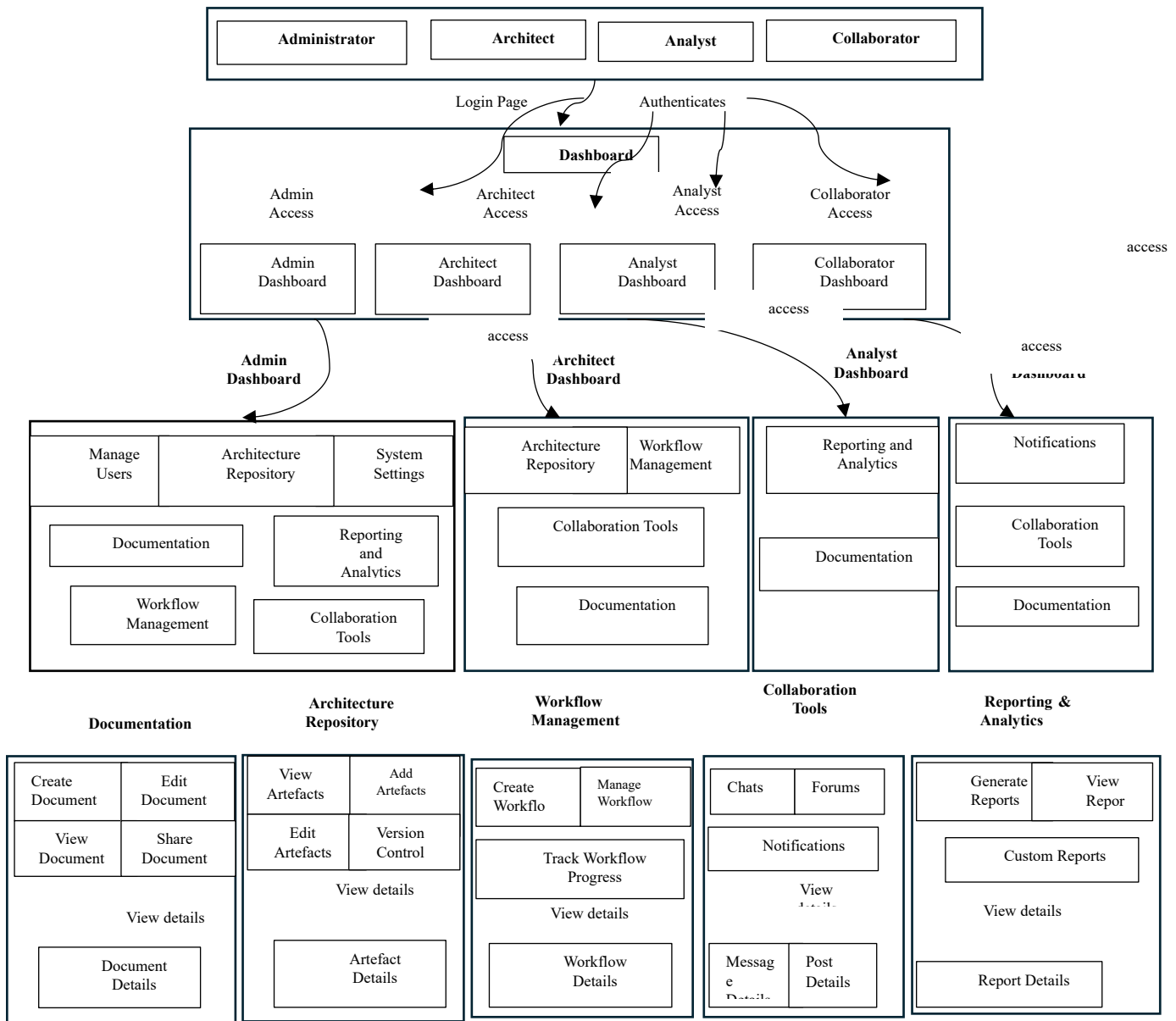


Figure 4: Structure of the Custom Architecture Management System (AMS) for AfCFTA

Source: Author's Construct (Bremang, 2024)

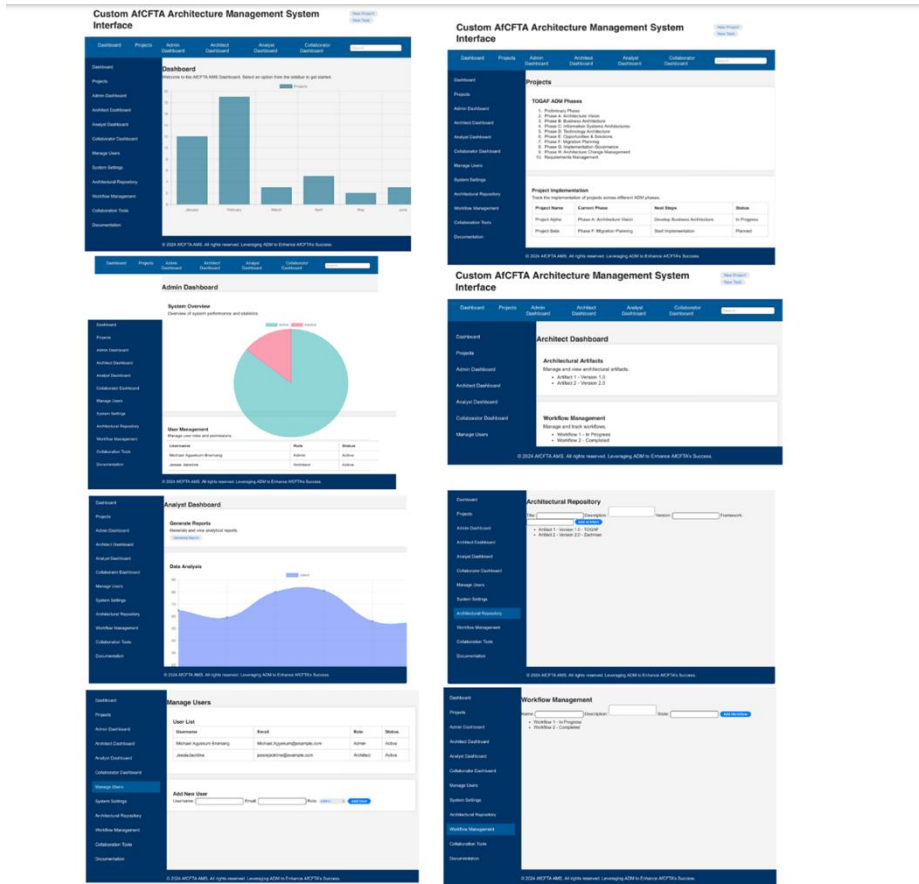


Figure 5: Custom Architecture Management System Interface design (AMS) for AfCFTA

Source: Author’s Construct (Bremang, 2024)

Discussions

The implications of instituting TOGAF’s ADM to the AfCFTA are explored in the discussion section as well as their relation to existing literature. Moreover, it looks into how this study practically contributes to trade facilitation and business efficiency, especially through architecture development processes. Furthermore, challenges faced by businesses and possible benefits that can accrue from ADM within AfCFTA are discussed in order to consider key issues for its successful implementation. Finally, limitations of the study are outlined while directions for future research are suggested, stressing on the need for AfCFTA’s architecture to continuously adjust with the dynamic political and economic environment on the Africa continent.

Relation to Existing Literature

Existing literature is built upon this study through the application of TOGAF’s ADM (Architecture Development Methodology) in the context of the African Continental Free Trade Area (AfCFTA). In previous research on ADM, it has been indicated that structured architectural directives are important in enhancing adherence and efficiency of operations in organisations (Giachetti, 2016). This study confirms how ADM supported by AMS may improve resource allocation, promote international cooperation and enhance regulatory consistency in AfCFTA. This study agrees with Mangeni and Atta-Mensah’s (2022) research on the need for scalable architectural frameworks and also conforms to Kotusev (2018) paper which emphasises on the practical benefits of TOGAF-based architectures.

Practical Contributions

The study emphasises the need for policymakers to take a cue from this research in order to make trade agreements, custom frameworks and best practices for trading that are transparent and clear. In addition, the study revealed that for architecture development processes, it is necessary to involve and obtain the support of stakeholders as “stakeholder involvement” is crucial for enhancing AfCFTA’s success. The research is dedicated to advancing trade facilitation emphasising the need for a strong business architecture, information architecture and technology architecture to make operations of AfCFTA smoother, streamline coordination in commerce and enhance economic growth.

Benefits for Businesses

With the help of ADM-based architectures, businesses, or companies under AfCFTA can achieve effective processes that induce improved effectiveness and lower regulatory complexities. Businesses can save some amount of money from lower administrative costs and reduced delays at borders. This can be achieved by improving logistics and streamlining operational processes, as this will make these companies operate more efficiently, hence reducing overhead costs due to cross-border trading. Businesses can improve their competitive edge in both local and international markets through the application of ADM, become more responsive to the market needs, optimise their supply chain while at the same time realising efficient operation.

Challenges and Considerations

Even though the benefits of implementing ADM are clearly defined for AfCFTA, there is a need for addressing several impediments and requirements regarding its implementation for a successful uptake. For ADM to be successful, stakeholders with an interest in ADM should take part in implementing the process. For any change in ADM to take place successfully, a lot of stakeholders must support it and contribute to its development. The architecture framework ought to be capable of adapting to the constantly changing political contexts, and economic scenarios in Africa. Should any changes happen at one point in the future then this means that this method must remain flexible enough to allow future democratic adjustments when situations change, hence staying relevant and achieving its purpose. To guarantee that all stakeholders are informed about using ADM guides and instruments, adequate teaching and skills development is necessary. An effective implementation may require that the corresponding skills and knowledge are gained through continuous comprehensive training schemes as well as sustained assistance.

Limitations and Future Directions

This research is primarily qualitative and highlights particular trading agreements and regional communities. A different approach and more varied case studies may be considered by future investigations which involve quantitative evaluation. The conditions of trade are changeable due to political and economic shifts and therefore the architecture development of AfCFTA should always adjust and be reviewed to remain pertinent. It would be important for future studies to target different technology frameworks and standards that might improve AfCFTA’s implementation of AMS and ADM. Policymakers should improve collaboration designed to enhance member states and stakeholder interaction such as capacity-building programs.

Conclusion and Recommendations

This study analyses the application of the Architecture Development Method and the creation of bespoke ADM-based architecture for African Free Trade Continental Area (AfCFTA), using the existing architectural artefacts and TOGAF Architecture Continuum. This paper demonstrated the value of leveraging existing architectural artefacts with practical contributions specifying the necessity of an Architecture Development Methodology supported by an Architecture Management System. This research promotes regional trade integration, sustainability and economic growth in Africa that would benefit businesses through increased operational efficiency.

According to the conducted research, there are several suggestions on how to enhance the operation of AfCFTA by implementing ToGAF’s Architecture Development Methodology (ADM). There is a need to alter the ADM phases in order to meet the requirements of the environment where AfCFTA operates exclusively from a broader regional point of

view. Where possible, the existing architectural assets and elements should be reused for the better facilitation, integrations and interoperability of AfCFTA's objectives. Member states will each have different levels of understanding and readiness in adopting the principles and standards of TOGAF. Integration of TOGAF's principles and standards will guarantee uniformity and harmonisation across member states, remedy situations and give suggested improvements to the design elements of AfCFTA's system.

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