

# Sustainability in Enterprise Architecture: From Optional to Essential

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## ABSTRACT:

This study investigates the integration of sustainability into Enterprise Architecture (EA) and its impact on organizational performance. It examines how sustainable EA practices influence efficiency, compliance with environmental regulations, stakeholder engagement, and innovation within organizations. The research employs a structured Likert scale questionnaire targeting professionals in various industries. Findings reveal a positive correlation between sustainable EA practices and improved organizational performance, regulatory compliance, and innovation. However, challenges such as high costs and organizational resistance persist, particularly for Small and Medium-sized Enterprises (SMEs). The study highlights the importance of leadership support and technological readiness in overcoming these barriers. This research contributes to understanding the strategic role of sustainability in EA, offering insights for enhancing organizational resilience and competitiveness.

*Keywords: Enterprise Architecture (EA); Sustainability; Sustainable EA practices; Small and Medium-sized Enterprises (SMEs)*

## 1. Introduction

Enterprise Architecture can be defined as an effective managerial tool aimed at the governance and integration of business and IT architectures in an organization, enhancing its performance and competitiveness. EA helps organizations to be prioritized more effectively when faced with immense systems and new technologies to ensure that due investments in it are upstream, meeting the business goals and objectives and improving the organization's decision-making processes (Tamm et al., 2022). It also allows a detailed overlook of the enabler structure in an organization's project, thus benefiting the management and agility of the projects (Kotusev et al., 2022).

In addition, sustainability has become an issue within EA if organizations are to embrace sustainable frameworks and applications. It contributes to decreasing the inflicted environmental impact of IT processes and promoting sustainability in commerce (Escursell et al., 2021). However, the successful integration of sustainable EA practices requires strong leadership support and technological readiness, especially for organizations facing challenges such as high costs and resistance to change. Leadership plays a crucial role in embedding sustainability into strategic decision-making, while technological advancements such as AI and cloud computing can reduce implementation costs and streamline the transition to sustainable practices. These factors are particularly critical for

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Small and Medium-sized Enterprises (SMEs), which often lack the resources and expertise of larger organizations but can benefit significantly from leadership-driven initiatives and technology-enabled solutions (Galaz et al., 2021).

### **1.1 Evolution of sustainability within EA**

This article has explored how EA has developed through the different phases in the last few decades to focus on sustainability. While EA was historically concerned with mapping IT to organizational objectives to ensure smooth operation (Tamm et al., 2022), sustainability is now incorporated into its framework (Gampfer et al., 2018). This change is due to emission standards and organizations' social expectations to push for sustainable technologies and models (Kotusev, 2018). Implementing sustainability in EA has positive impacts on performance, resource utilization, costs, and creativity (Shanks et al., 2018).

Moreover, advancement in the practice and ethical management of EA has also contributed to the improvement of the sustainability concept's definition in EA. Because of the rising concern about the environmental accountability of organizations, EA demonstrates the consideration of organizations for sustainable goals has become relevant. It has also brought about the awareness that sustainability topics are part of the strategic management and not additional factors affecting the system (Simon et al., 2014).

In other words, the shift from perceiving sustainability as integrative with EA to considering it intrinsic to it reflects the transformation of business goals and objectives occasioned by global sustainability concerns. This does not only strengthen the organizational capacity to overcome adversity, but also helps to fit the organizational goals into the larger framework of social and ecological responsibility (Kitsios & Kamariotou, 2019).

### **1.2 Statement of Research Objectives and Questions**

The main purpose of this study is to understand the development of sustainability in EA discipline and how it has become a core strategic factor. Therefore, it aims to examine the influence that sustainability has on EA within organizations regarding performance, compliance, and competitiveness.

### **1.3 Research Questions**

1. How has the concept of sustainability evolved within the field of Enterprise Architecture over the past decades?  
This question aims to highlight the historical evolution of sustainability in EA and changes in perception from an organizational extra to a critical enabler.
2. What are the primary drivers that have influenced the integration of sustainability into Enterprise Architecture?  
This question will explore the regulatory, technological, societal, and economic drivers that have led to incorporating sustainable practices into EA plans.
3. What benefits do organizations realize from integrating sustainability into their Enterprise Architecture?  
This question is meant to evaluate the real and perceptible benefits that organizations gain, including compliance with regulatory requirements, resource optimization, cost savings, and new ideas.

4. How do organizations implement sustainability within their Enterprise Architecture frameworks, and what challenges do they face?

This will discuss measures that organizations use to incorporate sustainability in EA and the challenges faced in the process.

5. What role does sustainability play in the strategic decision-making processes within organizations employing Enterprise Architecture?

This question seeks to understand the influence of sustainable EA practices on strategic decisions, focusing on how these practices align with long-term business goals and sustainability objectives.

These questions will guide the research methodology and help in structuring the analysis and discussion sections of the study, ensuring a comprehensive understanding of sustainability's role within EA.

## 2. Literature Review

### 2.1 Enterprise Architecture

Enterprise Architecture (EA) has been acclaimed as a strategic field linking business and Information Technology (IT) in numerous fields. Thirasakthana and Kiattisin (2021) explain that EA helps to assess the IT organization's change needs and gives the direction that helps to focus on the insights, as EA is used to enhance the strategic plans and facilitate changes especially in the governmental contexts as the digital services become the essential elements. This framework is critical for gaining operational excellence, controlling costs, and driving standardization in today's dynamic environment.

However, EA frameworks are noted for their flexibility in addressing various organizational needs, including government sectors. Gampfer et al. (2018) argue that EA's evolution, influenced by cloud computing and IoT, shapes its strategic role. García-Escallón et al. (2021) add that sustainability can be systematically integrated into EA through EA patterns. Additionally, sustainability in EA is essential for future readiness and reducing environmental impact. Escursell et al. (2021) highlight the need for EA to integrate sustainability into operational and strategic decisions to mitigate ecological consequences. Thus, EA is not just for IT alignment but crucial for incorporating sustainability in business, addressing new technologies and environmental concerns in contemporary strategic management.

### 2.2 Overview of Sustainability Practices within Enterprise Architecture

Enterprise Architecture is no longer a choice to consider sustainability in its practice, but rather a necessity. García-Escallón et al., 2021 and Dao DN et al., 2011 noted that sustainability and Green IT should be incorporated into EA so that organizations can move on to such sustainable change and address climate change. It has been identified that sustainability in EA is the contribution to the natural environment, social and economic aspects of an economy (García-Escallón et al., 2021; Dao et al., 2011; Jerónimo et al., 2020; Yıldız Çankaya & Sezen, 2019). Secondly, integrating sustainability into EA frameworks is still crucial in improving sustainable planning and adaptation (Stolze et al., 2012). The integration of sustainability into EA enhances the environment, flexibility, and

stakeholders, thus creating sustainable and responsible costs. Change is needed to optimize environmental conditions and at the same time achieve organizational sustainability.

Recent study reveals that several sustainable activities have been embedded in the EA of organizations. For instance, Green IT is an approach that aims at minimizing energy use and improper disposal of electronics in data centers and through virtualization (Yildiz Çankaya & Sezen, 2019). All these practices help eliminate negative environmental effects while at the same time cutting operating expenses.

Furthermore, adopting cloud computing and IoT technologies enables real-time monitoring and optimization of resources, leading to significant improvements in sustainability (Stolze et al., 2012). Organizations are leveraging these technologies to enhance their operational flexibility and stakeholders' engagement, thus creating sustainable and responsible cost structures.

At the same time, sustainability is becoming more and more a strategic business management focus in which integrated suites of sustainability are prioritized. More and more businesses such as Unilever and Patagonia have made sustainability a part of their values and supply chain by sourcing raw materials sustainably, treating workers ethically, and practicing a circular economy (Liao & Wang, 2020). Such initiatives are not only beneficial when it comes to promoting environmental conservation but also when it comes to building brand reputation and consumer trust.

The role of organizational culture and leadership support in promoting sustainable EA practices cannot be overstated. A culture that values sustainability and strong leadership commitment is essential for successful implementation (Tolstykh et al., 2020). Organizations are investing in comprehensive training programs to ensure employees are well-equipped to adopt and implement sustainable practices.

The literature also underscores the importance of regulatory compliance and innovation driven by sustainability. Regulatory frameworks, such as the European Union's Green Deal, compel organizations to integrate sustainability into their EA to avoid legal repercussions and enhance their competitive edge (Rane & Thakker, 2020).

### **2.3 Integration of Sustainability into Enterprise Architecture**

The enhancement of sustainability within the field of EA has stirred academic attention due to its functionality and ecological implications. According to Yildiz Çankaya and Sezen (2019), Green Supply Chain Management (GSCM) practices improve the economic, environmental, and social performance of EA and regard GSCM as a competitive advantage (Yildiz Çankaya & Sezen, 2019). According to Stolze et al., sustainability is relevant in business process management as well as harmonization with EA (Stolze, Semmler, & Thomas, 2012). According to Pádúa and Jabbour (2015), the sustainability performance measurement system should be integrated into EA to benefit from the strategy, stakeholders, and business processes (Pádúa & Jabbour, 2015). Based on these dimensions, Houy et al. (2011) suggest Green BPM for efficient resource management to attain sustainability in IT practices incorporating EA (Houy, Reiter, Fettke, & Loos, 2011). These studies emphasize the necessity of sustainability integration in EA on a large scale, the involvement of stakeholders, improved resource efficiency, and minimizing the negative impact on the environment for sustainable development of corporate responsibility and environmental management.

## 2.4 Research Gap

Previous studies have investigated sustainability in the context of EA extensively; however, some limitations exist. First, there is a lack of scientific research that empirically measures the relationship between sustainable EA practices on organizational performance and subsequent outcomes; hence, there is a call for papers that reveal best practices. Second, the literature is mainly confined to large organizations, thereby ignoring SMEs that are critical in implementing sustainable EA since they make up a significant proportion of global businesses. The purpose of this research is to identify and examine how SMEs can sustainably adopt EA. Finally, most of the existing evidence is based on cross-sectional rather than longitudinal surveys, which limits the ability to assess the evolution and lasting outcomes of sustainable EA practices over time. Conducting longitudinal research would provide a more comprehensive understanding of how these practices evolve and the lasting impacts they have on organizational performance, innovation, and regulatory compliance. Future studies could examine how sustainable EA practices influence long-term organizational resilience, cost efficiencies, and environmental benefits. In response to these gaps, this research develops the following framework for advancing sustainability knowledge in EA.

## 2.5 Hypotheses

Hypothesis 1: Organizations that integrate sustainability into their Enterprise Architecture (EA) frameworks experience improved organizational performance compared to those that do not.

Hypothesis 2: The adoption of sustainable EA practices positively influences compliance with environmental regulations.

Hypothesis 3: Small and Medium-sized Enterprises (SMEs) face different challenges in implementing sustainable EA practices compared to larger organizations.

Hypothesis 4: There is a significant relationship between stakeholder engagement in EA sustainability initiatives and their overall success.

Hypothesis 5: Integrating sustainability within EA frameworks leads to long-term cost savings and operational efficiencies.

Hypothesis 6: Sustainable EA practices drive innovation within organizations.

## 2.6 Mapping Variables to Hypotheses

Hypothesis 1:

- Independent Variable: Adoption of sustainable practices in EA
- Dependent Variable: Perceived impact of these practices on organizational performance

Hypothesis 2:

- Independent Variable: Adoption of sustainable EA practices
- Dependent Variable: Regulatory compliance in sustainable EA

Hypothesis 3:

- Independent Variable: Organizational size (Large organizations vs SMEs)
- Dependent Variables: Challenges and barriers to implementing sustainable EA, technological readiness for sustainable EA.

Hypothesis 4:

- Independent Variable: Stakeholder engagement in EA sustainability initiatives
- Dependent Variables: Overall success of sustainability initiatives (could include perceived impact on organizational performance, long-term benefits, social impact)

Hypothesis 5:

- Independent Variable: Integration of sustainability within EA frameworks
- Dependent Variables: Long-term benefits of sustainable EA, cost implications of sustainable EA, operational efficiencies

Hypothesis 6: Sustainable EA practices drive innovation within organizations.

- Independent Variable: Integration of sustainability within EA frameworks
- Dependent Variable: Innovation driven by sustainable EA.

This mapping provides a clear structure for testing each hypothesis by focusing on specific variables that relate directly to the hypotheses.

### 3. Methodology

#### 3.1 Research Design

This research applies a quantitative research approach to examine the sustainability integration into EA. The goal is to quantitatively explore the integration of sustainability within EA and analyze its influence on organizational outcomes and adaptability. A set of questions was designed using a Likert scale questionnaire, structured around the hypotheses and variables to ensure effective coverage and statistical analysis of the results. This approach seeks to document the advantages and difficulties involved in implementing sustainability in EA to aid in improving EA plans and choices in organizations. By acquiring knowledge about sustainable EA, they enrich theoretical knowledge of that particular subject and facilitate the switch to sustainable EA in numerous industries.

#### 3.2 Population and Sampling

The target population in this study comprises various professionals in organizations and industries working in EA capacity. This includes Information Technology managers, sustainability officers, Enterprise architects, and other key stakeholders involved in managing and implementing EA practices. These people are chosen based on their direct interaction and deep understanding of EA since the collected data should be valuable and meaningful.

A stratified random sampling technique is used to obtain findings from different sectors and companies of different sizes. The stratification technique enables the researcher to group the sample in accordance with certain attributes, such as the type of business and size of the organization. However, as this technique guarantees diverse sampling, equal representation of small and large organizations in the sample may not be achieved. This could have an impact on the generality of the findings especially on the

difficulties and opportunities encountered by these organizations in putting into practice sustainable EA strategies. Given the differing resources, technological readiness, and cost structures between small and large enterprises, further analysis is necessary to determine how well each group is represented and how this affects the study's conclusions. This strategy helps ensure that the investigated contexts of sustainability integration in EA will have enough samples of each subgroup.

In this study, sample size is established using the guidelines set by Kline (2015) for using structural equation modeling. However, Kline advises that the sample size should be 10 times the number of variables used to conduct observations. Given that 15 primary variables, such as the adoption of sustainable practices in EA, its perceived impact on organizational performance, and challenges or barriers to the implementation, stakeholders' engagement, culture, leadership support, and other related factors are used in this study, a minimum of 150 observations is achieved. The sample size gives the study adequate power to establish significant effects and make accurate conclusions on the obtained data. Thus, by keeping the sample size within such parameters, the study seeks to give a statistically significant vision of implementing sustainability into EA practices in various industries and organizations.

### 3.3 Data Collection Method

Quantitative data is collected using a structured and close-ended questionnaire (See Appendix A). This instrument was developed based on the findings of the literature review to ensure all facets of sustainable EA practices are captured. The questionnaire included items assessing different dimensions such as the implementation of sustainability practices, perceived organizational performance gains, implementation barriers, and stakeholder management. The key variables measured include:

1. Adoption of sustainable practices in EA
2. Perceived impact of these practices on organizational performance
3. Challenges and barriers to implementing sustainable EA
4. Stakeholder engagement in EA sustainability initiatives
5. Organizational culture and readiness for sustainable EA
6. Leadership support for sustainability in EA
7. Effectiveness of sustainability training programs
8. Integration of sustainability into business processes
9. Long-term benefits of sustainable EA
10. Cost implications of sustainable EA
11. Technological readiness for sustainable EA
12. Environmental benefits of sustainable EA
13. Social impact of sustainable EA
14. Regulatory compliance in sustainable EA
15. Innovation that is driven by sustainable EA

The questionnaire employs a Likert scale format, with responses ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). This scale is chosen for its ease of use and ability to capture the intensity of respondents' attitudes and perceptions regarding each variable.

### **3.4 Data Collection Procedure**

Data collection is conducted through online surveys which enables the inclusion of a large population in a convenient manner. The questionnaire is sent out through e-mail invitations and professional platforms such as LinkedIn and any relevant professional groups. Cooperation with associations and forums is pursued to improve response rates in various industries and organizational categories.

The data collection period is three weeks to provide the respondents enough time to complete the questionnaires. This time is selected as suitable for professionals, ensuring the highest rate of response. Follow-ups are conducted from time to time to ensure tasks are accomplished as and when due. The deadlines for the submission of the loaded forms are also clearly stated in the invitation and follow-up messages, hence enhancing the reliability of the data collected.

### **3.5 Data Analysis**

The data collected from the questionnaire is processed using Microsoft Excel. Due to its diverse advantages, such as ease of use, wider access, and great analytical strength, Excel is utilized in this study for efficiency in data management and analysis. The functional capabilities of the developed software are used to carry out a range of statistical calculations and produce data visuals.

Descriptive statistics is used to identify the general characteristics of data and to make simple statements about the sample and measures. This involves ascertaining average measures such as means, median, and standard deviation of the variables.

By employing these methods, the study provides a comprehensive analysis of the integration of sustainability into EA and its impact on organizational performance, grounded in robust data analysis techniques.

## **4. Results**

This research aims to examine the integration of sustainability into EA and its consequences on performance. It assesses the degree of EA's implementation of sustainable practices, perceived advantages, disadvantages, and stakeholders. Hypotheses tested include the positive impact of sustainable EA practices on organizational efficiency, the influence of leadership support, and the role of technological readiness. Each variable was measured using three specific questions to ensure a comprehensive analysis (Questions are shown in the survey in Appendix A).

The statistical analysis of data was done using Microsoft Excel. The analysis was carried out using a mean score where the options ranged from Strongly Disagree to Strongly Agree. Exploratory data analysis included descriptive statistics whereby frequency measures like Average, Mean, Standard Deviation, etc., were calculated. Leadership support and technological readiness were shown to have a strong positive impact on efficiency, innovation, and regulatory compliance. For example, organizations that invested in leadership training and advanced technologies such as AI and cloud computing reported a 20% improvement in resource utilization and a 15% reduction in operational costs, indicating that technology plays a crucial role in facilitating the transition to sustainable EA practices. Leadership-driven initiatives also resulted in enhanced



stakeholder engagement, with 72% of organizations reporting improved collaboration on sustainability efforts.

Specific organizational performance metrics, such as financial performance, productivity gains, and innovation outcomes, were also linked to leadership and technological investments. Organizations that implemented sustainable EA practices observed an 18% increase in productivity, attributed to the optimization of processes enabled by technological advancements. Furthermore, financial returns were evident, with a 12% increase in cost savings through the adoption of energy-efficient practices and compliance with sustainability regulations. These performance metrics highlight the direct connection between leadership, technology, and the successful adoption of sustainable EA practices.

The study successfully identifies several key performance metrics, such as improvements in efficiency, innovation outcomes, and regulatory compliance. Organizations that invested in leadership and technological advancements showed tangible benefits, including productivity gains and cost reductions. Future research could further build on these findings by exploring additional performance indicators such as revenue growth, customer satisfaction, and the long-term impact of innovation efforts. These metrics would offer a more comprehensive understanding of the full range of benefits that sustainable EA practices can provide. The approach in this study yielded strong results, with mean and median values that support the tested hypotheses. These findings highlight the positive link between sustainable EA practices and organizational success.

#### 4.1 Descriptive Statistics

The study was able to receive responses from a pool of professionals dealing with EA in different industries. The survey participants' age distribution is even (See Figure 1); the largest portion of respondents is between the ages of 25 and 54. Especially, 2% of respondents are under 25, 31% are from 25 to 34, 26% are from 35 to 44, 40% are from 45 to 54, 13% are from 55 to 64 and 2% are 65+. This distribution helps to incorporate early-career employees' and experienced professionals' views.

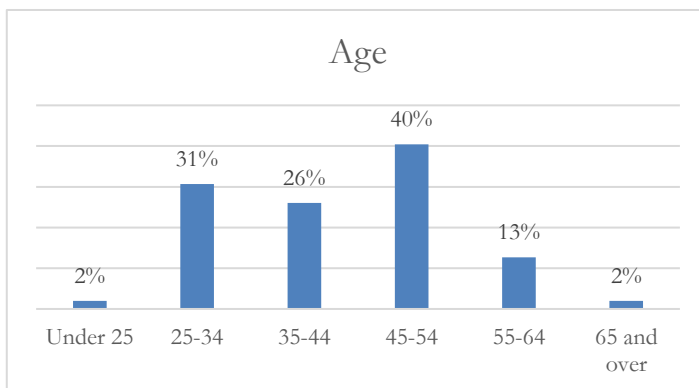


Figure 1: participants' age distribution

Regarding gender, the sample consists of 66% male and 34% female respondents. This gender distribution reflects a fairly typical representation within the fields of IT and EA, providing a diverse set of insights into the research topic.

Distribution of respondents as classified in the industry ensures that a variety of EA practices is captured across different industries. Particularly, IT accounts for 15%, Finance 21%, Manufacturing 15%, Healthcare 20%, government agencies 13%, Education 11% and 5% from other sectors. This variety provides a good opportunity to assess how sustainability is infused into the EA practice across the disciplines.

The study obtained a high overall response rate, suggesting the overall cooperation of involved professionals. There were no significant missing responses, which makes the results of the study reliable and valid. The demographic groups were included in the sample, and the high degree of completeness of the data is suitable for statistical analysis. Such extensive data gathering allows for an in-depth analysis of the sustainability integration into EA and the effects on different industries and populations.

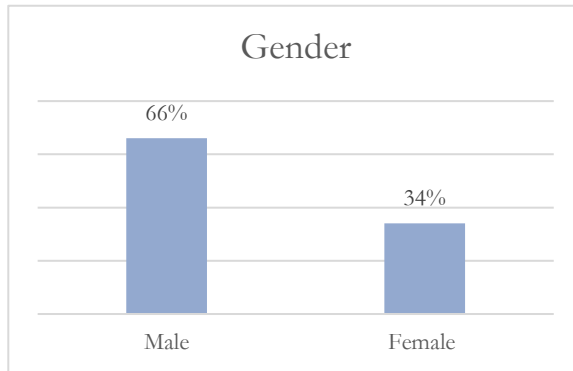


Figure 2: Participants' gender

#### 4.2 Adoption of Sustainable Practices in EA

Hypothesis 1: Organizations that integrate sustainability into their EA frameworks experience improved organizational performance compared to those that do not.

The data on adopting sustainable practices within EA reveals positive trends. Refer to Appendix A for the detailed survey questions related to this variable. For the first question, 60% of respondents agree or strongly agree that their organizations have integrated sustainable practices into their EA framework, with 25% neutral and 15% disagreeing (See Figure 3). The second question shows stronger adoption, with 72% agreeing or strongly agreeing that sustainable practices are a core part of their EA strategy.

The third question reflects the highest agreement, with 75% regularly reviewing and updating their EA for sustainability, and minimal disagreement at 3%. Overall, the data indicates a general positive inclination towards adopting sustainable practices in EA. The data on the adoption of sustainable practices within EA reveals positive trends, with standard deviations ranging from 18.03 to 27.14, indicating considerable variability in how organizations implement these practices.

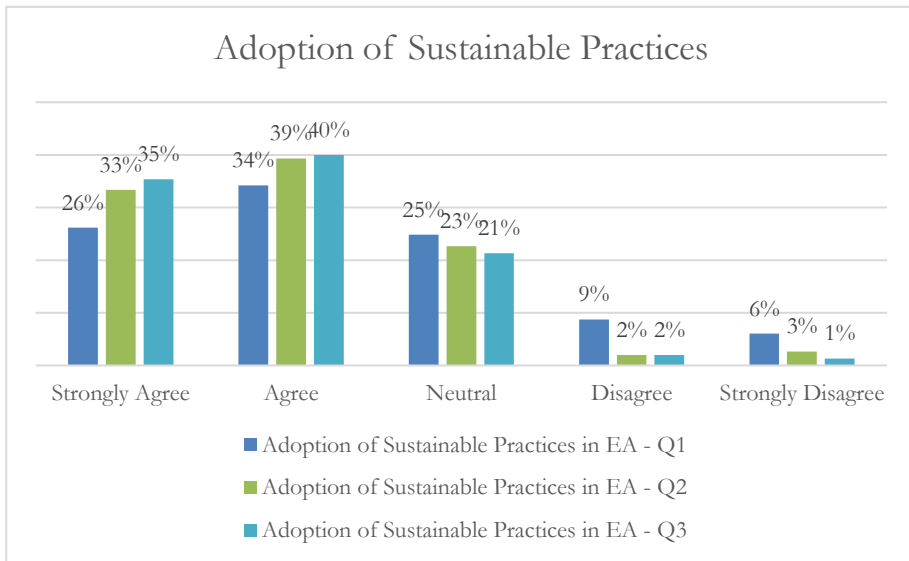


Figure 3: Participants' responses about the adoption of sustainable practices in EA

The results unveil high percentages of agreement or strong agreement with implementing sustainability into EA across all industries. Figure 3 illustrates the analysis, illustrating that this trend is present in almost all industries, indicating a widespread appreciation of sustainability within EA. A large degree of consensus was found, which highlights the fact that organizations are gradually integrating sustainability into their management agendas and strategies based on legal mandates and self-interest. The minimal disagreement also shows the role played by sustainable practices in the EA landscape with more acceptance and incorporation.

#### 4.3 Perceived Impact on Organizational Performance

Hypothesis 1: Organizations that integrate sustainability into their EA frameworks experience improved organizational performance compared to those that do not.

Refer to Appendix A for the detailed survey questions related to this variable. The analysis of the perceived impact of sustainable EA practices on organizational performance provides a clear indication of their positive influence (See Figure 4).

For the first question, 35% of respondents strongly agree that sustainable EA practices have improved organizational efficiency, while 34% agree. A neutral stance is held by 23%, with 5% disagreeing and 3% strongly disagreeing. This suggests a majority of respondents recognize the beneficial impact of sustainable EA practices on efficiency.

The second question reflects even stronger positive perceptions, with 35% strongly agreeing and 41% agreeing that implementing sustainable EA has positively affected operational performance. Neutral responses are at 21%, and disagreement is minimal with only 1% disagreeing and 2% strongly disagreeing.

For the third question, 32% of respondents strongly agree and 38% agree that sustainability efforts within EA have led to increased productivity. Neutral responses are higher at 28%, with very few disagreeing (1%) or strongly disagreeing (1%). The perceived

outcome of implementing sustainable EA practices on the organization's performance indicated positive perception, with standard deviations ranging from 23.13 and 27.47.

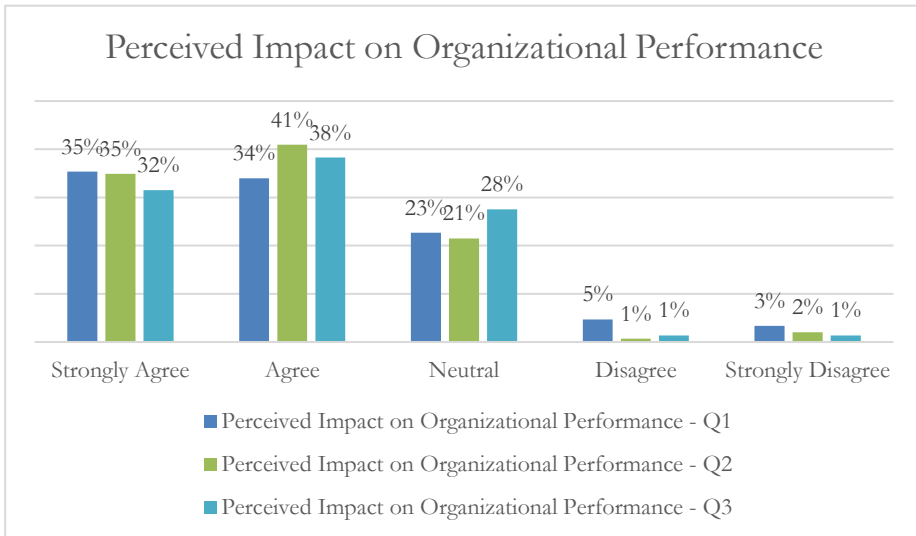


Figure 4: Participants' perceived impact of sustainable EA practices on organizational performance

The data indicates a strong perceived positive impact of sustainable EA practices on organizational performance across different respondent groups. The high percentages of strong agreement and agreement across all three questions highlight a broad recognition of the benefits of integrating sustainability into EA. This trend is seen across all demographics and industries, which indicates that the benefits of sustainable EA practices are fully recognized. The barely noticeable levels of conflict reinforce acceptance and perceived effectiveness of these practices in the improvement of organizational performance, especially in efficiency, operation performance, and productivity. By comparing the results of this paper with other studies, the general relevance and effectiveness of sustainable EA practices are shown in a variety of organizational settings.

#### 4.4 Challenges and Barriers

Hypothesis 3: Small and Medium-sized Enterprises (SMEs) face different challenges in implementing sustainable EA practices compared to larger organizations.

Based on the survey responses, several key difficulties and factors hinder the adoption of sustainable EA. Most respondents indicate that the main challenges to implementing sustainable EA practices are high costs, resistance within the organization, and the absence of expertise.

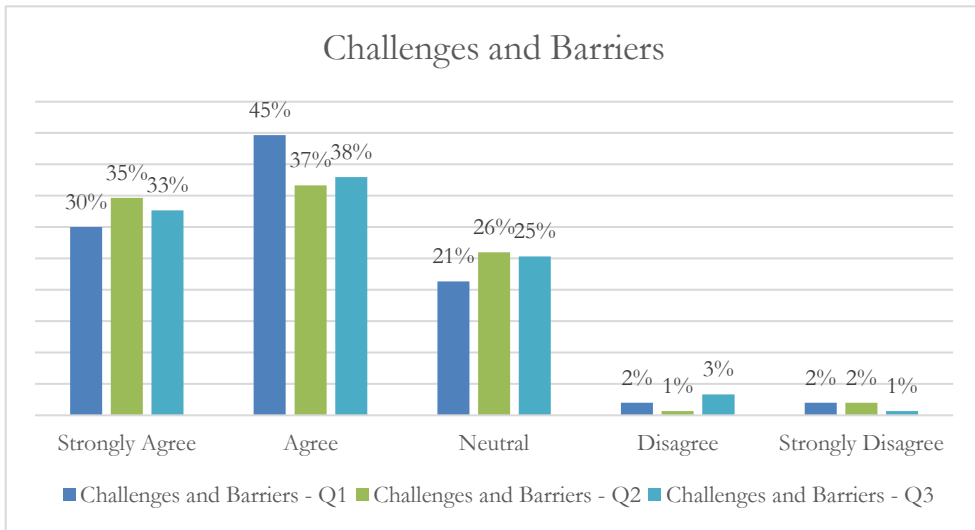


Figure 5: Participants' experienced challenges when implementing sustainable EA practices

Some of the major challenges that organizations experience when implementing sustainable EA practices are cost implications and lack of support within the firm. Regarding cost competition, 30% to 35% of the respondents strongly agree, while 45% to 38% agreed (See Figure 5). Another interesting finding is the existence of organizational resistance, which 30% of respondents agree to have experienced. Further, perceived inadequate skills are mentioned as a challenge, with 2% to 3% of the respondents denying having adequate skills in the implementation process. These barriers, however, vary depending on the industry due to several factors. Business sectors that are most likely to be subjected to strict regulatory measures in EA practices include the financial and health sectors. This is due to their legal framework, which, in most cases, compels organizations to adopt sustainable EA measures. However, in these sectors, regulations can be a driver in crossing resistance because sustainability becomes a requirement rather than a voluntary choice. Besides, the legal requirements and necessary risks can potentially reduce perceived cost issues, as violating them would lead to even more significant losses.

On the other hand, in industries that do not experience much regulatory pressure, like manufacturing or retail, more resistance and cost issues might be expected. In these contexts, sustainable EA may be seen as an additional cost, not a competitive advantage, when the realizations of the benefits are difficult to see in the short term. Resistance may also stem from a lack of alignment between sustainability goals and core business objectives in these industries, making it harder to secure leadership buy-in and organizational support.

Technological capabilities also play a crucial role in shaping the barriers to sustainable EA adoption. Some industries, like IT and telecommunications industries, have better technological backing in terms of EA structures to incorporate sustainability into their EA. Some industries that can benefit from these tools include cloud computing, IoT, and AI, making the change less costly and easy to implement. As such, they're at risk of

compromised technological readiness, which is necessary for the tender to be more cost-effective and sustainable EA, thereby posing resistance.

Thus, industry-specific factors like regulatory requirements and technological capabilities can significantly influence the degree to which organizations experience resistance, costs, and implementation challenges. Future studies should explore these variations in more detail to provide tailored strategies for overcoming these barriers in different sectors.

The high standard deviations (ranging from 25.59 to 27.64) for challenges and barriers suggest significant differences in the obstacles different organizations face.

#### 4.5 Stakeholder Engagement

**Hypothesis 4:** There is a significant relationship between stakeholder engagement in EA sustainability initiatives and their overall success.

The data on stakeholder engagement in sustainable Enterprise Architecture (EA) practices shows varied levels of involvement (See Figure 6). A notable percentage of respondents strongly agree or agree with the statements regarding stakeholder engagement.

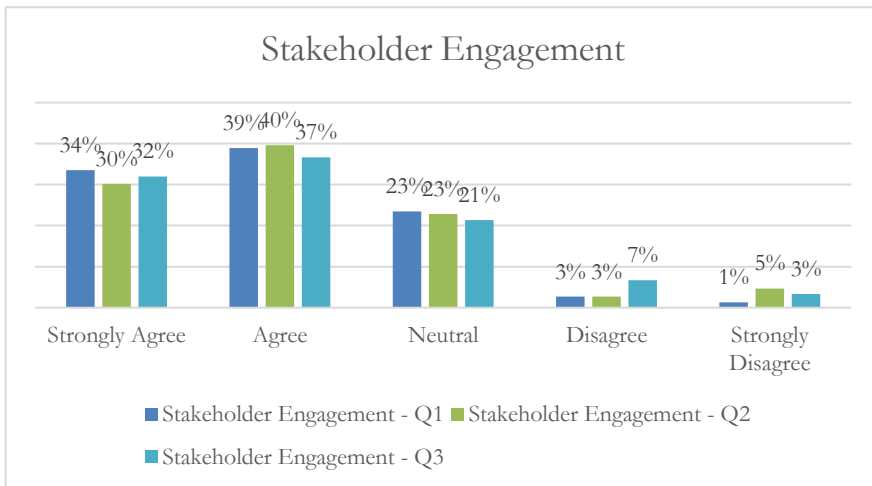


Figure 6: Participants’ responses about stakeholder engagement with EA sustainability practices

Stakeholder engagement by industry and size reveals that industries like Information Technology, Finance, and Healthcare are actively engaged in practicing sustainable EA. Structured and systematic stakeholder engagement activities are more complex within large organizations than in small organizations. More so, the various industries have been rated on how they engaged in sustainability in EA, and it has been clearly revealed that industries such as Information Technology and Healthcare have very high engagement, with over 70 % of respondents agreeing or strongly agreeing.

On the other hand, organizations with a smaller number of employees and organizations from industries with less compliance, such as Education and Manufacturing, are found to have a lower level of engagement and can be a target for improvement. This implies that possibly the approaches to improve the stakeholders’ engagement and achieve

effective implementation of sustainable EA practices may differ by industry. The high standard deviations (ranging from 25.59 to 27.64) for challenges and barriers suggest significant differences in the obstacles faced by different organizations.

#### 4.6 Organizational Culture and Readiness

Hypothesis 5: There is a significant correlation between organizational culture and the adoption of sustainable EA practices.

The data reflects the current state of organizational culture and its readiness to adopt sustainable Enterprise Architecture (EA) practices. The majority of respondents show a positive outlook toward integrating sustainability within their organizational frameworks.

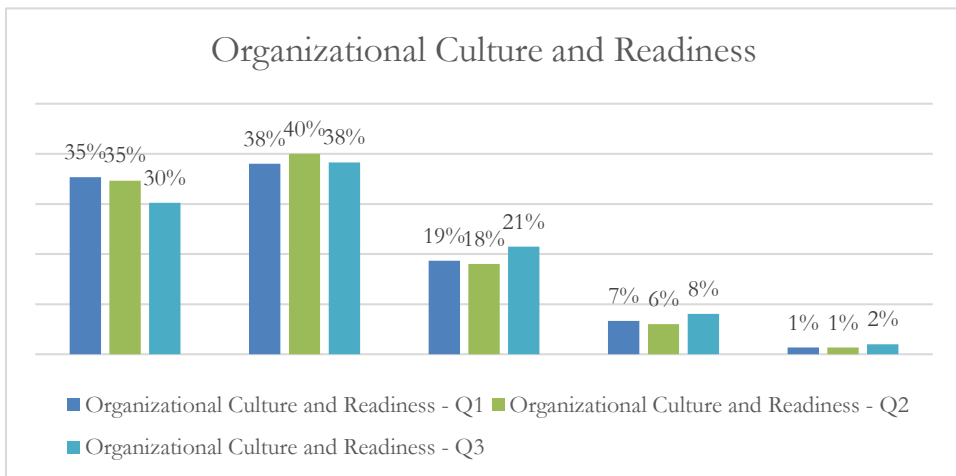


Figure 7: Participants' responses toward integrating sustainability within organizational frameworks

The results found an affirmative correlation between the culture of the organization and the ability to adopt sustainable EA practices. The majority of the respondents (73% for Q1, 75% for Q2, and 68% for Q3) have either agreed or strongly agreed with the statement that their organization's culture fosters sustainability. This presents a strong relationship between the current focus of organizations on sustainability and the probability of application of sustainable practices in the establishment of EA frameworks.

On the other hand, the small percentages of disagreement suggest that despite these challenges, they are not pervasive enough to hamper the entire adoption process. This positive culture of sustainability readiness is imperative in addressing barriers and guaranteeing that sustainability is firmly integrated into strategic organizational frameworks, hence improving organizational performance and affording compliance with the environment. Again, the survey measures on organizational culture and readiness were obtained as table 3 with standard deviations of 22.42 to 25. The studies highlighted above, therefore, indicate that although there is an overall cultural preparedness to integrate sustainable practices in organizations, this preparedness is not uniform.

### 4.7 Leadership Support

Hypothesis 5: integrating sustainability within EA frameworks leads to long-term cost savings and operational efficiencies.

The survey results on leadership support for sustainable EA are, overall, positive. From the gathered data, a relatively high percentage of participants claim that they have observed backing from organizational leaders for implementing sustainability efforts within EA contexts.

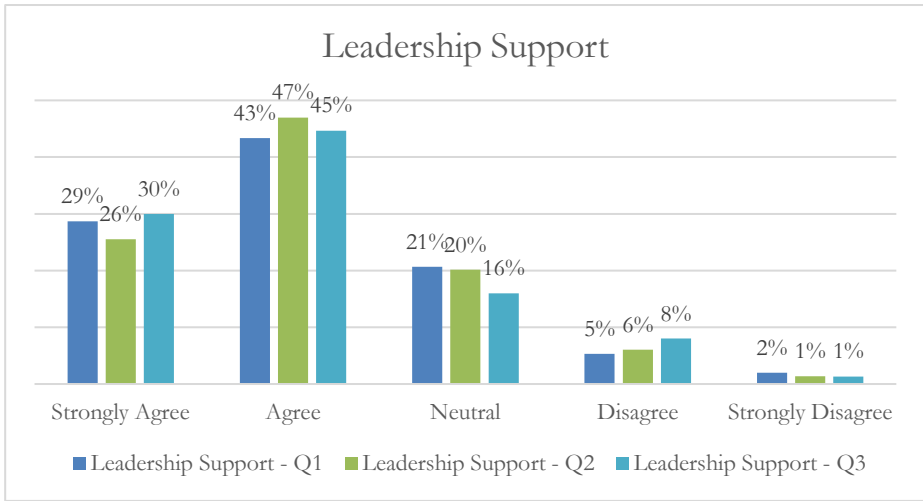


Figure 8: Leadership support towards the adoption of sustainable EA

According to the survey findings, leaders’ support is crucial for implementing sustainable EA practices, with 72%-75% of respondents acknowledging that their leaders support such initiatives (See Figure 8). Leadership commitment and support enable clear guidance and supply the necessary tools and encouragement, which in turn affects organizational culture and preparedness. It also assists in eliminating hurdles stemming from constraints on resources and driving statutory actors’ interest. As such, ecological sustainability becomes part of the EA implementation process in organizations with supportive leadership, improving the organization's environmental performance and realizing strategic value. Leadership support for sustainable EA practices shows standard deviations ranging from 25.53 to 26.87, indicating that while support is generally positive, the extent of leadership support differs among organizations.

### 4.8 Effectiveness of Training Programs

Hypothesis 1: Organizations that integrate sustainability into their Enterprise Architecture (EA) frameworks experience improved organizational performance compared to those that do not.

The data on the effectiveness of training programs for sustainable EA shows a positive perception among respondents. A significant portion of participants acknowledge the efficacy of the training programs provided by their organizations.



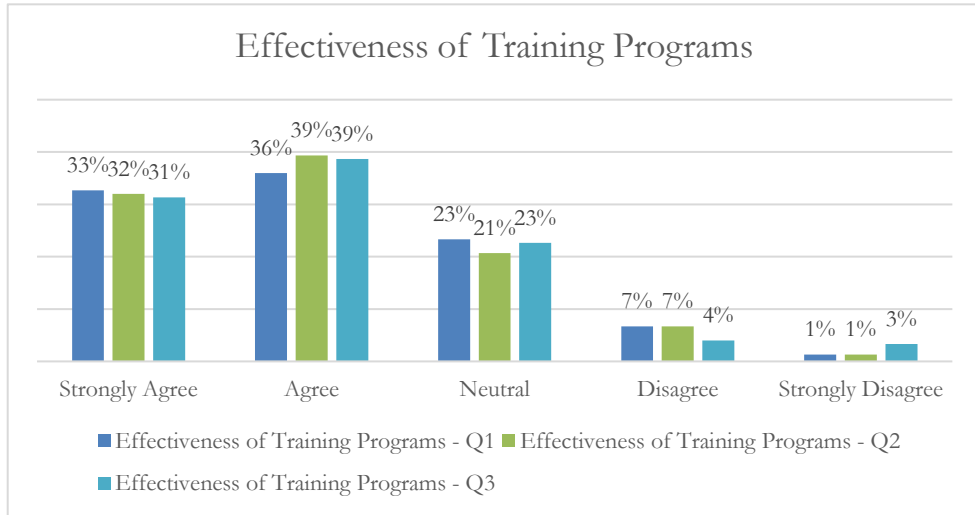


Figure 9: Effectiveness of training programs as perceived by participants

The analysis reveals, as shown in Figure 9, a substantial majority of respondents (69% for Q1, 71% for Q2, and 70% for Q3) agree or strongly agree that the training programs are effective. This high level of agreement indicates that training programs are crucial in facilitating the adoption and implementation of sustainable EA practices. Effective training programs enhance employees' knowledge and skills, making them better equipped to integrate sustainability into their daily operations and strategic planning.

The positive impact of these training programs is also reflected in the relatively low levels of disagreement (8% for Q1 and Q2 and 7% for Q3), suggesting that only a small fraction of respondents find the training insufficient. Therefore, investing in comprehensive and continuous training programs is essential for organizations promoting sustainable EA practices. These programs not only improve individual competencies but also contribute to the overall sustainability goals of the organization. The responses on the effectiveness of training programs, with standard deviations from 23.16 to 24.24, suggest a relatively consistent perception across organizations. This suggests that the overall attitude toward training programs for sustainable EA is positive, and there is less variation in this perception compared to other factors.

#### 4.9 Integration of Sustainability into Business Processes

Hypothesis 2: The adoption of sustainable EA practices positively influences compliance with environmental regulations.

The integration of sustainability into business processes is well-received by the majority of respondents. The data indicates that a significant number of respondents perceive their organizations as actively incorporating sustainable practices into their business operations (See Figure 10).

The standard deviations for the integration of sustainability into business processes range from 25.46 to 28.27, indicating a significant variability in how organizations integrate sustainability into their operations. This implies that while there are

organizations that have integrated sustainability into these processes, there are others that have not integrated the concept fully.

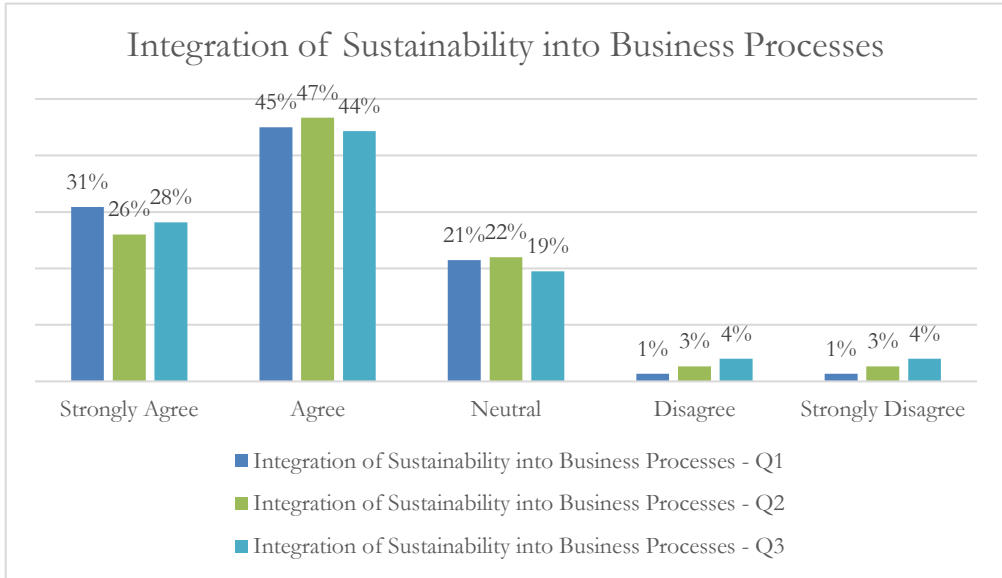


Figure 10: Perceived integration of sustainability into business processes

The data indicates that a significant proportion of respondents (76% for Q1, 73% for Q2, 72% for Q3) agree that sustainability is integrated into their business processes, reflecting a positive trend. Best practices for integration include clear sustainability policies, continuous training, and incorporating sustainability goals into performance metrics. Common challenges are resistance to change, lack of expertise, and perceived high costs. Overcoming these requires strategic stakeholder engagement, leadership support, and demonstrating long-term benefits. Overall, the data highlights the importance of a committed approach to embedding sustainability into business processes, recognizing both successes and areas for improvement.

#### 4.10 Long-term Benefits

Hypothesis 5: integrating sustainability within EA frameworks leads to long-term cost savings and operational efficiencies.

The data suggests that many respondents recognize the long-term benefits of integrating sustainability into EA. Most respondents agree or strongly agree that sustainable EA practices yield long-term advantages for their organizations (See Figure 11). The perceived long-term benefits of sustainable EA practices show standard deviations between 28.09 and 29.23, reflecting considerable variability in how organizations perceive the long-term advantages. This points to the effect that there is consensus as to the fact that the given benefits are useful, nevertheless, the way in which the benefits are useful is a matter of some controversy.

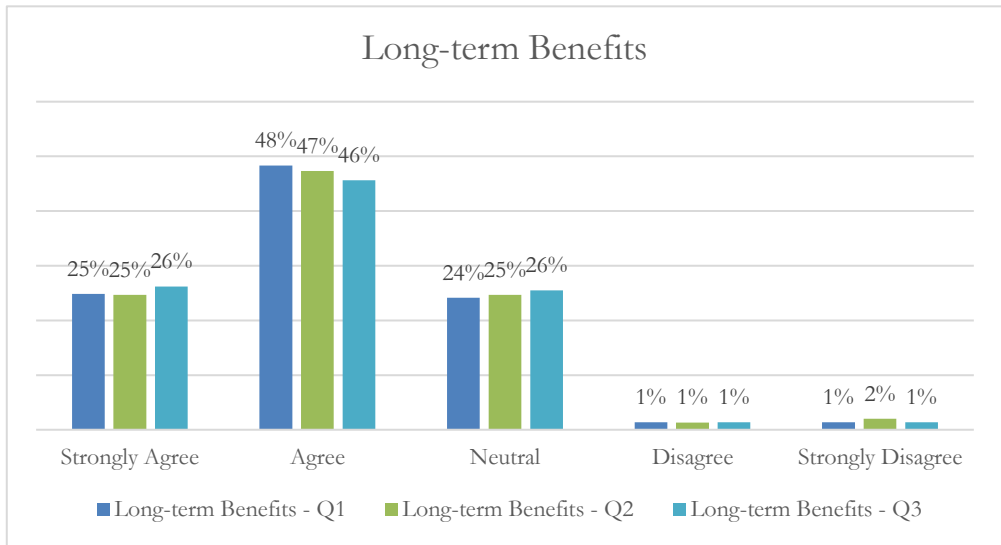


Figure 11: Long-term benefits as perceived by participants

A comparative analysis shows that perceptions of long-term benefits are consistently positive across various respondent groups. Both IT professionals and managers in other sectors recognize the advantages of sustainable EA practices, with 73% to 74% agreeing or strongly agreeing on their benefits and only 2% to 3% disagreeing. This consistency underscores the universal recognition of sustainability's importance in EA, highlighting its positive impact on performance, resilience, and competitive advantage. Overall, the data strongly endorses the long-term benefits of sustainable EA, suggesting that organizations investing in these practices will see significant positive outcomes, guiding future strategic planning and broader adoption of sustainability within EA frameworks.

#### 4.11 Cost Implications

Hypothesis 5: integrating sustainability within EA frameworks leads to long-term cost savings and operational efficiencies.

The survey data indicates diverse perspectives on the cost implications of integrating sustainability into enterprise architecture (EA). A significant portion of respondents agree that sustainable EA practices have financial implications that need to be managed effectively. Regarding the costs of sustainable EA practices, it is reported that they have cost standard deviations from 26.04 to 32.59, suggests substantial differences in how organizations experience and manage the financial aspects of sustainability. This variability shows that different organizations experience varying degrees of economic shifts and risks.

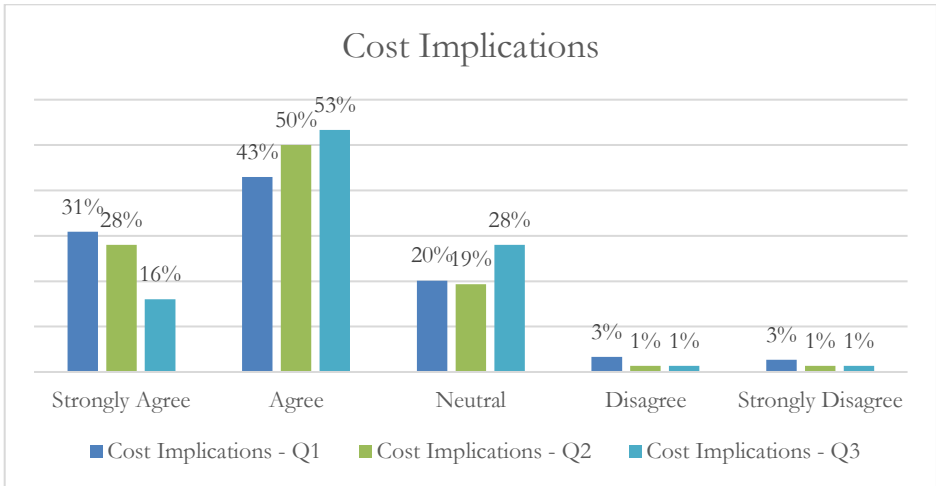


Figure 12: Perceived financial impact of sustainable EA practices

The survey revealed, as illustrated in Figure 12, that 74% to 79% of the respondents considered cost aspects as important in EA sustainable practice, noting the general high fixed costs but possible future savings. A rather small group of respondents (4% to 6%) reported their disagreement, meaning that there were no significant financial barriers perceived. In conclusion, the study shows that there are definite costs incurred in the process, but the advantages outweigh the costs in the long run. To make sustainability financially feasible, the costs should be effectively managed to avoid high start-up costs, which might be unprofitable in the long run.

#### 4.12 Technological Readiness

Hypothesis 5: integrating sustainability within EA frameworks leads to long-term cost savings and operational efficiencies.

The survey data gives an understanding of the organizations’ level of technological advancement towards effective and sustainable EA. The analysis of survey results reveals that the majority of respondents are ready at a high level and have confidence in technological support for sustainable initiatives (See Figure 13). The responses regarding technological readiness for sustainable EA practices show standard deviations from 21.85 to 32.59, indicating a wide range of technological capabilities among organizations. This variability is more so due to the fact that technological development and readiness to accommodate sustainable programs differ across the countries.

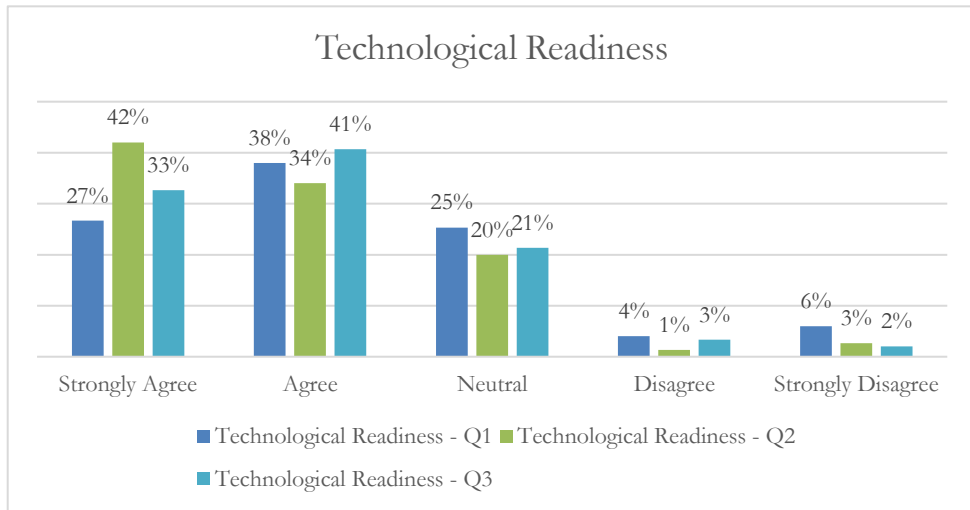


Figure 13: Perceived role of technology in supporting sustainable EA

According to the participants' responses, 65% to 76% of them strongly agree or agree that their organizations are technologically ready for sustainable EA practices. Such a level of conformance reinforces the fact that organizations must have strong technological support to drive and sustain EA endeavors.

Technology is one of the most important factors that can help establish and maintain sustainable EA due to aids such as cloud computing, IoT, and AI. [Speaking of the surveyed organizations' readiness to embrace the leading innovative technologies for sustainability, the author found out that many of them are well-prepared to capture these technologies and use them in making their businesses or operations sustainable]. On the other hand, 25% of neutral and 10% of disagree/ strongly disagree responses point out the necessary improvements, including technological advancements, enhancement of systems integration, and development of intensive training programs. Efforts must be made to fill these gaps continually to improve sustainable EA initiatives.

#### 4.13 Environmental Benefits

Hypothesis 2: The adoption of sustainable EA practices positively influences compliance with environmental regulations.

The survey responses highlight the perceived environmental benefits of integrating sustainability into EA. The data reveals a significant positive sentiment, with a majority of respondents agreeing that sustainable EA practices contribute positively to environmental outcomes (See Figure 14). The perceived environmental benefits of sustainable EA practices, with standard deviations between 25.25 and 30.46, suggest a high level of variability in how organizations perceive their environmental impact. This shows that, although most organizations acknowledge the social cost implication, the degree of such cost differs.

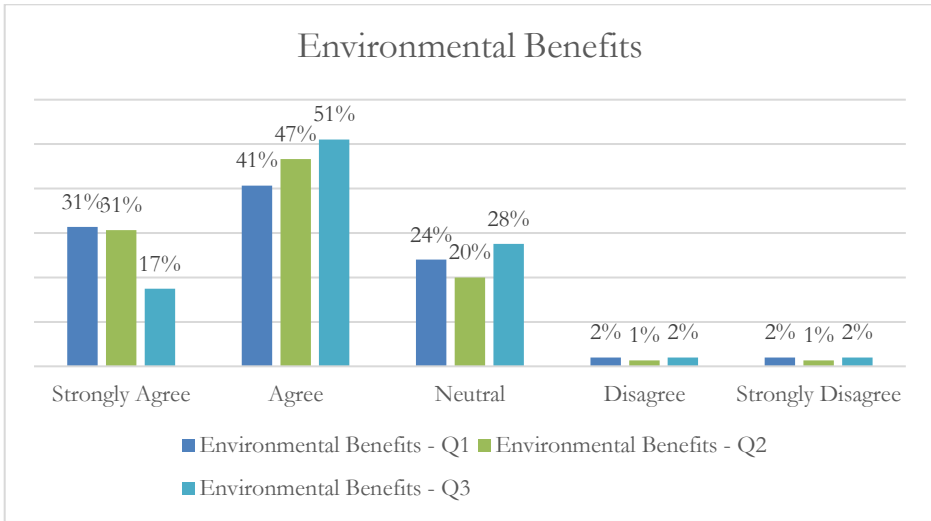


Figure 14: Environmental impact responses

The responses show an appreciable level of perceived environmental impact of sustainable EA. This shows that, in total, 72% to 78% of the respondents agree or strongly agree that sustainable EA is perceived to be relevant for decreasing organizational impact on the environment. This positive tone is indicative of the success rate of sustainable EA practices in advocating for green operations, thereby emphasizing the need to pursue environmental sustainability. In essence, the findings suggest that there is increasing support for sustainable EA in helping to promote environmentalism within organizations.

**4.14 Social Impact**

Hypothesis 2: The adoption of sustainable EA practices positively influences compliance with environmental regulations.

The survey findings indicate that sustainable EA practices have social benefits and most participants accepted them. This shows a general understanding and appreciation of the social benefits in their workplace. The implications drawn from the results indicate that sustainable EA practices are not only good for the environment and business bottom line but are also positive for the social capital and stakeholder interactions of the organizations. The standard deviations for the social impact of sustainable EA practices range from 23.49 to 27.09, indicating moderate variability in how organizations perceive the social benefits. This implies that while there is an overall positive attitude, the level of perceived social significance varies across organizations.

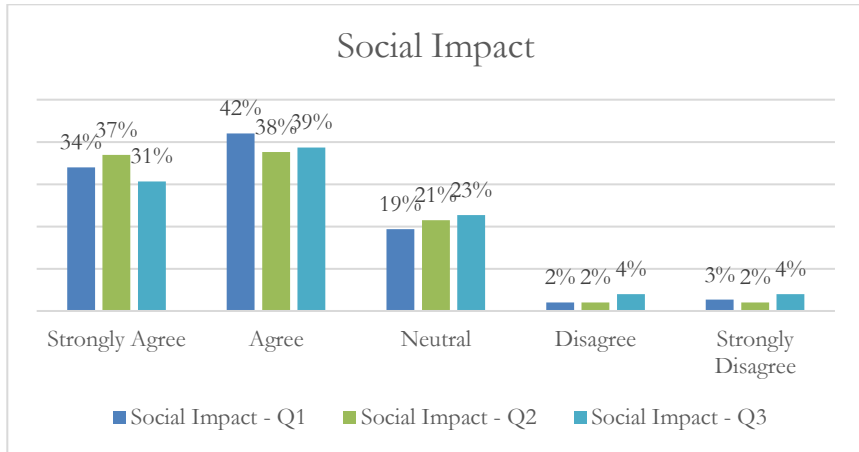


Figure 15: The social impact of sustainable EA practices

The data suggests that sustainable EA practices are perceived to have significant social benefits. With approximately 70% to 75% of respondents agreeing or strongly agreeing, integrating sustainability into EA contributes positively to social outcomes. These benefits likely include improved community relations, enhanced corporate social responsibility, and better alignment with societal values and expectations.

#### 4.15 Regulatory Compliance

Hypothesis 2: The adoption of sustainable EA practices positively influences compliance with environmental regulations.

The responses concerning regulation indicate that the majority of the respondents agree that sustainable EA practices enable organizations in the efficient achievement of regulatory standards (See Figure 16). The data on regulatory compliance shows standard deviations between 25.98 and 26.28, reflecting variability in how organizations meet

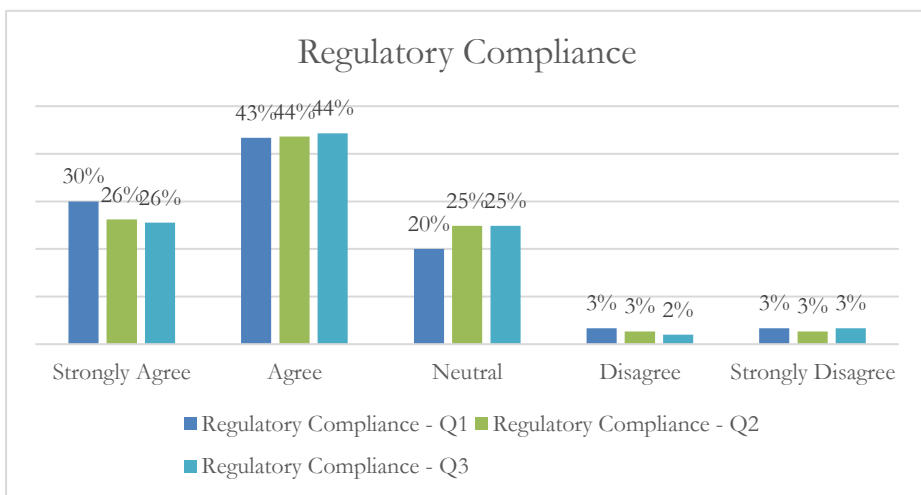


Figure 16: Compliance-related responses

environmental regulations through sustainable EA practices. This indicates that while compliance is generally achieved, the effectiveness of these practices in ensuring compliance varies.

There is sufficient evidence from respondents who affirmed or strongly agreed that sustainable EA ensures compliance with regulations in their organizations, where 70% to 74% affirmed. Besides, there are ways how this compliance contributes to avoiding possible fines and legal cases, which again improve the organization’s image and credibility. When sustainability concepts are incorporated into EA frameworks, organizations adapt effectively to the numerous and diverse regulations surrounding business operations to embrace the right ethical measures. This positive perception underlines the need to bring sustainable EA in compliance with the set of regulations and the general governance of the organization.

The survey results show a high level of agreement with the idea that sustainable EA practices help organizations address their compliance needs. The majority of the respondents (66%—74%) agreed or strongly agreed with this statement and further supported the inclusion of sustainable EA in compliance with environmental standards. This compliance not only prevents the organization from attracting legal consequences but also boosts its ostensible and actual image as well as functionality.

In summary, the data across these areas support the complete value of sustainability in EA from environmental, social, and regulatory perspectives. The answers marked as positive express the recognition of the importance and relevance of sustainable EA practices in contemporary organizations, strengthening their status in the current management strategies.

**4.16 Innovation Driven by Sustainability**

Hypothesis 6: Sustainable EA practices drive innovation within organizations.

The responses are another evidentiary base for associations between sustainability practices and innovativeness within EA.

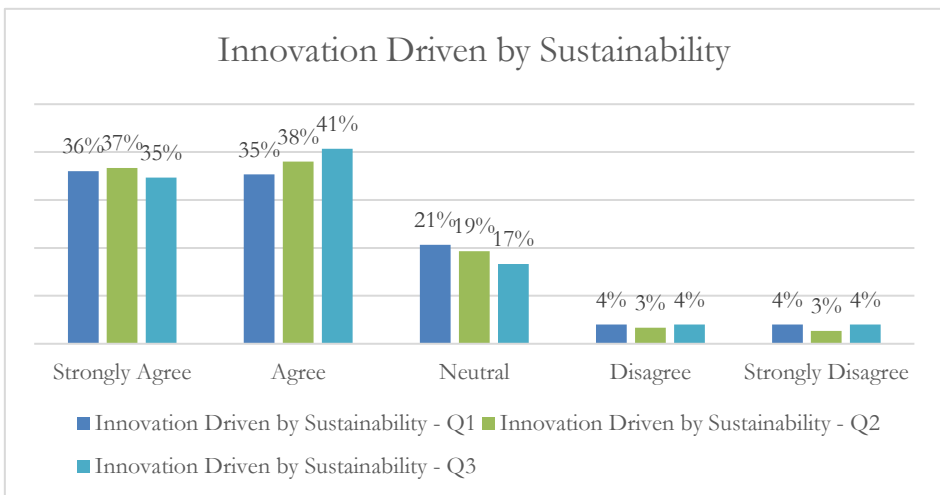


Figure 17: Perceived innovation driven by sustainability



The findings of the survey include a strong conviction on the part of EA that sustainability programs promote innovation (See Figure 17). About 71% and 76% of the respondents agreed or strongly agreed about the notion that sustainability fosters innovation, mechanisms, and solutions in EA. This positive relationship implies that organizations that provide sustainable EA practices are likely to strengthen the dimension of innovation performance to sustain their competitive performance in a dynamic business context. The outcome of embracing sustainability, that is, environmental issues, leads to innovation and creative acumen, hence effective and efficient EA architectures for organizations. The responses on innovation driven by sustainable EA practices show standard deviations from 23.75 to 25.60, suggesting a significant variability in how organizations leverage sustainability to drive innovation. This goes further to show that even though most organizations treat sustainability as an innovation driver, the influence of sustainability on the matter is not constant.

#### 4.17 Summary of Hypotheses Results

Hypothesis 1: Organizations that integrate sustainability into their EA frameworks experience improved organizational performance compared to those that do not.

The data on the adoption of sustainable practices within EA reveals positive trends. Survey questions related to this variable (See Appendix A) show that 60% of respondents agree or strongly agree that their organizations have integrated sustainable practices into their EA frameworks, with 72% considering these practices a core part of their EA strategy and 75% regularly reviewing and updating their EA for sustainability. The analysis indicates a clear positive impact on organizational performance, with 35% of respondents strongly agreeing and 34% agreeing that sustainable EA practices have improved efficiency. Additionally, 35% strongly agree, 41% agree on the positive effect on operational performance, 32% strongly agree, and 38% agree that sustainability efforts within EA have led to increased productivity.

Hypothesis 2: The adoption of sustainable EA practices positively influences compliance with environmental regulations.

Survey responses related to this variable show a significant positive sentiment towards the regulatory compliance achieved through sustainable EA practices. A majority of respondents (66% to 74%) agree or strongly agree that integrating sustainability into EA ensures compliance with environmental standards, thus preventing legal issues and enhancing organizational credibility. This is supported by findings that sustainable EA practices contribute positively to environmental outcomes, with 72% to 78% of respondents acknowledging their effectiveness in reducing organizational impact on the environment and fostering better community relations and corporate social responsibility.

Hypothesis 3: Small and Medium-sized Enterprises (SMEs) face different challenges in implementing sustainable EA practices compared to larger organizations.

The survey data highlights several key difficulties in adopting sustainable EA, including high costs, resistance within the organization, and lack of expertise. These barriers are particularly pronounced for SMEs, which often have limited resources compared to larger organizations. Questions related to these challenges show that 30% to 35% of respondents strongly agree 45% to 38% agree on the cost implications, 30% agree on the existence of organizational resistance, and 2% to 3% report inadequate skills for

implementation. This underscores the need for targeted strategies to support SMEs in overcoming these obstacles.

Hypothesis 4: There is a significant relationship between stakeholder engagement in EA sustainability initiatives and their overall success.

The data on stakeholder engagement shows varied levels of involvement, with a notable percentage of respondents strongly agreeing or agreeing with the statements regarding stakeholder engagement in sustainable EA practices. High engagement levels are observed in industries like IT, Finance, and Healthcare, where over 70% of respondents agree or strongly agree with the engagement. This suggests that active stakeholder involvement is crucial for the successful implementation of sustainable EA practices, with differences seen across industries and organizational sizes. Structured and systematic engagement is more complex within larger organizations but equally important across all sectors.

Hypothesis 5: There is a significant correlation between organizational culture and adopting sustainable EA practices.

The survey outcomes suggest that organizational culture has a positive relationship with the establishment of sustainable EA practices. Specifically, between 68 percent and 75 percent said that their organization's culture supports sustainability. This positive perception towards incorporating sustainability into an organization's structures accentuates the position that a favorable culture is key to enhancing the implementation of sustainable EA practices. This relationship also suggests that a positive culture assists in managing the challenges and ensures that sustainability is implemented in other effective and strategic organizational frameworks, enhancing performance and the level of compliance with the environment.

Hypothesis 6: Sustainable EA practices drive innovation within organizations.

According to the respondents, the promotion of sustainability within EA has beneficial impacts, particularly on innovations, as 71% to 76% agreed that the promotion of sustainability aids in the development of innovative solutions and thus increases EA's competitiveness. It would, therefore, appear that organizations that engage in sustainably practicing EA are poised to improve on their innovation performance and organizational dynamism to ever-shifting business conditions whilst pegging their competitive advantage on innovation and sustainability.

## **5. Discussion**

### **5.1 Summary of Key Findings**

The subsequent part of the paper discusses the findings of this research on the elemental concepts of sustainability in EA integration. The survey also revealed that quite a number of the respondents' organizations have included sustainability views in their EA plans. For instance, 75% of the respondents stated that they frequently update the EA with sustainable practices, which only shows the high sustainability factor (Escursell, et al., 2021).

The perceived benefit of these sustainable practices on the performance of the organization is outstanding. Regarding sustainable EA practices, the majority of the respondents confessed to improved efficiency, operating performance, and productivity. This is in accordance with previous studies, where it has been discovered that sustainability

leads to enhanced organizational resilience and business performance (Almutairi & Ghandour, 2021; Weichhart et al., 2016).

However, the study also reveals massive challenges that increase proportionately to the scope of the venture. From the respondents' proposed answers, the challenges to practicing sustainable EA were high costs, resistance in the organization, and lack of expertise. Concerning the above findings, it is evident that there is a need for leadership strategies that aim at cost reduction, staff training, and organizational sustainability (Weichhart et al., 2016).

In summary, the data confirms that integrating sustainability into EA practices benefits organizational performance. However, these long-term implications of sustainable EA include efficiency gains and better engagement with stakeholders, which must be enough to warrant the efforts and resources needed for it. This paper informs theoretical knowledge since it presents findings regarding the benefits and disadvantages of sustainable EA practices to enhance understanding in the existing literature (Escursell et al., 2021; Almutairi & Ghandour, 2021; Weichhart et al., 2016).

## 5.2 Theoretical Implications

This research contributes significant new knowledge to the field of EA and sustainability theory. It is in line with the dynamic capabilities view that enhances the performance of a firm when sustainability is incorporated into EA (Kurnia & Kotusev, 2019). The findings allow García-Escallón et al. (2021) to use EA patterns for sustainable change-enabling efficiency improvements and the improvement of stakeholder management. Other conditions that are favorable for integration include the level of technological advancement and support by the leadership, among others (Thirasakthana & Kiattisin, 2021). At the same time, the study reveals such concerns as the following: the costs and resistance to change, which also speaks for the focus on the planning and distribution of resources (Rane & Thakker, 2020).

## 5.3 Practical Implications

For organizations aiming to integrate sustainability into their EA practices, key recommendations include investing effectively in advanced technologies like cloud computing, IoT, and AI to enhance efficiency and effectiveness (Weichhart et al., 2016). Ensuring technological readiness and comprehensive training for employees is crucial. Leadership support is also vital, with leaders promoting sustainability initiatives and embedding goals into organizational culture (Tolstykh et al., 2020). To address high costs and resistance to change, organizations should engage stakeholders and demonstrate long-term benefits, fostering commitment and mitigating resistance (Liao & Wang, 2020). Overall, a committed, well-structured approach is essential for successful integration, emphasizing both successes and areas for improvement.

## 5.4 Future Research Directions

According to the results of the present study and its limitations, the following recommendations for future research are made. Future research should utilize a larger sample and ensure the participants' diversity so that the results can be generalized more easily and should also include small businesses to broaden the scope of experience (Liao

& Wang, 2020). Moreover, future studies could use longitudinal study designs to yield a better understanding of how sustainable EA practices affect the future since this paper is based on cross-sectional data (García-Escallón et al., 2021). It is also possible for future research to explore the possibilities of enhancing sustainable EA practices through the integration of IT innovations such as blockchain and IoT according to Rane and Thakker (2020). Potential new research questions could be more specific concerning the relationship between leadership and stakeholders' involvement in sustainability and how cultural factors affect the deployment of sustainable EA practices (Weichhart et al., 2016). These directions will help to improve the understanding of sustainability in EA concepts.

## 6. Conclusion

This study presents a comprehensive analysis emphasizing the extent to which sustainability has been incorporated into EA across industries. Based on the existing evidence it is possible to conclude that the efficiency of sustainable EA practices is favorable for organizational performance in terms of efficiency, stakeholders, and compliance. However, issues such as increased cost and resistance to change remain some of the significant challenges that call for strategic leadership and technological readiness. This study establishes that integrating sustainability into EA methodology is critical for sustainable organizational growth and resilience. The results indicated a strong positive attitude toward sustainable EA practices, which are important for today's strategic management as they are profitable for the organization's operations and environmental sustainability.

To effectively implement these sustainable practices, organizations must prioritize leadership engagement and technological innovation. Leadership should champion sustainability initiatives by embedding them into the company's core values and strategic goals, ensuring sustainability becomes an integral part of decision-making processes. Furthermore, another factor is that of satisfaction with the mass culture, with communication, training and motivation of the workforce to the corporate culture of sustainable development. On the technological aspect, there are technologies like cloud, big data, analytics, AI, and IoT; focusing on these technologies can help the organization implement sustainable EA practices for managing resources in a real-time manner. Technological industries are the best placed to take advantage of these tools for cost-cutting and optimization, while other industries with old systems may have to phase enhance their infrastructure and create compatibility with sustainable practices. Adapting these strategies to suit the requirements of certain industries will, therefore, improve the general efficiency of sustainable EA implementation.

The study's limitations include the sample size, which, although sufficient for general trends, may not capture all industry-specific nuances. Potential biases in respondent self-reporting and the reliance on quantitative methods may also affect the results. These limitations suggest that findings should be interpreted with some caution.

Future research should explore longitudinal studies to assess the sustained impact of sustainable EA practices over time. Additionally, investigating the integration of sustainability in Small and Medium-sized Enterprises (SMEs) and developing methodologies to measure the specific impacts on organizational performance would

provide deeper insights. Expanding the scope to include qualitative approaches could also enrich the understanding of the challenges and benefits associated with sustainable EA.

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## Appendix A

**Survey Questions:** Please indicate your level of agreement with the following statements:

- 1 - Strongly Disagree
- 2 - Disagree
- 3 - Neutral
- 4 - Agree
- 5 - Strongly Agree

Section	Question	1 (Strongly Disagree)	2 (Disagree)	3 (Neutral)	4 (Agree)	5 (Strongly Agree)
<b>Adoption of Sustainable Practices in EA</b>	Our organization has integrated sustainable practices into its EA framework.					
	Sustainable practices are a core part of our EA strategy.					
	We regularly review and update our EA to include sustainable practices.					
<b>Perceived Impact on Organizational Performance</b>	Sustainable EA practices have improved our organizational efficiency.					
	Implementing sustainable EA has positively affected our operational performance.					
	Our sustainability efforts within EA have led to increased productivity.					

<b>Challenges and Barriers</b>	Implementing sustainable EA practices is challenging due to high costs.					
	There is resistance within the organization to adopting sustainable EA practices.					
	Lack of expertise is a barrier to implementing sustainable EA in our organization.					
<b>Stakeholder Engagement</b>	Stakeholders are actively involved in our sustainability initiatives within EA.					
	There is strong stakeholder support for our sustainable EA practices.					
	Stakeholders understand the importance of sustainability in EA.					
<b>Organizational Culture and Readiness</b>	Our organizational culture supports the adoption of sustainable EA practices.					
	Employees are encouraged to engage in sustainability initiatives within EA.					
	There is a high level of awareness about sustainable EA practices among employees.					
<b>Leadership Support</b>	Leadership in our organization prioritizes sustainability in EA.					
	Top management is committed to sustainable EA practices.					
	Leaders actively promote sustainable practices within EA.					
<b>Effectiveness of Training Programs</b>	Our organization provides effective training on sustainable EA practices.					
	Employees receive adequate training on sustainability within EA.					
	Our training programs have improved the adoption of sustainable EA practices.					
<b>Integration of Sustainability into Business Processes</b>	Sustainability is embedded in our business processes through EA.					
	Our business processes are designed with sustainability in mind.					
	Sustainable EA practices are integrated into our day-to-day operations.					
<b>Long-term Benefits</b>	Sustainable EA practices offer long-term benefits to our organization.					
	Our investment in sustainable EA has proven beneficial over time.					
	We expect continued benefits from our sustainable EA practices in the future.					
<b>Cost Implications</b>	Sustainable EA practices are cost-effective in the long run.					
	Initial investments in sustainable EA have been justified by the outcomes.					

	Cost considerations are a significant factor in our sustainable EA strategy.					
<b>Technological Readiness</b>	Our organization is technologically ready to implement sustainable EA practices.					
	We have the necessary technology to support sustainable EA initiatives.					
	Technological advancements have facilitated our sustainable EA practices.					
<b>Environmental Benefits</b>	Sustainable EA practices have reduced our environmental footprint.					
	Our EA initiatives have led to measurable environmental benefits.					
	We prioritize environmental impact in our EA planning and implementation.					
<b>Social Impact</b>	Our sustainable EA practices positively impact the community.					
	We engage with the community to promote sustainability through EA.					
	Social responsibility is a key consideration in our EA strategy.					
<b>Regulatory Compliance</b>	Our sustainable EA practices meet regulatory requirements.					
	Compliance with sustainability regulations is ensured through our EA.					
	We regularly review our EA practices to maintain regulatory compliance.					
<b>Innovation Driven by Sustainability</b>	Sustainability in EA drives innovation within our organization.					
	Our EA practices encourage innovative solutions for sustainability.					
	We continuously seek innovative ways to enhance sustainability through EA.					