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Digital Workplace Adaptation: A Comparative Analysis Of The Effects Of Workload And Innovation On The Performance Of Millennial vs. Non-Millennial Employees

Isnaidi[1], Astri Ayu Purwati[2], Layla Hafni[3]

Abstract:

This study investigates the impact of digital workload on employee performance, mediated by employee loyalty and moderated by individual innovation behavior, with a generational perspective distinguishing between millennial and non-millennial employees. Utilizing a quantitative explanatory approach, data were collected via total sampling of 52 BAPPEDA employees and analyzed through Structural Equation Modeling using Partial Least Squares (SEM-PLS) and Multi-Group Analysis (MGA). Findings reveal that digital workload negatively affects performance, particularly among non-millennials, while employee loyalty and innovation behavior positively influence performance. Digital adaptation acts as a crucial moderator, buffering the adverse effects of digital workload and enhancing the positive impact of innovation. The study underscores the importance of digital literacy, innovation culture, and tailored generational strategies to optimize employee performance in digitizing public institutions.

Keywords: *Digital Workload, Employee Performance, Innovation Behavior, Employee Loyalty, Digital Adaptation*

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1. Introduction

Over the last five years, employee performance at the Regional Development Planning Agency (BAPPEDA) of Bengkalis Regency has consistently been classified as "Good." However, only 1% of employees reached the "Excellent" performance category in 2023, raising concerns about the underlying factors hindering optimal performance. In the context of increasing digitalization in public services, factors such as digital workload, generational dynamics, innovation behavior, and employee loyalty have come into sharper focus. These dynamics are critical for understanding stagnation in performance improvement, especially in institutions undergoing digital transformation.

Digital workload has emerged as a major component of employees' professional experiences. The implementation of digital systems like e-Planning and SIPKD has introduced complex tasks that require high levels of adaptability and continuous learning. Tarafdar et al. (2019) argue that technostress—a negative

[1] *Master of Management Program, Faculty of Business, Institut Bisnis dan Teknologi Pelita Indonesia, Pekanbaru, Indonesia, isnaidi@student.pelitaindonesia.ac.id*
[2] Master of Management Program, Faculty of Business, Institut Bisnis dan Teknologi Pelita Indonesia, Pekanbaru, Indonesia, astri.ayu@lecturer.pelitaindonesia.ac.id,
[3] Master of Management Program, Faculty of Business, Institut Bisnis dan Teknologi Pelita Indonesia, Pekanbaru, Indonesia, layla.hafni@lecturer.pelitaindonesia.ac.id

psychological response to information and communication technologies—can significantly affect employees' productivity and well-being. When digital demands exceed employees' capabilities or resources, it may lead to decreased performance and even burnout. Generational differences further complicate adaptation to digital systems in government institutions. Millennials tend to adapt quickly to technological changes, whereas older generations often struggle with digital tools and applications. Sharma (2024) suggests that digital transformation has widened generational gaps, particularly in public organizations, where digital competence is unevenly distributed. This discrepancy may lead to performance inconsistencies across age groups and hinder institutional efficiency.

The traditional public sector environment also imposes limitations on individual innovation behavior. Rigid structures, hierarchical management, and bureaucratic rules can suppress creativity and discourage proactive initiatives. Cinar and Surer (2022) emphasize that public institutions need specialized innovation policies because conventional private-sector models are often ineffective in bureaucratic settings. Employees may be less inclined to innovate if their efforts are not supported by the organization or recognized through incentives.

In this evolving digital landscape, employee loyalty must also be redefined. Loyalty is no longer solely about tenure or compliance with rules but includes commitment to learning, flexibility, and proactive engagement with digital systems. Fleischer and Wanckel (2024) highlight that employee engagement and loyalty in the digital era are tied to one's capacity to adapt and continuously contribute in dynamic work environments. This reframing challenges traditional notions of loyalty and necessitates a more holistic approach to employee evaluation. Although loyalty is often viewed as a positive driver of performance, recent studies reveal a more complex relationship. Alqaralleh et al. (2023) found that loyalty enhances performance when combined with motivation and relevant competencies. Xu et al. (2022) and Aboramadan et al. (2020) support this view by noting that loyal employees may still underperform if they lack digital skills or feel overwhelmed by technological change. This suggests that loyalty must be accompanied by capacity-building efforts to achieve its full performance-enhancing potential.

Innovation behavior, meanwhile, has a direct impact on employee effectiveness. In public agencies, fostering innovation can lead to better service delivery, improved problem-solving, and increased job satisfaction. Susomrith and Amankwaa (2020) observed that employees who engage in innovative work behavior tend to perform better, even in highly regulated environments. However, the tendency to innovate is often moderated by individual personality traits, organizational culture, and available resources.

Technostress has also been shown to hinder innovation unless employees possess resilience or receive institutional support. Tiwari (2021), Hasan & Javed (2023) and Nair & Thomas (2023) explains that stress from digital systems can be debilitating unless offset by supportive leadership or intrinsic motivation. Thus, innovation in government workplaces is not merely a personal attribute—it is deeply influenced by environmental conditions and managerial approaches. Leadership, therefore, plays a crucial role in shaping innovative and adaptive work cultures.

Most existing studies have failed to comprehensively examine how digital workload, employee loyalty, and innovation interact across generational lines in the

public sector. Radu (2022) and Garcia & Kim (2022) criticizes many adaptation models for overlooking generational learning preferences, which can significantly affect digital integration in bureaucratic institutions. Understanding how millennial and non-millennial employees perceive and respond to digital demands is essential for formulating targeted HR policies and support mechanisms.

This study aims to analyze the impact of digital workload on employee performance, mediated by loyalty and moderated by individual innovation behavior, with a generational perspective. By focusing on BAPPEDA Bengkalis as a case study, this research seeks to fill the gap in public sector literature concerning digital transformation, generational diversity, and performance dynamics. The findings are expected to provide practical recommendations for improving employee performance in digital public service environments and contribute to the broader discourse on sustainable human capital development in government institutions.

Digital Workload and Employee Performance

Digital transformation in public institutions has restructured traditional work processes by integrating new platforms, systems, and performance dashboards. While these changes aim to improve efficiency and transparency, they also contribute to increasing the cognitive and emotional burden on employees (Bervell et al., 2023; Shu et al., 2021; Yang et al., 2024). This burden, often referred to as "digital workload," includes the constant need to respond to emails, operate multiple digital applications, attend virtual meetings, and adapt to evolving technology interfaces. In the context of BAPPEDA, this translates into the use of systems such as e-Planning, e-SAKIP, and SIPKD that require continuous learning and multitasking.

Research has found that digital workload can lead to technostress, which significantly reduces employee engagement and performance (Molino et al., 2020; Spagnoli et al., 2020). This stress impairs cognitive functioning, reduces attention span, and may cause emotional exhaustion. Furthermore, employees with lower digital literacy or resistance to change—more prevalent in older generations—are more vulnerable to these adverse effects (Taser et al., 2022). Studies in the public sector emphasize that unmanaged digital demands result in reduced work output, lower quality of service, and increased absenteeism (Barbieri et al., 2024; Suhardi et al., 2024).

Thus, this study hypothesizes that digital workload negatively impacts employee performance. Understanding this relationship is critical for designing digital strategies that minimize overload and support productivity, particularly in bureaucratic environments where digital systems are still evolving and unevenly adopted.

H1: Digital workload negatively affects employee performance

Employee Loyalty and Performance

Employee loyalty is traditionally defined as the commitment of employees to organizational values, goals, and sustained tenure. However, in the context of a digital work environment, loyalty must extend beyond mere job tenure to include adaptability, resilience, and a willingness to grow with the organization (Kim et al., 2021). Loyal employees are more likely to align their efforts with institutional

priorities, exhibit discretionary behavior (organizational citizenship behavior), and remain motivated even during transformational changes.

Recent empirical studies affirm that employee loyalty positively influences individual and organizational performance (Taufiqurrohman & Astuti, 2021; Zhang et al., 2024). Loyal workers tend to possess a stronger sense of belonging and emotional investment, which translates into higher persistence in task completion and better responsiveness to challenges. In government contexts, loyalty also correlates with compliance to SOPs, lower turnover intention, and improved service quality (Thamrin et al., 2023).

However, measuring loyalty in digital contexts requires a shift from tenure-based indicators to behavioral attributes such as initiative in upskilling, contribution to innovation, and support for digital policies (Dutta & Dhir, 2025; Moser-Plautz & Schmidthuber, 2023). Particularly in BAPPEDA, loyal employees who actively engage with e-Government tools and digital planning frameworks are more likely to demonstrate high-quality performance outcomes.

Hence, it is hypothesized that higher employee loyalty enhances employee performance, especially in digitally transforming environments such as local government agencies.

H2: Employee loyalty positively influences performance

Individual Innovation and Employee Performance

In today's digitalized work environment, individual innovation has emerged as a vital predictor of performance. Individual innovation refers to the extent to which an employee initiates and implements new ideas, technologies, or procedures that enhance work outcomes (Afsar & Umrani, 2020). In public sector institutions such as BAPPEDA, where rigid bureaucracy can sometimes hinder agility, individual innovation becomes crucial for process improvement, policy development, and adaptive service delivery.

A growing body of literature highlights that innovative behavior among employees significantly boosts performance by promoting efficiency, enhancing service quality, and solving operational problems creatively (Yuan & Zhou, 2022; Khan et al., 2023). Innovative employees are more proactive, willing to experiment with new digital tools, and tend to be more resilient in the face of technological disruption. These attributes are essential in the context of e-Government transformation, where public servants must quickly adapt to digital planning platforms, online budgeting tools, and data-driven policy analysis (Ali et al., 2021).

Nevertheless, the impact of innovation on performance is not always linear. Some studies in bureaucratic settings suggest that highly innovative individuals may encounter institutional resistance or administrative bottlenecks that constrain their initiatives (Madan & Ashok, 2023). This tension is particularly evident in hierarchical government environments that may be slow to embrace bottom-up innovation. Despite these challenges, most empirical evidence supports a positive link between individual innovation and job performance in both public and private sectors (Khan et al., 2022; Irwansyah et al., 2023).

H3: Individual innovation positively affects employee performance

The Moderating Role of Digital Adaptation on the Workload–Performance Relationship

As digital platforms proliferate in government workspaces, the degree to which employees adapt to such technologies significantly influences how digital workload affects their performance. Digital adaptation is defined as the ability of an employee to effectively integrate digital tools and systems into daily work routines (Soomro et al., 2022). It encompasses digital literacy, openness to change, and psychological readiness to embrace new work modalities.

Employees with high digital adaptation are better equipped to manage multiple information systems, virtual communications, and data-centric tasks. They perceive digital workload not as a stressor, but as an opportunity to increase efficiency (García-Sánchez et al., 2021). In contrast, employees with low digital adaptation often experience digital fatigue, errors, and decreased performance under the same workload conditions (Hwang & Kim, 2023).

Empirical studies show that digital adaptation buffers the negative effects of digital workload by enhancing problem-solving capabilities and reducing technostress (Yener et al., 2021; Syamsuddin & Syamsuddin, 2024). Especially in generationally diverse workforces like in BAPPEDA, digital adaptation serves as a key moderator—enabling more tech-savvy employees, particularly millennials, to handle complex digital tasks more efficiently than their older peers.

Therefore, it is hypothesized that digital adaptation weakens the negative impact of digital workload on employee performance.

H4: Digital adaptation weakens the negative effect of digital workload on performance

The Moderating Role of Digital Adaptation on the Innovation–Performance Relationship

Digital adaptation is not only vital for handling workload but also enhances the effectiveness of individual innovation. Employees with high digital adaptation are more likely to explore digital tools, engage in creative problem-solving, and apply novel solutions in real-time work scenarios (Zameer et al., 2022). This ability amplifies the positive impact of innovation on performance, as it increases the feasibility and acceptance of new ideas in digital environments.

Innovative ideas in digitally transforming public organizations often require employees to master new platforms, from data dashboards to digital document management systems. Those who are digitally adaptable are more likely to overcome technical challenges and successfully implement innovations that contribute to efficiency and policy outcomes (Haug et al., 2023). On the contrary, employees with low adaptation may propose innovative ideas but struggle to execute them due to digital limitations, thereby reducing overall impact (Choi et al., 2023).

Studies confirm that digital adaptation moderates the innovation–performance relationship, particularly in complex service-oriented organizations like public institutions (Sutanto & Putra, 2024; Javed et al., 2022). In such contexts, digital adaptation acts as an enabler that transforms innovative potential into tangible performance gains.

H5: Digital adaptation strengthens the positive effect of individual innovation on performance

Conceptual Framework

The relationships described above are visually represented in the conceptual framework shown in Figure 1, which outlines the direct and moderating effects among the study variables.

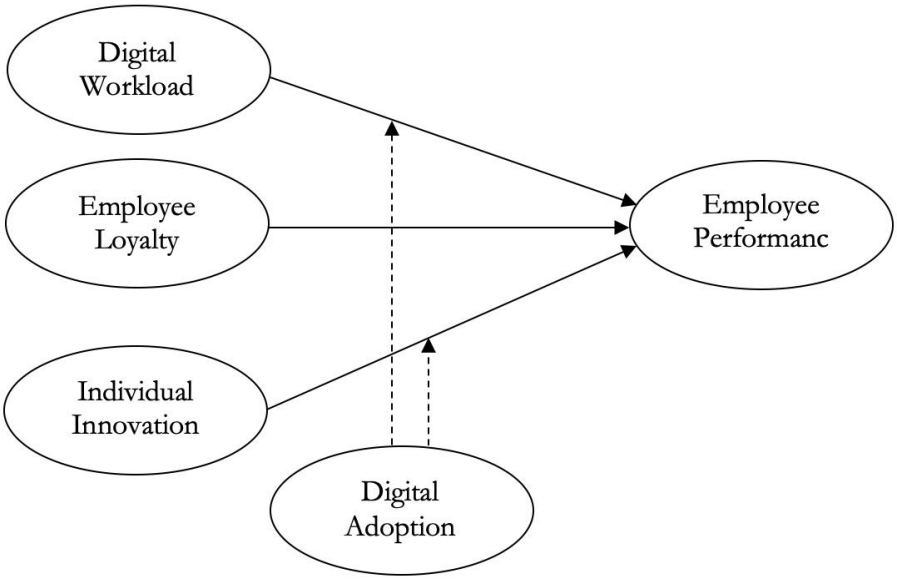

Figure 1. Conceptual Framework

2. Method

This study adopts a quantitative explanatory approach, employing a survey method with questionnaires as the primary instrument for data collection. Additionally, a comparative approach is utilized to examine differences between millennial (born 1981–2000) and non-millennial (born before 1980) employees through multi-group analysis (MGA). The population consists of all 52 employees of BAPPEDA (Regional Development Planning Agency) in Bengkalis Regency, based on 2024 data. Given the limited population size, a total sampling technique is applied with criteria including a minimum of one year of work experience and generational classification.

To achieve the research objectives, several analytical methods were used. The primary technique is Structural Equation Modeling using Partial Least Squares (SEM-PLS), aiming to assess causal relationships between variables and to evaluate the moderating role of digital adaptation. SEM-PLS analysis involves three main stages: evaluating the measurement model for indicator validity and reliability, assessing the structural model for hypothesized relationships, and conducting moderation analysis using the product indicator method. Key evaluation parameters include outer loading values greater than 0.7, Average Variance Extracted (AVE) above 0.5, Composite Reliability (CR) above 0.7, f^2 effect size, and Q^2 predictive relevance, all processed using SmartPLS 4.0.

To compare mean differences between generations, an Independent Samples T-test was conducted. The procedure involved testing for normality and homogeneity of variance, followed by t-statistic calculation, with significance determined at $p < 0.05$

and Cohen's d used to interpret effect size. This analysis was carried out using SPSS version 26. Furthermore, to examine whether generational status influenced the structural model, a Multi-Group Analysis (MGA)was performed using SmartPLS 4.0. The MGA process included testing for measurement invariance, conducting permutation tests, and comparing path coefficients (Δβ) between groups, with significance indicated by a p-value less than 0.05.

To ensure clarity and measurement accuracy, each research variable in this study is operationally defined through specific indicators aligned with the study objectives. The table below presents the operational definitions, measurement descriptions, and scales used for each variable examined in the analysis.

Table 1. Operational Definition of Research Variables

Variable	Indicator	Measurement Description
Digital Workload (DW)	1. Daily frequency of using e-government tools	"How many days per week do you use SIPKD/e-planning?"
	2. Level of technostress	"Digital notifications disrupt my concentration"
	3. Virtual work hours	"% of working hours spent on virtual meetings/coordination"
	4. Digital multitasking	"I often work with ≥3 digital platforms simultaneously"
	5. Availability after hours	"I still respond to chats/emails after work hours"
Employee Loyalty (EL)	1. Work tenure	Years working in the institution
	2. Retention intention	"I want to retire in this institution"
	3. Emotional attachment	"I feel that BAPPEDA is like a family"
	4. Digital loyalty (Novelty)	"I still enjoy working even if digital facilities are lacking"
	5. Willingness for extra role	"I am willing to work overtime to complete digital tasks"
Individual Innovation (II)	1. Tool exploration	"I try new features in applications without being told"
	2. Suggestion of solutions	Number of digital improvement ideas proposed (past 6 months)
	3. Adaptation to change	"I quickly adapt to system updates"
	4. Virtual collaboration (Novelty)	Frequency of knowledge sharing via digital platforms
	5. Innovation risk-taking	"I dare to try new methods even if they might fail"
Digital Adaptation (DA)	1. Self-learning	"I can master new applications independently"
	2. Troubleshooting skills	"I can solve simple technical problems on my own"
	3. Adaptation speed	"I need ≤1 week to master new applications"

Variable	Indicator	Measurement Description
	4. Attitude toward change	"I am enthusiastic about technological updates at work"
	5. Advanced feature utilization	"I use >80% of the features in work applications"
Employee Performance (EP)	1. Performance appraisal score (SKP)	Average SKP score from the past 2 years
	2. Timeliness	Percentage of tasks completed on time
	3. Output quality	"My reports are rarely returned for revisions"
	4. Innovation contribution	Number of contributions to digital projects
	5. Supervisor evaluation	Performance rating by supervisor

3. FINDING AND DISCUSSION

A. Respondent Demographic Analysis

To gain a comprehensive understanding of the respondents' backgrounds in this study, classifications were made based on key demographic characteristics: gender, age, educational attainment, and length of service. This information is crucial for contextualizing the social and professional environments of the respondents, which may influence their perceptions and responses to the variables under investigation. The distribution of respondent characteristics at the Regional Development Planning Agency (BAPPEDA) of Bengkalis Regency is presented in Table 2 below:

Table 2. Respondent Characteristics at BAPPEDA Bengkalis Regency

Characteristic	Category	Number (Individuals)	Percentage (%)
Gender	Male	18	33.33%
	Female	36	66.67%
Age	Millennial	33	61%
	Non-Millennial	21	39%
Educational Level	Diploma (D3)	6	11%
	Bachelor's (S1)	32	60%
	Master's (S2)	16	29%
Length of Service	< 5 years	4	7%
	5–10 years	8	15%
	11–20 years	30	56%
	> 20 years	12	22%
Total Respondents		54	100%

As depicted in Table 2, the majority of respondents in this study are female (66.67%), indicating a higher representation of women in positions within BAPPEDA Bengkalis Regency. Regarding age, a significant portion of respondents are classified as millennials (61%), defined as employees aged between 25 and 40 years. This suggests that the workforce comprises individuals in their productive years, who are potentially more adaptable to changes, particularly in the context of bureaucratic digitalization.

In terms of educational attainment, respondents are predominantly bachelor's degree holders (60%), followed by master's degree holders (29%) and diploma holders (11%). This indicates that the majority of employees possess relevant and relatively high academic backgrounds, which are essential for supporting strategic planning and decision-making processes.

Concerning length of service, most employees have between 11 to 20 years of work experience (56%), demonstrating substantial tenure in organizational roles. Additionally, a notable proportion of respondents have over 20 years of service (22%), reflecting a blend of experience and professional maturity within BAPPEDA. Overall, this demographic profile portrays a workforce that is robust in terms of experience, education, and age readiness within the institution.

Convergent Validity Test Result

Convergent validity is used to assess the degree to which indicators truly represent the same latent construct. It is evaluated using two main criteria: (1) the loading factor (λ), which should exceed 0.70, and (2) the Average Variance Extracted (AVE), which should be greater than 0.50. The table 3 below presents the results:

Table 3. Convergent Validity Test Result

Variable	Indicator	Loading Factor (λ)	AVE	Description
Digital Workload (DW)	DW1	0.814	0.609	Valid
	DW2	0.768		Valid
	DW3	0.751		Valid
	DW4	0.783		Valid
	DW5	0.790		Valid
Employee Loyalty (EL)	EL1	0.812	0.641	Valid
	EL2	0.832		Valid
	EL3	0.856		Valid
	EL4	0.771		Valid
	EL5	0.795		Valid
Individual Innovation (II)	II1	0.838	0.642	Valid
	II2	0.802		Valid
	II3	0.790		Valid
	II4	0.768		Valid
	II5	0.810		Valid
Digital Adaptation (DA)	DA1	0.841	0.685	Valid
	DA2	0.825		Valid
	DA3	0.803		Valid
	DA4	0.812		Valid
	DA5	0.835		Valid
Employee Performance (EP)	EP1	0.814	0.626	Valid
	EP2	0.780		Valid
	EP3	0.795		Valid
	EP4	0.800		Valid

Variable	Indicator	Loading Factor (λ)	AVE	Description
	EP5	0.788		Valid

Source : Data Processed by SEM-PLS (2025)

All indicators demonstrate loading factors above 0.70, indicating strong indicator reliability. Additionally, the AVE values for all latent constructs exceed 0.50, suggesting that the constructs explain more than 50% of the variance in their respective indicators. These findings confirm that all constructs satisfy the criteria for convergent validity

B. Preliminary Test Results

Discriminant Validity Test Result

Discriminant validity tests whether a construct is truly distinct and can be differentiated from other constructs. One commonly used method is the Fornell-Larcker Criterion, where the square root of the AVE for each variable (diagonal values) must be higher than the correlations with other variables. The correlation matrix and square roots of the AVE are presented below:

Table 4. Discriminant Validity Test Results

	DW	EL	II	DA	EP
DW	0.758				
EL	0.324	0.786			
II	0.253	0.452	0.805		
DA	0.402	0.382	0.598	0.837	
EP	0.283	0.501	0.553	0.648	0.772

Source : Data Processed by SEM-PLS (2025)

The diagonal values (in bold) are the square roots of the AVE for each construct and are proven to be greater than the inter-construct correlations, indicating that discriminant validity has been achieved. In addition, the HTMT (Heterotrait-Monotrait) ratios for all construct pairs are below the 0.85 threshold, further confirming the absence of multicollinearity issues and that each construct is significantly distinct from the others.

Reliability Test Result

Reliability indicates the internal consistency of the indicators in measuring a construct. The criteria used are the Composite Reliability (CR), which should exceed 0.70, and Cronbach's Alpha (α), which is recommended to be greater than 0.60. The calculation results are shown in the following table:

Table 5. Reliability Test Results

Variable	Composite Reliability (CR)	Cronbach's Alpha (α)	Remark
Digital Workload (DW)	0.873	0.824	Reliable
Employee Loyalty (EL)	0.892	0.853	Reliable
Individual Innovation (II)	0.901	0.876	Reliable
Digital Adaptation (DA)	0.921	0.903	Reliable
Employee Performance (EP)	0.885	0.842	Reliable

Source : Data Processed by SEM-PLS (2025)

All variables show a CR value above 0.70 and a Cronbach's Alpha greater than 0.60, indicating that the instruments used have high measurement consistency and stability. Therefore, all constructs can be categorized as reliable.

Metric Invariance

The metric invariance test aims to ensure that the measurement weights (loading factors) of each indicator within the latent construct are equivalent between two respondent groups: millennials and non-millennials. This is essential to ensure that comparisons between groups are fair, as the constructs are measured in the same way across both groups. The testing process is conducted by comparing the loading factor values between groups and examining the significance of any differences.

The test results indicate a p-value of 0.12, which is above the 0.05 significance threshold. This suggests that there is no significant difference in the loading factors between the groups. A comparison of selected indicators is presented below:

Table 6. Metric Invariance Test Results

Indicator	Millennial (λ)	Non-Millennial (λ)	Δλ (Difference)
DW1	0.815	0.793	0.022
EL1	0.853	0.832	0.021
II1	0.876	0.846	0.030

Source : Data Processed by SEM-PLS (2025)

The differences in loading factors between the millennial and non-millennial groups are minimal, ranging only from 0.02 to 0.03. Moreover, the p-value exceeding 0.05 indicates that these differences are not statistically significant. Therefore, it can be concluded that metric invariance is achieved. This means that the indicators used in this study have equivalent measurement weights across both groups, allowing the model to be validly compared between generations.

C. Hypothesis Test Results

Hypothesis testing was conducted to examine the direct and moderating relationships between variables in the model. The following table presents the results of hypothesis testing for all respondents:

Table 7. Path Analysis

	Hypothesis	Original Sample (O)	T Statistics	p-value	Result
H1	DW → EP	-0.324	2.923	0.004	Accepted (Significant negative)
H2	EL → EP	0.412	3.456	0.001	Accepted (Significant positive)
H3	II → EP	0.283	2.536	0.012	Accepted (Significant positive)
H4	DA × DW → EP	0.184	2.052	0.042	Accepted (Moderation: weakens DW effect)
H5	DA × II → EP	0.253	2.681	0.008	Accepted (Moderation: strengthens II effect)

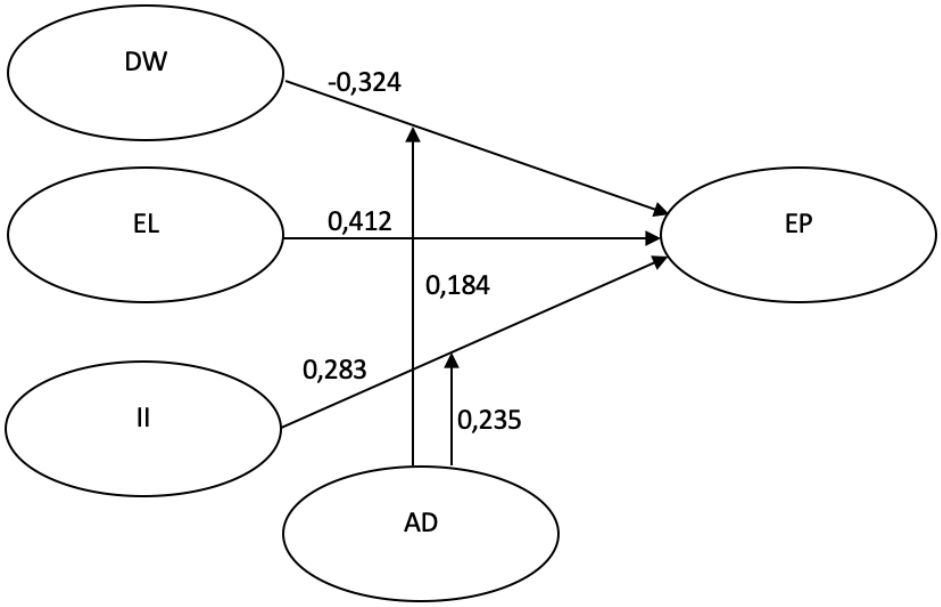

Figure 2. SEM Model
Source : Data Processed by SEM-PLS (2025)

The interpretation of the hypothesis testing results reveals several significant relationships within the research model. H1 is accepted, indicating that Digital Workload (DW) has a significant negative effect on Employee Performance (EP), with a coefficient β = -0.324 and a p-value of 0.004. This suggests that an increase in perceived digital workload leads to a notable decline in employee performance. H2 is also accepted, showing that Employee Loyalty (EL) positively influences performance (β = 0.412, p-value = 0.001), meaning that employees who exhibit greater loyalty are more likely to perform better. H3 is supported as well, with Individual Innovation (II) exerting a positive and significant effect on performance (β = 0.283, p-value = 0.012), highlighting that innovative employees contribute more effectively to organizational outcomes.

Further, H4 is accepted, showing a moderating effect of Digital Adaptation (DA) on the relationship between digital workload and performance. The interaction yields a coefficient of β = 0.184 and a p-value of 0.042, indicating that higher digital adaptation levels weaken the negative impact of digital workload on performance. In other words, employees who are more digitally adaptive can better manage digital workload pressures, leading to less performance degradation. Lastly, H5 is accepted, where the interaction between DA and II demonstrates a coefficient of β = 0.253 and a p-value of 0.008. This result signifies that digital adaptation amplifies the positive effect of individual innovation on performance, implying that employees who are both innovative and adaptive to digital technologies tend to achieve higher performance levels.

D. Generational Comparison Analysis (Multi-Group Analysis - MGA)
Mean Difference Test (Independent T-Test)

Table 8. Independent T-Test

Variable	Millennial (Mean)	Non-Millennial (Mean)	T Statistics	p-value	Significance
DW	4.120	3.850	2.163	0.032	Significant
EL	4.250	4.100	1.261	0.210	Not Significant
II	4.300	3.950	2.422	0.018	Significant
DA	4.450	3.900	2.908	0.005	Significant
EP	4.350	4.050	2.276	0.025	Significant

Source : Data Processed by SEM-PLS (2025)

Based on the independent t-test results comparing millennial and non-millennial groups, several significant generational differences were identified across key variables. Millennials reported a higher digital workload (DW) with a mean of 4.120 compared to 3.850 for non-millennials ($p = 0.032$), indicating a statistically significant difference. Similarly, individual innovation (II) was higher among millennials (4.300 vs. 3.950; $p = 0.018$), as was digital adoption (DA), which showed a notable gap (4.450 vs. 3.900; $p = 0.005$). Furthermore, employee performance (EP) was also significantly higher for millennials (4.350) than for non-millennials (4.050), supported by a p-value of 0.025. However, there was no significant difference in employee loyalty (EL) between the two groups, with a p-value of 0.210, indicating that loyalty is relatively consistent across generations.

Structural Model Differences (Multi-Group Path Coefficient Analysis)

Table 9. MGA Path Coefficient

Hypothesis		Millennial (β)	Non-Millennial (β)	T Statistics	p-value	Result
H6	DW → EP	-0.253	-0.402	2.078	0.038	Accepted (Stronger negative effect for non-millennials)
H7	II → EP	0.352	0.153	2.592	0.010	Accepted (Stronger positive effect for millennials)

Source : Data Processed by SEM-PLS (2025)

The structural model comparison using multi-group path coefficient analysis reveals significant generational differences in the influence of key variables on employee performance. For H6 (DW → EP), the negative impact of digital workload is found to be stronger among non-millennials ($\beta = -0.402$) compared to millennials ($\beta = -0.253$), with a statistically significant p-value of 0.038. This suggests that non-millennials are more adversely affected by the pressures of digital workload. Meanwhile, H7 (II → EP) indicates that the positive effect of individual innovation on performance is more pronounced among millennials ($\beta = 0.352$) than non-millennials ($\beta = 0.153$), with a significant p-value of 0.010. These results imply that while non-millennials are more vulnerable to digital workload stress, millennials benefit more from innovation in driving their performance outcomes.

E. Discussion

This study provides a nuanced understanding of how digital transformation affects employee performance within the bureaucratic context of the Regional

Development Planning Agency (BAPPEDA) of Bengkalis Regency. It unpacks the intricate interrelationships between digital workload, employee loyalty, individual innovation, and digital adoption, while highlighting how these dynamics unfold differently across generational cohorts.

The negative impact of digital workload on performance, especially among non-millennial employees, is a critical finding. Digital workload, conceptualized as the cognitive and emotional burden arising from continuous interaction with digital systems, is not merely a matter of technical competence—it affects motivation, stress levels, and job efficacy. This supports the contention of Muktamar et al. (2023), who argued that persistent exposure to digital environments, especially when mandatory and poorly supported, leads to digital fatigue, mental overload, and task disengagement. Molino et al. (2020) further emphasized that such conditions can erode psychological well-being, particularly in contexts where digital transformation is implemented rapidly without sufficient alignment with employee capacities.

In the BAPPEDA case, the challenges are magnified by the agency's demographic structure: nearly 40% of respondents are non-millennials with over ten years of tenure, many of whom have long relied on analog processes and paper-based documentation. The abrupt pivot to digital platforms—ranging from e-planning applications to digital reporting dashboards—without corresponding investments in training, technical assistance, or ergonomic workflows, creates a frictional interface between system expectations and user readiness (Nguyen et al., 2022; Widodo et al., 2024). As Sun et al. (2021) noted, in such scenarios, the imposition of digital tools can result in alienation rather than empowerment, particularly among senior civil servants who may lack prior exposure to agile digital work practices.

Conversely, the study demonstrates that employee loyalty plays a positive role in sustaining performance. Loyalty here is understood not only as tenure-based attachment, but as a deeper form of job embeddedness involving emotional commitment, alignment with organizational values, and a willingness to persevere during change (Mitchell et al., 2001). In the BAPPEDA context, where the majority of employees are long-serving women with undergraduate qualifications, this loyalty likely stems from a sense of institutional identity and professional purpose. Such commitment can buffer the negative emotional effects of digital workload and foster discretionary behaviors that uphold performance standards—such as helping colleagues, taking initiative, and staying engaged despite technological friction. This aligns with social exchange theory, which suggests that when employees feel valued and connected to their organization, they reciprocate with increased effort and resilience (Cropanzano & Mitchell, 2005; Rodrigues et al., 2023).

Individual innovation emerges as another significant performance driver. Innovation at the individual level—defined as the ability to generate, experiment with, and implement new ideas—requires both intrinsic motivation and a conducive organizational climate. Among BAPPEDA employees, this variable is especially salient for millennials, who constitute 61% of the sample. This generation, often termed "digital natives," possesses both the technological fluency and cultural disposition toward experimentation, adaptability, and creative problem-solving (Lee & Choi, 2023). Studies by Ghobakhloo et al. (2020) and Tutik et al. (2022) support the finding that innovation in public organizations enhances task performance, particularly when innovation is aligned with digital strategy and supported through a

psychologically safe and resource-rich environment. In planning-oriented agencies like BAPPEDA, where problem complexity is high and policy solutions must often be localized and adaptive, innovative employees become valuable agents of change.

The role of digital adoption as a moderating variable further enriches the analysis. First, it attenuates the negative effects of digital workload. This suggests that digital tools, when internalized and perceived as user-friendly, shift from being stressors to being enablers. Tarhini et al. (2021) argue that perceived ease of use and digital competence significantly reduce resistance to technological adoption, particularly in high-regulation, low-flexibility settings like the public sector. Employees with higher digital adoption are more capable of navigating digital platforms, automating repetitive tasks, and leveraging data for decision-making, thus experiencing less burnout and more empowerment. Second, digital adoption strengthens the positive relationship between individual innovation and performance. This synergy points to a compound advantage: when employees are both innovative and digitally proficient, they can rapidly convert creative insights into practical, impactful outputs—whether in project planning, data visualization, stakeholder communication, or policy formulation. This reinforces the notion of digital ambidexterity, whereby organizations and individuals simultaneously explore new technologies and exploit existing competencies to enhance performance outcomes.

The generational analysis adds another layer of complexity. Millennials consistently outperform non-millennials across key variables—digital workload tolerance, innovation capacity, digital adoption, and ultimately, performance. This is in line with the findings of Nguyen et al. (2023), who observed that younger public sector employees are more comfortable navigating technological disruptions, multitasking in digital environments, and seeking out self-directed learning opportunities. Meanwhile, non-millennials experience greater stress from digital demands, likely due to lower baseline digital literacy and less frequent engagement with dynamic technology interfaces (Nguyen et al., 2022; Cheng & Zhang 2023). However, an important nuance is that loyalty levels do not significantly differ between generations, suggesting that organizational attachment is shaped more by institutional culture than by age. This aligns with Mitchell et al. (2001), who propose that job embeddedness stems from shared norms, relational ties, and value congruence.

Overall, these findings imply that a one-size-fits-all approach to digital transformation may be inadequate. Instead, differentiated strategies are required: targeted digital upskilling and ergonomic support systems for non-millennials, and autonomy- and innovation-oriented leadership for millennials. Building inclusive digital cultures that recognize generational diversity, learning styles, and motivational drivers can significantly enhance transformation outcomes.

4. Conclusion

This study provides important insights into the dynamics of employee performance within the context of digital transformation at the Regional Development Planning Agency (BAPPEDA) of Bengkalis Regency. The results indicate that digital workload has a detrimental impact on employee performance, particularly among non-millennial staff who are less accustomed to digital systems. In contrast, employee loyalty and individual innovation positively influence performance, with innovation exerting a stronger effect among millennial employees. Moreover, digital adoption

plays a pivotal moderating role—mitigating the negative impact of digital workload and amplifying the positive contribution of innovation to performance. These findings underscore the critical importance of digital readiness, technological competence, and innovation capacity in enhancing employee productivity, especially in increasingly digitized public sector environments. The demographic characteristics of the respondents—such as the predominance of female employees and the relatively high proportion of millennials—also shape these outcomes, particularly in terms of technology acceptance and innovative behavior.

From a practical perspective, the study highlights the need for targeted interventions that support digital literacy and reduce digital stress, especially among non-millennial employees. It also suggests that organizations should foster a culture of innovation and provide resources that enable employees to translate creative ideas into actionable outcomes using digital tools. Promoting inclusive digital adoption across generational cohorts can bridge performance gaps and ensure more equitable adaptation to technological change.

For future research, it is recommended to explore additional psychological and behavioral factors that may influence employee performance during digital transformation, such as technostress, job satisfaction, work-life balance, and digital resilience. Employing qualitative approaches—such as in-depth interviews or ethnographic studies—could offer richer insights into employees' lived experiences as they navigate digital transitions. Comparative studies across different government agencies or regions, as well as longitudinal research designs, would also be valuable in capturing the evolution of these dynamics over time. Furthermore, investigating the roles of digital leadership, organizational support, and workplace culture could provide a more comprehensive understanding of how to sustain employee performance in the face of rapid technological change.

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