Measurement of Responsible AI and Sustainable AI Influence on IT Service Management

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***Abstract*—The utilization of artificial intelligence (AI) in IT service management has demonstrated considerable promise to enhance operational efficiency and service quality. The efficacy of AI integration in IT service management is significantly contingent upon implementing responsible and sustainable AI principles that establish digital trust as the cornerstone of system trust. Furthermore, most concentrate on technical elements, like algorithmic efficiency and service automation. The research objective assesses how responsible AI and sustainable AI enhance the efficacy of IT service management by establishing digital trust as a mediating variable. This study employed a convergent triangulation method utilizing an explanatory design approach through sophisticated elucidation. The research population comprises firms implementing AI in IT service management within the West Kalimantan region. Data were gathered via an online questionnaire administered to 282 participants using a random sampling method, with 239 respondents providing complete answers, resulting in a response rate of 84.75%. Data analysis with the Likert scale and Partial Least Squares Structural Equation Modeling (PLS-SEM) tool. This research is novel due to its incorporation of ethical and sustainability aspects of AI within the measurement model of IT service management effectiveness, alongside a focus on responsible AI to foster digital trust and facilitate the successful transformation of AI-driven IT service management.**

Keywords—Measurement, Responsible AI, Sustainable AI, Digital Trust, IT Service Management.

I. INTRODUCTION

The utilization of artificial intelligence (AI) in information technology (IT) service management has emerged as a pivotal component of an organization's digital transformation. The capacity of AI to automate IT service delivery facilitates enhancements in operational efficiency, diminishes the workload of IT staff, and expedites the resolution of user issues [1]. Artificial intelligence currently contributes to multiple facets of IT service management, including incident analysis, troubleshooting, and chatbot-driven user assistance. AI facilitates enhanced incident management analysis and the deployment of predictive solutions to avert service disruptions [2]. Nonetheless, beneath these advantages lie apprehensions about the preparedness of AI for responsible and sustainable implementation without undermining user trust and company viability. AI-based solutions devoid of transparency and sustainability considerations may result in user resistance, with security vulnerabilities and biases in decision-making. This suggests that in the absence of a definitive assessment of the effects of responsible and sustainable AI in IT service management, companies could encounter trust and regulatory compliance issues that may impede the efficacy of AI technology [3].

This statistic is crucial, as user trust in AI-based solutions significantly influences their acceptability. Implementing AI without regard for transparency, justice, and accountability may elicit concerns from users and organizations [4]. Decisions rendered by AI lacking a clear and structured rationale can provoke skepticism, particularly for IT services associated with data security and user privacy. Without a measurement system capable of evaluating the responsibility and sustainability of AI in IT service management, enterprises find it challenging to modify policies and procedures to align with user expectations and advance ethical norms [5]. The sustainability of AI technology in IT service management is a factor that must not be overlooked. Suboptimal utilization of AI may result in excessive energy usage, heightened carbon emissions, and exacerbated environmental sustainability challenges. Numerous prior studies indicate that AI systems lacking a sustainability focus may exhibit energy inefficiency and result in considerable long-term ecological consequences [6, 7, 8]. Measurement of sustainable AI within IT service management is essential to guarantee the environmentally responsible adoption of AI technology while maintaining business efficiency.

Moreover, measuring responsible AI and sustainable AI in IT service management significantly impacts IT governance and legislation. As legislation concerning AI usage rises in numerous nations, firms must comprehend how technology can satisfy relevant compliance norms [9]. Without explicit measurements, organizations struggle to assess how effectively AI systems fulfill compliance obligations on transparency, ethics, and sustainability norms. This measurement will assist firms in formulating superior strategies, mitigating legal hazards, and enhancing competitiveness within a progressively intricate digital ecosystem [10]. It possesses strategic significance in enhancing corporate competitiveness in the digital age. Organizations that adopt AI responsibly and sustainably will garner greater trust from customers, business partners, and authorities [11]. By developing a dependable, transparent, and sustainable AI system, enterprises can enhance customer satisfaction and establish a robust IT service management ecosystem [12]. This research aims to create a more

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comprehensive measurement model to aid organizations in evaluating how well AI adheres to the principles of accountability and sustainability and the degree to which digital trust can mediate its beneficial effects on the efficacy of IT service management.

While numerous studies have examined the utilization of AI in IT service management, the majority predominantly emphasize technical dimensions, including algorithmic efficiency and service automation [13, 14, 15]. Limited research has mainly investigated how responsible AI and sustainable AI enhance the efficacy of IT service management through the lens of digital trust. Digital trust is crucial in accepting AI since the technology's openness, fairness, and accountability will significantly affect consumer and organizational responses. This research gap indicates the necessity for a comprehensive examination of how the digital trust context mediates the effects of responsible and sustainable AI implementation on the efficacy of IT service management.

This research aims to integrate the principles of responsible AI and sustainable AI inside IT service management, areas that have seldom been the primary focus of prior studies. The methodology is more comprehensive and practical, enabling enterprises to utilize the established model as a metric for evaluating AI integration within an IT service management context. The approach offers pragmatic insights for policymakers, IT professionals, and companies to guarantee that AI implementation enhances the effectiveness of IT services while conforming to ethical and environmental standards. Furthermore, it provides a novel perspective on comprehending the problems and prospects of AI in IT service management during the digital transformation period. This research possesses significant academic merit as it addresses a deficiency in the literature concerning the assessment of responsible and sustainable AI in IT service management. As a novel approach, this work provides theoretical and empirical contributions applicable to future research. The research integrates conceptual and practical methodologies, enabling the exploration of AI's impact on IT service management from both efficiency and ethical, sustainability, and digital trust perspectives. This research offers significant insights for academics, industry, and regulators in formulating more reliable, adaptive AI rules and practices, as well as sustainable initiatives.

The research challenge aims to assess and investigate how responsible AI and sustainable AI might, directly and indirectly, enhance the efficacy of IT service management via digital trust elements. The problem formulation aligns with the research objective, which aims to ascertain the degree to which the context of digital trust mediates the effects of the exogenous constructs of responsible AI and sustainable AI on the efficacy of IT service management and its respective indicators. This research offers advantages for industry and academic discussions on responsible, transparent, and sustainable AI governance inside IT service management.

II. Literature Review

A. Responsible AI

Responsible AI refers to developing and implementing artificial intelligence ethically, equitably, and accountably [16]. The growing adoption of AI is becoming more prevalent and accepted among users, particularly in IT services that entail decision automation procedures. This study primarily focuses on essential markers of responsible AI, including transparency, fairness, explainability, accountability, and compliance [17]. AI transparency denotes the degree to which AI systems are accessible and comprehensible to users, encompassing knowledge of decision-making processes, utilized data, and any risks associated with their application [18]. Equity in responsible AI underscores the significance of impartiality and non-discrimination in the determinations made by AI systems [19]. Explainability pertains to the capacity of AI to elucidate the processes and rationale underlying its conclusions, enabling people to comprehend the logic employed in decision-making [20]. Accountability in AI pertains to the obligation of developers, organizations, and the AI system to ensure that judgments are justifiable [21]. Accountability encompasses governance elements, necessitating enterprises to establish explicit protocols for AI utilization in IT services to guarantee security, reliability, and compliance. Compliance with responsible AI pertains to the observance of legislation, norms, and ethical criteria that regulate the application of AI in IT services [22].

B. Sustainable AI

Energy efficiency is essential in executing IT service management, as data centers that facilitate IT services utilize significant energy resources. Energy-efficient algorithms and infrastructure improvements can markedly decrease power consumption [23]. To guarantee that AI-driven operations in IT service management are both technologically efficient and environmentally sustainable during data processing, storage, and distribution activities [24]. Integrating renewable energy sources and sophisticated cooling systems in data centers can facilitate the attainment of this objective. Hardware optimization entails designing and implementing more efficient and eco-friendly components inside the IT infrastructure. Research has focused on advancing AI accelerators and methodologies like analog computing to diminish energy consumption while preserving high performance. These hardware design advancements can enhance the energy efficiency necessary for sustainable AI [25]. Sustainable data management underscores the significance of effective and accountable data governance in IT services. Using pertinent and high-caliber data can diminish the necessity for substantial data processing, hence conserving energy [26]. Moreover, sustainable data management strategies contribute to minimizing digital waste and enhancing operational efficiency. Lifecycle Management concerning sustainable AI entails measuring and overseeing the environmental ramifications of an AI system throughout its lifecycle, encompassing raw material extraction, production, operation, and disposal [27]. This methodology guarantees that every phase of the AI lifecycle incorporates sustainability factors and mitigates adverse environmental effects.

C. Digital Trust

Perceived Security indicates the degree to which consumers believe that IT service systems are protected against security threats and vulnerabilities. This trust is established by executing robust security protocols, including data encryption, stringent access restrictions, and continuous system monitoring [28]. Organizations that effectively cultivate security perceptions generally achieve more significant growth as consumers exhibit increased confidence in their products and services. Trust in AI-based Decisions pertains to users' faith in the judgments made by artificial

intelligence systems within IT services [29]. This trust is crucial as AI-generated decisions can influence numerous operational and strategic dimensions. To cultivate this confidence, organizations must ensure that AI systems are transparent, explicable, and free from bias. Data Privacy Assurance pertains to an organization's dedication to safeguarding customer data privacy inside IT services [30]. This includes privacy rules, openness in data governance, and adherence to data protection regulations. Digital trust is established when users have confidence that their personal information is processed and maintained securely, free from the risk of abuse or privacy infringements. Organizations that ensure data privacy cultivate greater confidence among consumers and other stakeholders.

D. IT Service Management

IT Service Management is a systematic approach to the design, execution, administration, and enhancement of information technology service delivery to fulfill user requirements and organizational goals. Critical metrics, such as operational Efficiency, user satisfaction, cost reduction, incident response time, and service reliability, frequently determine IT service management efficacy assessment. Operational Efficiency denotes an organization's capacity to optimize operations and eliminate obstacles to IT service delivery. IT service management minimizes reactive tasks through established processes and defined workflows, enabling IT teams to concentrate on innovation and enhancement of IT services [31]. User satisfaction is a crucial metric for evaluating the quality of IT services, enabling firms to align their offerings with user expectations and enhance customer experience and loyalty [32]. Cost reduction can be attained through the standardization of processes and the optimization of IT service resources. By utilizing frameworks like ITIL, firms can pinpoint areas necessitating enhancement, minimize redundancy, and augment operational cost efficiency [33]. Incident Resolution time evaluates the Efficiency of the IT team's response to and resolution of reported events. Rapid reaction times enhance service quality and bolster user confidence in IT services [34]. Service Reliability denotes the consistency and availability of IT services in alignment with defined service level agreements (SLAs). Efficient IT implementation guarantees service availability, reduces downtime, and fulfills business objectives [35].

III. Research Method

This study uses mixed methodologies, integrating quantitative and qualitative approaches to assess how responsible AI's and sustainable AI's latent constructs enhance IT service management via digital trust. The study model employs convergent triangulation and an explanatory design, supplemented with additional clarification [36]. This research commences with an explanation of the backdrop, literature review, problem formulation, hypothesis development, data collection and analysis, research findings, and conclusions [37]. The subject of this research comprises businesses or firms that have implemented AI in IT service management within the West Kalimantan region. For sampling via the random sampling technique [37], the criteria include organizations or firms that have employed AI in IT service management for at least one year, originating from diverse sectors such as banking, technology, healthcare, and manufacturing, and possessing AI-based IT service management systems. The respondents included IT managers, IT personnel, and stakeholders directly engaged in AI-driven IT service management. Senior IT managers were chosen as informants for each industry sector due to their extensive knowledge and reliability, making them suitable for in-depth interviews based on the questionnaire responses.

Primary data was acquired by a survey conducted from January to June 2025, employing a purposive sampling strategy delivered online via Google Forms to 282 respondents, of which 239 organizations or companies submitted complete responses, yielding a return rate of 84.75%. The research tool utilized a questionnaire assessed by a Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree) [38]. The questionnaire was compiled by integrating multiple prior investigations and including various modifications based on differing conditions, timeframes, and research sites. The validity and reliability assessments included Exploratory Factor Analysis (EFA) and Cronbach's Alpha. The analysis used the Partial Least Squares Structural Equation Modeling (PLS-SEM) method to examine the relationship between variables and assess digital trust's direct influence and mediating function. The steps of PLS-SEM include conceptual models, algorithmic analysis methods, bootstrapping, path diagram models, model evaluation, findings, and suggestions [38]. The bootstrapping approach is employed to disperse the data without being limited by the normality assumption.

Evaluate the premise of the research model to assess the degree to which Responsible AI and Sustainable AI can enhance IT service management via digital trust inside the firm. The research hypotheses encompass H1: responsible AI positively influences digital trust in IT service management, suggesting that greater transparency, fairness, explainability, accountability, and regulatory compliance in an AI system correlates with heightened digital trust in IT service management; H2: sustainable AI positively impacts digital trust in IT service management, indicating that energy efficiency, carbon footprint reduction, hardware optimization, data management sustainability, and AI lifecycle management can enhance user trust in AI-driven IT service management. H3: Digital trust serves as a mediator in the relationship between responsible AI and IT service management, signifying its crucial role in connecting the influence of responsible AI on enhancing operational efficiency, user satisfaction, cost reduction, incident resolution time, and service reliability within IT service management; Digital trust mediates the relationship between sustainable AI and IT service management, indicating that digital trust is crucial in connecting AI sustainability with enhancements in IT service management, whereby environmentally friendly and efficient AI will be more readily accepted and positively influence overall IT service management.

IV. Results and Discussion

The discussion and analysis of the research findings commence with an examination of the path coefficient between exogenous and endogenous variables. The findings of this study serve as the foundation for the estimation using the Partial Least Squares (PLS) Algorithm, followed by the bootstrapping process. The primary objective of executing the bootstrapping method is to acquire data distribution to attain optimal outcomes and satisfy the assumption of normalcy within the research model [38]. This strategy involves employing an algorithm that produces several resamples through the resampling with replacement method, wherein

each sample is randomly drawn from the original dataset, permitting the selection of a single data row many times [38]. This research used the Partial Least Squares-Structural Equation Modeling (PLS-SEM) technique to assess the connection between exogenous and endogenous latent variables. The exogenous variables examined are responsible AI and sustainable AI, whilst the endogenous variables consist of digital trust and IT service management. Each latent variable is assessed by indications that pertinent prior study references have substantiated. The PLS-SEM approach comprises several latent exogenous and endogenous variables characterized by the following indicator composition: (a) Responsible AI encompasses indicators of transparency (RAI1), fairness (RAI2), explainability (RAI3), accountability (RAI4), and compliance (RAI5); (b) Sustainable AI comprises indicators of energy efficiency (SAI1), carbon footprint reduction (SAI2), hardware optimization (SAI3), data management sustainability (SAI4), and lifecycle management (SAI5); (c) Digital trust includes indicators of perceived security (DT1), trust in AI-driven decisions (DT2), and data privacy assurance (DT3); IT service management encompasses metrics of operational efficiency (ITSM1), user satisfaction (ITSM2), cost reduction (ITSM3), issue resolution time (ITSM4), and service reliability (ITSM5).

The subsequent illustration depicts the correlation between the exogenous and endogenous latent variables and their corresponding indicators inside the research path diagram model, encompassing responsible AI, sustainable AI, digital trust, and IT service management (see Figure 1). This path diagram illustrates causal relationships between variables, with arrows showing the influence of exogenous factors on endogenous factors. Responsible AI and sustainable AI are presumed to directly impact digital trust, subsequently influencing IT service management. This model also investigates how digital trust mediates the relationship between responsible AI and sustainable AI in IT service management.

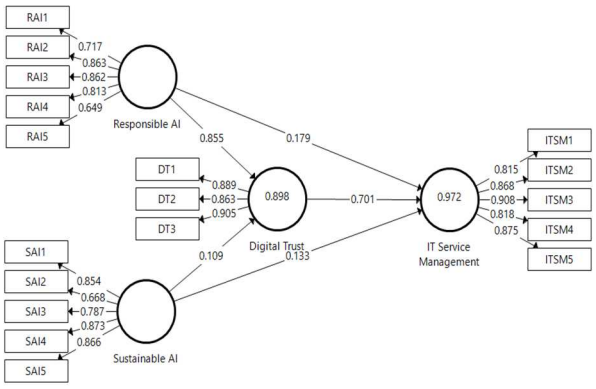

Fig. 1. Research Path Diagram Model

The outer model analysis indicates that the RAI5 (compliance) and SAI2 (carbon footprint reduction) indicators possess loading factor values of 0.649 and 0.668, respectively, both falling below the minimum threshold of 0.70; thus, they must be omitted from the research path diagram model [38]. Consequently, these two indicators are unsuitable for measuring responsible AI and sustainable AI constructs and should be excluded from the study model. Subsequently, recalculation was performed utilizing the PLS Algorithm, revealing a substantial alteration in the route coefficient value (see Figure 2). This modification reflects the necessity to maintain the model's high dependability and validity.

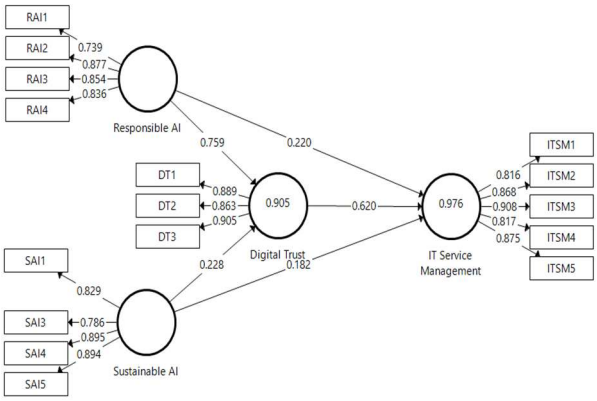

Fig. 2. Revised Research Path Diagram Model

The subsequent analysis phase involves measuring convergent and discriminant validity by computing the Average Variance Extracted (AVE) by the Fornell-Larcker criteria. Table I displays the outcomes of discriminant validity tests for each construct. In contrast, Table II presents the findings of reliability and validity assessments, including Composite Reliability (CR), Cronbach's Alpha (CA), and Average Variance Extracted (AVE). Specific requirements must be fulfilled to guarantee the study model's reliability and validity: the CR value must be above 0.80, Cronbach's Alpha must surpass 0.70, and AVE must be greater than 0.50 [38].

TABLE I. DISCRIMINANT VALIDITY

Fornell-Larcker Criterion	DT	ITSM	RAI	SAI
Digital Trust (DT)	0.886			
IT Service Management (ITSM)	0.980	0.858		
Responsible AI (RAI)	0.941	0.950	0.828	
Sustainable AI (SAI)	0.834	0.875	0.798	0.852

TABLE II. RELIABILITY AND VALIDITY OF CONSTRUCTS

Fornell-Larcker Criterion	CA	rho_A	CR	AVE
Digital Trust (DT)	0.863	0.865	0.916	0.785
IT Service Management (ITSM)	0.910	0.913	0.933	0.735
Responsible AI (RAI)	0.847	0.863	0.897	0.686
Sustainable AI (SAI)	0.875	0.894	0.914	0.726

The subsequent phase in the inner model analysis involves implementing the bootstrapping technique tools. This bootstrapping technique evaluates the significance of each indicator constituting a construct within the research model. This analysis uses the t-statistic value to assess the presence and magnitude of the influence between constructs in the model. An indicator is deemed significant if the t-statistic exceeds 1.96, corresponding to the z-score at the 95% confidence level, and the p-value is below 0.05 [36]. The significance test findings for the path coefficients indicate that all original sample and t-statistic values are positive, with the relationships between constructs in the model exhibiting t-statistic values exceeding those in the t-table (see Table III).

TABLE III. PATH SIGNIFICANCE TEST

Fornell-Larcker Criterion	Original Sample (O)	T-Statistic (|O/STDEV|)	P-Values
Digital Trust → IT Service Management	0.620	19.301	0.000
Responsible AI → Digital Trust	0.759	30.791	0.000
Responsible AI → IT Service Management	0.220	8.159	0.000
Sustainable AI → Digital Trust	0.228	8.197	0.000
Sustainable AI → IT Service Management	0.182	11.906	0.000

Examining the research path diagram indicates that responsible AI significantly impacts digital trust, evidenced by a path coefficient of 0.759. This value signifies that the responsible use of AI principles, encompassing openness, fairness, explainability, and accountability, can substantially enhance digital trust. This aligns with other research [13, 14, 15], indicating that responsible AI enhances user trust by offering transparency in decision-making and mitigating harmful bias. Sustainable AI exerts a lesser impact on Digital Trust, evidenced by a path coefficient of 0.228. This score indicates that although AI sustainability is significant in the long term, it does not directly influence establishing digital trust. Sustainability concerns, like energy efficiency, eco-friendly resource management, and the societal implications of AI, may have a more enduring influence on establishing digital trust than immediate effects. Moreover, digital trust significantly impacts IT service management, evidenced by a path coefficient of 0.620. This suggests that an elevated level of digital trust enhances the efficacy of adopting an AI-driven IT service management system. The direct impact of responsible AI on IT service management is minimal, indicated by a route coefficient value of 0.220. The influence of responsible AI on IT service management is more pronounced when facilitated by heightened digital trust. Likewise, sustainable AI directly impacts IT service management with a path coefficient of 0.182, signifying that the sustainability component of AI has a diminished effect on the direct efficacy of IT service management. Other research has not documented this discovery [11, 12]. It reinforces the findings of this study while highlighting the significance of digital trust for the effective implementation of IT service management. Digital trust facilitates the interaction between responsible AI and sustainable AI in IT service management.

The subsequent phase performs the Goodness of Fit test by computing the Adjusted R-squared value. The digital trust and IT service management calculations provide values of 0.904 and 0.976, respectively. The Adjusted R-squared value quantifies the extent to which the independent variable elucidates the dependent variable while accounting for the number of predictors to mitigate bias from model complexity. The digital trust score of 90.4% indicates that it is attributable to responsible AI and Sustainable AI, whilst the remaining 9.6% is affected by external factors not encompassed by the model. This value is significantly elevated, indicating that independent factors (responsible AI and sustainable AI) substantially influence the formation of digital trust. The influence of responsible AI on digital trust surpasses that of sustainable AI, indicating that responsible AI plays a more essential role than sustainability in fostering digital trust. The Adjusted R-Square value for the IT service management variable is 97.6%, indicating that digital trust, responsible AI, and sustainable AI account for it. In comparison, 2.4% is affected by other external factors. The effective execution of IT service management relies entirely on digital trust and responsible and sustainable AI principles.

The calculation findings for the predictive relevance of R-Square reached 0.998 (99.8%), indicating that this research model possesses a very high level of predictive capability, reliability, and validity in forecasting other unobserved dependent variables inside the model. Simultaneously, external influences beyond this research model influence the remainder. Predictive Relevance (Q^2) is a crucial metric in the PLS-SEM model that demonstrates the model's efficacy in forecasting the dependent variable. A high Q^2 score signifies the model's strong predictive capability, enabling it to inform decisions and generalize beyond the research sample.

The subsequent phase involves implementing a feedback mechanism to acquire more precise outcomes from the prior study. The procedure was conducted via a focus group discussion (FGD), during which identical questions were posed to all designated informants. All informants indicated that digital trust is crucial for facilitating the preparedness to engage in responsible and sustainable AI within the implementation of AI-based IT service management. This study is limited by the scope of analysis for each indicator, the interpretation of path coefficient values for each variable, and the relationships between constructs necessary to validate the impact of digital trust on the implementation of IT service management.

V. CONCLUSION AND FUTURE RESEARCH

Digital trust significantly mediates and enhances the impact of responsible AI and sustainable AI on the efficacy of IT Service Management. Organizations aiming to enhance AI-driven IT service management should prioritize the adoption of responsible AI to foster digital trust rather than concentrating solely on short-term, sustainable AI initiatives. This suggests that the efficacy of AI in IT Service Management will be suboptimal in the absence of robust digital trust, despite AI being developed responsibly and sustainably. Further research may involve formulating a measurement model for customer trust for AI in IT service management, identifying influencing factors, and exploring measures to enhance user trust.

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