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# DIGITAL TRANSFORMATION RESISTANCE AMONG ENGINEERING EMPLOYEES IN HIGH-RISE PROPERTY MANAGEMENT: THE ROLE OF UTAUT AND GENERATIONAL HETEROGENEITY

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**Abstract:** This study examines the effects of performance expectancy, effort expectancy, social influence, and facilitating conditions on digital transformation resistance among engineering employees in high-rise property management, while also assessing cross-generational heterogeneity. Using an explanatory quantitative design, data were collected through a survey of 150 respondents working in the Greater Jakarta area. The data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM), followed by Measurement Invariance of Composite Models (MICOM) and Multi-Group Analysis (MGA). The pooled-sample results indicate that performance expectancy and effort expectancy have significant negative effects on digital transformation resistance, whereas social influence does not show a significant effect. Facilitating conditions exhibit a significant positive relationship and are therefore treated as an unexpected finding that requires theoretical caution. The study also finds that most respondents still operate within a hybrid digital-manual system, suggesting that resistance in this context is better understood as a burden of transition rather than as pure anti-technology rejection. Partial measurement invariance is supported only for the comparison between Generation X and Generation Z. Within this boundary, performance expectancy appears more salient for Generation X, whereas effort expectancy appears more salient for Generation Z. However, the article does not treat this pattern as evidence of pure generational moderation. Because cohort categories substantially overlap with job level and career stage, the findings are interpreted more cautiously as bounded cohort-position heterogeneity embedded in organizational structure. The study contributes by extending UTAUT into the digital resistance paradigm and by showing that, in hybrid technical environments, resistance is shaped more by operational usefulness and workflow friction than by normative pressure.

***Keywords:*** *Digital Transformation Resistance; Generational Heterogeneity; High-Rise Property Management; Hybrid Digital-Manual Transition; UTAUT*

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## 1. Introduction

Digital transformation has become a strategic imperative in high-rise building management because operational efficiency, service quality, and building sustainability increasingly depend

on data-driven systems. In this sector, digital technologies such as building management systems, digital maintenance platforms, smart utility monitoring, and complaint-handling applications are expected to improve energy efficiency, work coordination, and service responsiveness (Purnomo et al., 2024; Naji et al., 2024). Yet the pace of adoption is uneven across properties, especially in long-operating buildings where manual routines, fragmented legacy systems, and established work habits remain deeply embedded.

The engineering function stands at the center of this transition. Engineering employees are responsible for preventive maintenance, utilities monitoring, fault reporting, work-order execution, and rapid response to tenant complaints. When digital systems are introduced into these activities, employees must adapt not only to new interfaces but also to new reporting logic, new coordination patterns, and new expectations regarding speed, traceability, and compliance. In such settings, resistance is likely to emerge not merely as a refusal of technology, but as a response to disrupted routines, cognitive strain, and perceived short-term burdens (Oreg, 2003; Pansini et al., 2023; Cieslak & Valor, 2025).

This study addresses two gaps. First, most UTAUT-based studies explain technology adoption by placing behavioral intention or use behavior as the main outcome, whereas resistance remains underexplored as the inverse behavioral manifestation of acceptance (Venkatesh et al., 2003; Theres & Strohmeier, 2024). Second, property-management studies tend to emphasize organizational readiness for digital transformation rather than the resistance of frontline engineering employees who must actually work within hybrid manual-digital operations (Ba et al., 2024; Naji et al., 2024). The present study therefore repositions performance expectancy, effort expectancy, social influence, and facilitating conditions as antecedents of digital transformation resistance.

The study also considers generational heterogeneity. Generation X, Generation Y, and Generation Z were shaped by different sociohistorical experiences with technology, work routines, and learning styles. Recent studies suggest that technology perceptions may differ across cohorts, but organizational science also warns that generational narratives often overlap with age, career stage, tenure, and organizational context (Dendrinos & Spais, 2024; Rudolph et al., 2021). In response, this research treats generation primarily as an empirical lens for identifying heterogeneity across cohorts rather than as a deterministic psychological category.

Accordingly, this article aims to examine the role of the four UTAUT constructs in reducing or failing to reduce digital transformation resistance among engineering employees in high-rise property management, while also assessing whether the strength of these relationships varies across generations.

## 2. Literature Review Concept

UTAUT explains technology-related behavior through four main determinants: performance expectancy, effort expectancy, social influence, and facilitating conditions (Venkatesh et al., 2003). Performance expectancy refers to the belief that technology improves job performance. Effort expectancy refers to the perceived ease of learning and using the technology. Social influence reflects the perception that important others expect technology use. Facilitating conditions indicate the perception that organizational resources, support, and infrastructure are available for technology use. Although UTAUT was originally developed to explain acceptance, these constructs can also be analytically reframed to explain resistance when perceived usefulness, ease, social legitimacy, or organizational support are insufficient to reduce the burden of change.

Resistance to Change (RTC) conceptualizes resistance as a tendency to preserve the status quo through routine seeking, emotional reaction, cognitive rigidity, and short-term focus (Oreg, 2003). In digital transformation settings, these dimensions become visible when employees prefer manual procedures, feel discomfort toward digital workflows, struggle to revise established cognitive frames, or focus on immediate inconvenience rather than long-term operational gains (Pansini et al., 2023; Cieslak & Valor, 2025). In this study, digital transformation resistance is treated as the dependent variable, representing employees' tendency to resist the shift from manual to digital work processes in engineering operations.

The generational perspective adds contextual nuance to this framework. A more senior cohort may demand clearer evidence that a digital system genuinely improves performance before abandoning established routines, while a younger cohort may respond more strongly to interface clarity, speed, and perceived ease. At the same time, any cross-generational interpretation must remain cautious because differences may also reflect job level, tenure, and work responsibility rather than generation alone (Rudolph et al., 2021). For that reason, this article interprets generational findings as bounded heterogeneity within the sample rather than as universal generational laws.

Based on this theoretical integration, the study expects performance expectancy and effort expectancy to reduce resistance because employees should be less resistant when technology is clearly useful and easy to use. Social influence and facilitating conditions are also expected to reduce resistance if digital work is supported by organizational norms, leadership signals, training, technical support, and adequate infrastructure. In addition, the study examines whether these relationships display heterogeneity across generations. The hypotheses are stated as follows:

H1: Performance expectancy negatively affects digital transformation resistance.
H2: Effort expectancy negatively affects digital transformation resistance.
H3: Social influence negatively affects digital transformation resistance.
H4: Facilitating conditions negatively affect digital transformation resistance.
H5-H8: The strength of the relationships in H1-H4 varies across Generations X, Y, and Z.

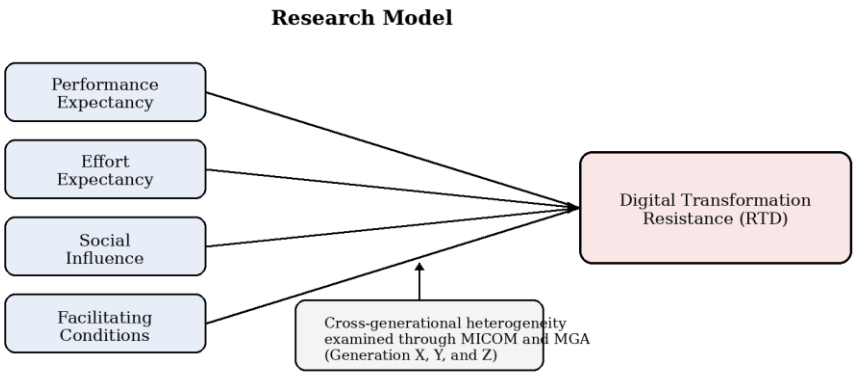


**Figure 1.** Research Model of the Study

## 3. Research Method

This research used an explanatory quantitative design and a cross-sectional survey. The study focused on engineering employees working in high-rise property management in the Greater Jakarta area (Jabodetabek), including apartments, office buildings, shopping centers, hotels,

and mixed-use buildings. Purposive sampling was applied using three inclusion criteria: respondents had worked in engineering for at least one year, had experience with manual and/or digital work systems, and belonged to Generation X (1965-1980), Generation Y (1981-1996), or Generation Z (1997-2012). The final dataset comprised 150 valid responses, with an intentionally balanced distribution of 50 respondents in each generational cohort for comparative purposes.

Data were collected through a structured questionnaire using a five-point Likert scale. Screening questions were placed at the beginning of the instrument to ensure that only eligible engineering employees proceeded. Additional quality controls included one-response-per-device/account settings, attention checks, and screening for careless responding such as speeding or straightlining.

The analysis followed the PLS-SEM approach using SmartPLS 4. The measurement model was first assessed using outer loading, composite reliability, rho_A, average variance extracted (AVE), and discriminant validity. Structural relationships were then evaluated using path coefficients and the coefficient of determination ($R^2$). To examine cross-generational heterogeneity, the study applied MICOM before conducting MGA, because meaningful cross-group interpretation requires at least partial measurement invariance (Henseler et al., 2016; Cheah et al., 2020).

## 4. Results and Discussion

### 4.1. Results

**Respondent Profile**

The empirical context of this study is not a fully digitalized organizational setting, but a transitional one. Of the 150 respondents, 74.7% reported working in a mixed digital-manual mode, 18.0% worked in a fully digital mode, and 7.3% still worked manually. This distribution is substantively important because it suggests that resistance should be interpreted primarily as a burden of transition created by the coexistence of two work logics rather than as pure anti-technology rejection.

The sample also indicates that generational categories overlap with career stage. Generation Z respondents were heavily concentrated in technician/staff positions, while Generation X respondents were more represented in managerial and supervisory roles. This overlap supports a cautious reading of any cross-generational pattern, because observed differences may partly reflect hierarchical position and work responsibility in addition to cohort membership.

**Table 1. Respondent Characteristics**

| Aspect | Category | n | % |
|---|---|---|---|
| Work location | Jabodetabek | 150 | 100 |
| Engineering tenure | More than 1 year | 150 | 100 |
| System mode | Mixed digital-manual | 112 | 74.7 |
| System mode | Digital | 27 | 18.0 |
| System mode | Manual | 11 | 7.3 |
| Building type | Apartment / residential | 56 | 37.4 |

| | | | |
|---|---|---|---|
| Building type | Office building | 42 | 28.0 |
| Building type | Mixed-use | 26 | 17.3 |
| Building type | Hotel / villa / resort | 21 | 14.0 |
| Building type | Shopping mall | 5 | 3.3 |
| Position | Technician / staff | 68 | 45.3 |
| Position | Chief / manager / director | 33 | 22.0 |
| Position | Supervisor / coordinator | 22 | 14.7 |
| Position | Senior / leader | 18 | 12.0 |
| Position | Assistant / deputy | 9 | 6.0 |

Across cohorts, 84% of Generation Z respondents were in technician/staff roles, whereas 38% of Generation X respondents occupied chief/manager/director positions. This pattern indicates that generational categories are intertwined with organizational location. Therefore, any subsequent cross-generational interpretation in this article is framed cautiously as cohort-position heterogeneity embedded in organizational structure, rather than as evidence that each generation possesses a fixed and homogeneous technological orientation.

**Measurement Model Assessment**

Measurement evaluation was conducted on the complete sample before group comparison. One indicator (EE2) was removed because its initial outer loading was only 0.519. After this deletion, the complete-sample measurement model met the required reliability and convergent-validity thresholds. Subgroup results were more uneven: Generation X remained stable, Generation Y displayed instability in facilitating conditions and social influence, and Generation Z showed instability primarily in facilitating conditions.

**Table 2. Summary of Measurement Model Evaluation**

| Group | Main finding | Interpretation |
|---|---|---|
| Complete sample | EE2 removed; remaining constructs met reliability and AVE thresholds. | Robust and suitable for structural analysis |
| Generation X | Indicators remained relatively stable with no major measurement disturbance. | Interpretation feasible |
| Generation Y | FC and SI showed negative/low loadings; rho_A, CR, and AVE were problematic. | Highly limited; exploratory only |
| Generation Z | FC remained unstable, while PE, EE, SI, and RTD were relatively adequate. | Interpret with caution, especially FC |

**Structural Model Assessment**

The coefficient of determination for digital transformation resistance was $R^2 = 0.466$, indicating that 46.6% of the variance in resistance was explained by performance expectancy, effort expectancy, social influence, and facilitating conditions. In behavioral and information-systems research, this may be interpreted as moderate explanatory power.

At the pooled-sample level, performance expectancy and effort expectancy had significant negative relationships with resistance. Social influence was not significant. Facilitating conditions produced a positive and significant coefficient, which ran counter to the proposed hypothesis and was therefore treated as an unexpected association rather than a stable substantive finding.

These results suggest that resistance in engineering work is driven more strongly by instrumental judgments about usefulness and ease than by top-down social pressure. In other words, employees respond primarily to whether the system improves work and reduces friction, not merely to whether supervisors or peers expect them to use it.

**Table 3. Path Coefficients by Complete Sample and Generational Subgroup**

| Relationship | Complete sample β (p) | Gen X β (p) | Gen Y β (p) | Gen Z β (p) |
|---|---|---|---|---|
| PE -> RTD | -0.427 (0.001) | -0.576 (0.004) | -0.171 (0.532) | -0.334 (0.063) |
| EE -> RTD | -0.448 (0.002) | -0.249 (0.185) | -0.031 (0.906) | -0.400 (0.025) |
| SI -> RTD | -0.008 (0.899) | 0.035 (0.709) | -0.326 (0.335) | 0.075 (0.690) |
| FC -> RTD | 0.201 (0.035) | -0.085 (0.616) | -0.025 (0.937) | -0.190 (0.428) |

**MICOM and Multi-Group Analysis**

Measurement invariance was assessed before comparing path coefficients across generations. Only the Generation X versus Generation Z comparison achieved partial measurement invariance. This means that the safest cross-group interpretation is limited to that pair. Consistent with Gelman and Stern (2006), a difference between significant and non-significant subgroup coefficients does not automatically imply a significant difference between groups; therefore, the study interprets the subgroup pattern descriptively rather than as definitive moderation.

Within this limitation, performance expectancy appeared more salient for Generation X, whereas effort expectancy appeared more salient for Generation Z. Results involving Generation Y should be read very cautiously because measurement instability at the subgroup level likely affected the pattern.

**Table 4. MICOM Summary and Implications for MGA**

| Comparison | Invariance result | Conclusion | Implication |
|---|---|---|---|
| Gen X vs Gen Y | Configural met; compositional invariance not met | Measurement invariance not achieved | MGA cannot be read as pure behavioral difference |

| | | | |
|---|---|---|---|
| Gen X vs Gen Z | Configural met; partial invariance achieved | Most defensible comparison pair | MGA can be interpreted more safely |
| Gen Y vs Gen Z | Configural met; compositional invariance not met | Measurement invariance not achieved | Findings are only indicative and exploratory |

### 4.2. Discussion

The main contribution of this study is not simply to confirm that usefulness and ease matter, but to show that they matter differently when UTAUT is repositioned from an acceptance model to a resistance model within a hybrid digital-manual transition. In mainstream UTAUT research, performance expectancy and effort expectancy are typically examined as drivers of behavioral intention or use behavior (Venkatesh et al., 2003). Recent synthesis studies also continue to position these two constructs as core predictors of technology acceptance across organizational settings (Theres & Strohmeier, 2024). The present study is consistent with that tradition in one important respect: usefulness and ease remain central. However, it also departs from that tradition in a theoretically meaningful way. In this study, the outcome is not intention to use but resistance to digital transformation. This means that the same UTAUT constructs operate here as inverse evaluative mechanisms: when employees do not see sufficient usefulness or do not experience adequate ease, resistance is not merely a passive absence of acceptance, but an active response to the operational burden of change. This inversion is especially visible because the empirical setting is not fully digitalized; rather, most respondents still work within a hybrid system in which manual and digital routines coexist. Under such conditions, resistance should be understood less as anti-technology ideology and more as a rational response to duplicated reporting, process misalignment, and unfinished redesign of work architecture.

The significant negative effect of performance expectancy strengthens this argument, yet it also requires a more critical interpretation than the conventional productivity framing found in many UTAUT studies. In adoption-oriented research, performance expectancy is generally interpreted as the belief that technology improves efficiency or job outcomes. In digital transformation studies in facilities and building management, performance-related beliefs are also often discussed in terms of readiness, process improvement, and organizational capability (Ba et al., 2024; Naji et al., 2024). The present findings support these prior studies only partially. Performance expectancy does reduce resistance, but in the engineering context its meaning is broader than efficiency alone. For engineering employees, the perceived value of a digital system is closely tied to operational legitimacy: whether the system improves reliability, strengthens traceability, reduces error risk, and supports control over building operations. In this sense, performance expectancy in the present study is not merely about working faster, but about whether digitalization becomes a credible mechanism for safer and more controllable operations. This extends prior UTAUT-based research by showing that, in technically sensitive work environments, performance beliefs are filtered through reliability and risk considerations, not merely through general beliefs about productivity.

The significant negative effect of effort expectancy also aligns with prior UTAUT literature, but here the construct appears especially salient because of the transitional context. In conventional acceptance studies, ease of use is important because it lowers the cognitive barrier to technology adoption. In this study, however, effort expectancy captures more than

learnability. It also reflects friction embedded in hybrid workflows, including duplicated inputs, repeated switching between manual and digital procedures, and the practical inconvenience of operating within a system that has not yet achieved process integration. This finding therefore goes beyond the standard UTAUT interpretation. It resonates with broader digital transformation research showing that digitalization may simultaneously promise efficiency and create additional job demands, workload, and information strain when process design remains incomplete (Makowska-Tłomak et al., 2023; Zacher & Rudolph, 2024). It also supports recent work in facilities-management transformation emphasizing that digital systems should simplify work rather than merely digitize existing bureaucracy (Ba et al., 2024; Naji et al., 2024). Thus, the contribution of this study is to show that effort expectancy in resistance settings is best interpreted as perceived workflow friction, not only as perceived simplicity of the interface.

By contrast, social influence did not significantly reduce resistance. This result diverges from the original UTAUT proposition that the expectations of supervisors, peers, or important others can shape technology-related behavior, especially in organizational or mandatory-use settings (Venkatesh et al., 2003). It also departs from strands of digital transformation research that place considerable emphasis on leadership communication, symbolic endorsement, and change messaging as mechanisms for increasing adoption. The present findings suggest that such normative influence may be insufficient in engineering environments where employees evaluate technologies primarily through their direct consequences for operational work. In other words, formal encouragement may create symbolic legitimacy, but symbolic legitimacy alone does not appear strong enough to offset process friction. This helps explain why top-down communication, while often emphasized in change programs, may have limited effect when the system is not yet experienced as genuinely helpful by frontline users. The result therefore contributes a critical nuance to prior UTAUT and digital transformation studies: in high-reliability technical work, instrumental evaluation may dominate normative persuasion.

The facilitating conditions finding is even more theoretically provocative. In standard UTAUT logic, facilitating conditions are expected to support use because employees are more likely to engage with technology when infrastructure, resources, and assistance are available. In this study, however, facilitating conditions showed a positive association with resistance at the pooled-sample level. This does not mean that support itself increases resistance in any simple sense. Rather, it suggests that support may lose its expected function when the digital ecosystem is fragmented. Compared with prior digital transformation studies that assume training, infrastructure, and support are coherent enablers of change, the present finding indicates that support can become counterproductive when it is layered onto unstable processes. In such settings, more systems, more support channels, or more formal interventions may generate additional coordination points and new confusion instead of clarity. This interpretation is consistent with digital workplace and technostress research showing that technology intensity, overload, and fragmented digital demands can undermine wellbeing and heighten strain when organizational integration is weak (Marsh et al., 2024; Pansini et al., 2023; Valtonen & Holopainen, 2025). Therefore, the positive facilitating-conditions coefficient should be read not as a contradiction to theory per se, but as evidence that the meaning of organizational support changes under hybrid transition. What matters is not the mere presence of support, but whether support is embedded in an integrated work system.

The findings on generational heterogeneity also require a more careful interpretation than a simple generational narrative. At a descriptive level, the pattern appears broadly consistent with selected prior studies suggesting that older cohorts tend to emphasize utility and

performance proof, whereas younger cohorts are more sensitive to ease, interface quality, and user experience (Dendrinos & Spais, 2024). The present study shows a similar directional pattern: performance expectancy appears more salient for Generation X, while effort expectancy appears more salient for Generation Z. However, this pattern should not be overgeneralized as evidence of pure generational moderation. Unlike consumer-facing UTAUT studies, the current organizational setting is strongly shaped by internal hierarchy and division of labor. In this sample, Generation Z respondents were overwhelmingly concentrated in technician/staff roles, whereas Generation X respondents were more represented in chief, managerial, and supervisory roles. This means that the observed heterogeneity is likely to reflect not only cohort-based technological orientation, but also the different work realities attached to organizational position and career stage.

This overlap is especially important for interpreting the Generation Z result. The stronger role of effort expectancy among Generation Z should be understood less as proof that younger employees are inherently more ease-oriented, and more as an indication that younger respondents in this sample were positioned closer to execution-intensive frontline work. As technician/staff users, they interacted more directly with application interfaces, reporting flows, mobile input routines, and the immediate frictions of digital-manual overlap. Their sensitivity to effort expectancy therefore likely reflects a frontline-user configuration in which system speed, interface clarity, and workflow smoothness are decisive. Conversely, the stronger role of performance expectancy for Generation X may reflect not only cohort-based preference, but also the evaluative standpoint of employees occupying roles with broader responsibility for operational outcomes, compliance, reliability, and coordination. For that reason, the study's contribution is better framed as evidence of cohort-position heterogeneity than of generational essentialism. This interpretation is also consistent with organizational science critiques showing that many supposed generational differences are confounded with age, tenure, hierarchy, and work context (Rudolph et al., 2021). Given that only the Generation X versus Generation Z comparison achieved partial measurement invariance, and that Generation Y remained measurement-unstable, the article therefore presents cross-generational findings as bounded heterogeneity within the sample rather than as universally generalizable generational laws.

Taken together, these findings suggest that digital transformation resistance in engineering work is best understood as a systemic indicator of incomplete integration. The study confirms the centrality of performance expectancy and effort expectancy, as prior UTAUT research would predict, but it also shows that their meaning becomes more operational and risk-sensitive in hybrid technical environments. At the same time, the divergence of social influence and facilitating conditions from their expected roles highlights an important boundary condition of adoption theory: when organizations digitalize without fully redesigning work, support and social endorsement may lose explanatory power relative to direct user evaluation of friction, reliability, and usefulness. From this perspective, the managerial implication is clear. Digital transformation should not be managed merely as technology introduction or communication rollout, but as process redesign that reduces overlap, establishes a clear single source of truth, and aligns system architecture with the responsibilities of different user groups.

## 5. Conclusion

This study concludes that performance expectancy and effort expectancy are the two most important determinants in reducing digital transformation resistance among engineering employees in high-rise property management. Social influence did not significantly reduce

resistance, and facilitating conditions produced an unexpected positive coefficient that should not be overinterpreted without further investigation.

The results also show that resistance in this context is inseparable from the reality of hybrid digital-manual transition. Most respondents were not operating in fully digital environments, meaning that resistance was closely related to dual procedures, transitional friction, and the practical burden of unfinished change processes. The cross-generational findings should also be interpreted with greater precision. The most defensible comparison indicates that performance expectancy is relatively more salient for Generation X, whereas effort expectancy is relatively more salient for Generation Z. However, this pattern should not be presented as evidence of pure generational moderation. In this sample, cohort membership overlaps substantially with job level and career stage, with Generation Z concentrated in technician/staff roles and Generation X more represented in managerial and supervisory positions. Therefore, the article interprets these results as cohort-position heterogeneity embedded in organizational structure. This means that the observed pattern captures how different cohort-role configurations evaluate digital transformation, rather than implying that all members of a given generation respond in the same way. Under this interpretation, Generation Z appears especially sensitive to interface friction and workflow smoothness because it is located closer to frontline execution, while Generation X appears more sensitive to demonstrable operational outcomes because it is located closer to coordination and accountability functions.

## Limitations and Future Research

This study has several limitations that should be acknowledged. First, the measurement model was not equally stable across all generational subgroups, especially Generation Y and the facilitating-conditions construct in Generation Z. Second, the cross-sectional self-report design supports structural association rather than definitive causality. Third, although the study examines generational heterogeneity, cohort categories in this sample overlap substantially with job level and career stage. As a result, the cross-generational pattern reported here should be understood as bounded heterogeneity within a specific organizational sample rather than as pure evidence of generation-based psychological differences.

Future studies should therefore disentangle cohort, tenure, and hierarchical position more explicitly, for example by using matched subgroup designs, incorporating job level as a control or comparison factor, or contrasting frontline and managerial roles directly within and across cohorts. Future research should also strengthen measurement stability across cohorts, enlarge subgroup sample sizes, and incorporate additional organizational variables such as change leadership, innovation culture, workflow friction, process alignment, system integration quality, and employee participation. Mixed-method approaches would also be valuable for uncovering contextual factors that are not fully captured by the basic UTAUT framework, especially in transitional organizations where resistance may function not simply as individual reluctance, but as a signal that digital integration remains incomplete.

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