

Future Trends for Direction in Enterprise Architecture: Systematic Literature Review

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ABSTRACT

In the modern business era, enterprise architecture is becoming increasingly important for companies to achieve their business goals. However, designing and implementing an effective enterprise architecture can be challenging, especially due to the ever-increasing complexity of information systems, changing business needs, and pressure to continually improve efficiency and performance. This study aims to analyze the literature review to map future trends in enterprise architecture related to technological developments and business needs. The research method used This study was conducted by conducting a systematic literature search using leading academic databases such as Scopus, Web of Science, and IEEE Xplore. Inclusion and exclusion criteria have been established to ensure that the selected articles are relevant to the topics discussed. Articles that met the inclusion criteria were then analyzed and critically assessed to identify trends in enterprise architecture. The results of this study produce arguments for the importance of enterprise architecture in helping companies to operate efficiently and integrate different systems and applications. The results of this study indicate that the future trends and topics of enterprise architecture help organizations achieve strategic goals and enable companies to adapt quickly to changes in business and technology. This study concludes that future trends in enterprise architecture can help companies adopt future information technology trends in enterprise architecture. The findings in this study have significant practical implications for enterprise architecture practices. Enterprises should take these trends into account

when designing and deploying their enterprise architecture, to ensure that they maximize the benefits of the latest technologies and meet changing business needs.

Keywords: analysis trends, enterprise architecture, future direction, systematic literature review

INTRODUCTION

In a modern business context that continues to evolve rapidly, companies need to stay abreast of the latest enterprise architecture trends. These enterprise architecture trends cover the strategies, models, technologies, and infrastructure used by companies to power their enterprise architecture. Recent enterprise architecture trends cover a wide range of issues, such as the adoption of cloud technologies, microservices, containerization architectures, data-driven architectures, cybersecurity, and more (Schubert et al., 2023). Companies must understand these trends and use them appropriately to achieve their business goals. The importance of enterprise architecture trends is to help companies understand the latest technology trends and use them strategically in their enterprise architecture (Zhou et al., 2023). By understanding these trends, companies can improve operating efficiency and effectiveness, improve customer experience, optimize costs, and increase innovation. In other words, an enterprise architecture that follows the latest trends can help companies achieve a competitive advantage in the market (Kotusev et al., 2023).

In addition, there are several main problems that are often found in enterprise architecture topics, including Difficulties in achieving consistency and integration between different systems and applications. Companies often have many separate systems and applications, which complicates the integration between them (Oberle et al., 2023). This can lead to the imperfection of data and business processes, which affect the efficiency and productivity of the company (Telukdarie et al., 2023). Some of the problems that can be identified are as follows: Complexity in managing change: Companies often experience difficulties in managing changes to their enterprise architecture due to the complexity of connected systems and applications (Pisoni & Díaz-Rodríguez, 2023). Changes to one system or application can impact other systems or applications, requiring careful planning and management of changes. Another problem is the challenge of maintaining data security and privacy. Companies must ensure that their enterprise architecture meets data security and privacy standards set by rules and regulations (Cao et al., 2023). This can involve ensuring that data is stored securely and cannot be accessed by unauthorized parties. The next problem is the difficulty in adopting the latest technology. Companies often experience difficulties in adopting the latest technology due to limited resources and costs (Pattij et al., 2022). However, if companies don't keep up with the latest in technology, they can fall behind their competitors. The next problem is the challenge of achieving the expected ROI. Enterprises must ensure that their investment in enterprise architecture generates the expected return on investment (ROI). However, achieving the expected ROI can be difficult due to the high costs and changes required to a company's IT infrastructure. The last problem that can be identified is the challenge of managing the complexity of enterprise architectures. Companies often have very complex IT infrastructure, which makes it difficult to manage. This can result in system or application failure, as well as long recovery times in emergency situations (ETTAHIRI & DOUMI, 2022). Finally, issues on the topic of enterprise architecture are often related to system consistency and integration, the

complexity of IT infrastructure, data security, and privacy, difficulties in adopting the latest technology, ROI, and managing the complexity of enterprise architecture. Enterprises need to proactively identify and address these issues so that their enterprise architecture can deliver the expected business benefits.

Several solutions that have been made on the topic of enterprise architecture include Enterprise Architecture Frameworks (EA Frameworks): EA Frameworks are frameworks used to organize and integrate IT infrastructure and applications within a company. EA Frameworks help to achieve consistency and integration between different systems and applications, as well as simplify the management of changes to enterprise architecture (Gellweiler, 2022). Cloud Computing: Cloud Computing has become a popular solution for improving enterprise architecture. By utilizing cloud services, companies can integrate and manage separate systems and applications more easily (Anggraini et al., 2019; Brandis et al., 2014; Mezgár & Rauschecker, 2014). In addition, cloud computing also helps companies adopt the latest technology without having to bear the high costs of developing and managing IT infrastructure (Bui & Lyytinen, 2022). Big Data Analytics: Big Data Analytics enables companies to process data on a large scale, enabling companies to make better decisions based on accurate data (Cochran et al., 2016; Sousa & Machado, 2014). By leveraging Big Data Analytics, companies can gain deeper insight into their business, as well as make more timely and effective decisions (Lnenicka & Komarkova, 2019). Security Architecture: Security Architecture ensures that enterprise architecture meets data security and privacy standards set by rules and regulations. By using Security Architecture, companies can ensure that their data is well protected and cannot be accessed by unauthorized parties (Kim & Lee, 2020; Pulkkinen et al., 2007; Shariati et al., 2011). DevOps: DevOps is a methodology that enables companies to accelerate application release times and reduce downtime by improving collaboration between development teams and operations teams. DevOps can help companies accelerate application development, accelerate innovation, and enable companies to adopt the latest technologies more quickly (Griffo et al., 2021). Service-Oriented Architecture (SOA): SOA enables enterprises to integrate disparate systems and applications through service-oriented services. By using SOA, companies can achieve consistency and integration between different systems and applications, as well as simplify the management of changes to the enterprise architecture. Solutions on the topic of enterprise architecture include the use of EA Frameworks, cloud computing, Big Data Analytics, Security Architecture, DevOps, and SOA. Enterprises can choose the solution that best suits their business needs and goals to improve their enterprise architecture and address issues as they arise.

State-of-the-art on the topic of enterprise architecture covering best practices and the latest technologies in designing, managing, and updating an enterprise's information technology (IT) infrastructure. State-of-the-art on-trend enterprise architecture topics covering the latest trends and latest innovations in enterprise architecture. several topics from the state of the art on trend enterprise architecture topics such as microservices architecture and containerization are the latest trends in enterprise architecture that allow companies to increase the flexibility and scalability of the services they offer. Microservice architecture breaks applications into smaller pieces, while containerization allows the packaging of applications in containers that can be implemented across multiple platforms and environments. In addition, Cloud technologies continue to evolve rapidly and become increasingly important in enterprise architectures. The cloud enables enterprises to store and process data in a distributed manner, reduce IT infrastructure costs, and increase scalability and flexibility. Another

trending topic is Data-driven architecture including Big Data technology and analytics, as well as distributed databases. Enterprises can use this technology to gain better business insights, improve operational effectiveness, and strengthen decision-making. Another topic to pay attention to is cyber security. Cybersecurity is becoming increasingly important in enterprise architectures with the increasing number of cyber threats. Companies must use advanced security technologies to protect their data and infrastructure from cyberattacks. The next topic to pay attention to is SOA. Service-based architecture (SOA) is a well-established approach in enterprise architecture. However, companies continue to adopt SOA better and more effectively, by strengthening system integration, reducing costs, and increasing operating efficiency (Alwadain et al., 2016). In conclusion, the state of the art on the topic of trend enterprise architecture includes the latest trends and innovations in enterprise architecture, such as microservices and containerization architectures, cloud technology, data-driven architectures, cybersecurity, and service-based architectures (Loft et al., 2022)(van de Wetering, 2022). Enterprises should continuously monitor these trends and use them strategically to strengthen their enterprise architecture. Another conclusion that can be explained is that the state of the art on the topic of enterprise architecture includes the latest approaches and technologies in designing, managing, and updating an enterprise's IT infrastructure, such as SOA, SOOA, COA, CSOA, DOA, and MOA. Enterprises must understand and strategically use these approaches and technologies to strengthen their enterprise architecture and achieve desired business goals.

Novelty in research on the topic of enterprise architecture can be interpreted as the latest contribution given to enrich understanding of the topic. Novelty in research on the topic of trend enterprise architecture is expected to be interpreted as the latest contribution in identifying, analyzing, or applying new trends in the development of enterprise architecture. Novelty in research on the topic of enterprise architecture is conducting research in the developing field of enterprise architecture for service-based organizations and research on the impact of enterprise architecture on innovation in business. In addition, this research novelty can produce findings or conclusions that are trending enterprise architecture and future research directions that help the successful implementation of enterprise architecture. By conducting research that has novelty, enterprise architecture research can make a significant contribution to the development and understanding of this topic. The novelty of this research is to analyze new trends in enterprise architecture, such as micro-service architecture, service-based architecture, or cloud-native architecture, and evaluate the advantages and challenges of each architecture. Analyze trends in business and technology contexts, and how enterprise architecture can help organizations overcome challenges or take advantage of opportunities in addressing these trends. Analyze trends in the context of a particular industry or business sector and how enterprise architecture can help an organization meet requirements or take advantage of opportunities within that sector. By conducting research that has novelty, trend research on enterprise architecture can make a significant contribution to understanding new trends in enterprise architecture development and helping organizations develop enterprise architectures that are more effective and responsive to changing business and technology trends.

There are many different and complex enterprise architecture models, datasets, methods, and frameworks that have been published. Therefore, it is very important to conduct a comprehensive review of the current state of enterprise architecture. This study aims to identify and analyze a review

of the literature on enterprise architecture on research trends, methods used, and frameworks used in enterprise architecture between 2010 and 2023.

Enterprise architecture

Enterprise architecture is an approach to designing, managing, and updating an enterprise's information technology (IT) infrastructure. Enterprise architecture aims to create alignment between business strategy and information technology, so as to increase efficiency, effectiveness, and innovation in company operations (Romero et al., 2022). Enterprise architecture (EA) is the practice of designing and managing the business structure, information technology (IT), data, and applications of an organization (Tamm et al., 2022). EA aims to achieve alignment between strategic business goals and the IT architecture that supports them (Ilin et al., 2021; Tahara & Yamamoto, 2021; van der Raadt et al., 2010). A good IT architecture must be able to help an organization achieve its business goals, improve the efficiency and effectiveness of business processes, and ensure the security and reliability of information systems. There are several EA frameworks used in the industry, such as TOGAF (The Open Group Architecture Framework)(Anggraini et al., 2019; Goepp & Petit, 2017; Kornysheva & Deneckère, 2022), Zachman Framework(Bondar et al., 2017; Gona & Smith, 2011; Lapalme et al., 2016; Noran, 2003), FEAF (Federal Enterprise Architecture Framework)(Bondar et al., 2017), and others. In practice, EA consists of several domains, namely business architecture, data architecture, application architecture, and technology architecture. Each of these domains comprises a distinct set of tasks and activities to develop and maintain a comprehensive and integrated organizational architecture.

The advantage of adopting EA is that it allows organizations to increase flexibility, minimize IT development costs, ensure data security, and increase business effectiveness and efficiency. EA can also help organizations navigate rapid and complex technological changes, and enable IT and business teams to work together to achieve organizational goals (Gažová et al., 2022).

METHODS

2.1. Review Method

We take a systematic approach to conducting reviews on enterprise architecture topics. The method we use is a systematic literature review which has become an established method in various fields including the field of information technology more specifically in enterprise architecture (Widianto & Subriadi, 2022). This method is a process for identifying, assessing, and interpreting specific research questions from scientific paper evidence that has been collected. Almost the same pattern was also practiced by Alsufyani, in conducting a literature review (Alsufyani & Gill, 2022)

There are three main stages in conducting a systematic literature review (SLR), namely the planning stage, the analysis stage, and the final report stage. See Figure 1. The first stage is carried out in three simple steps, namely identifying the need for a review, developing a protocol review, and evaluating a protocol review. The second stage was carried out by searching for the main study papers, selecting the main study papers, extracting data per a main study, assessing the quality of the main study papers, and conducting data synthesis. In the final stage, it is carried out by disseminating the results of a literature review that has been successfully analyzed in the second stage.

These steps were carefully executed in building the protocol in Step Two so that we can ensure its quality. In addition, this protocol also aims to reduce the possibility of bias occurring. In order to do well, the formulation of research questions, and search strategies, formulate criteria only on enterprise architecture.

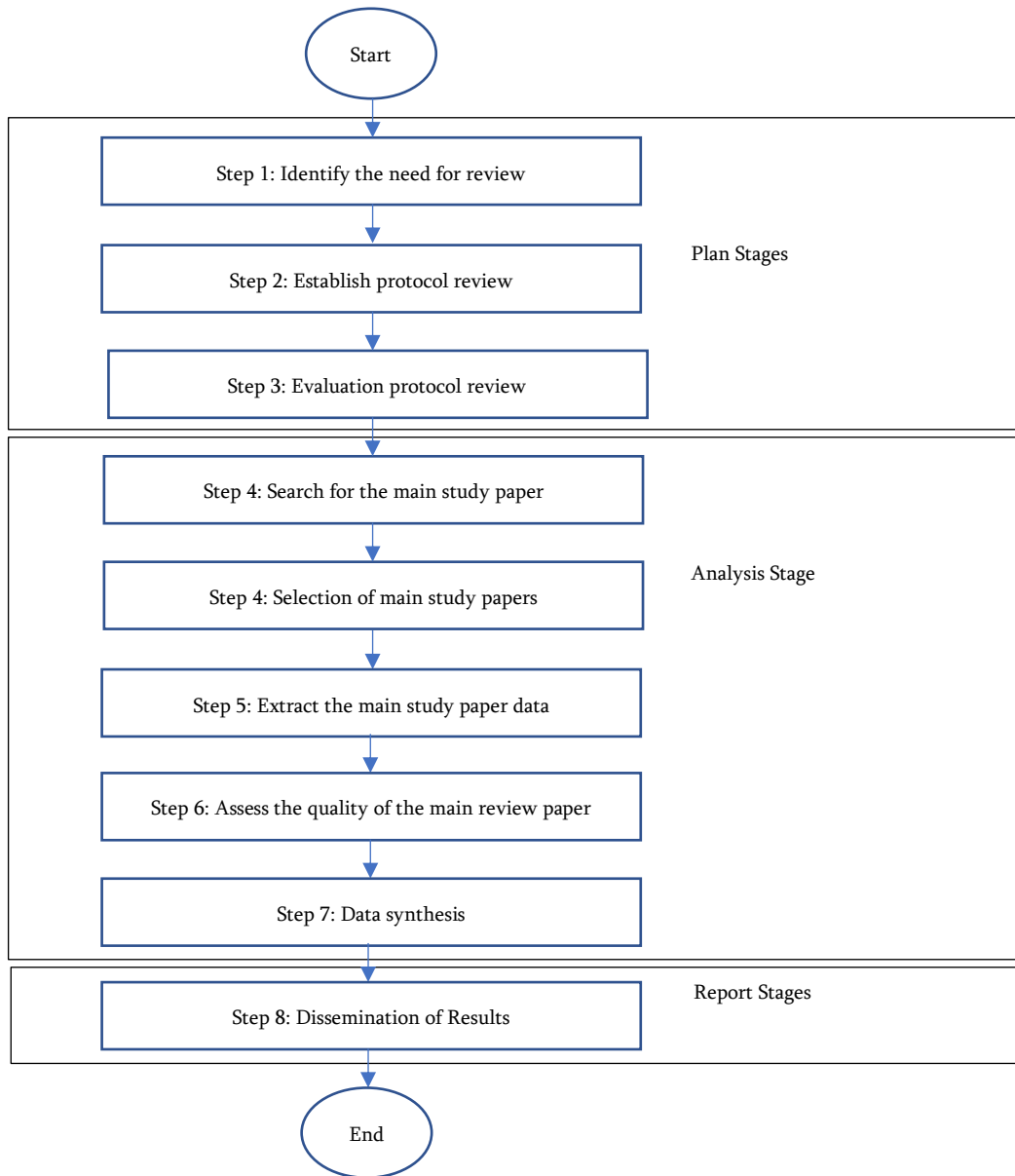


Figure 1. Stages of Systematic Literature Review

2.2. Research Questions

This research question is intended to make the literature review conducted to focus on the topic being studied. Table 1 shows the research questions that will be answered in this study. Questions are designed to describe population, intervention, comparison, outcomes, and context. The structure of the research questions is structured as follows:

Table 1. Summary of the Structure of the research questions

Population	enterprise architecture
Intervention	enterprise architecture, SOA, togaf, Zachman Framework, FEAF
comparison	n/a
Outcome	enterprise architecture
Context	Studies on enterprise architecture

In formulating the design structure of the research questions, we created research questions as shown in Table 2.

Table 2. Research questions

Id	Research question	Motivation
R1	What research topics have been chosen by researchers in the enterprise field architecture	Identify topics and research trends in the field of enterprise architecture

2.3. Search Strategy

Our search process is a series of processes to select articles from databases, libraries, and various other digital sources. The selection process is carried out by defining keywords precisely to increase the probability of finding relevant articles. The search strategy is carried out through trusted online databases as follows:

- ScienceDirect (sciencedirect.com)
- Springer (springerlink.com)
- Scopus (scopus.com)
- IEEE Xplore (<http://www.ieee.org/web/publications/xplore/>)
- Web of Science – Thomson Reuters (<http://webofknowledge.com>)
- ACM Guide to Computing Literature (<http://dl.acm.org/>)

We perform a search based on predefined criteria. The identification that we did search pays attention to the research questions that have been formulated.

2.4. Study Selection

We make exclusive and inclusive criteria to be used with the criteria in selecting the various scientific papers that we collect. These criteria are as follows:

- a) Exclusive criteria

- We do not submit papers that are not written in English
 - We do not include datasets, frameworks, and methods other than those closely related to the enterprise architecture
 - We do not select papers that lack good and reliable validity or experiments whose results can be trusted from the topic of enterprise architecture.
- b) Inclusive criteria
- We select papers that have been published in reputable conferences or journals and if the paper has conference and journal versions, we only use the journal version.
 - If the papers have duplicates in the same study, we only use the more recent and complete review.
 - We only use academic studies or trusted reports and studies from various Institutions that have the competence to conduct research on enterprise architecture.
 - We only select studies that specifically address enterprise architecture topics.

We organize all major review papers from various Mendeley management reference applications (<https://www.mendeley.com/>). We identified papers with the main requirement of addressing the topic of enterprise architecture. We made a selection of 1240 papers and got the final results that met the specific enterprise architecture requirements of 400 papers. The results of the analysis of 400 papers are what we review in a systematic literature review. These papers are relevant to the questions we have formulated in this study. These papers are selected from various reputable journals and have good qualifications.

2.5. Data Extraction

We select from the main study papers that we have previously collected. We perform data extraction according to the research questions. The extraction that we carried out on the 400 main study papers was in accordance with the requirements that we had carried out in the study selection section. We design the extraction data we have collected to answer the research questions. The completeness of the properties to complete the data extraction that we did is shown in Table 3.

Table 3. Completeness of property data extraction

Property	Research Questions
Research trends and topics	Q1

2.6. Study Quality Assurance

We carry out quality assurance to ensure the quality of the data we have collected. This is done to guide the interpretation of the synthesis that has been done. Syntheses are needed to answer research questions from the various pieces of evidence we collect. The extraction data can be in the form of quantitative and qualitative data. We present these data in the form of tables, bar graphs, and circle graphs so that they are easy to present and understand.

RESULTS AND DISCUSSION

Trends and Future Direction of Enterprise Architecture

Trend Enterprise Architecture (EA) refers to developments or changes in practice and thinking about how an organization can plan, design, and implement its information technology (IT) architecture and business architecture effectively. Enterprise architecture is a practice used by organizations to design and manage systems, technologies, and business processes so that they are integrated and run efficiently (Griffo et al., 2021). Enterprise architecture helps organizations accelerate business change, reduce costs, increase efficiency, increase security, and strengthen business competition (Ilin et al., 2021).

The current trend for enterprise architecture is a shift to service-based architecture, the use of cloud technology, and data-oriented thinking (Alghamdi et al., 2021). The service-based architecture enables organizations to easily build flexible and integrated applications and systems so that companies can quickly adapt to changing markets and business needs (Gökalp & Martinez, 2021). The use of cloud technology helps organizations store and process data more efficiently and effectively while reducing costs. The use of cloud technology also allows organizations to access larger resources quickly and easily. Data-oriented thinking is important to help organizations understand data and make better business decisions. This involves collecting and processing data centrally so that organizations can identify business trends and opportunities more quickly and accurately (Mirsalari & Ranjbarfard, 2020). See Figure 2.



Figure 2. Trends topics for enterprise architecture

Overall, current trends in enterprise architecture enable organizations to become more efficient, flexible, and continuously adapt to changing market and business needs. Some of the key trends in EA practice include an Increased Focus on Business Value: A successful EA must be able to deliver clear and measurable business value (Vernadat, 2020). Therefore, the main concern of EA today is ensuring that IT design and investment decisions are based on business priorities and needs. Increasing Role of Technology: EA is also increasingly paying attention to the role of technology in supporting business strategy. This includes thinking about how technologies such as cloud computing, big data, and the Internet of Things (IoT) can be effectively leveraged in a business context. Increasing Focus on Adaptive Enterprise Architectures: EA is also increasingly focusing on developing architectures that can adapt to rapid business changes and constantly changing technological changes (Dumitriu & Popescu, 2020). In this context, modular and scalable architectures, and Agile approaches are gaining increasing attention (Pérez-Castillo et al., 2020). Increased Use of Artificial Intelligence (AI): EA is also increasingly paying attention to the use of artificial intelligence (AI) technology in supporting architectural design and development decisions (Takeuchi & Yamamoto, 2020) (Zimmermann et al., 2020). AI can help identify trends and patterns in data and can be used to design more effective and efficient architectures. These are some of the trends in current EA practice. It is important for organizations to keep abreast of trends and adopt best practices in their architectural development to optimize business value and ensure compliance with ever-changing business and technological changes (Gong et al., 2020). See Figure 3.

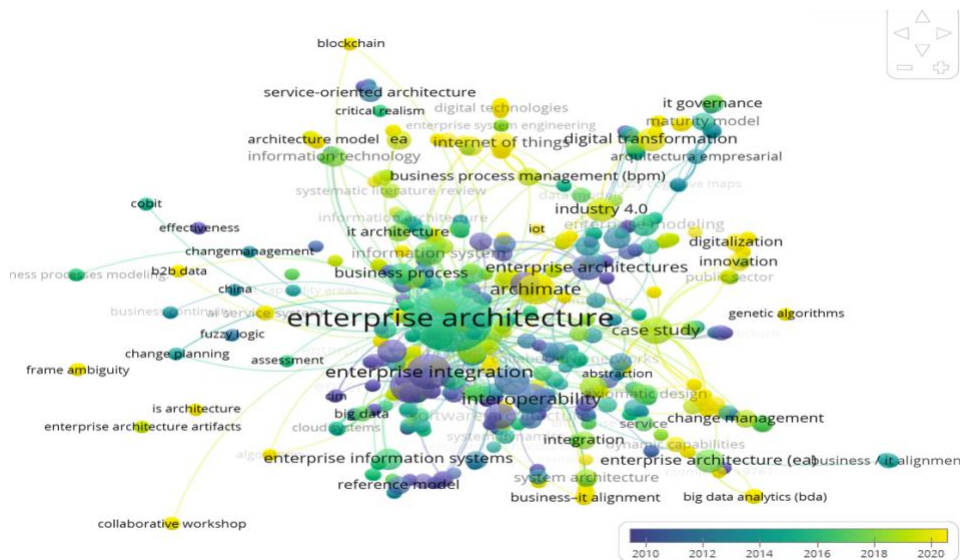


Figure 3. Trends future topic of enterprise architecture

Trend Enterprise Modeling

Enterprise Modeling trends refer to developments or changes in practice and thinking about how an organization can design, model, and analyze its business processes, organizational structures, and data effectively (Tahara & Yamamoto, 2021). Some of the key trends in Enterprise Modeling practice

today include the Increasing Use of Digital Models: Digital models, which include both 2D and 3D models, are increasingly being used in business and systems modeling. This can help organizations better visualize and understand their business processes and identify opportunities to improve efficiency. Increased Focus on Data: Data modeling is increasingly becoming a key focus in Enterprise Modeling practices (Mirsalari & Ranjbarfard, 2020). This includes data modeling, data integration, and data management to support better business decisions. Increased Focus on Business Processes: A better understanding of business processes is increasingly becoming a concern in Enterprise Modeling practices. It includes business process modeling, business process analysis, and a better understanding of how business processes can be improved and improved (Dumitriu & Popescu, 2020). Increasing Use of Cloud Technologies: Cloud computing is increasingly being used in Enterprise Modeling practices. This includes using cloud services for modeling, analysis, and data management. Increasing Use of Agile Methods: Agile methods are increasingly being used in Enterprise Modeling practices. Agile can help organizations adapt more quickly to changes in business and technology and can increase modeling efficiency and effectiveness. These are some of the trends in current Enterprise Modeling practices. It is important for organizations to keep abreast of trends and adopt best practices in their modeling development to optimize business value and ensure compliance with ever-changing business and technological changes (Abu Bakar et al., 2019).

Trend Enterprise Integration

Enterprise integration is the process of integrating different information systems within an organization to increase business efficiency, effectiveness, and openness. The trend of enterprise integration refers to the direction and development of enterprise integration development in recent years (Gong & Janssen, 2019). One of the main trends in enterprise integration is the adoption of cloud technology. More organizations are turning to cloud solutions for the integration of their data and applications due to lower costs, flexibility, and better scalability. Other trends include the use of API (Application Programming Interface) and microservices to ease integration, as well as the adoption of AI (Artificial Intelligence) technology and analytics to optimize business processes and improve decision-making.

Another trend related to enterprise integration is the adoption of service-oriented architectures (SOA) and container-based architectures such as Docker and Kubernetes. SOA enables organizations to develop modular systems that are more easily integrated, while Docker and Kubernetes enable organizations to manage containerized applications that can be deployed quickly and easily across multiple environments. In addition, there is also the trend of the platform as a service (iPaaS) integration, which integrates data and applications from the cloud and on-premise, as well as blockchain technology to secure and verify business transactions. In conclusion, the trend of enterprise integration focuses on effectively and efficiently integrating different information systems and applications to increase organizational productivity and efficiency. Technologies such as cloud, AI, analytics, and SOA are increasingly being improved and continue to develop to strengthen enterprise integration (Bouafia & Molnár, 2019)(McDermott et al., 2019).

Archimate

Archimate is a modeling language for enterprise architecture that can be used to describe, analyze, and visualize overall enterprise architecture. Archimate provides a collection of graphical notations that are used to represent various components involved in enterprise architecture, such as business, applications, technology, and infrastructure (Pankowska, 2019).

The Archimate trend relates to the use of the Archimate modeling language in the development and planning of enterprise architectures. In recent years, the Archimate trend has grown rapidly due to the growing awareness of the need to effectively manage and improve enterprise architectures. The application of Archimate helps organizations better design and manage enterprise architecture, which can assist in strategic decision-making and improve business performance. Some of the benefits of using Archimate include enabling corporate architects to better understand how architectural elements are interrelated, as well as enabling corporate architects to better visualize corporate architecture to make decisions easier (Gonçalves et al., 2021; Šaša & Krisper, 2011; Yamamoto et al., 2019). In following the Archimate trend, organizations can increase the efficiency and effectiveness of their enterprise architecture, which in turn can help in achieving the organization's strategic goals.

Cloud Computing Trends in the Context of Enterprise Architecture

The trend of cloud computing in the context of enterprise architecture (EA) is a model that enables companies to store, manage, and access data in a centralized, flexible, and scalable manner via the Internet or Internet-connected networks. Cloud computing changes the traditional on-premises IT model to a cloud-based model, making it easier for companies to manage and access data from anywhere and anytime (Anggraini et al., 2019).

In the context of EA, cloud computing enables companies to integrate applications and services into a cloud platform. Cloud computing also allows companies to choose services and applications that suit business needs and accelerate solution development and implementation (Alghamdi et al., 2021). In addition, cloud computing also enables companies to reduce infrastructure and data management costs, thus accelerating ROI (Return on Investment) from IT investments. However, the cloud computing trend in the context of EA also has challenges, such as data security and privacy, service reliability, and interoperability between different cloud platforms. Therefore, companies must pay attention to these factors when choosing a cloud platform and integrating applications and services into the platform (Bernus et al., 2014).

Systems Engineering

Systems engineering is a systems development method that integrates disciplines and practices from fields such as computer science, industrial engineering, management science, and mathematics to design, develop, and maintain systems. In the context of enterprise architecture, system engineering trends refer to more effective system integration through the application of methodologies, techniques, and tools to manage the entire system life cycle, from planning to development, implementation, and operations (Dumitriu, 2018). Some of the latest technology trends in system engineering include model-based software development, service-oriented business architecture, and object-oriented information systems. In addition, other supporting technologies such as database management systems, system analysis and design, and software testing can also be used to increase the efficiency and effectiveness of engineering systems (Yamamoto et al., 2018).

In the context of enterprise architecture, the trend of system engineering can assist organizations in designing, developing, and implementing systems that are more integrated and responsive to business and technological needs (Goerzig & Bauernhansl, 2018). This can lead to benefits such as increased productivity, quality, and speed of service, as well as reduced costs and risks. Therefore, the trend of system engineering has become very important in enterprise architecture strategies in various organizations around the world.

Software Architecture in the Context of Enterprise Architecture

Software architecture trends in the context of an enterprise architecture or enterprise architecture refer to the organization's view of the design of information systems or information technology as a whole. In this case, software architecture is seen as an important part of enterprise architecture, because software is often used to facilitate and manage business processes in companies (Pfähler & Kemper, 2018).

One of the developing software architecture trends in the context of enterprise architecture is the use of service-oriented architecture (SOA). SOA is a software architectural framework that enables the development of systems that function as services, with these services being used and accessed by other systems within the enterprise architecture (Ansyori et al., 2018). Another trend is the use of microservices architectures. This architecture places the focus on developing and delivering smaller, more modular services. In a microservices architecture, applications are built as a collection of self-services that can be flexibly bundled and can be managed independently. In the context of enterprise architecture, microservices architecture can assist companies in increasing system flexibility, scalability, and robustness (Bhattacharya, 2018).

In addition, software architecture in the context of enterprise architecture has also developed toward the use of container-based architectures. This architecture allows developing and shipping applications separately in containers, which contain all the application elements needed to run them. This architecture allows applications to be easily installed and managed and can help companies accelerate response time and application deployment (Thönssen & von Dewitz, 2018). Overall, software architecture trends in the context of enterprise architectures continue to evolve to meet the increasingly complex and diverse needs of organizations. Using the right architecture can help organizations improve the efficiency, scalability, and reliability of their information systems and information technology.

Digital Transformation

The trend of digital transformation in the context of enterprise architecture refers to changes that occur in organizations to adopt new digital technologies and improve business processes, develop new business models, and increase value for customers. In the context of enterprise architecture, digital transformation involves the use of digital technology to increase business efficiency and flexibility (Hubert, 2018). This can include implementing cloud applications and IoT (Internet of Things) technology, using data analytics and AI (Artificial Intelligence), and developing mobile applications. To facilitate digital transformation, organizations can use an enterprise architecture framework to map business processes, technology, and information architecture. In this regard, service-oriented approaches and technologies such as microservices and containerization can help organizations achieve

their digital transformation goals. However, the digital transformation trend also presents challenges, including issues of information security and dependence on technology (Noran, 2013). Therefore, it is important for organizations to consider these factors and develop sustainable and flexible strategies to deal with the rapidly changing business environment.

Industry 4.0

Industry 4.0 is the trend of the industrial revolution which is currently growing rapidly and introducing new concepts in the context of enterprise architecture. Industry 4.0 is supported by technologies such as the Internet of Things (IoT), big data, cloud computing, artificial intelligence, and so on.

In the context of enterprise architecture, industry trend 4.0 requires organizations to implement flexible and adaptive enterprise architectures to integrate different technologies and systems, and to facilitate fast and effective digital business transformation (Kornysheva & Barrios, 2020). Enterprise architecture must be able to support systems and processes that are constantly changing and handle increasingly large and complex data volumes (Yli-Ojanperä et al., 2019).

In Industry 4.0, enterprise architecture can play a key role in providing a reliable and easy-to-use platform for organizations to adapt to the rapidly changing business environment. In this case, enterprise architecture must be able to provide solutions for system integration, data management, and interoperability with different systems and technologies. Thus, the use of industry 4.0 trends in the context of enterprise architecture can help organizations create systems and business processes that are more efficient, adaptive, and innovative. This enables organizations to be better prepared for future challenges and gain competitive advantage in increasingly complex and dynamic markets.

Business Process

Business process trends in the context of enterprise architecture include the use of business process methodologies, tools, and technologies to integrate, model, monitor, and optimize an organization's business processes. This can help organizations achieve efficiency, improve product or service quality, and improve responsiveness to fast market demands (Kangilaski, 2013). One of the well-known methods in business processes is the Business Process Modeling Notation (BPMN), which allows organizations to describe their business processes in the form of diagrams and analyze, measure, and optimize those processes. Other tools such as workflow management systems, decision management systems, and business process management systems can also help in automating business processes.

In enterprise architecture, business processes can be integrated with other systems and applications, such as CRM, SCM, and ERP, so that data and information can move smoothly throughout the organization. Thus, enterprise architecture based on business processes can help organizations adapt to rapid market and environmental changes, increase efficiency and speed, and strengthen business competitiveness and performance (Yamamoto, 2013)(Närman et al., 2012).

CONCLUSION

This research concludes that enterprise architecture is an important practice in managing organizational architecture, and its implementation requires close collaboration between IT and

business teams as well as top management support. Organizations need to pay attention to the factors that affect the implementation of enterprise architecture and choose an architectural framework that fits their needs and context. In addition, organizations need to pay attention to future trends in enterprise architecture, including the integration of business and IT architectures, a service-based approach, and an increasing focus on business value. Past trends in enterprise architecture include the use of architectural frameworks, such as the Zachman Framework and TOGAF, as well as an emphasis on developing information technology architectures. Future trends in enterprise architecture include integrating business architecture and information technology, adopting a service-based approach, and increasing focus on business value. Enterprise architecture implementation requires close collaboration between IT and business teams, as well as full support from top management. The selection of an architectural framework that fits the needs and context of the organization is very important in developing an enterprise architecture. This research has implications for Companies to monitor developments and changes in organizational architecture as well as adopt future trends in enterprise architecture, such as integration of business and IT architectures, service-based approaches, and increased focus on business value.

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