

# Enhancing Flood Resilience in the UAE: An Integrated Task-Technology Fit and Technology Acceptance Model of IoT-Based Disaster Management

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## Abstract

Flooding in the UAE has intensified due to climate change and rapid urbanization, revealing weaknesses in disaster management despite smart infrastructure investments. While IoT technologies offer potential for real-time monitoring and response, their effectiveness depends on alignment with operational needs and user acceptance—areas underexplored in arid regions. This study develops and tests a framework integrating Task-Technology Fit (TTF) and the Technology Acceptance Model (TAM) to evaluate IoT-based flood disaster systems in the UAE. Data from 291 disaster management personnel were analyzed using Structural Equation Modeling. Results show that task requirements significantly impact system-task fit, which strongly influences perceived usefulness and ease of use. Notably, perceived usefulness fully mediates the relationship between system fit and strategic value. The study contributes to disaster resilience literature and offers practical recommendations for system co-design, inter-agency coordination, and training. Future research should expand to comparative and longitudinal studies across Gulf nations to support climate adaptation strategies.

**Keywords:** Flood, Resilience, IoT, Model, UAE

## Introduction

Flooding has emerged as one of the most pressing global challenges of the 21st century, with increasing frequency and severity due to climate change, rapid urbanization, and inadequate infrastructure (Lee et al., 2020). The socio-economic and environmental consequences of floods are profound, disrupting livelihoods, damaging infrastructure, and straining disaster response systems (Ho et al., 2023). While historically considered localized events, floods now pose a systemic risk to both developed and developing nations, necessitating comprehensive mitigation and adaptation strategies (Dharmarathne et al., 2024). The Gulf Arab region,

including the United Arab Emirates (UAE), is particularly vulnerable due to its arid climate, rapid urban expansion, and exposure to extreme weather events (Al Mazroui et al., 2017). Despite its advanced infrastructure, the UAE has experienced devastating floods in recent years, highlighting gaps in preparedness, public awareness, and disaster management frameworks (El Nagggar & Abdelrazik, 2024). This study seeks to address these gaps by exploring the role of technology in enhancing flood resilience, with a focus on IoT-based solutions tailored to the UAE's unique environmental and urban challenges (Subraelu et al., 2023).

The urgency of studying flood resilience in the UAE cannot be overstated, as the region faces escalating risks from climate-induced extreme weather, compounded by rapid urban development and insufficient adaptive measures. Unlike traditional flood-prone areas, the UAE's arid environment presents unique challenges, where sudden, intense rainfall leads to catastrophic flash floods with little warning (Al-Dousari et al., 2018). The economic and human costs of these events—such as the 2022 Fujairah floods—demonstrate a critical need for innovative, technology-driven solutions that enhance early warning systems, improve infrastructure resilience, and strengthen emergency response mechanisms (Central2r, 2024). Furthermore, as the UAE continues to invest in smart city initiatives and sustainable development, integrating IoT-based disaster management frameworks becomes essential to safeguarding its urban future. This research is not only timely but also imperative for informing policies, optimizing resource allocation, and ultimately reducing the vulnerability of communities to future flood disasters.

The increasing frequency of floods in the UAE underscores a critical problem: existing disaster management systems are insufficient to cope with the growing risks posed by climate change (Tan et al., 2021). Events such as the 2022 Fujairah floods, which resulted in fatalities and extensive economic losses, reveal systemic weaknesses in urban drainage, emergency response coordination, and public awareness (Central2r, 2024). Traditional flood mitigation strategies, often designed for temperate regions, may not be effective in arid environments, where sudden, intense rainfall overwhelms infrastructure (Al-Dousari et al., 2018). Furthermore, while the UAE has invested in advanced urban planning, gaps remain in integrating real-time monitoring, predictive analytics, and community engagement into disaster preparedness (UAE Government, 2024). Previous research has explored various disaster management models, including resource optimization and IoT applications, but few studies have examined their applicability in the Gulf context (Imamura, 2022). This study aims to bridge that gap by developing a tailored IoT framework that enhances flood resilience through improved data-driven decision-making and stakeholder coordination.

A review of existing literature reveals several key factors influencing flood preparedness, including technological infrastructure, government policies, public awareness, and behavioral responses (Jean Louis et al., 2024). The Protection Motivation Theory (PMT) and Technology Acceptance Model (TAM) provide useful frameworks for understanding how individuals and institutions perceive and respond to flood risks (Yang et al., 2013). However, most studies focus on flood-prone temperate regions, leaving arid environments like the UAE underrepresented in disaster management research (Al Mazroui et al., 2017). Additionally, while IoT technologies have been proposed for disaster response, their practical implementation and perceived usefulness among end-users—such as emergency responders

and urban planners—remain understudied (Simon, 1997). This research aims to fill these gaps by examining how IoT-based solutions can be optimized for the UAE's specific needs, ensuring both technological efficacy and user acceptance (Lei et al., 2015).

The primary objective of this study is to develop an IoT-enabled disaster management framework that enhances flood resilience in the UAE by integrating real-time monitoring, predictive analytics, and stakeholder coordination. The research will evaluate the alignment between technological capabilities and disaster management tasks using the Task-Technology Fit (TTF) model, while also assessing user acceptance through TAM. By doing so, the study seeks to provide actionable insights for policymakers, urban planners, and emergency responders, ensuring that technological solutions are not only theoretically sound but also practically viable (Papadopoulos et al., 2017). The expected contributions of this research are threefold: (1) advancing theoretical understanding of technology adoption in disaster management, particularly in arid regions; (2) proposing a scalable IoT framework for flood resilience that can be adapted to other Gulf countries (World Bank, n.d.); and (3) informing policy recommendations to strengthen the UAE's disaster preparedness and response strategies.

### **Literature review**

#### *Floods in the Gulf Arab Region with Emphasis on the UAE*

Gulf Arab countries namely Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates (UAE) are known for their arid environments and historically minimal rainfall. Yet, in recent years, these nations have seen an alarming surge in flooding due to climate change and aggressive urbanization. The UAE has become increasingly vulnerable to these climate-related disasters. According to Ahmed et al. (2022), floods in this region have resulted in substantial economic losses, disruptions to infrastructure, and loss of life. These flood events are no longer sporadic but are intensifying in frequency and severity, driven by shifting global climate patterns and higher atmospheric moisture levels (Ali & Thamiry, 2023).

The UAE, as a leading urban and economic hub in the Gulf, is uniquely at risk. Its rapid urban development, especially in cities like Dubai and Abu Dhabi, has often outpaced flood resilience infrastructure. Drainage systems built for historically low rainfall levels are no longer sufficient, leading to major disruptions during heavy rain events (Terry et al., 2023). For instance, insured property losses from floods in the UAE in 2024 were estimated between USD 650–850 million, with Dubai being the most severely affected (Middle East Insurance Review, 2024). Despite substantial investments in infrastructure, reports show that fragmented governance and a lack of coordination among agencies continue to undermine flood mitigation efforts (Nanjwani, 2024).

Socially, floods affect vulnerable populations disproportionately. In neighboring Kuwait, marginalized communities have shown lower access to emergency resources during floods (Arnous et al., 2022), and similar concerns apply in UAE's urban peripheries. In addition, cultural behaviors—such as prioritizing documentation over evacuation during extreme weather—further exacerbate risks (Jean Louis et al., 2024). Empirical findings stress the urgent need for both structural and educational interventions. While regional cooperation among Gulf countries could yield benefits through knowledge-sharing and joint flood

preparedness programs (El Naggar & Abdelrazik, 2024), public awareness and technology-enabled preparedness are key to improving resilience in the UAE.

#### *Theoretical Foundation: Task-Technology Fit (TTF) and Technology Acceptance Model (TAM)*

The integration of Task-Technology Fit (TTF) and the Technology Acceptance Model (TAM) offers a robust framework to evaluate the adoption and strategic value of IoT-based technologies in disaster management. TTF, introduced by Goodhue and Thompson (1995), posits that the effectiveness of a technology is directly linked to how well it aligns with the tasks it is intended to support. In the context of flood disaster response in the UAE, this fit is crucial technologies such as IoT sensors must deliver accurate, real-time data to support decision-making, early warnings, and resource coordination (Ramadan et al., 2024; Bellini, Nesi & Pantaleo, 2022). The Requirements-Technology Fit (RTF) adaptation used in this study acknowledges these unique task demands by redefining 'tasks' as disaster-related information needs and 'performance impact' as strategic value.

However, even if a technology is well-aligned with operational needs, its effectiveness is compromised if users are unwilling or unable to adopt it. This is where TAM becomes essential. Developed by Davis (1989), TAM explains how two core perceptions—usefulness and ease of use—influence users' intention to adopt a system. In disaster scenarios, perceived ease of use is critical as responders often operate under stress and time constraints. If a system is seen as complicated, it may be ignored or misused (Prihanto et al., 2024). Similarly, perceived usefulness plays a key role: technologies that demonstrably enhance efficiency, such as real-time alerts or automated evacuation protocols, are more likely to be embraced (Rodríguez-Espíndola et al., 2022).

Combining TTF and TAM offers a dual perspective—aligning systems not only with operational demands but also with human perceptions and behaviors. The integrated model, supported by Dishaw and Strong (1999), offers greater explanatory power than either model alone. This approach has been validated in recent studies, such as Chai, Xu, and Li (2023), who integrated TAM with the Theory of Planned Behavior (TPB) to understand remote work adoption, underscoring that both technical and behavioral factors shape acceptance.

#### *Hypotheses Development*

The successful implementation of IoT in flood management hinges on its ability to match real-world information needs with technological capabilities. IoT sensors that track water levels, weather changes, and infrastructure status provide situational data critical to emergency response. When IoT systems are integrated with workflows, they not only enhance coordination but also ensure that decision-makers act on accurate, real-time information. Research by Yang, Yang, and Plotnick (2013) affirms that IoT enhances situational awareness and resource visibility, improving TTF outcomes in emergency settings.

H1: IoT-based technology has a positive effect on Requirements-Technology Fit (RTF). Effective disaster response requires systems tailored to specific operational tasks such as monitoring, assessment, and communication. Technologies that meet these high-stakes demands demonstrate stronger TTF. For example, GIS platforms and automated alert systems, which enable rapid visualization and response, represent high alignment with flood tasks (Sinha et al., 2019; Wang et al., 2021). When these tools are intuitive and map directly

onto emergency scenarios, they yield more responsive and efficient disaster management strategies.

H2: Task requirements have a positive impact on Requirements-Technology Fit.

Strategic value in disaster management emerges when systems lead to faster, more effective responses. A well-fitted system reduces information delays, optimizes resource deployment, and enhances coordination, all of which are crucial in minimizing flood impacts. Empirical studies by Sinha et al. (2019) show that strong TTF can reduce response times by 30%, making a clear case for its role in delivering strategic benefits.

H3: Requirements-Technology Fit has a positive relationship with strategic value.

When a disaster management system is aligned with operational tasks, it naturally feels more intuitive and easier to use. Goodhue and Thompson (1995) argue that ease of use is not only a function of interface design but also of how well a system supports users' real-world needs. In flood scenarios, streamlined dashboards that consolidate sensor data into actionable alerts enhance usability and lower cognitive burden.

H4: Requirements-Technology Fit has a positive relationship with perceived ease of use.

Usefulness is deeply influenced by the relevance of system features to operational goals. Systems that align with task requirements are seen as more impactful because they enable better planning, response, and coordination. As Venkatesh and Davis (2000) note, systems perceived as useful are more likely to be adopted, particularly in high-pressure environments like disaster response.

H5: Requirements-Technology Fit has a positive relationship with perceived usefulness.

Ease of use directly impacts whether systems are utilized during emergencies. In fast-moving crises, even capable technologies can be ignored if they are too complex. Usable systems support faster decision-making and consistent usage, thereby increasing their strategic value (Zobeidi et al., 2024).

H6: Perceived ease of use has a significant positive relationship with the strategic value of disaster systems.

When users see clear benefits from using a system—such as reduced response time, better resource allocation, or fewer casualties—they are more likely to engage consistently. As Rodríguez-Espíndola et al. (2022) suggest, PU not only drives adoption but also reinforces the long-term viability and credibility of the technology.

H7: Perceived usefulness has a significant positive relationship with strategic value.

Systems that match user needs are easier to use, and this ease increases their strategic impact. D'Ambra et al. (2012) confirm that user perceptions of ease mediate the translation of technological fit into measurable benefits.

H8: Perceived ease of use mediates the relationship between RTF and strategic value.

Strategic value is realized when technology both fits the task and is seen as useful by the user. Venkatesh and Davis (2000) underscore the role of PU as a mediator between system design and long-term effectiveness in organizational settings.

H9: Perceived usefulness mediates the relationship between RTF and strategic value.

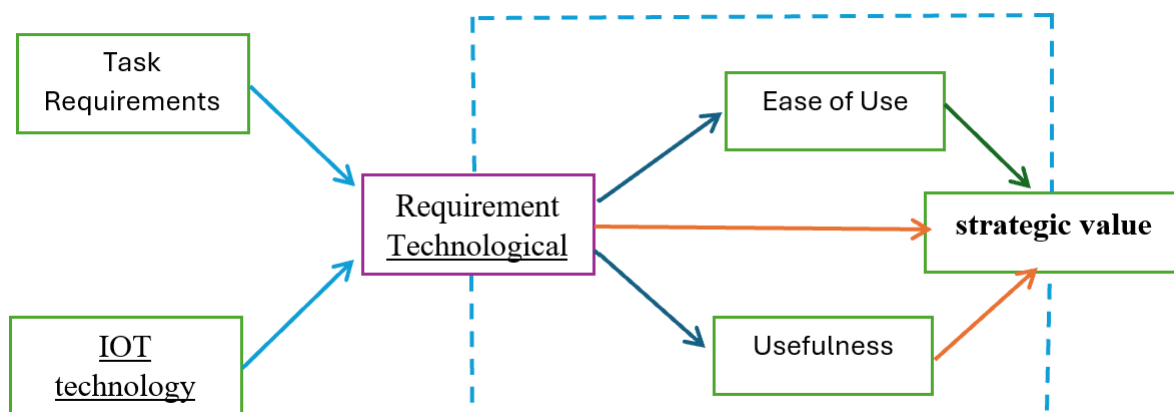


Figure 1: Conceptual Framework

### Methodology

This study employs a positivist paradigm and adopts a deductive research strategy, using a quantitative methodology to examine how technological fit influences the strategic value of disaster management systems in the UAE, particularly in the context of flood response. Data were collected through a structured survey questionnaire distributed to 291 respondents from agencies such as the National Emergency Crisis and Disasters Management Authority (NCEMA) and the Abu Dhabi Police GHQ. The questionnaire was divided into six sections and consisted of 38 items, using a 7-point Likert scale ranging from "Strongly Disagree" (1) to "Strongly Agree" (7) to measure the level of agreement. The constructs were operationalized using validated scales adopted from established literature to ensure both content and construct validity (Hair et al., 2019). The variable Task Requirements was measured using 10 items adapted from Yang, Yang and Plotnick (2013) and Sinha et al. (2019). These items assess essential operational needs during disaster response, such as access to real-time information, tracking of rescue resources, and decision-making support. The construct IoT Technology was measured using 6 items, based on the work of Yang, Yang and Plotnick (2013), Sinha et al. (2019), and Anbarasan et al. (2020). These items evaluate the ability of the IoT system to provide real-time environmental data, ensure system continuity, and support resource tracking and data visualization. The core construct of the study, Requirements-Technology Fit (RTF), was measured using 14 items, adapted from Goodhue and Thompson (1995), Sinha et al. (2019), and Anbarasan et al. (2020). The items reflect how well the IoT system matches the information and coordination needs of responders, including aspects like data consistency, reliability, integration, and system resilience. The Perceived Usefulness (PU) construct, grounded in the Technology Acceptance Model by Davis (1989), was measured using 4 items adapted from Zhong, Oh and Moon (2021). These items assess users' perceptions of how the system enhances their effectiveness in managing disaster tasks. Likewise, Perceived Ease of Use (PEU) was measured using 4 items adopted from Prihanto et al. (2024) and Vanduhe, Nat and Hasan (2020), focusing on the system's simplicity, accessibility, and user-friendliness in high-stress scenarios. The Strategic Value of the disaster management system, as the dependent variable, was assessed using 5 items drawn from Sinha et al. (2019) and Yang, Yang and Plotnick (2013). These items measure the system's contribution to improving situational awareness, reducing response time, supporting inter-agency coordination, and optimizing the allocation of resources. All measurement items were reviewed by academic experts and industry practitioners for face and content validity, followed by a pilot test with 40

respondents, achieving Cronbach’s Alpha values above 0.70 for all constructs, confirming internal consistency and reliability. This rigorous measurement approach ensures that each construct is accurately captured, allowing robust evaluation of the direct and mediated effects within the research framework.

**Results**

The findings from the structural model offer insightful validation of the hypothesized relationships in the proposed research framework concerning the strategic value of IoT-based disaster management systems in the UAE. The empirical analysis revealed several significant paths that collectively explain how operational task demands, technology alignment, and user perceptions drive the strategic value of such systems, particularly within high-stakes environments like those overseen by the Ministry of Interior.

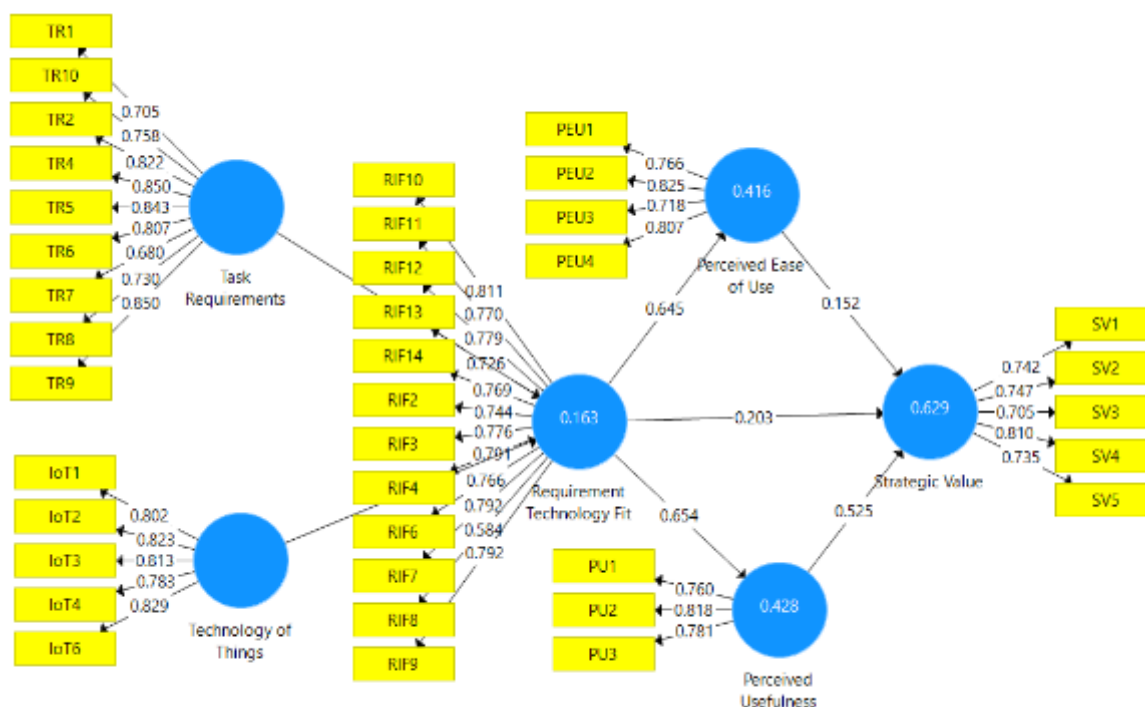


Figure 2: Structure Model

As shown at Table 1, the first hypothesis (H1), which posited that IoT capabilities would directly influence Requirement-Technology Fit (RTF), was not supported. The path coefficient was low ( $\beta = 0.085$ ) and statistically insignificant ( $p = 0.239$ ), suggesting that the mere availability of IoT technologies such as sensors, tracking, and connectivity does not ensure alignment with operational tasks in emergency settings. This finding signals a critical insight: technology adoption alone is insufficient unless it is purposefully embedded within the broader operational context. It reinforces the necessity of customization, where technological deployments are tightly integrated with actual disaster response protocols and inter-agency coordination mechanisms. In contrast, the second hypothesis (H2), asserting that Task Requirements significantly influence RTF, was strongly supported ( $\beta = 0.331$ ,  $p < 0.001$ ). This result confirms that a clear understanding of field-level operational needs is a foundational driver of successful system integration. It supports the principle that system design must be anchored in front-line realities rather than dictated by technological trends. The importance

of this path is further underlined by its meaningful effect size ( $f^2 = 0.074$ ), emphasizing that task clarity and specificity are crucial for achieving functional alignment and user acceptance.

Table 1

*Hypotheses testing*

No	Hypothesis	<i>B</i> <i>coefficient</i>	STD	T Statistics	P Values
H1	Perceived Ease of Use -> Strategic Value	0.158	0.071	2.21	0.028
H2	Perceived Usefulness -> Strategic Value	0.528	0.075	6.999	0.000
H3	Requirement Technology Fit - > Perceived Ease of Use	0.636	0.05	12.8	0.000
H4	Requirement Technology Fit - > Perceived Usefulness	0.653	0.045	14.608	0.000
H5	Requirement Technology Fit - > Strategic Value	0.192	0.074	2.6	0.01
H6	Task Requirements -> Requirement Technology Fit	0.331	0.07	4.755	0.000
H7	Technology of Things -> Requirement Technology Fit	0.085	0.072	1.178	0.239
H8	RTF → PEU → Strategic Value (Mediation)	0.226	0.0512	4.973	0.000
H9	RTF → PU → Strategic Value (Mediation)	0.297	0.0324	7.051	0.000

Requirement-Technology Fit was found to have a substantial impact on both Perceived Ease of Use (PEU) and Perceived Usefulness (PU), supporting hypotheses H3 and H4. Specifically, the path coefficient for RTF → PEU was ( $\beta = 0.636$ ,  $p < 0.001$ ), with a strong corresponding effect size ( $f^2 = 0.679$ ), indicating that systems closely aligned with the users' job responsibilities are significantly easier to operate. Similarly, the path from RTF → PU was also highly significant ( $\beta = 0.653$ ,  $p < 0.001$ ;  $f^2 = 0.743$ ), validating that functional alignment substantially enhances users' recognition of the system's utility. These findings align with the core principles of the Task-Technology Fit theory, reaffirming that alignment not only influences immediate usability perceptions but also plays a key role in shaping judgments of technological relevance and value.

Moreover, RTF had a significant but modest direct effect on Strategic Value (H5:  $\beta = 0.192$ ,  $p = 0.010$ ;  $f^2 = 0.050$ ), suggesting that while alignment with operational requirements does contribute to strategic outcomes, its full effect is best realized when filtered through user perceptions. This effect aligns with the understanding that technologies do not yield strategic benefits in isolation; rather, they must be embraced and utilized effectively by the workforce. Perceived Ease of Use and Perceived Usefulness were both significant predictors of Strategic Value, thereby confirming hypotheses H6 and H7. The effect of PEU was modest ( $\beta = 0.158$ ,  $p = 0.028$ ), indicating that systems that are easier to use do contribute to improved strategic performance, although this impact is secondary to that of perceived usefulness. In contrast, the influence of PU on Strategic Value was the strongest among all direct effects ( $\beta = 0.528$ ,  $p$

< 0.001), emphasizing that technologies are considered strategically valuable primarily when they demonstrably enhance task performance, coordination, and decision-making effectiveness in crisis response scenarios.

The mediating roles of PEU and PU were also rigorously tested using indirect effects and variance accounted for (VAF) analysis. The mediation analysis revealed that PEU partially mediated the relationship between RTF and Strategic Value (indirect effect = 0.226, total effect = 0.451, VAF = 50.1%), indicating a dual pathway where system alignment both directly and indirectly (via usability) impacts strategic outcomes, which confirms H8. On the other hand, PU was found to fully mediate the relationship between RTF and Strategic Value (indirect effect = 0.297, total effect = 0.341, VAF = 100%), confirming that usefulness perceptions are the dominant explanatory mechanism through which system-task alignment translates into strategic impact, which confirms H9.

Collectively, the supported hypotheses paint a consistent and theoretically grounded picture: strategic value is maximized not through technological sophistication alone, but through coherent alignment between system capabilities, task demands, and user experiences. The results uphold the foundational assertions of both the Technology Acceptance Model (TAM) and the Task-Technology Fit (TTF) theory, emphasizing the critical importance of designing with the user in mind and embedding technology within the unique operational workflows of disaster response agencies.

These findings hold substantial implications for both theory and practice. From a theoretical standpoint, they demonstrate the interplay between technical fit and perceptual acceptance in shaping strategic outcomes, offering a refined view of how mediating mechanisms operate in public safety technology contexts. Practically, the results advocate for a participatory design approach where system developers, end-users, and policy stakeholders co-create solutions tailored to actual emergency management needs. Future systems should not only be reliable and robust but also intuitive, relevant, and seamlessly integrated into the daily realities of emergency responders. Such systems are more likely to be adopted, trusted, and leveraged for maximum strategic benefit.

### **Discussion and Conclusion**

The findings of this study provide critical insights into the role of IoT technology in disaster management, particularly within the UAE's unique context of rapid urbanization, climate vulnerability, and institutional coordination challenges. Contrary to conventional assumptions, IoT adoption alone (H1) did not significantly enhance Requirement-Technology Fit (RTF), suggesting that technological deployment without operational integration yields limited strategic value. This aligns with Goodhue and Thompson's (1995) TTF theory, emphasizing that technology must align with task workflows, user capabilities, and organizational structures to be effective. The UAE's experience reflects a broader challenge in smart city initiatives—where advanced sensors and data platforms often remain siloed from actual emergency protocols (Yang et al., 2013; Samadhiya et al., 2024).

However, the strong positive relationship between task requirements and RTF (H2) underscores the importance of user-centered design in disaster systems. Technologies tailored to specific operational needs—such as real-time flood mapping or automated

evacuation alerts—demonstrated higher functional alignment, echoing Sinha et al.'s (2019) findings on task-driven systems. This highlights a key practical implication: disaster technologies must be co-developed with first responders to ensure relevance and usability. The modest direct effect of RTF on strategic value (H3) further suggests that while technical alignment is necessary, it must be complemented by institutional support, training, and policy integration to achieve systemic resilience (Anparasan & Lejeune, 2019).

The mediating roles of perceived ease of use (PEOU) and perceived usefulness (PU) offer nuanced insights into technology adoption. While PEOU (H4) facilitated usability, its weak impact on strategic value indicates that intuitive interfaces alone cannot compensate for functional shortcomings. In contrast, PU (H5) fully mediated the RTF-strategic value link, reinforcing Davis's (1989) TAM principle that users prioritize technologies delivering tangible benefits. For the UAE, this means IoT systems must prove their utility in real-world scenarios—such as reducing flood response times or optimizing resource allocation—to gain stakeholder trust and long-term adoption (Prihanto et al., 2024).

### **Theoretical and Practical Contributions**

First, this study provides critical insights for government agencies and emergency responders, particularly in the UAE and similar arid regions, where traditional flood management strategies often fall short. By integrating IoT with the Task-Technology Fit (TTF) and Technology Acceptance Model (TAM) frameworks, the research offers a practical roadmap for deploying technology in ways that align with real-world operational needs. For example, findings can guide agencies like NCEMA in implementing interoperable flood monitoring systems, ensuring sensor data seamlessly integrates with emergency response protocols. This directly enhances decision-making during crises, reducing economic losses and saving lives. Second, the study equips urban planners and infrastructure developers with evidence-based strategies to build climate-resilient cities. Unlike generic models, this research highlights how arid environments require tailored solutions—such as adaptive drainage systems and real-time risk analytics—to cope with sudden, intense rainfall. By identifying gaps in current infrastructure and governance, the study enables planners to prioritize upgrades that mitigate flood risks, safeguarding communities and economic assets. These insights are especially valuable for fast-growing cities in the Gulf, where rapid urbanization exacerbates vulnerability. Third, the findings hold major implications for technology providers and researchers working on disaster resilience. The study demonstrates that IoT solutions must be designed not just for technical performance but also for user adoption and workflow compatibility. For instance, private-sector developers can use the TAM insights to create more intuitive flood warning tools, while academics gain a validated framework for future studies in underrepresented arid regions. This bridges the gap between theoretical innovation and real-world applicability. Finally, the research has global relevance, offering transferable lessons for other water-scarce, urbanizing nations facing climate extremes. By proving that effective flood management depends on both technology and human-institutional factors, the study encourages international stakeholders—such as the World Bank and UN Disaster Risk Reduction teams—to adopt a more holistic approach to resilience planning. Policymakers worldwide can replicate the UAE's lessons to strengthen preparedness, ensuring that technological investments translate into tangible risk reduction. In essence, this study goes beyond academic theory to deliver actionable strategies that protect lives, economies, and urban futures. Its true significance lies in empowering

stakeholders—from local responders to global policymakers—to harness technology in ways that are effective, adaptive, and ultimately lifesaving.

### Limitations and Future Research

The study's reliance on a cross-sectional survey of UAE Ministry of Interior personnel limits generalizability to other regions or agencies. Future research should employ longitudinal or mixed-method designs to capture evolving technology use during actual disasters. Expanding the theoretical lens to include frameworks like UTAUT or Institutional Theory could further elucidate organizational and cultural barriers to IoT adoption (Venkatesh et al., 2003). Additionally, comparative studies across Gulf nations could identify regional best practices for climate resilience.

### Conclusion

This study reveals that IoT's potential in disaster management is contingent on task alignment, perceived usefulness, and institutional integration—not just technical sophistication. For the UAE, this means moving beyond hardware-centric approaches to embrace user-driven, policy-supported systems that bridge the gap between data and action. As climate risks intensify, the lessons here extend to other arid regions: resilience requires not only smart technologies but smarter governance, ensuring innovations translate into lifesaving outcomes. Future efforts must focus on closing implementation gaps, fostering multi-stakeholder collaboration, and rigorously evaluating systems in real-world crises to build truly adaptive disaster management ecosystems.

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