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An Integrated TAM and TOE Model Examining AI Adoption Intention in UAE Civil Defence

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Abstract

Artificial intelligence (AI) is increasingly becoming an important tool for strengthening emergency management, predictive capability, operational coordination, and public safety performance. However, AI adoption in civil defence organisations depends not only on technological availability, but also on staff acceptance and organisational readiness. This study examines AI adoption intention among UAE Civil Defence staff using an integrated mediation model that combines the Technology Acceptance Model (TAM) and the Technology–Organization–Environment (TOE) framework. Perceived usefulness and perceived ease of use were examined as TAM-based predictors, while TOE readiness was modelled as a mediating construct linking individual technology perceptions with AI adoption intention. Data were collected through a structured questionnaire survey from 278 UAE Civil Defence staff across operational response, command and control, prevention, training, logistics, information technology, and administration. The model was analysed using Partial Least Squares Structural Equation Modelling (PLS-SEM) in SmartPLS. The findings showed that perceived ease of use, perceived usefulness, and TOE readiness had significant positive effects on AI adoption intention. TOE readiness was the strongest direct predictor of adoption intention and significantly mediated the relationships between perceived usefulness, perceived ease of use, and AI adoption intention. The model explained 73.1% of the variance in AI adoption intention, indicating strong explanatory power. The findings suggest that

successful AI adoption in UAE Civil Defence requires a balanced focus on user acceptance, organisational readiness, technological infrastructure, governance support, training, and operational integration.

Keywords: Artificial intelligence adoption, UAE Civil Defence, Technology Acceptance Model, Technology–Organization–Environment framework, organisational readiness, public safety, PLS-SEM

1. Introduction

Artificial intelligence (AI) is increasingly transforming emergency management and public safety operations across the world. Governments are investing heavily in AI technologies to improve operational efficiency, predictive capabilities, situational awareness, and decision-making during emergencies. In the United Arab Emirates (UAE), AI has become a strategic national priority under the country's broader digital transformation agenda (UAE Artificial Intelligence Office, 2023). Public-sector organisations are progressively integrating AI into governance, smart services, and operational systems to enhance responsiveness and institutional performance (Almazrouei et al., 2024). Within this context, UAE Civil Defence agencies are exploring the use of AI technologies to strengthen emergency response capabilities, fire prevention systems, risk prediction, dispatch coordination, and disaster management operations. Recent initiatives such as the Dubai Civil Defence AI Lab and AI-based Civil Defence Readiness Room further demonstrate growing institutional commitment toward AI-enabled emergency management (Dubai Civil Defence, 2025; Emirates News Agency, 2022).

The operational environment of civil defence organisations presents unique challenges for AI adoption. Emergency-response agencies operate under conditions characterised by time pressure, uncertainty, public accountability, and high operational risk. Decisions made during incidents may directly affect public safety and human lives. Consequently, adopting AI within civil defence environments requires more than technological availability alone. Successful implementation depends on whether personnel perceive AI systems as useful and easy to use, as well as whether the organisation itself is prepared to support operational integration. Organisational readiness, governance structures, infrastructure capability, training support, and interoperability therefore become critical determinants of adoption success (Uren & Edwards, 2023; Almarri et al., 2024).

Previous studies on technology adoption have frequently relied on the Technology Acceptance Model (TAM) to explain behavioural intention toward technology use. TAM identifies perceived usefulness and perceived ease of use as the primary predictors of technology acceptance (Davis, 1989). Although TAM has demonstrated strong explanatory power across multiple sectors, critics argue that the model focuses heavily on individual perceptions while paying insufficient attention to organisational and institutional conditions that influence implementation outcomes. This limitation is particularly important in public-sector and emergency-response environments where organisational procedures, governance systems, and operational readiness significantly shape technology adoption decisions (Bright et al., 2024).

To address this limitation, this study integrates TAM with the Technology–Organization–Environment (TOE) framework developed by Tornatzky and Fleischer (1990). TOE explains technology adoption through organisational and environmental readiness factors, including infrastructure capability, leadership support, policy frameworks, technical expertise, and institutional preparedness. Combining TAM and TOE provides a more comprehensive understanding of AI adoption because it captures both

individual acceptance factors and organisational capability conditions. Recent studies also support integrating individual acceptance and organisational readiness perspectives when examining AI adoption in public-sector institutions (Hržica et al., 2025; Zhou et al., 2025).

This study therefore proposes an integrated TAM–TOE framework to examine AI adoption intention within UAE Civil Defence. The model positions perceived usefulness and perceived ease of use as the key TAM predictors of AI adoption intention, while organisational readiness functions as the mediating mechanism linking user perceptions with operational adoption. By integrating individual-level and organisational-level perspectives, the study contributes to the growing literature on AI adoption in public-sector emergency-response organisations.

2. Literature Review

2.1 UAE Civil Defence AI Adoption as DV

The UAE has emerged as one of the leading countries in the Middle East in promoting artificial intelligence adoption across government sectors. National strategies such as the UAE Artificial Intelligence Strategy 2031 reflect the government's commitment to integrating AI into public services, smart governance, and operational decision-making (UAE Artificial Intelligence Office, 2023). Public-sector organisations are increasingly encouraged to adopt AI technologies to improve efficiency, service delivery, predictive analytics, and institutional innovation (Almazrouei et al., 2024). GCC-focused AI studies similarly suggest that regional governments are positioning AI as a strategic capability for long-term institutional transformation and digital competitiveness (Albous et al., 2025).

Within the emergency-response sector, UAE Civil Defence organisations have begun exploring AI-enabled systems to improve operational effectiveness and public safety management. AI applications in civil defence include predictive fire detection, incident prioritisation, emergency dispatch optimisation, smart surveillance systems, risk forecasting, and automated reporting mechanisms. Dubai Civil Defence has also introduced AI-focused initiatives such as the Civil Defence AI Lab in partnership with Dubai AI Campus to accelerate AI capability development and innovation in emergency management operations (Dubai Civil Defence, 2025). Furthermore, Dubai has established an AI-based Civil Defence Readiness Room to support predictive planning, operational coordination, and emergency preparedness (Emirates News Agency, 2022). Reports also indicate that Dubai Civil Defence is implementing AI systems capable of predicting and preventing fire incidents before escalation, reflecting the increasing operational integration of AI within emergency-response systems (Gulf News, 2024).

Despite these developments, AI adoption within civil defence agencies remains complex. Emergency-response organisations operate under high-risk conditions where technological failure may result in severe operational consequences. AI systems must therefore satisfy strict requirements relating to reliability, cybersecurity, interoperability, transparency, and accountability (Nikiforova et al., 2025). Furthermore, public-sector agencies often experience challenges associated with bureaucratic structures, policy ambiguity, resistance to change,

limited technical expertise, and infrastructure constraints (Aljneibi, 2024). These factors may hinder the transition from experimental AI implementation to routine operational integration.

Existing literature suggests that many public-sector organisations struggle to institutionalise AI technologies despite positive attitudes toward innovation. In several cases, employees perceive AI systems as beneficial, yet operational adoption remains limited because organisational systems are insufficiently prepared to support implementation (Bright et al., 2024; Selten & Klievink, 2024). This creates an important research gap in understanding how organisational readiness influences AI adoption intention within emergency-response agencies such as UAE Civil Defence.

Accordingly, this study argues that AI adoption in UAE Civil Defence cannot be explained solely through user acceptance factors. Instead, successful operational integration requires a combination of positive employee perceptions and strong organisational readiness conditions. This justifies the integration of TAM and TOE within the proposed conceptual framework.

Table 1. AI adoption intention items

Code	Items	Source
AIA1	I intend to use AI technologies in my work activities.	Davis (1989);
AIA2	I am willing to rely on AI systems during emergency operations.	Majrashi (2024)
AIA3	I expect AI to become part of my routine work processes.	
AIA4	I would support wider AI implementation within UAE Civil Defence.	

2.2 Organisational Readiness (TOE) as Mediator

The Technology–Organization–Environment (TOE) framework was introduced by Tornatzky and Fleischer (1990) to explain how organisations adopt technological innovations. The framework proposes that technology adoption is influenced by three contextual dimensions: technological factors, organisational factors, and environmental conditions. Among these dimensions, organisational readiness has emerged as one of the most important determinants of successful technology implementation.

Organisational readiness refers to the extent to which an organisation possesses the necessary infrastructure, resources, leadership support, technical capability, governance systems, and institutional commitment required for technology adoption. In the context of AI implementation, readiness includes factors such as data accessibility, system interoperability, staff training, cybersecurity capability, management commitment, operational procedures, and technical support structures (Uren & Edwards, 2023).

AI technologies differ from traditional information systems because they require continuous data integration, adaptive learning processes, advanced computational capability, and governance oversight. Consequently, organisations that lack readiness may struggle to operationalise AI effectively even when employees demonstrate positive attitudes toward

technology use. This issue is particularly significant in emergency-response organisations where operational reliability, speed, and coordination are essential.

Public-sector research increasingly highlights organisational readiness as a critical determinant of AI adoption success. Studies suggest that weak governance structures, inadequate infrastructure, limited technical expertise, and policy uncertainty often create barriers to AI implementation in government institutions (Bright et al., 2024; Nikiforova et al., 2025). Research conducted in UAE public-sector organisations similarly identifies infrastructure capability, leadership support, governance quality, and risk management as major determinants of successful AI implementation (Almarri et al., 2024). In contrast, organisations with strong readiness conditions are more likely to institutionalise AI systems successfully and integrate them into operational workflows.

Within UAE Civil Defence, organisational readiness is especially important because emergency operations depend heavily on coordination, interoperability, and rapid decision-making. AI technologies can only function effectively when supported by reliable infrastructure, integrated communication systems, skilled personnel, and clear operational protocols. Therefore, this study conceptualises organisational readiness as the mediating mechanism linking individual acceptance factors with AI adoption intention.

Table 2. Organisational Readiness (TOE) items

Code	Items	Source
TOE1	My organisation provides adequate infrastructure for AI implementation.	Tornatzky & Fleischer (1990); Uren & Edwards (2023)
TOE2	UAE Civil Defence provides sufficient training for AI usage.	
TOE3	Management supports the adoption of AI technologies.	
TOE4	Existing systems are compatible with AI integration.	

2.3 Perceived Usefulness (PU) as IV

Perceived usefulness is a central construct within the Technology Acceptance Model developed by Davis (1989). It refers to the degree to which an individual believes that using a particular technology will improve job performance. According to TAM, users are more likely to adopt a system when they perceive that it enhances effectiveness, productivity, and decision-making capability.

In emergency-response environments, perceived usefulness becomes particularly significant because operational personnel work under conditions characterised by urgency, complexity, and risk. AI systems that improve situational awareness, support faster decision-making, enhance incident coordination, or strengthen predictive capability are likely to be perceived as useful by civil defence staff. For example, AI-supported risk prediction systems may enable responders to identify hazards more accurately, while automated dispatch systems may reduce response times during emergencies.

Previous studies consistently demonstrate that perceived usefulness positively influences behavioural intention toward technology adoption across both private-sector and public-sector settings (Davis, 1989; Majrashi, 2024). In AI adoption research, perceived usefulness remains one of the strongest predictors of adoption intention because employees tend to prioritise technologies that provide practical operational value.

However, the relationship between perceived usefulness and operational adoption may not always be direct. In public-sector organisations, employees may recognise the benefits of AI while simultaneously perceiving organisational systems as insufficiently prepared to support implementation. This suggests that perceived usefulness may also shape organisational readiness perceptions. When employees view AI as valuable and operationally beneficial, they may become more confident in the organisation's ability to support implementation successfully (Hržica et al., 2025). Accordingly, this study proposes that perceived usefulness positively influences both AI adoption intention and organisational readiness perceptions within UAE Civil Defence.

Table 3. Perceived Usefulness (PU) items

Code	Items	Source
PU1	AI systems improve my operational performance during emergency response.	Davis (1989); Hržica et al., (2025)
PU2	AI helps improve the accuracy of incident-related decisions.	
PU3	AI enhances the efficiency of Civil Defence operations.	
PU4	AI improves situational awareness during emergencies.	

2.4 Perceived Ease of Use (PEOU) as IV

Perceived ease of use refers to the degree to which individuals believe that using a technology will require minimal effort (Davis, 1989). Within TAM, perceived ease of use influences technology adoption because users generally prefer systems that are understandable, accessible, and easy to operate. Technologies perceived as overly complex or difficult to use are less likely to achieve widespread acceptance.

In emergency-response environments, ease of use becomes especially important because personnel often operate under high-pressure conditions where cognitive overload and time constraints are common. Civil defence staff require systems that can be learned quickly, integrated smoothly into operational workflows, and used effectively during critical incidents. AI systems that are difficult to interpret or operate may increase operational uncertainty and reduce trust among emergency responders.

Existing research consistently shows that perceived ease of use positively affects behavioural intention toward technology adoption (Davis, 1989). Employees are more likely to accept AI systems when they believe the systems reduce effort, simplify tasks, and improve operational efficiency (Majrashi, 2024). Furthermore, ease of use may indirectly influence adoption by

shaping organisational readiness perceptions. When AI systems are perceived as manageable and user-friendly, organisations may experience fewer barriers relating to training, implementation complexity, and operational integration (Uren & Edwards, 2023).

In the context of UAE Civil Defence, perceived ease of use is expected to play a critical role because emergency personnel require technologies that support rapid and reliable decision-making under stressful operational conditions. AI systems perceived as intuitive and operationally compatible are therefore more likely to gain acceptance and facilitate broader organisational readiness for implementation. Consequently, this study proposes that perceived ease of use positively influences both AI adoption intention and organisational readiness perceptions within UAE Civil Defence.

Table 4. Perceived Ease of Use (PEOU) items

Code	Items	Source
PEOU1	Learning to use AI systems is easy for me.	Davis (1989); Uren & Edwards, (2023).
PEOU2	AI systems are clear and understandable.	
PEOU3	Interacting with AI systems does not require much mental effort.	
PEOU4	AI systems are easy to integrate into my daily work tasks.	

3. Conceptual Framework and Hypotheses Development

This study proposes an integrated mediation model to explain artificial intelligence (AI) adoption intention in UAE Civil Defence. The framework combines the Technology Acceptance Model (TAM) (Davis, 1989) with the Technology–Organization–Environment (TOE) framework (Tornatzky & Fleischer, 1990). The integration is necessary because AI adoption in emergency-response organisations cannot be adequately explained through individual acceptance variables alone. While TAM explains how users evaluate technology, TOE explains whether the organisational environment is sufficiently prepared to operationalise and sustain that technology. In high-risk public safety settings such as civil defence, adoption depends not only on whether personnel perceive AI positively, but also on whether organisational structures, governance systems, and operational processes are capable of supporting reliable deployment (Bright et al., 2024; Nikiforova et al., 2025).

The conceptual distinction between TAM and TOE is important. TAM is primarily concerned with individual cognitive evaluations of technology, particularly perceived usefulness (PU) and perceived ease of use (PEOU). Perceived usefulness refers to the extent to which individuals believe that using a system enhances job performance, while perceived ease of use reflects the extent to which the system is perceived as requiring minimal effort (Davis, 1989). These constructs have consistently predicted behavioural intention across digital transformation studies, including within public-sector environments (Majrashi, 2024). However, TAM has also been criticised for overemphasising user perceptions while underestimating institutional and organisational constraints. This limitation becomes particularly significant in emergency-response organisations where operational decisions are

shaped by hierarchy, standard operating procedures, interoperability requirements, and accountability obligations rather than individual preference alone.

The TOE framework addresses this limitation by situating technology adoption within broader organisational conditions. TOE argues that adoption outcomes are influenced by technological capability, organisational preparedness, and environmental pressures (Tornatzky & Fleischer, 1990). In the context of AI adoption, organisational readiness becomes especially important because AI systems require integrated data infrastructures, technical expertise, cybersecurity safeguards, leadership commitment, governance mechanisms, and operational legitimacy before they can move from experimentation to routine use (Uren & Edwards, 2023). Consequently, this study conceptualises organisational readiness as the critical mechanism linking positive staff perceptions of AI with actual adoption intention.

The focus on mediation reflects an important theoretical gap in existing AI adoption research. Much of the current literature examines direct effects between TAM variables and behavioural intention while paying limited attention to the organisational processes that enable or constrain implementation in practice. This creates a recurring problem in public-sector AI research: employees may perceive AI as useful and easy to use, yet organisations still fail to achieve operational adoption because institutional readiness remains weak (Bright et al., 2024). In emergency management contexts, this gap is amplified by the high consequences of technological failure. AI-supported decisions related to dispatch coordination, risk prediction, incident triage, and situational awareness require not only user acceptance, but also organisational confidence in reliability, accountability, and interoperability (Nikiforova et al., 2025).

Accordingly, this study defines AI adoption intention at the operational level rather than merely at the individual experimentation level. AI adoption refers to the intention of UAE Civil Defence personnel to integrate AI tools into real operational activities such as incident prioritisation, predictive risk analysis, emergency response coordination, post-incident reporting, and command support functions. Operational adoption further implies that AI systems are embedded within organisational workflows, training systems, and decision-making procedures rather than being used informally or experimentally. This distinction is important because public-sector organisations frequently experience a disconnect between pilot-stage innovation and institutionalised operational deployment (Selten & Klievink, 2024).

The UAE context further strengthens the relevance of organisational readiness as a mediating construct. The UAE government has actively promoted national AI transformation through ambitious digital governance strategies and smart public-sector initiatives (UAE Artificial Intelligence Office, 2023). Recent studies similarly suggest that the UAE public sector is positioning AI as a strategic capability for institutional modernisation and digital transformation (Almazrouei et al., 2024; Albous et al., 2025). However, civil defence organisations operate under conditions of heightened regulatory accountability, cybersecurity sensitivity, and public safety risk. As a result, positive employee attitudes toward AI may not

automatically translate into adoption intention unless organisational systems are perceived as sufficiently prepared to support safe and legitimate deployment. Research on adaptive AI governance in UAE public services similarly highlights the importance of institutional coordination, governance capability, and organisational preparedness for successful AI implementation (Aljneibi, 2024).

Recent public-sector studies further suggest that AI diffusion often occurs faster than the development of governance frameworks, resulting in fragmented or informal adoption practices (Bright et al., 2024). This makes readiness not merely a supporting factor, but a decisive operational condition. In the UAE emergency-response context, several developments demonstrate growing institutional interest in AI-enabled civil defence operations. Dubai Civil Defence launched the Civil Defense AI Lab in partnership with Dubai AI Campus to accelerate AI innovation in emergency management and public safety operations (Dubai Civil Defence, 2025). Similarly, the establishment of an AI-based Civil Defence Readiness Room in Dubai reflects increasing investment in AI-supported preparedness, predictive coordination, and operational integration (Emirates News Agency, 2022). Reports also indicate that Dubai Civil Defence has begun implementing predictive AI systems capable of identifying fire risks before incidents escalate, reflecting the strategic integration of AI into emergency prevention systems (Gulf News, 2024). These developments indicate an enabling national environment, yet they also reinforce the importance of examining whether readiness is consistently perceived across operational personnel rather than assumed at leadership level alone.

The proposed model therefore positions perceived usefulness and perceived ease of use as the primary antecedents of AI adoption intention, consistent with TAM. Employees are expected to demonstrate stronger adoption intention when they believe AI improves operational performance, enhances response effectiveness, and supports faster decision-making under pressure. Likewise, personnel are more likely to adopt AI systems when those systems are perceived as understandable, accessible, and cognitively manageable during high-intensity emergency situations.

However, this study argues that these TAM perceptions also shape organisational readiness perceptions. This relationship is theoretically plausible because employee evaluations of usefulness and ease of use influence how organisational capability is interpreted and experienced. Staff assess organisational readiness through observable indicators such as training adequacy, system integration quality, infrastructure reliability, leadership commitment, technical support responsiveness, and procedural clarity. When AI systems are perceived as useful and manageable, personnel are more likely to perceive the organisation as capable of supporting implementation successfully. This argument aligns with emerging multi-level AI adoption research that integrates individual acceptance factors with organisational readiness mechanisms (Hržica et al., 2025).

The model further proposes that organisational readiness directly influences AI adoption intention. In emergency-response environments, readiness functions as an operational enabler that legitimises technology use and reduces uncertainty associated with AI-supported

decision-making. High levels of readiness increase confidence that AI systems can be implemented safely, consistently, and accountably across operational units. Conversely, low readiness reinforces perceptions that AI adoption is risky, fragmented, or unsustainable. Organisational readiness therefore represents more than a background condition; it becomes an active determinant of whether AI transitions from experimental use to institutionalised operational practice. Research on AI implementation in UAE public-sector organisations similarly identifies infrastructure quality, leadership support, governance capability, and risk management as critical determinants of successful AI deployment (Almarri et al., 2024). Comparable GCC-focused research also emphasises that institutional capability and organisational validation are central to sustainable AI adoption across regional public-sector environments (Albous et al., 2025).

The central contribution of the framework lies in the mediation hypotheses. This study proposes that organisational readiness mediates the relationships between perceived usefulness, perceived ease of use, and AI adoption intention. The mediation logic suggests that positive perceptions of AI alone are insufficient to generate meaningful adoption intention unless they are translated into confidence in organisational capability and preparedness. In this sense, organisational readiness acts as the mechanism through which individual acceptance beliefs become operationally actionable within UAE Civil Defence. The hypotheses are therefore formulated as Table 5.

Table 5. Hypotheses of the framework

Hypothesis	Statement
H1	Perceived usefulness positively influences AI adoption intention among UAE Civil Defence staff.
H2	Perceived ease of use positively influences AI adoption intention among UAE Civil Defence staff.
H3	Perceived usefulness positively influences organisational readiness perceptions for AI adoption.
H4	Perceived ease of use positively influences organisational readiness perceptions for AI adoption.
H5	Organisational readiness positively influences AI adoption intention among UAE Civil Defence staff.
H6	Organisational readiness mediates the relationship between perceived usefulness and AI adoption intention.
H7	Organisational readiness mediates the relationship between perceived ease of use and AI adoption intention.

Although mediation analysis using cross-sectional survey data cannot establish definitive causality, it remains theoretically valuable for testing whether empirical relationships are consistent with the proposed explanatory mechanism (Baron & Kenny, 1986). Contemporary mediation analysis literature further recommends bootstrapping approaches for assessing indirect effects because they provide stronger statistical inference than traditional causal-step methods (Preacher & Hayes, 2008). Given the exploratory and prediction-oriented nature of this study, Partial Least Squares Structural Equation Modelling (PLS-SEM) is considered

appropriate because it accommodates complex mediation models, prediction-focused analysis, and latent construct assessment simultaneously (Hair et al., 2022). Advanced PLS-SEM literature also supports its suitability for organisational and behavioural research involving indirect effects and multi-construct frameworks (Hair et al., 2018; Hair et al., 2024).

Nevertheless, mediation analysis in cross-sectional research cannot fully verify temporal causality and should therefore be interpreted cautiously. This limitation is common within TAM and TOE research and should be acknowledged explicitly. Despite this limitation, the mediation design offers important practical insight because it identifies whether organisational readiness functions as the primary bottleneck in AI adoption within UAE Civil Defence. If the indirect effects through readiness are stronger than the direct TAM effects, the implication is significant: successful AI adoption will depend less on persuasion or awareness campaigns and more on strengthening infrastructure, governance, interoperability, training, and institutional support systems.

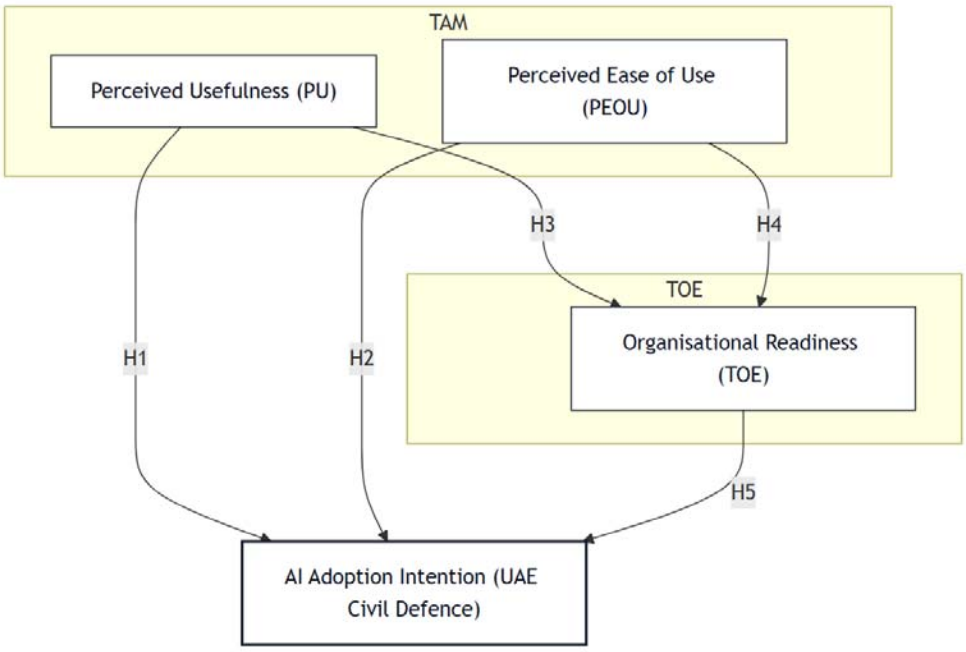

Figure 1. Presents the proposed conceptual framework

The model illustrates the direct effects of perceived usefulness and perceived ease of use on AI adoption intention, as well as their indirect effects through organisational readiness. Organisational readiness, conceptualised through the TOE framework, functions as the mediating mechanism that translates positive AI perceptions into operational adoption intention under the institutional realities of emergency-response organisations.

4. Modelling of Conceptual Framework

This section presents the modelling of the conceptual framework developed to explain

artificial intelligence (AI) adoption intention within the UAE Civil Defence framework. The proposed framework is based on an integrated mediation model that combines the Technology Acceptance Model (TAM) with the Technology–Organization–Environment (TOE) framework. TAM explains technology adoption from the perspective of individual users through perceived usefulness and perceived ease of use, while TOE explains adoption from the broader technological, organisational, and environmental context (Davis, 1989; Tornatzky & Fleischer, 1990).

The integration of TAM and TOE is appropriate for the present study because AI adoption in public safety organisations is not only influenced by individual perceptions of the technology, but also by organisational readiness, technological infrastructure, regulatory support, leadership commitment, and environmental pressure. This is consistent with recent studies which argue that AI adoption in the public sector requires the alignment of individual acceptance, institutional capacity, governance readiness, and operational integration (Bright et al., 2024; Selten & Klievink, 2024; Uren & Edwards, 2023). In the UAE context, the relevance of AI adoption is further supported by national public-sector AI initiatives and government service transformation programmes (Aljneibi, 2024; UAE Artificial Intelligence Office, 2023).

In this study, perceived ease of use (PEOU) and perceived usefulness (PU) were adopted from TAM as predictors of AI adoption intention (AIA). The TOE construct was included as a mediating factor to explain how technological, organisational, and environmental conditions influence the relationship between TAM factors and adoption intention. The mediation approach is consistent with the view that adoption intention may be shaped through both direct and indirect mechanisms (Baron & Kenny, 1986; Preacher & Hayes, 2008).

The conceptual framework was tested using Partial Least Squares Structural Equation Modelling (PLS-SEM) through SmartPLS. PLS-SEM was considered suitable because the study is prediction-oriented and examines multiple relationships among latent constructs. The modelling process followed two major stages: measurement model assessment and structural model assessment, consistent with established PLS-SEM procedures (Hair et al., 2018; Hair et al., 2022; Hair et al., 2024).

4.1 Data for Modelling

The data for modelling were gathered from UAE Civil Defence staff across operational response, command and control, prevention, training, logistics, information technology, and administration. The data were collected through a structured questionnaire survey using a non-probability quota sampling approach.

The quota sampling approach was adopted because of operational access constraints in public safety organisations. Public safety institutions often operate under strict organisational procedures, shift-based duties, and restricted access to operational staff, making probability sampling difficult to implement. Therefore, quota sampling was used to ensure representation across key departments and role categories while reducing the likelihood that responses

would be dominated by a single operational unit.

The accessible population was approximately 1,020 staff. From this population, 278 valid responses were obtained and used for the modelling process in SmartPLS. The sample size was considered appropriate for PLS-SEM analysis because PLS-SEM is suitable for models involving latent variables, prediction-oriented analysis, and complex relationships among constructs (Hair et al., 2022). The use of PLS-SEM is also consistent with recent technology adoption studies in public sector and AI implementation contexts (Hržica et al., 2025; Majrashi, 2024; Zhou et al., 2025).

4.2 Measurement Model Assessment

The measurement model assessment was conducted to evaluate the reliability and validity of the constructs used in the study. This stage is essential because the structural relationships can only be meaningfully interpreted when the constructs are measured reliably and validly. Following the recommendations of Hair et al. (2018, 2022), the assessment focused on internal consistency reliability, convergent validity, and discriminant validity.

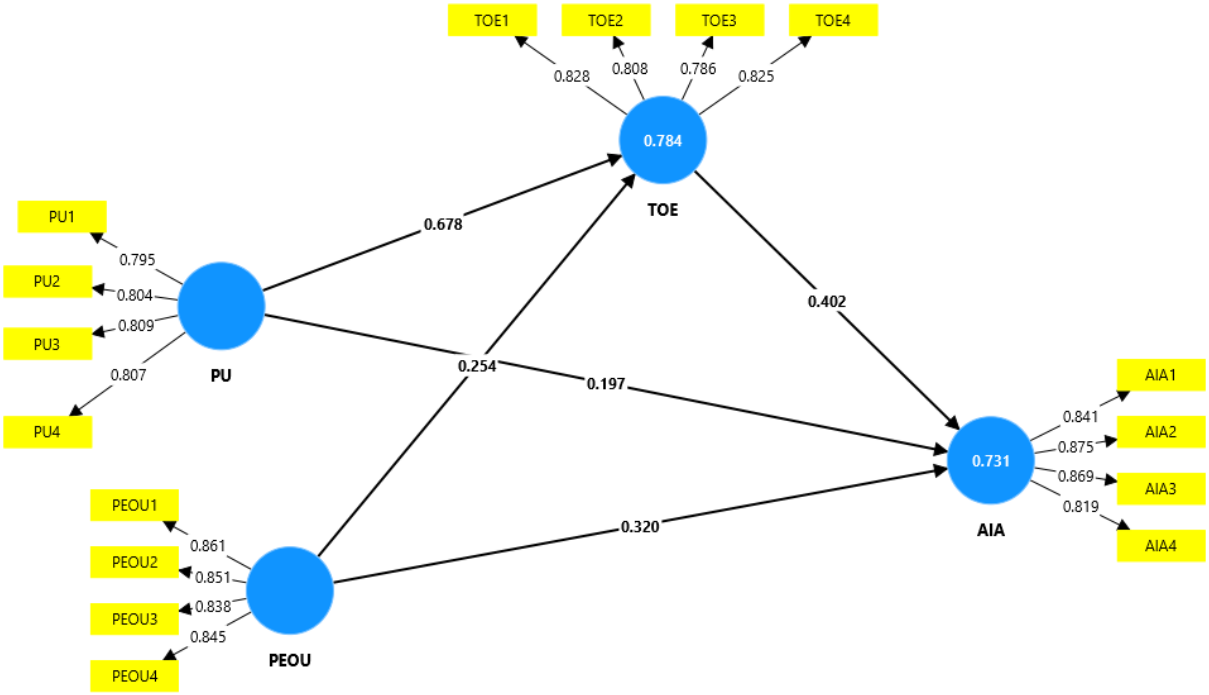

Figure 2. Model after PLS Algorithm procedure

As shown in Table 6, internal consistency reliability was assessed using Cronbach's alpha and composite reliability. The Cronbach's alpha values for all constructs were above the recommended threshold of 0.70. The values ranged from 0.818 for PU to 0.873 for AIA, indicating acceptable internal consistency. Composite reliability values also exceeded the recommended minimum threshold of 0.70, ranging from 0.880 for PU to 0.913 for AIA. These results show that the measurement items were reliable in representing their respective constructs.

Table 6. CVR

	Cronbach's alpha	Composite reliability	Average variance extracted (AVE)
AIA	0.873	0.913	0.724
PEOU	0.871	0.912	0.720
PU	0.818	0.880	0.646
TOE	0.828	0.885	0.659

Convergent validity was assessed using the average variance extracted (AVE). The AVE values for all constructs were above the recommended threshold of 0.50. AIA recorded an AVE of 0.724, PEOU recorded 0.720, PU recorded 0.646, and TOE recorded 0.659. This indicates that each construct explained more than 50% of the variance in its associated indicators. Therefore, convergent validity was established for all constructs.

Table 7. HTMT values

	AIA	PEOU	PU	TOE
AIA				
PEOU	0.887			
PU	0.926	0.882		
TOE	0.953	0.897	1.057	

Discriminant validity was assessed using the HTMT criterion and the Fornell–Larcker criterion. As shown in Table 7, some HTMT values were above the commonly recommended threshold. The HTMT value between TOE and PU was 1.057, while the values between TOE and AIA and between PU and AIA were also relatively high. This suggests a possible discriminant validity concern, particularly between PU and TOE.

Table 8. Fornell Larcker values

	AIA	PEOU	PU	TOE
AIA	0.851			
PEOU	0.776	0.849		
PU	0.787	0.754	0.804	
TOE	0.818	0.766	0.870	0.812

The Fornell–Larcker results in Table 8 also indicate some overlap among constructs. Although most diagonal values were higher than their corresponding inter-construct correlations, the correlation between PU and TOE was 0.870, which was higher than the square root of AVE for PU at 0.804 and TOE at 0.812. This further suggests that PU and TOE

may be conceptually close in the context of AI adoption.

This overlap is understandable because perceived usefulness may be closely linked to organisational and technological readiness in AI adoption contexts. For example, staff may perceive AI as useful when the organisation has sufficient infrastructure, leadership support, regulatory alignment, and implementation capability. Similar arguments have been made in public sector AI adoption studies, where perceived value, organisational readiness, and institutional support are often interrelated (Almarri et al., 2024; Bright et al., 2024; Hržica et al., 2025; Uren & Edwards, 2023).

Overall, the measurement model demonstrated acceptable reliability and convergent validity. However, the discriminant validity results indicate that the relationship between PU and TOE should be interpreted with caution. Future studies may refine the measurement items or model TOE as a higher-order construct to reduce conceptual overlap.

4.3 Structural Model Assessment

The structural model assessment was conducted after establishing the reliability and validity of the measurement model. This stage examined the strength, significance, and predictive capability of the relationships among the constructs. The assessment included collinearity analysis, coefficient of determination, effect size, predictive relevance, and path analysis, following PLS-SEM assessment procedures recommended by Hair et al. (2018, 2022, 2024).

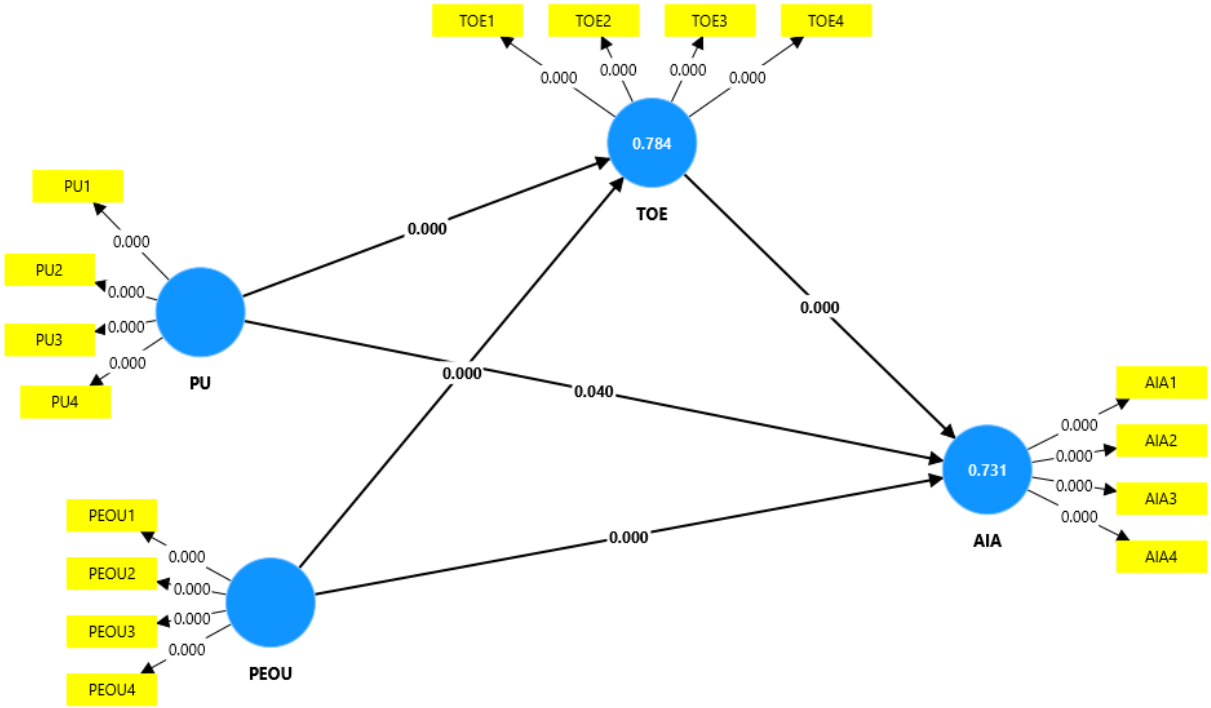

Figure 3. Model after Bootstrapping procedure

Table 9. VIF values

INNER MODEL	VIF
PEOU -> AIA	2.617
PEOU -> TOE	2.316
PU -> AIA	4.449
PU -> TOE	2.316
TOE -> AIA	4.640

Collinearity was assessed using variance inflation factor values. As shown in Table 9, all VIF values were below the conservative threshold of 5.00. The VIF values ranged from 2.316 to 4.640. Although the VIF values for PU → AIA and TOE → AIA were relatively high, they remained within the acceptable range. Therefore, multicollinearity was not considered a serious problem in the structural model.

Table 10. R Square values

	R-square	R-square adjusted
AIA	0.731	0.729
TOE	0.784	0.783

The explanatory power of the model was assessed using R-square values. As presented in Table 10, the R-square value for AIA was 0.731, with an adjusted R-square value of 0.729. This means that PEOU, PU, and TOE jointly explained 73.1% of the variance in AI adoption intention. This indicates strong explanatory power and confirms that the integrated TAM–TOE model is suitable for explaining AI adoption intention among UAE Civil Defence staff.

The R-square value for TOE was 0.784, with an adjusted R-square value of 0.783. This indicates that PEOU and PU explained 78.4% of the variance in TOE. The result suggests that staff perceptions of ease of use and usefulness strongly influence their evaluation of the technological, organisational, and environmental conditions supporting AI adoption.

Table 11. f-Square values

	AIA	PEOU	PU	TOE
AIA	-	-	-	-
PEOU	0.145	-	-	0.130
PU	0.032	-	-	0.921
TOE	0.129	-	-	-

Effect size was assessed using f-square values. As shown in Table 11, PEOU had an effect size of 0.145 on AIA, indicating a small-to-medium effect. PU had an effect size of 0.032 on AIA, indicating a small effect. TOE had an effect size of 0.129 on AIA, also indicating a small-to-medium effect. In relation to TOE, PU had a large effect size of 0.921, while PEOU had an effect size of 0.130. These findings show that PU is the strongest predictor of TOE, while PEOU and TOE also contribute meaningfully to AI adoption intention.

Table 12. CCVR values

CCVR	**SSO**	**SSE**	**Q^2 (=1-SSE/SSO)**
AIA	1592.000	759.396	0.523
PEOU	1592.000	1592.000	0.000
PU	1592.000	1592.000	0.000
TOE	1592.000	783.362	0.508

Predictive relevance was assessed using Q^2 values. The cross-validated redundancy results in Table 12 show Q^2 values of 0.523 for AIA and 0.508 for TOE. Since both values are greater than zero, the model has predictive relevance for the endogenous constructs.

Table 13. CCVC values

CCVC	**SSO**	**SSE**	**Q^2 (=1-SSE/SSO)**
AIA	1592.000	750.693	0.528
PEOU	1592.000	760.597	0.522
PU	1592.000	950.902	0.403
TOE	1592.000	919.552	0.422

The cross-validated communality results in Table 13 also show positive Q^2 values for all constructs, including AIA at 0.528, PEOU at 0.522, PU at 0.403, and TOE at 0.422. These results confirm that the model has acceptable predictive capability.

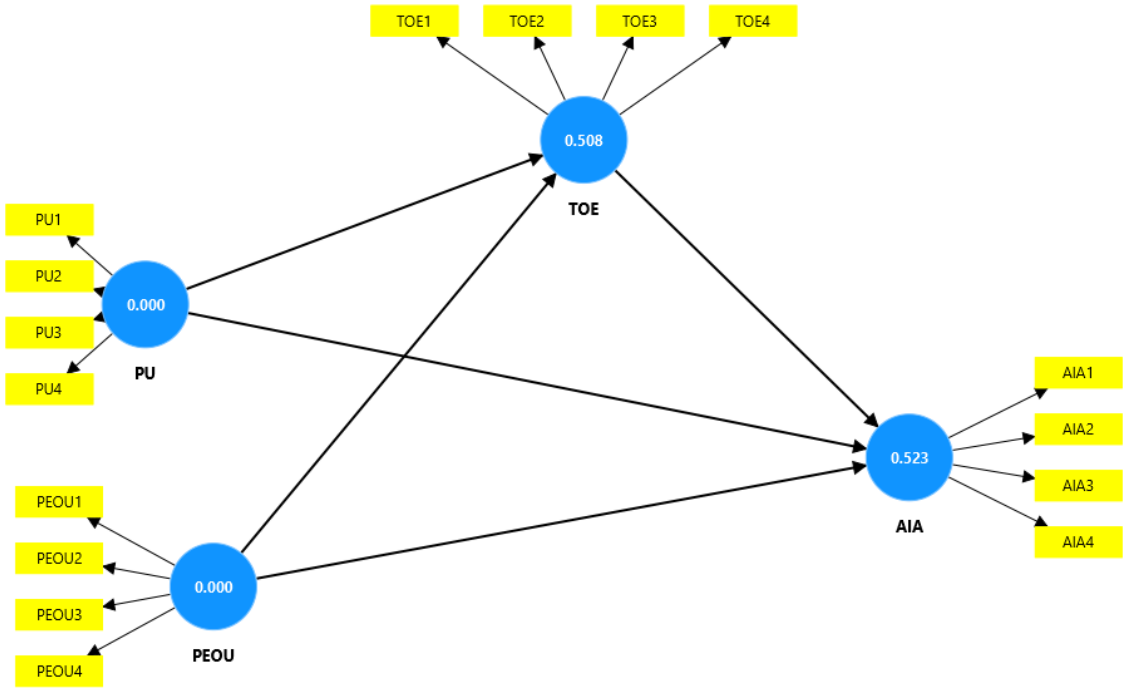

Figure 4. Model after Blindfolding procedure

4.3.1 Path Analysis

Path analysis was conducted to examine the direct and indirect relationships among the constructs in the proposed model. The significance of the relationships was assessed using path coefficients, t-statistics, and p-values. The mediation relationships were interpreted based on the principle that indirect effects explain how an independent variable influences a dependent variable through a mediating construct (Baron & Kenny, 1986; Preacher & Hayes, 2008).

Table 14. Direct relationships

Hypotheses	Direct effect	Original sample (O)	T statistics	P values
H2	PEOU -> AIA	0.320	4.796	0.000
H4	PEOU -> TOE	0.254	4.501	0.000
H1	PU -> AIA	0.197	2.057	0.040
H3	PU -> TOE	0.678	13.598	0.000
H5	TOE -> AIA	0.402	4.432	0.000

As presented in Table 14, all direct relationships in the structural model were positive and statistically significant. The relationship between perceived ease of use and AI adoption intention was significant ($\beta = 0.320$, $t = 4.796$, $p < 0.001$), supporting H2. This indicates that UAE Civil Defence staff are more likely to intend to adopt AI when they perceive AI systems

as easy to learn, understand, operate, and integrate into their daily work activities. This result supports the Technology Acceptance Model assumption that ease of use is a key determinant of technology acceptance (Davis, 1989).

The relationship between perceived ease of use and TOE readiness was also significant ($\beta = 0.254$, $t = 4.501$, $p < 0.001$), supporting H4. This suggests that when AI systems are perceived as user-friendly and operationally manageable, staff are more likely to view the wider technological, organisational, and environmental conditions as supportive of AI adoption. In practical terms, ease of use may reduce perceived implementation complexity and strengthen confidence in organisational readiness.

The direct effect of perceived usefulness on AI adoption intention was positive and significant ($\beta = 0.197$, $t = 2.057$, $p = 0.040$), supporting H1. This shows that staff are more likely to adopt AI when they believe it can improve operational performance, decision-making accuracy, emergency response efficiency, prevention activities, and administrative functions. Although significant, this was the weakest direct effect in the model, suggesting that usefulness alone may not be sufficient to drive AI adoption intention without organisational support and readiness.

The relationship between perceived usefulness and TOE readiness was the strongest direct relationship in the model ($\beta = 0.678$, $t = 13.598$, $p < 0.001$), supporting H3. This finding indicates that perceived usefulness strongly shapes staff perceptions of organisational and contextual readiness. In the UAE Civil Defence context, when AI is seen as valuable for improving emergency management and operational effectiveness, staff are more likely to believe that the organisation has the capacity, infrastructure, and support systems needed for AI implementation.

The direct effect of TOE readiness on AI adoption intention was also positive and significant ($\beta = 0.402$, $t = 4.432$, $p < 0.001$), supporting H5. This was the strongest direct predictor of AI adoption intention. The result confirms that organisational, technological, and environmental readiness plays a central role in encouraging AI adoption among UAE Civil Defence staff. Factors such as leadership support, infrastructure readiness, system compatibility, training, governance clarity, and environmental pressure appear to be critical in shaping adoption intention. This finding supports the TOE framework, which argues that innovation adoption is influenced by the wider organisational and environmental context (Tornatzky & Fleischer, 1990), and aligns with recent public-sector AI studies emphasising institutional readiness and operational integration (Almazrouei et al., 2024; Bright et al., 2024; Selten & Klievink, 2024).

Overall, the direct path results show that all five direct hypotheses were supported. TOE readiness emerged as the most important direct determinant of AI adoption intention, followed by perceived ease of use and perceived usefulness. This suggests that AI adoption in UAE Civil Defence is not driven only by individual perceptions of the technology, but also by the extent to which the organisation is perceived as ready to support AI implementation.

Table 15. Indirect relationships

Hypotheses	Indirect effect	Original sample (O)	T statistics	P values
H7	PEOU -> TOE -> AIA	0.102	3.086	0.002
H6	PU -> TOE -> AIA	0.272	4.222	0.000

Table 15 presents the indirect relationships through TOE readiness. The indirect effect of perceived ease of use on AI adoption intention through TOE readiness was positive and significant ($\beta = 0.102$, $t = 3.086$, $p = 0.002$), supporting H7. This indicates that TOE readiness mediates the relationship between perceived ease of use and AI adoption intention. Therefore, ease of use influences adoption intention not only directly, but also indirectly by strengthening staff perceptions that the organisation is ready to implement AI.

The indirect effect of perceived usefulness on AI adoption intention through TOE readiness was also positive and significant ($\beta = 0.272$, $t = 4.222$, $p < 0.001$), supporting H6. This confirms that TOE readiness mediates the relationship between perceived usefulness and AI adoption intention. The result suggests that when staff perceive AI as useful, they are more likely to view the organisation as prepared for AI adoption, which in turn increases their intention to adopt AI.

The mediation effect was stronger for perceived usefulness than for perceived ease of use. This means that the usefulness of AI becomes especially influential when it is supported by organisational readiness, technological infrastructure, leadership commitment, training, and governance mechanisms. In other words, staff may recognise the value of AI, but their willingness to adopt it depends strongly on whether the organisation is ready to support its effective use.

Overall, the indirect path results confirm that both mediation hypotheses were supported. TOE readiness functions as an important mediating mechanism between TAM factors and AI adoption intention. This finding strengthens the argument that AI adoption in public-sector organisations is a multi-level process shaped by both individual acceptance and organisational readiness (Hržica et al., 2025; Nikiforova et al., 2025; Zhou et al., 2025). In the UAE Civil Defence context, successful AI adoption therefore requires more than positive user perceptions; it also requires a supportive organisational environment capable of translating those perceptions into practical operational adoption.

4.4 Summary of the Modelling Results

The modelling results provide empirical support for the proposed integrated TAM–TOE framework for explaining AI adoption intention in UAE Civil Defence. The measurement model results showed that all constructs achieved acceptable internal consistency reliability and convergent validity. Cronbach's alpha, composite reliability, and AVE values were all above the recommended thresholds, confirming that the constructs were measured reliably.

However, the discriminant validity assessment revealed possible overlap between PU and TOE. This was shown in both the HTMT results in Table 7 and the Fornell–Larcker results in

Table 8. The overlap suggests that perceived usefulness and TOE readiness may be closely connected in the AI adoption context. This is understandable because staff may perceive AI as useful when the organisation has the necessary infrastructure, leadership support, policy direction, digital capability, and readiness conditions to implement it effectively.

The structural model demonstrated strong explanatory power. The model explained 73.1% of the variance in AI adoption intention and 78.4% of the variance in TOE. These findings indicate that the integrated TAM–TOE model provides a strong explanation of AI adoption intention among UAE Civil Defence staff.

The results of the direct relationships showed that PEOU, PU, and TOE all had significant positive effects on AI adoption intention. Among these predictors, TOE had the strongest direct effect on AIA, followed by PEOU and PU. This indicates that while individual perceptions of usefulness and ease of use are important, broader organisational and environmental readiness conditions are especially influential in shaping AI adoption intention.

The mediation analysis also confirmed that TOE significantly mediated the relationships between PEOU and AIA, and between PU and AIA. The indirect effect of PU on AIA through TOE was stronger than the indirect effect of PEOU on AIA through TOE. This suggests that perceived usefulness plays a major role in shaping adoption intention by strengthening perceptions of technological, organisational, and environmental readiness.

In conclusion, the findings show that AI adoption intention within UAE Civil Defence is influenced by both individual-level technology acceptance factors and organisational-contextual factors. Staff are more likely to adopt AI when they perceive it as useful and easy to use, and when the organisation provides a supportive technological, organisational, and environmental environment. Therefore, the integrated TAM–TOE mediation model offers a valuable framework for understanding and promoting AI adoption in public safety and emergency management organisations.

The findings are also relevant to the UAE's wider public-sector AI transformation agenda. Recent initiatives such as AI adoption guidelines in government services, Civil Defence AI readiness projects, AI laboratories, and predictive fire-prevention systems demonstrate the increasing institutional importance of AI in emergency management and public safety (Dubai Civil Defence, 2025; Emirates News Agency, 2022; Gulf News, 2024; UAE Artificial Intelligence Office, 2023). Thus, strengthening AI adoption in UAE Civil Defence requires attention not only to technological performance, but also to organisational readiness, staff acceptance, governance arrangements, and operational integration.

5. Discussion

This study examined artificial intelligence adoption intention in the UAE Civil Defence context through an integrated mediation model combining the Technology Acceptance Model (TAM) and the Technology–Organization–Environment (TOE) framework. The findings provide important empirical support for the argument that AI adoption in public safety organisations cannot be explained only by individual technology perceptions. Instead,

adoption intention is shaped by the interaction between user-level acceptance factors and broader organisational, technological, and environmental readiness conditions.

The results confirm that perceived ease of use has a significant positive effect on AI adoption intention. This finding supports the core assumption of TAM that users are more likely to accept a technology when they perceive it as easy to understand and operate (Davis, 1989). In the UAE Civil Defence context, this is particularly important because AI systems are likely to be used in high-pressure operational environments, including emergency response, command and control, prevention, inspection, and risk monitoring. If staff perceive AI systems as complicated, disruptive, or difficult to integrate into daily operations, their willingness to adopt such systems may decline. Therefore, ease of use is not merely a technical design issue; it is also an operational adoption issue.

Perceived usefulness also had a significant positive effect on AI adoption intention. This indicates that UAE Civil Defence staff are more likely to support AI adoption when they believe that AI can improve work performance, decision-making, response time, prediction, prevention, and organisational efficiency. This result is consistent with Davis (1989), who identified perceived usefulness as a central determinant of technology acceptance. It also aligns with recent public-sector AI studies, which argue that AI adoption depends on whether public organisations can demonstrate practical value and operational relevance rather than treating AI as a symbolic innovation (Bright et al., 2024; Selten & Klievink, 2024).

However, the effect of perceived usefulness on AI adoption intention was weaker than the effect of TOE on AI adoption intention. This is an important finding. It suggests that even when staff believe AI is useful, their intention to adopt it may still depend heavily on whether the organisation has the necessary infrastructure, leadership support, training systems, governance mechanisms, and implementation readiness. In other words, usefulness alone may not be sufficient to drive AI adoption in a public safety organisation. Staff may recognise the value of AI, but adoption intention may remain limited if they perceive weak organisational preparation or unclear implementation arrangements.

The TOE construct had the strongest direct effect on AI adoption intention. This confirms the importance of technological, organisational, and environmental conditions in shaping AI adoption within UAE Civil Defence. The finding supports the TOE framework, which argues that innovation adoption is influenced by the wider context in which the technology is implemented (Tornatzky & Fleischer, 1990). In practical terms, this means that AI adoption requires more than positive staff attitudes. It also requires technological compatibility, organisational support, leadership commitment, data readiness, policy alignment, regulatory clarity, and a supportive implementation environment.

This finding is particularly relevant to the UAE public sector, where AI adoption is closely linked to national digital transformation strategies and government service innovation. Existing UAE initiatives, including AI adoption guidelines, AI readiness rooms, AI laboratories, and predictive fire-prevention systems, show that AI is becoming increasingly important in emergency management and public safety (Dubai Civil Defence, 2025; Emirates News Agency, 2022; Gulf News, 2024; UAE Artificial Intelligence Office, 2023). However,

the findings of this study suggest that successful adoption depends not only on the availability of AI initiatives, but also on whether staff perceive these initiatives as institutionally supported, operationally relevant, and practically usable.

The mediation results further strengthen the value of integrating TAM and TOE. TOE significantly mediated the relationships between perceived ease of use and AI adoption intention, and between perceived usefulness and AI adoption intention. This means that PEOU and PU influence adoption intention both directly and indirectly through TOE readiness. The stronger indirect effect was found in the relationship between PU and AIA through TOE. This suggests that perceived usefulness becomes more influential when it is supported by organisational and environmental readiness conditions.

This finding contributes to the literature by showing that AI adoption in public safety organisations is a multi-level process. Individual acceptance factors such as usefulness and ease of use matter, but their influence is strengthened or weakened by organisational context. This supports recent arguments that AI adoption in public organisations requires the integration of behavioural intention, institutional trust, governance readiness, and operational capability (Aljneibi, 2024; Hržica et al., 2025; Majrashi, 2024; Nikiforova et al., 2025). Therefore, the integrated TAM–TOE model is useful because it avoids treating AI adoption as either a purely individual decision or a purely organisational decision.

A critical issue in the findings is the discriminant validity concern between PU and TOE. The HTMT value between PU and TOE exceeded the recommended threshold, and the Fornell–Larcker result also showed overlap between the two constructs. This suggests that respondents may not have clearly distinguished between the usefulness of AI and the organisational-technological readiness to implement AI. Conceptually, this overlap is understandable. In a public safety organisation, staff may perceive AI as useful only when the organisation has the infrastructure, leadership, policies, data systems, and training needed to make AI effective. Therefore, usefulness and readiness may be closely connected in practice.

Nevertheless, this issue should not be ignored. The high correlation between PU and TOE may indicate that some questionnaire items were conceptually similar or that TOE was measured in a way that overlapped with performance expectations. Future studies should refine the measurement items to ensure clearer separation between individual perceptions of usefulness and organisational-contextual readiness. TOE may also be modelled as a higher-order construct consisting of technological, organisational, and environmental dimensions separately. This would allow future research to identify which specific TOE dimension has the strongest influence on AI adoption intention.

Another important issue is the relatively high VIF values for PU → AIA and TOE → AIA, although they remained below the conservative threshold of 5.00. This suggests that multicollinearity was not severe, but the predictors were still closely related. This is consistent with the discriminant validity results and again indicates that AI adoption factors in public-sector contexts are interconnected. Rather than viewing this only as a statistical limitation, it also reflects the complex reality of AI adoption, where usefulness, ease of use, infrastructure, leadership, governance, and readiness are often mutually reinforcing.

The high R-square value for AI adoption intention shows that the model has strong explanatory power. PEOU, PU, and TOE explained 73.1% of the variance in AIA. This indicates that the integrated model is effective in explaining AI adoption intention among UAE Civil Defence staff. The R-square value for TOE was also high, showing that PEOU and PU explained 78.4% of the variance in TOE. This suggests that staff perceptions of ease of use and usefulness strongly influence how they evaluate the broader readiness environment.

From a practical perspective, the findings imply that UAE Civil Defence should not focus only on acquiring AI technologies. Adoption will likely be stronger if AI systems are introduced with clear operational value, user-friendly interfaces, adequate training, leadership support, governance clarity, and staff involvement. AI adoption strategies should therefore combine technical implementation with change management. Staff must understand not only how AI works, but also why it is useful, how it improves Civil Defence operations, and how the organisation will support its use.

The findings also suggest that trust and readiness are central to AI implementation in public safety. Since Civil Defence operations involve risk-sensitive decisions, staff may be cautious about relying on AI unless there are clear procedures, accountability mechanisms, and human oversight. This aligns with the wider public-sector AI literature, which emphasises responsible AI adoption, institutional governance, and operational integration (Bright et al., 2024; Nikiforova et al., 2025; Selten & Klievink, 2024). Therefore, AI adoption should be treated as a governance and organisational transformation issue, not only as a technology deployment issue.

Overall, the discussion shows that AI adoption intention in UAE Civil Defence is shaped by both individual and institutional factors. The findings support TAM by confirming the importance of perceived ease of use and perceived usefulness. They also support TOE by showing that organisational and environmental readiness has a strong influence on adoption intention. Most importantly, the mediation results show that TOE acts as a bridge between individual perceptions and adoption intention. This confirms that AI adoption in public safety organisations requires alignment between user acceptance, organisational readiness, and national AI transformation priorities.

6. Conclusion

This study developed and tested an integrated TAM–TOE mediation model to explain artificial intelligence adoption intention among UAE Civil Defence staff. The findings showed that perceived ease of use, perceived usefulness, and TOE readiness all had significant positive effects on AI adoption intention.

TOE was the strongest direct predictor of AI adoption intention and also significantly mediated the relationships between TAM factors and adoption intention. This confirms that AI adoption in UAE Civil Defence depends not only on whether staff perceive AI as useful and easy to use, but also on whether the organisation provides the necessary technological, organisational, and environmental support.

The model demonstrated strong explanatory power, explaining 73.1% of the variance in AI adoption intention. However, the discriminant validity concern between PU and TOE suggests that future studies should refine the measurement of these constructs or examine TOE as a multidimensional higher-order construct.

In conclusion, successful AI adoption in UAE Civil Defence requires a balanced focus on technology design, staff acceptance, organisational readiness, governance support, and operational integration. The integrated TAM–TOE model provides a useful framework for understanding and strengthening AI adoption in public safety organisations.

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