Triple-A Paradigm: Examining its Role in Shaping Sustainable Performance

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Abstract

This study investigates the impact of the Triple-A Paradigm—comprising Technology Adoption (AD), Agility (AG), and Alignment (AL) on Sustainable Performance (SP) in the aviation sector. Utilizing a robust empirical approach, employing SmartPls analysis the research establishes a significant positive relationship between each dimension of the Triple-A Paradigm and Sustainable Performance. The data was collected through questionnaire survey from 163 aviation management professionals and the findings reveal that advanced technology adoption, organizational agility, and strategic alignment positively contribute to sustainable practices within the aviation industry. The study's outcomes provide valuable insights for aviation industry stakeholders and suggest strategic imperatives for enhancing sustainable performance in a dynamically evolving sector.

Keywords: *Adoptability, Alignment, Agility, Sustainable Performance, Aviation Industry.*

Introduction

In the current dynamic landscape the pursuance of the sustainable performance has become essential. To achieve the overall industrial operational efficiency and resilience the sustainability has become paramount (Upham, Maughan, Raper, & Thomas, 2012) . The aviation sector endure with extraordinary challenges, a paradigmatic approach known as the Triple-A Paradigm—comprising Technology Adoption (AD), Agility (AG), and Alignment (AL)—emerged as a critical framework and is demands investigation for its potential impact on shaping sustainable performance (Alfalla-Luque, Machuca, & Marin-Garcia, 2018) . The identified gap in the study lies in the limited exploration of the Triple-A Paradigm and its specific impact on shaping sustainable performance within aviation organizations. While the Triple-A Paradigm—Agility, Adaptability, and Alignment—has been recognized for enhancing overall organizational effectiveness and has been explored in the manufacturing, food and chemical industry (Agi, Faramarzi-Oghani, & Hazır, 2021; Akhtar, AdeelAkhtar, & Ilyas, (2022); de Camargo Barros & de Almeida, 2024; Hamann, Wullenkord, Reese, & van Zomeren, 2024; Jia, Li, Zhang, & Chen, 2024). There is a dearth of research examining its nuanced influence on sustainability initiatives with respective aviation industry especially in Pakistan aviation sector. Though, the research question arise in this study is to address that how do Agility, Adaptability, and Alignment individually contribute to sustainable performance within the aviation organizations?

The aviation industry is vibrant source of the global connectivity and is highly in demand to adopt the technological innovation (Kemp & Vinke, 2012; Qureshi, & Nisar, 2014). The Technological adaptation is one of the dimension of Triple-A paradigm and it required the integration of the latest technologies with the aviation industry to achieve the sustainability in terms of social, economic and environmental perspective (Shafiq, Akhtar, Ismail, & Awais, 2021). The significant technological aspects can be the use of artificial intelligence, data analytics, and automation in the aviation operations to attain the sustainability (Kuisma, 2018; Serengil & Gülay, 2024)

The second major dimension of the Triple-A paradigm is the “Agility” which reflects the industry capability of responsiveness and to deal with dynamic and uncertain situation and adaptation of technological changes with amount of significant resilience. This resilience generate organization capacity to deal with disasters like Covid-19, the airlines who were more Agile and resilient has had deal with the situation more effectively (Caesari, Iqbal, & Hutahayan, 2023).

Furthermore, the dimension of Alignment (AL) underlines the strategic coherence between technology adoption strategies and sustainable practices within aviation organizations. To maintain the balance between technological advancements and sustainable goals is a multifaceted challenge that demands a comprehensive examination (Fu et al., 2023). By exploring the relationship between AL and sustainable performance, this research seeks to provide nuanced insights into how strategic alignment can contribute to the industry's overall sustainability objectives(Pijpers, Gordijn, & Akkermans, 2009).

The rigorous empirical investigation has been employed on this study and statistical analyses tool “SmartPls” has been employed to assess the significance of the Triple-A Paradigm in influence on sustainable performance within the aviation sector (Shafique Ur Rehman, Bhatti, Kraus, & Ferreira, 2021). By examining each dimension individually AD, AG, and AL the research aims to contribute not only to the academic understanding of these relationships but also to provide the practical insights and implications for stakeholders of aviation industry (Shafique Ur Rehman et al., 2021). Therefore, the Triple-A Paradigm represents a holistic and integrative framework that has the potential to reshape sustainable performance within the aviation industry. As the industry navigates an era of technological evolution and heightened sustainability expectations, understanding the intricate dynamics of the Triple-A Paradigm becomes instrumental in fostering a resilient and environmentally conscious aviation sector (Caesari et al., 2023).

The aviation sector is the backbone of global connectivity, and advancement in environmental, social, economic, and technological development is currently this sector's dynamic challenge. In this regard, the major problem is that the aviation companies' long-term survival now depends critically on their capacity to adapt quickly to change, match their objectives with sustainability, and demonstrate agility (Karaman, Kilic, & Uyar, 2018).

Though, the objective of this empirical study was to sort out the complex interrelationships between the agility, alignment, and adaptability approaches and their combined impact on the aviation sector's sustainable performance.

The scope of this study was focuses on organizations across aviation industry, exploring the applicability of the Triple-A Paradigm in both commercial airline’s and civil aviation regulatory authority of Pakistan. The research encompasses an empirical approach, involving surveys to capture a comprehensive understanding of the relationships between Agility, Adaptability, Alignment, and sustainable performance.

The practical contribution of this study is that it offer actionable insights for managers and organizational leaders that how to implement and leverage the Triple-A Paradigm for aviation sector sustainable performance improvements. The theoretical contribution of this study is that it helps to the aviation leaders to enhance existing organizational theories by integrating sustainability considerations, offering a more comprehensive understanding of how organizations can achieve long-term viability through the Triple-A Paradigm.

Literature Review

In the ever-evolving landscape of the aviation industry, the nexus between organizational strategy and sustainable performance has become increasingly vital. As aviation organizations grapple with the imperatives of adapting to emerging technologies, aligning with environmental and social considerations, and exhibiting agility in the face of unpredictable challenges, a comprehensive understanding of the existing literature is imperative. This literature review aims to explore the current body of knowledge surrounding adaptability, alignment, and agility approaches within the aviation industry and their influence on sustainable performance. By synthesizing insights from diverse scholarly contributions, this review establishes a foundation for the empirical investigation into the intricate dynamics that govern the sustainable evolution of the aviation sector.

Aviation Industry

A vital component of global logistics and connectivity is the aviation industry and it has significant impact on the economic development (Eriksson & Steenhuis, 2015). Now days this aviation sector has undergone significant transformations which is driven by technological advancements, environmental concerns, and evolving consumer expectations (Singh, Rana, Abdul Hamid, & Gupta, 2023; Sun et al., 2020). Under this literature review we explores the key themes that have shaped the trajectory of the aviation sector and are emphasizing the intricate interplay between technological progress, environmental imperatives, and strategic resilience (Undavalli et al., 2023).

Technology has continuously impacted the aviation business and is known one of the main pillars supporting the aviation industry's expansion. This journey took start from the Wright brothers' groundbreaking flight to the current era of sophisticated aircraft design and state-of-the-art avionics (Ding, Zheng, Yang, Wang, & Han, 2024). It is essential that to for the improvement in the operational efficiency and safety the aviation industry shall have a strong technological adoption strategy (Williams, 2019). In this regard the adaptability, or capacity of aviation industry's to adhere and quickly accept and incorporate new technology has become a key concern for the aviation operations businesses and it is considered a crucial to stay ahead of the competition (Ding et al., 2024).

The second significant and essential pillar of the current discourse surrounding the aviation industry is environmental considerations. As the aviation activities are contributing significantly in the environmental pollution and the current situation of increasing climate change concerns has abundant support to the growing need for sustainable practices (Singh et al., 2023). The major environmental effects comes through the noise and carbon emissions and pollution through air logistics (Karaman et al., 2018). This discussion has highlighted responsibility of the industry's to address carbon emissions and noise pollution. Organizations are facing the challenge of aligning their operations with environmental considerations, incorporating eco-friendly practices, and investing in alternative fuels and propulsion systems to enhance sustainability (Undavalli et al., 2023).

Besides the technological and environmental factors, the aviation industry is also vulnerable by its unforeseen challenges and external disruptions. The ability, flexibility or the capacity of the organizations operations to respond the disasters or any unforeseen events or challenges is termed the “agility” and is crucial for the organizations resilience (Ding et al., 2024). Research by Pettit and Beresford (2019) underscores the importance of agility in navigating uncertainties, such as economic fluctuations, geopolitical events, and global health crises (Lim, Pettit, Abouarghoub, & Beresford, 2019). The recent pandemic of COVID-19 has urge the significance of organizational agility in adapting to rapidly changing circumstances (Wils, Van Baelen, Holvoet, & De Vlaminck, 2006).

Furthermore, the dynamics of global competition, regulatory frameworks, and collaborative partnerships have shaped the aviation industry's strategic landscape. Scholars like O'Connell and Williams (2019) emphasize the role of strategic alliances, mergers, and acquisitions in influencing the industry's competitive structure (O’Connell et al., 2019). The strategic decisions made by aviation organizations impact their overall performance and ability to align with global market trends.

The aviation sector is characterized by a high rate of advancement appropriation and execution due to the speedy changes in aircraft advances, navigation systems, and working forms. The objective of this study is to decide how much aviation organizations can do to cultivate adaptability so that modern innovation can be consistently coordinates and move forward generally for the operational effectiveness whereas lessening antagonistic natural impacts.

Sustainable Performance of Aviation Industry

The sustainable aviation operations management has been emerged as a critical area of research in response to the growing climate change and environmental concerns and to fulfill the needs of the responsible business practices (Fatima, Shafiq, Saeed, & Shikh, 2023; Sharma & Singh, 2017). Scholars have investigated into various aspects of sustainability within the aviation sector e.g. the challenges of sustainable aviation operations, opportunities, and strategies that organizations needs to employ to balance the environmental and social responsibility with economic viability (Sharma & Singh, 2017).

One key aspect of sustainable performance in aviation is the industry's environmental impact, particularly its contribution to carbon emissions and climate change (Tashfeen, Saleem, Ashfaq, Noreen, & Shafiq, 2023). Research by Gudmundsson et al. (2021) emphasizes the need for the aviation sector to address its carbon footprint and adopt measures to mitigate environmental harm (Ding et al., 2024; Gudmundsson, Cattaneo, & Redondi, 2021). This sustainability means the vibrant investments in fuel-efficient aircraft, introducing the alternative efficient fuel fuels and to extend the efforts to increase operational efficiency and to reduce emissions (Undavalli et al., 2023).

In this discussion and debate of sustainable performance of aviation industry the more critical aspects is the environmental considerations and performance of the social responsibility. Aviation companies are prioritizing community engagement, ethical business practices, and corporate social responsibility activities due to demand from stakeholders and regulations (Payán-Sánchez, Plaza-Úbeda, Pérez-Valls, & Carmona-Moreno, 2018). Research by Berland et. all (2017) examine how social responsibility is changing and how it affects how sustainably aviation firms operate, emphasizing the value of fostering strong bonds with stakeholders and communities (Berland, Joannides, & Levant, 2015; Watanabe, Shafiq, Ali, Nawaz, & Nazeer, 2024).

As the social and environmental dimensions are crucial the economic dimension is also equally crucial and essential to addressed e.g. the balancing of profitability with responsible business practices is a constant challenge for aviation sector (Peacock, Cooper, Waller, & Richardson, 2024). Research by (Dar, Khan, Shafiq, & Ali, 2021; Spasojevic, Lohmann, & Scott, 2019) examines into the economic aspects of sustainable aviation, emphasizing the need for financial resilience and adaptability in terms of economic uncertainties. Economic sustainability perspective means shall consider the operational cost-effectiveness, financial stability, and the long-term economic viability of aviation organizations (Ding et al. 2024).

Sustainable practices in the aviation sector can be integrated through the operational and technological innovations. Some of the studies investigated the prospective of technology for the enhancing the sustainable performance of the aviation sector of developing countries like Pakistan (Agi et al., 2021).The innovative technology enable the aviation sector to have more secure and safe logistics and it includes the implementation of modern navigation systems, improvements in air traffic management, and the development of more fuel-efficient and environmentally friendly aircraft (Bögel, Pereverza, Upham, & Kordas, 2019). The aviation operations regulatory bodies has significant role for shaping the sustainability aspect of aviation industry, for example the International regulatory body is the International Civil Aviation Authority (ICAO) which provides regulatory framework and agreements for the international aviation operations (Lutte & Bartle, 2017). The ICAO also set the standards and the initiatives for addressing the environmental and social sustainability aspects of the aviation industry. Through such regulatory initiatives and measures the effectiveness can be bring into the promotion of the sustainable practices (Bögel et al., 2019; Shafiq, Akhtar, Tahir, Akhtar, & Kashif, 2021).

However, the sustainable performance of aviation industry depends on the multifaceted approach e.g. environmental stewardship, social responsibility, economic resilience, operational technological advancements, and regulatory compliances (Akhtar, Khan, Akhtar, Shafiq, & Tanveer, 2020; Kashif, Shafiq, Tahir, Wahid, & Ahmed, 2020; Peacock et al., 2024). The scholars and the practitioners both has acknowledged the sustainability perspective for the aviation industry and has routed these complex dimensions to ensure a balanced and sustainable future for the industry (Lutte & Bartle, 2017). This literature sheds overview on the various viewpoints and scholarly contributions that advance our knowledge of sustainable performance in the aviation industry.

Triple-A Sustainability Framework

The term Triple-A consist of the *Adoptability*, *Alignment* and *Agility*, and is known as the Triple-A Framework. In the sustainability perspective the role of the triple-A is vital in terms of sustainability and it stands at the forefront of strategic considerations. This framework provides a guides for aviation organizations and it interlinks the paradigms of environmental and social responsibility with a harmonious balance (Ding et al., 2024; Nazeer, Fuggate, & Shafiq, 2020).

Adoptability

The critical factor which influence the sustainability of the aviation industry is the adoptability paradigm especially in the dynamic nature industry of aviation sector and it is closely concerned with constant technological advancements (Alharbi, Abdel-Malek, Milne, & Wali, 2022). To ensure the long term viability it is essential for the aviation industry to embrace and integrate new technologies and innovative operational practices to navigate the complex challenges while ensuring the long-term viability (de Vries, Wolleswinkel, Hoogreef, & Vos, 2024). The technological advancement and its acceptability or adoptability in the aviation is sector is multifaceted concept and it is essential for the industry to emerge the innovations and become the responsive (Watanabe & Shafiq, 2023). The significance of the adoptability and technological advancement has been studied and highlighted its importance for shaping the sustainable aviation operations (Lee et al., 2021). The adoptability in aviation industry is now beyond the concept of traditional aircraft design which shall include the fuel efficiency, now the pace of adoptability is extended to electric propulsion and autonomous aircrafts. This advancement has bring the concept of the autonomous aircrafts, advance materials, learning of the organization culture and to bring a continuous improvement into the overall system.

The adoptability has emphasized on the leadership, training programs and collaborations in fostering a culture which brings the technological change (Watanabe, Shafiq, Nawaz, Saleem, & Nazeer, 2024). This study emphasis to adopt the technological change which foster the sustainability perspective through enhancement of the operational efficiency and to reduce the environmental impacts (Caldarelli, Zardini, & Rossignoli, 2021; de Vries et al., 2024). Now the concept of adoptability is further extended to ward the resilience of supply chain and aviation operations and to promote the industry-wide standards. It is changing the regulations, global perspectives and events and the various dynamics of the market even to bring the resilience in the overall operations (Shafiq, Nazeer, & Saleem, 2023; Zhang et al., 2020).

The recent global perspective and the sustainability debates and awareness has sensitize the aviation sector to adhere and shall include the social and environmental imperative in its aviation operations. Therefore, now the organizations readiness to adopt the technological, cultural and social change has become core investigation topics and it required to provide a synthesized knowledge and direction in this field to make it more sustainable and resilient in framework. These strategic implementation demands the strategic and visionaries leadership to forester the sustainable aviation operations (de Vries et al., 2024; Joksimovic, Carbonneau, Brazier, & Vingerhoeds, 2024). The present literature analysis offers valuable insights into the diverse aspects of adoptability in the aviation industry, thereby laying the groundwork for future investigations into its influence on the sustainable performance of the sector (Joksimovic et al., 2024). Based on the above discussion a hypothesis is framed as below:

H1: Adoptability significantly influence the sustainable performance of the aviation industry

Alignment

The alignment perspective in the aviation industry means the synchronization of various aviation operational strategies in its pursuit of sustainable practices e.g. environmental and social sustainable perspectives. Therefore, it is difficult for the aviation organizations to bring the balance between both the environmental and economic viability in the market (Pijpers et al., 2009). In the current scenario the environmental considerations are at the top of the aviation industry alignment efforts and the significant efforts has been noticed to shift the aviation operations towards eco-friendly and less corban emission technology. Various studies has been carried on to scores the importance of the alignment of aviation operational with environmental regulations and fuel efficient operations (Seo, Park, & Kim, 2018).

The other important dimension of the alignment is the social responsibility with the economic and environmental concerns into the aviation sector. Therefore, the community engagement and the role of the stakeholder expectations play pivotal role in shaping the good will and reputation of the organizations overall sustainability measures(Graver, Zhang, & Rutherford, 2019). The alignment is declared an ethical and social values which considered an integral part of sustainability narratives in the aviation industry (Feizabadi, Gligor, & Alibakhshi, 2021). The role of ICAO is significant and crucial in the implementation of sustainability initiatives and to make them align with the required social, environmental and economic perspectives, the numerous studies has been held on this topic (Fu et al., 2023; Korb & Heinze, 2021; Pijpers et al., 2009). The alignment in aviation operations depicts that how collective efforts are vested to shape the sustainability and sharing of the resources, knowledge transfer and use of the sustainable practices (Feizabadi et al., 2021).

We can concludes that the role of the alignment is essential in the sustainability for the achievement of the strategic and long-term sustainability goals e.g. the environmental stewardship to social responsibility and regulatory compliance. This literature review lays the foundation for future research into the various aspects of alignment in the aviation industry and how it affects sustainable performance. To investigate the impact of the alignment on the sustainable performance of aviation industry the hypothesis has been framed, below.

H2: Alignment significantly influence the sustainable performance of the aviation industry

Agility

The environment of the aviation industry is highly dynamic and unpredictable where fluctuation take place very rapidly and the organizational agility emerges as a critical factor for ensuring the sustainability (Woltjer, Johansson, & Berggren, 2015). The term Agility is coined as an ability of an aviation organization to respond the fluctuation and immediate challenges in the prompt and more effective way. The agility is crucial and plays a vital role in the aviation industry resilience and the organization capability to handle and implement the sustainability practices in efficient and effective way (YILMAZ, 2023). The sudden disruption due to the geopolitical issue, global health crises and weather factors are the common aspects of aviation industry. In such scenarios, organizational agility becomes imperative for the industry's survival and continued sustainable performance. Research by Liu and Lu (2020) emphasizes the importance of agility in the aviation sector, highlighting its role in adapting to changing market conditions, optimizing operations, and effectively managing crises (Li, Lin, Turel, Liu, & Luo, 2020). The study explores how agile organizational structures and responsive decision-making contribute to sustained performance in the face of uncertainties. Adaptive supply chain and logistics methods are also a part of operational agility in the aviation sector.

The agility of airline logistics systems is examined in research by Christopher and Saghiri (2018), who highlight the importance of flexibility in adjusting to shifting demand patterns, streamlining routes, and guaranteeing the effective flow of products and services (Lotfi & Saghiri, 2018). The agility reports that how effective flow of goods, services and information is by reducing the wastes in terms of carbon footprint reductions and overall supply chain and logistics management efficiency and effectiveness in aviation industry (Awan & Shafiq, 2015; Shafiq, Nazeer, Soratana, & Maqbool; Shafiq & Soratana, 2019a, 2019b). The importance of the Agility has been highlighted during the COVID-19 pandemic which has underscored the critical role of agility in the aviation industries and has responded to unforeseen challenges. The study highlights the correlation between organizational agility and the industry's resilience during unprecedented disruptions and has uttered the importance of agility in sustainability perspective (Undavalli et al., 2023).

Furthermore, agility within the aviation sector is closely tied to the digital and technological transformative initiatives. The artificial intelligence and the real time decision making through utilization of the big data and digital technology is the integral part of the agile management techniques (Grazieschi, Asdrubali, & Guattari, 2020). To meet the agile perspective the aviation industry has established the collaborative partnership and alliance which is a global network and the purpose is to respond to the uncertainties collectively and it included the utilization of the shared resources, optimized routes and to address the collective sustainability goal together (Khan & Wisner, 2019).

In conclusion to the above discussion the term “Agility” is considered a fundamental factor of the sustainability influencers and the aviation industry may attain the sustainability goals through inclusion of the agility perspective and creating the flexibility capability overall (Feizabadi et al., 2021; Undavalli et al., 2023). This literature review provides understandings into the different scopes of agility within the aviation sector, therefore, based on the groundwork it will be useful for further exploration of its impact on sustainable performance.

H3: Agility significantly influence the sustainable performance of the aviation industry

Theoretical Framework

This theoretical framework establishes the elations and employed the investigative of relationships and influences of Triple-A (Adoptability, Alignment, and Agility) approaches on the aviation operations sustainable performance. The term Adoptability captures the aviation industry's capability to hold the technological advancements and operational innovations, the term alignment is the practice with emerging trends and balance and hormone with the social, environmental and economic dynamics. The third variable is the Agility which underscores the industry's fluctuated or adaptive prowess which enables it to deal with the un-certainties and the dynamic challenges.

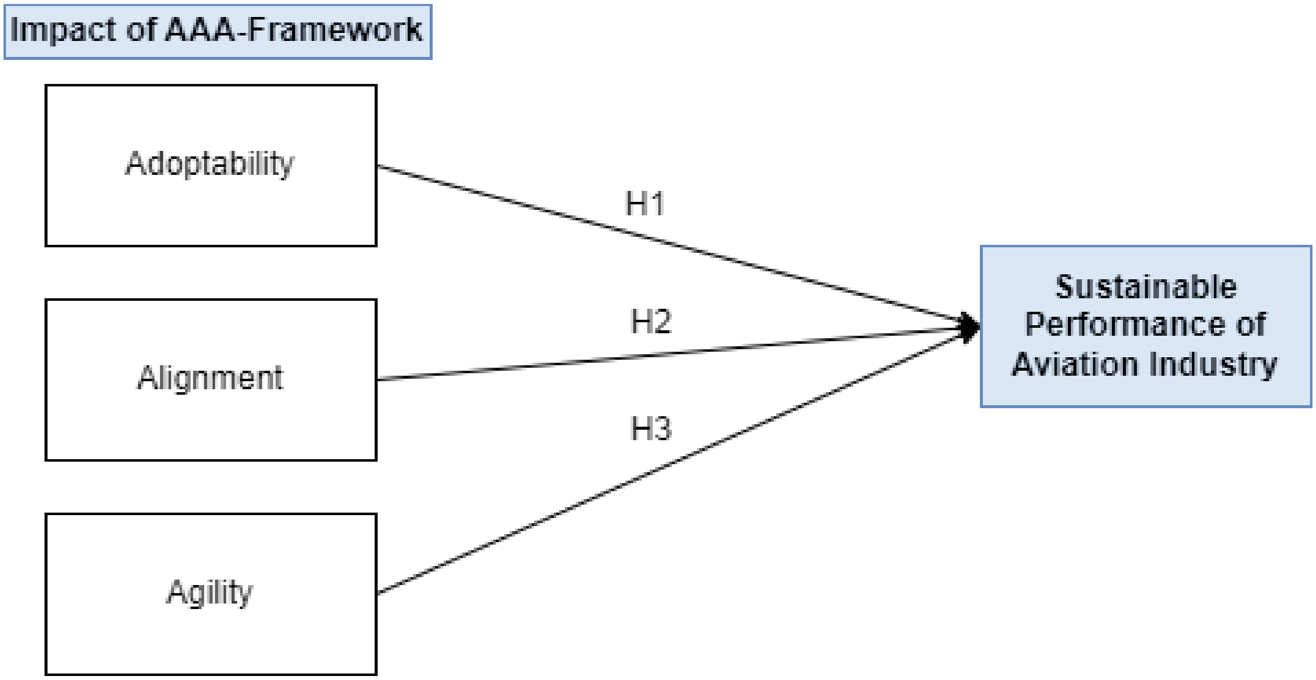

Figure 1: Research Framework

Research Methodology

This quantitative research is focused on the aviation sector, specifically targeting aviation professionals operating within developing countries, with a primary emphasis on the context of Pakistan. The study aimed to gather primary data through a questionnaire survey, utilizing 7-point Likert scales. To enhance the appropriateness and reliability of the survey instrument, the scales were meticulously adapted from the work of Akhtar, AdeelAkhtar, & Ilyas, (2022), ensuring a robust and validated foundation for the measurement tools (Akhtar, AdeelAkhtar, & Ilyas, 2022).

The population under consideration for this study comprises aviation professionals with substantial work experience exceeding five years, holding roles in both airlines and civil aviation authorities. As per the general rule by Krejcie and Morgan (1970), “where the population size is unknown or infinite, researchers may use a standard rule of thumb for determining an appropriate sample size. A commonly recommended guideline is to have a sample size that is at least 30 times the number of independent variables in the analysis”. Moreover this 30 times rule is widely cited(Krejcie & Morgan, 1970). Though, our variables are 4 in total so as per this general rule our sample size will be 4x30= 120 respondents. The sample selection involved employing purposive and snowball sampling techniques and we collected the data from 163 aviation operations management professionals, ensuring a diverse representation from both sectors. To maintain transparency and accuracy, the data collection period was confined to a specific timeframe of approximately two months. This temporal limitation ensures a snapshot of the aviation professionals' perspectives during a defined period, enhancing the contextual relevance of the study.

Ethical considerations were integral to the research design, with a commitment to maintaining the confidentiality of respondents' personal information. Measures were implemented to safeguard the privacy and anonymity of participants, ensuring that their data is treated with utmost sensitivity and kept secure throughout the research process. The structured questionnaire, tailored for this study, was distributed using online platforms, specifically Google Forms, and disseminated through emails and WhatsApp, as it widely adopted technique (Farooq, Shafiq, & Tahir, 2019; Saif Ur Rehman & Shafiq, 2019). The choice of these platforms aimed to facilitate ease of response collection and accommodate the busy schedules of aviation professionals.

Subsequent to data collection, the analysis was conducted using "SmartPLS 3.0," a robust statistical tool well-suited for estimating outcomes and deriving meaningful results from the study. This methodological framework ensures a rigorous and ethical approach to investigating the perspectives and experiences of aviation professionals in the evolving landscape of the aviation sector in developing countries.

Results and Analysis

This section presents a comprehensive exploration and interpretation of the data collected from various facets of the industry, shedding light on how these strategic dimensions influence and mold sustainable practices. The findings encapsulate the culmination of efforts to understand the extent to which aviation organizations adopt emerging technologies, align their strategies with environmental and social considerations, and exhibit agility in response to dynamic challenges. Through rigorous statistical analysis and qualitative examination, this section unfolds the insights garnered from a diverse sample within the industry, aiming to contribute to the broader discourse on the sustainable evolution of aviation practices.

Measurement Model Results

The measurement results provide insights into the reliability and validity of the latent constructs in the model. Here are some key measurement results you might encounter in SmartPLS.

Indicator Loadings

Indicator loadings represent the strength of the relationship between each observed (measured) variable and its corresponding latent construct. Higher loadings indicate a stronger relationship, therefore the required threshold used by various authors is ≥ 0.7 (Din & Shafiq, 2019; Shafiq & Soratana, 2020). Results presented in Table 01 and Figure 02 shows the outer loadings for each indicator, which indicate the correlation between the indicator and its corresponding latent variable. Higher values suggest a stronger relationship between the indicator and the construct. For example, the Agility construct has three indicators (AG1, AG3, and AG5) with outer loadings of 0.759, 0.839, and 0.817, respectively. These values indicate that the indicators have a strong positive correlation with the Agility construct. The complete results extracted from this measurement model has meet the thresholds requirements and are the indicators loading are depicted below in Figure 02 and Table 01.

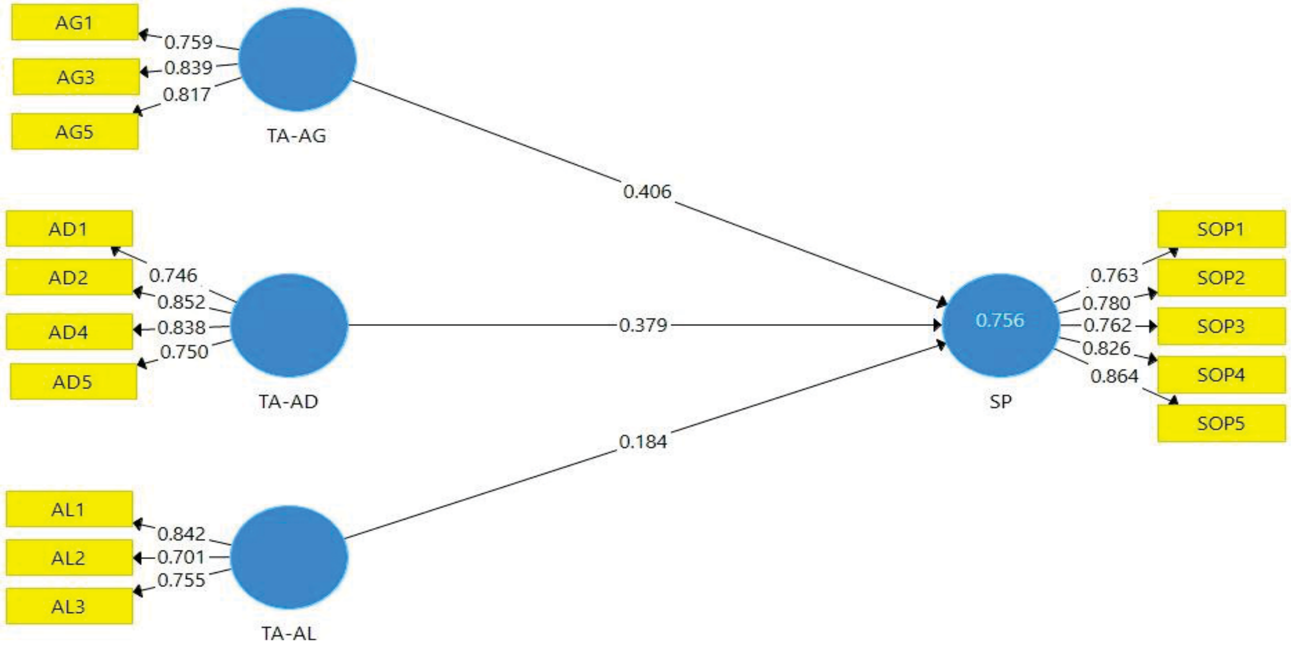

Figure 2: Measurement Model

Reliability of constructs (variables) and indicators (measures)

Through SmartPLS it is typically assessed internal consistency using measures such as Cronbach's alpha. Cronbach's alpha is a statistical metric that gauges the extent to which items within a construct consistently measure the same underlying concept. Higher alpha values indicate greater reliability, suggesting that the indicators within a construct are closely related and effectively measure the intended latent variable. The threshold for the Cronbach's alpha is that the value of the "Cronbach's Alpha shall be ≥ than 0.70. The results shown in the Table 01 depicts that the Cronbach's alpha values range from 0.700 (for Adoptability, Agility and Sustainable Performance), the range of the alignment is 0.654 which less than threshold of 0.70. Therefore, there overall results and values suggest an acceptable level of internal consistency reliability for all constructs, Table 01.

Table 1. Criteria for Assessing the Quality of Independent & Dependent Variables

"List of Variables"	"Measure"	"Outer Loading"	"Values of Cronbach's Alpha"	"Composite Reliability"	"AVE"
Adoptability	AD1	0.746	0.809	0.875	0.637
	AD2	0.852			
	AD4	0.838			
	AD5	0.750			
Agility	AG1	0.759	0.730	0.847	0.650
	AG3	0.839			
	AG5	0.817			
Alignment	AL1	0.842	0.654	0.811	0.590
	AL2	0.701			
	AL3	0.755			
Sustainable Performance	SOP1	0.763	0.859	0.899	0.640
	SOP2	0.780			
	SOP3	0.762			
	SOP4	0.826			
	SOP5	0.864			

The Composite reliability is an alternative measure of internal consistency reliability that accounts for the different outer loadings of the indicator variables. It is generally considered a more robust measure than Cronbach's alpha. Higher values (typically above 0.7) indicate better reliability. The table 01 shows that the composite reliability values range from 0.811 (for Alignment) to 0.899 (for Sustainable Performance). All constructs have composite reliability values above 0.7, indicating good internal consistency reliability.

AVE (Average Variance Extracted): AVE is a measure of convergent validity, which assesses the extent to which a construct explains the variance of its indicators. Higher AVE values (typically above 0.5) indicate that the construct explains a significant portion of the variance in its indicators, suggesting adequate convergent validity. The AVE values in the table 01 are range from 0.590 (for Alignment) to 0.650 (for Agility). Overall, the results presented in the table 01 suggest that the measures used in the study have acceptable levels of reliability and validity, with some constructs performing better than others.

Table 2: Assessment of Discriminant Validity

Fornell-Larcker Criterion

	SP	**TA-AD**	**TA-AG**	**TA-AL**
SP	**0.800**			
TA-AD	0.794	**0.798**		
TA-AG	0.715	0.759	**0.786**	
TA-AL	0.673	0.584	0.660	**0.768**

Table 02, presents the results of the Fornell-Larcker criterion, which is a method used to assess discriminant validity in structural equation modeling. The Fornell-Larcker criterion compares the square root of the average variance extracted (AVE) for each construct with the correlations between that construct and all other constructs in the model. To establish discriminant validity, the square root of the AVE for each construct should be greater than the correlation between that construct and any other construct in the model.

In the table 02, the square roots of the AVE values for each construct are shown in bold along the diagonal. The off-diagonal elements represent the correlations between the constructs. For example, the square root of the AVE for the Sustainable Performance (SP) construct is 0.800.

The Variance Inflation Factor (VIF) is a measure used to detect multicollinearity among independent variables. VIF values are calculated for each independent variable in the model. A VIF value of 1 indicates no collinearity, while values above a certain threshold (typically 5 or 10) suggest the presence of multicollinearity. By examining these values, we assess the level of multicollinearity in this model. If VIF values are below the recommended threshold (e.g., 5 or 10), it suggests that there is no significant multicollinearity problem.

Structural Model Results

The structural model in SmartPLS involves examining the relationships and paths among latent variables in the proposed theoretical model. This includes assessing the direct and indirect effects of one variable on another, as well as evaluating the overall fit of the model. The figure 03, presents the loading of bootstrapping which indicates standard errors and confidence intervals of path coefficients and is providing robust statistical inference.

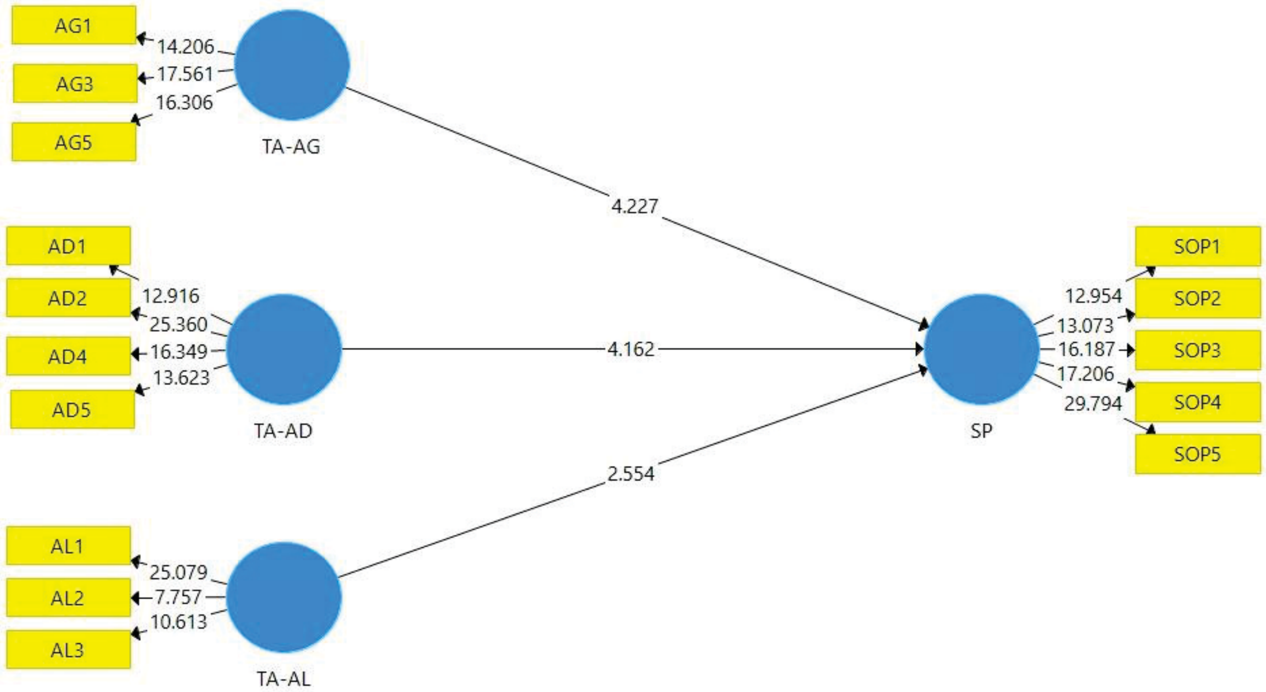

Figure 3: Structural Model (Bootstrapping)

The structural model analysis in SmartPLS helps researchers evaluate the validity of their hypothesized relationships, understand the strength of these relationships, and assess the overall quality of the structural equation model.

Table 3: Mean, STDEV, T-Values, P-Values

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
TA-AD -> SP	0.379	0.388	0.091	4.162	**0.000**
TA-AG -> SP	0.406	0.393	0.096	4.227	**0.000**
TA-AL -> SP	0.184	0.189	0.072	2.554	**0.011**

Table 3, presents the means, standard deviations, t-values, and p-values for the path coefficients between the exogenous variables (TA-AD, TA-AG, and TA-AL) and the endogenous variables (SP). The table shows that:

- TA-AD has a significant positive effect on with a t-value of 4.162 and a p-value of 0.000, indicating a strong positive relationship.
- TA-AG has a significant positive effect on SP (sustainable performance) with a t-value of 4.227 and a p-value of 0.000, indicating a strong positive relationship.
- TA-AL has a significant positive effect on SP with a t-value of 2.554 and a p-value of 0.011, indicating a weak but positive relationship.

The correlations among the latent variables was also calculated and the values shows that AD, AG, AL, and SP are highly correlated, with correlation coefficients range from 0.422 to 0.476.

The coefficient of determination (R-square) for endogenous variable was also calculated which indicating the proportion of variance explained by the model. The adjusted R-square values are also provided, which account for the number of predictors in the model. The values for the latent or dependent variables Sustainable Performance (SP) provide insights into the explanatory power of the regression models. In the context of SP, the model accounts for 75.6% of the variance, with an adjusted R-squared of 75.1%, indicating a moderate fit.

Table 4: Hypotheses Results and Decision

Hypothesis	Path/Relationship	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P-Values	Decision
H1	**TA-AD -> SP**	0.379	0.388	0.091	4.162	**0.000**	**Accepted**
H2	**TA-AG -> SP**	0.406	0.393	0.096	4.227	**0.000**	**Accepted**
H3	**TA-AL -> SP**	0.184	0.189	0.072	2.554	**0.011**	**Accepted**

"The critical threshold for t > 1.96, with a significance value (P-Value) of < 0.05."

Table 4 presents the hypothesis path/relationship decisions based on the t-values and p-values. The table shows that the hypotheses H1, H2, and H3 are accepted. For Adoptability, Agility and Alignment the paths are significantly positive, whereas the path of Alignment is comparatively low but still significantly accepted.

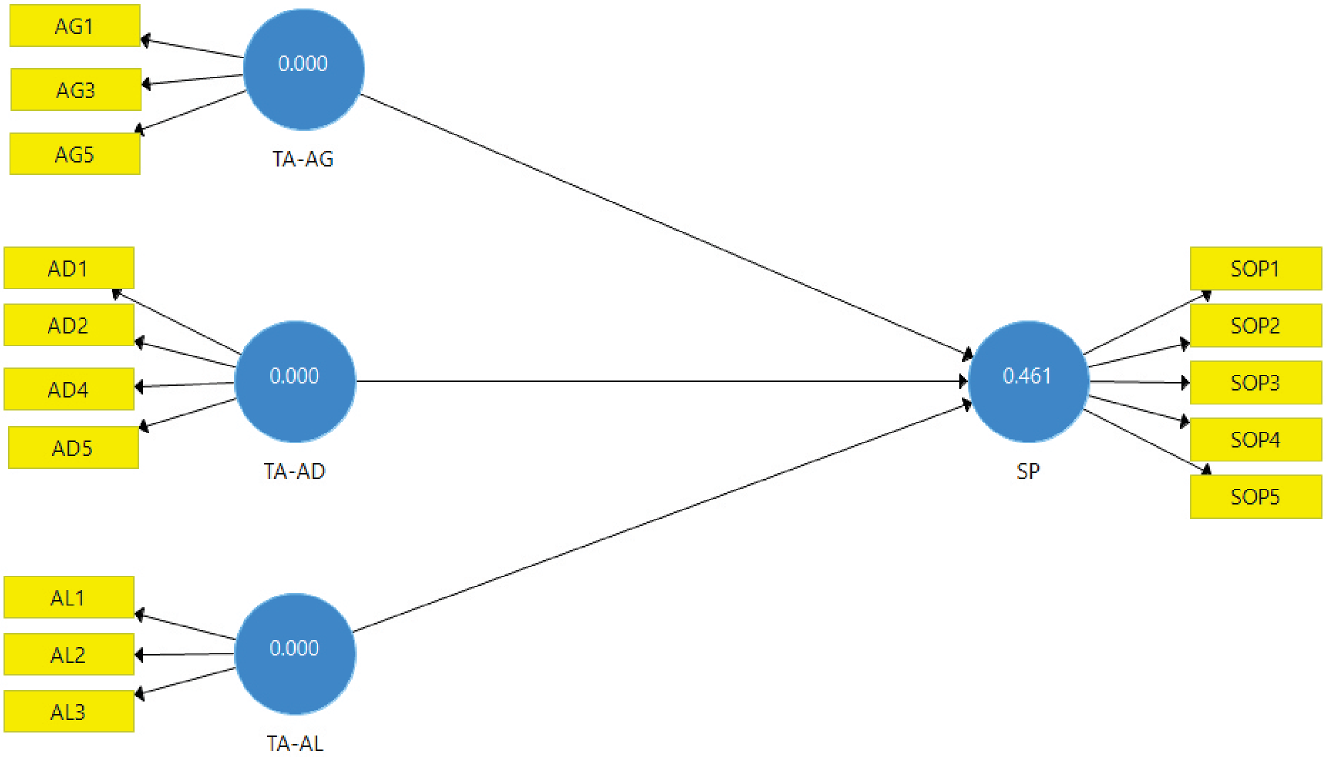

Figure 4: Blindfolding Model

In above Figure 04, the blindfolding pictorial model is presented the required thresholds are typically displayed on the results figure. Values falling on Figure indicate that the model's has the ability to predict endogenous constructs, with higher values signifying stronger predictive relevance and overall model robustness.

Conclusion and Recommendations

The empirical investigation into the influence of Triple-A “Adoptability” (AD), “Alignment” (AG), and “Agility” (AL) approaches on the sustainable performance of the aviation industry unveils a nuanced landscape of relationships. The hypothesis are significantly accepted. These outcomes emphasize the intricate dynamics within the aviation industry, emphasizing the complex interplay of strategies and their distinct impacts on various facets of sustainability.

The findings illuminate the industry's need for a multifaceted approach, recognizing that the effectiveness of strategies varies across different performance dimensions. The acceptance of Hypothesis indicates that the variables are directly correlate with sustainable performance. This highlights the need for aviation organizations to critically evaluate and tailor their strategies, acknowledging the distinct influences of Adoptability, Alignment, and Agility on diverse performance metrics. The results are aligned with the study of Akhtar, AdeelAkhtar, & Ilyas, (2022) which held on the pesticide's firms in Pakistan and results are aligned with the Resource-Based View theory which indicates a direct correlation between the identified variables and sustainable performance.

Recommendations

After the literature review and statistical evaluation of study "Triple-A Paradigm: Examining its Role in Shaping Sustainable Performance within the Aviation Industry" all the hypotheses are accepted positively. We will encourage the aviation organizations that they shall invest in the adoption of advanced technologies within the aviation industry to enhance sustainable performance. For the Agile perspective it is also identified critical and shall promote organizational agility in technology adoption processes to foster sustainable performance in response to dynamic industry changes. At the last we emphasize aligning technology adoption strategies with sustainable practices to ensure a harmonized approach that positively impacts overall performance.

Therefore, overall under this study we will suggests that a strategic focus on integrating the Triple-A Paradigm—Technology Adoption, Agility, and Alignment—will contribute significantly to shaping sustainable performance within the aviation industry. Organizations are advised to implement these recommendations to stay competitive and resilient in the dynamic aviation sector. In essence, this study calls for a strategic recalibration of sustainability initiatives in the aviation sector, leveraging a nuanced understanding of Adoptability, Alignment, and Agility to foster a comprehensive and enduring commitment to sustainable practices. This study has the limitations of generalizability, it has been conducted for the developing countries scenarios and for having the more rigorous results and generalizability we recommend that the organizational culture and external stakeholder's collaborations variables shall be studied further.

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