

MEDIATING EFFECTS IN THE ADOPTION OF GAMIFIED E-GOVERNMENT SERVICES AMONG GENERATION Z

Sasho Josimovski

Faculty of Economics – Skopje, University Ss. Cyril & Methodius, North Macedonia,
saso.josimovski@eccf.ukim.edu.mk

Lidija Pulevska Ivanovska

Faculty of Economics – Skopje, University Ss. Cyril & Methodius, North Macedonia,
lidija.pulevska@eccf.ukim.edu.mk

Martin Kiselicki

Faculty of Economics – Skopje, University Ss. Cyril & Methodius, North Macedonia,
martin.kiselicki@eccf.ukim.edu.mk

Mare Bogeva Micovska

Public Procurement Bureau, North Macedonia, marebm@gmail.com

Abstract: Gamification has been used more and more in the digital transformation of public administration as a tactic to increase compliance, transparency, and citizen engagement. Points, prizes, and social components are used by gamified e-government services to encourage behavior change, especially in younger generations accustomed to digital engagement. Even though models like the Unified Theory of Acceptance and Use of Technology (UTAUT) are used in a large portion of the current research on digital adoption in the public sector, these frameworks frequently place an emphasis on peer influence and usability while under examining the institutional aspect of trust. However, it has been repeatedly noted that a key determinant of whether or not citizens embrace and continue to use digital services is their level of trust in public institutions and the government. In light of this, this study explores how trust functions as a mediating factor in Generation Z's adoption of gamified e-government initiatives. The study expands on UTAUT by presenting trust in institutions and the government as a possible mediator between the behavioral intention to use gamified public services and two important predictors: facilitating conditions and social influence. A survey of 119 young people in North Macedonia, where e-government initiatives are being pushed as instruments for fiscal accountability and transparency, was used to gather data. Respondents, who are primarily from Generation Z, are a perfect group to research how digital innovations are adopted because of their experience with gamified environments and their changing perceptions of institutional trust. Both direct and indirect effects were tested using regression-based mediation analysis, which was backed by 5,000 bootstrap resamples. The findings offer compelling evidence that behavioral intention is significantly predicted by social influence and favorable circumstances. Peer approval and the presence of dependable infrastructure in particular were found to be strong predictors of sustained use of gamified services. Furthermore, trust was also significantly predicted by facilitating conditions, indicating that institutional competence and system reliability perceptions serve as the cornerstones for fostering trust in open digital platforms. Conversely, trust was not significantly impacted by social influence, suggesting that increased institutional confidence is not solely a result of peer approval. The results showed that trust did not significantly mediate the relationship between behavioral intention and either facilitating conditions or social influence when mediation was evaluated.

Keywords: E-government adoption, Trust in Institutions, Generation Z, Mediation Analysis

1. INTRODUCTION

The way that citizens and public institutions interact has changed as a result of the rapid spread of digital technologies. Through creative features, e-government platforms are increasingly being developed to promote compliance, participation, and trust in addition to offering access to services (Carter & Bélanger, 2005). According to Deterding, Dixon, Khaled, and Nacke (2011), gamification—the use of game design elements outside of games—has become a popular strategy for encouraging user participation and maintaining behavioral change. Empirical research suggests that gamified public services can decrease informality and promote transparency by making compliance socially visible and rewarding (Hamari, Koivisto, & Sarsa, 2014; Hassan & Hamari, 2020). Models like the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh, Morris, Davis, & Davis, 2003) have historically served as a guide for adoption research in information systems; however, these frameworks prioritize social and usability-related predictors, including social influence, performance expectancy, effort expectancy, and facilitating conditions. Adoption in the context of e-government, however, is not just based on peer pressure or convenience. Citizens' perceptions of public digital services are frequently shaped by their level of trust

in institutions and the government (Carter & Bélanger, 2005; Gefen, Karahanna, & Straub, 2003). According to McKnight, Choudhury, and Kacmar (2002), trust affects users' perceptions of an institution's ability to act responsibly, safeguard their data, and provide the benefits they have promised. More recent studies confirm this dynamic, showing that trust remains one of the strongest predictors of e-government adoption and continuance intention (Li, 2021; Zeebaree, Agoyi, & Aqel, 2022; Luo, Hasan, & Ahmad, 2024). For example, Aleisa et al. (2024) find that integrating trust into UTAUT significantly improves explanatory power, while Adeel et al. (2023) highlight the role of government legitimacy and trust in shaping citizens' willingness to adopt innovative e-government services. Similarly, Mesa et al. (2023) demonstrate that digital trust plays a crucial role in bridging the digital divide and fostering confidence in public service delivery. These findings mirror observations in gamification research: while leaderboards, badges, and points can promote initial participation, sustained participation necessitates trust in the system's integrity, fairness, and dependability (Mekler, Brühlmann, Tuch, & Opwis, 2017; Tondello et al., 2016). This trust dimension is particularly important in the public sector, where skepticism toward government remains relatively high (Frey & Torgler, 2007). In light of this, the current study expands on the UTAUT framework by investigating how trust in institutions and the government mediates the uptake of gamified e-government services. In particular, it examines whether trust can account for how social influence and facilitating conditions affect Generation Z users' intentions to adopt and use such services. By doing so, the study bridges the gap between the institutional realities of public sector digitalization and technology adoption models, which frequently presume social conformity and rational decision-making.

This study makes two contributions. In theory, it integrates digital government research with information systems by positioning trust as a central construct in the analysis of gamified e-government adoption. In practice, it offers guidance to policymakers aiming to create long-lasting gamified services, emphasizing the need to combine peer effects and usability with strategies that strengthen institutional trust.

2. METHODOLOGY

This study used a quantitative, cross-sectional survey design to investigate how trust affects Generation Z's adoption of gamified e-government services. By adding trust in institutions and the government as a mediating factor between social influence, enabling circumstances, and behavioral intention, the conceptual model expands upon the Unified Theory of Acceptance and Use of Technology (UTAUT). An online survey was used to gather data from young people in North Macedonia, with a focus on university students between the ages of 18 and 24. A total of 119 valid cases were kept for analysis after incomplete responses were removed. Since Generation Z is the most technologically savvy group in society, their opinions are crucial to the success of gamified public services, which is why they were chosen. Five-point Likert scales, with 1 denoting strongly disagree and 5 denoting strongly agree, were used to measure each item. Each of the three items used to measure Social Influence and Facilitating Conditions showed strong internal consistency ($\alpha = .815$ and $.828$, respectively). Three items measuring the likelihood of continuing to use and recommend the service were used to measure behavioral intention ($\alpha = .860$). One indicator of system reliability and uptime was used to gauge trust; single-item measures are frequently employed in exploratory trust research, despite the fact that they do not allow for internal consistency testing (Wanous, Reichers, & Hudy, 1997). In order to preserve model parsimony, demographic variables like gender, age, and employment status were not included as controls, but they were nonetheless gathered for descriptive purposes. Bootstrapped mediation tests and ordinary least squares regression were used to analyze the data. Initially, all constructs' descriptive statistics, reliabilities, and correlations were calculated. The direct effects of facilitating circumstances and social influence on behavioral intention, as well as their effects on trust, were then estimated using regression models. A final model simultaneously included social influence, facilitating conditions, and trust to test behavioral intention. Using bootstrapped indirect effects with 5,000 resamples, mediation was evaluated; it was deemed significant when zero was excluded from the 95 percent confidence interval (Hayes, 2018). Without the extra complexity of full structural equation modeling, this method offers a thorough yet approachable way to investigate the mediating role of trust.

3. LITERATURE REVIEW

By introducing features like leaderboards, points, and rewards into contexts that aren't typically associated with games, gamification has become a popular strategy to increase user engagement with digital services (Deterding, Dixon, Khaled, & Nacke, 2011). Gamified initiatives in the public sector seek to promote civic engagement, transparency, and compliance. Fiscal transparency initiatives and receipt-scanning apps, for instance, incentivize citizens to document transactions, which decreases informality and boosts accountability (Hamari, Koivisto, & Sarsa, 2014; Hassan & Hamari, 2020). Prior studies show that by making interacting with government services more engaging and rewarding, gamification in e-government not only boosts participation but also changes citizens'

perceptions of institutions (Mekler, Brühlmann, Tuch, & Opwis, 2017). Even though gamification can increase engagement in the short term, sustained use necessitates a more solid foundation, especially in situations where institutional trust is low. A popular framework for comprehending technology adoption is the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh, Morris, Davis, & Davis, 2003). Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions are the four main predictors of behavioral intention identified by UTAUT. These concepts describe how adoption in digital government is influenced by views of utility, usability, peer support, and infrastructure. Since peer endorsement frequently motivates use of public digital platforms, studies show that social influence is especially powerful among younger users (Carter & Bélanger, 2005). In a similar vein, enabling factors—like system dependability and support accessibility—are essential to guaranteeing continued use (AlAwadhi & Morris, 2009). Notwithstanding UTAUT's capacity for explanation, detractors point out that it ignores institutional and contextual factors and presumes logical decision-making (Williams, Rana, & Dwivedi, 2015). This restriction is particularly noticeable in e-government, where citizens' willingness to participate is based on their trust in the public institutions that provide the service as well as its usability.

One of the main factors influencing citizens' adoption of e-government services is their level of trust in institutions and the government. Trust shapes initial acceptance and subsequent use by influencing perceptions of risk, fairness, and data protection (Carter & Bélanger, 2005; Gefen, Karahanna, & Straub, 2003). According to McKnight, Choudhury, and Kacmar (2002), trust is made up of convictions regarding competence, kindness, and honesty—all of which are extremely pertinent to digital public services. When users believe the system is transparent, dependable, and equitable, they are more likely to participate in gamified contexts (Tondello et al., 2016). On the other hand, low levels of trust can compromise even well-designed services because people who are skeptical of government institutions tend to disengage or participate very little (Frey & Torgler, 2007). Even so, not many studies have formally incorporated trust as a mediating construct into well-known adoption frameworks like UTAUT, especially when it comes to gamified e-government.

Research Gap

The significance of usability, social influence, and infrastructure in influencing behavioral intention has been demonstrated by earlier research on gamification and the adoption of digital government. These studies, however, frequently ignore the institutional aspect of adoption and treat users as purely rational actors. Some citizens convert peer encouragement and usability into long-term behavioral intention, while others stay disengaged, which may be explained by their trust in institutions and the government. In order to bridge this gap, the current study adds trust as a mediator between behavioral intention, facilitating conditions, and social influence to the UTAUT model. This method offers theoretical and practical insights into the circumstances that lead to the long-term success of gamified e-government initiatives.

4. RESULTS

The descriptive statistics show that respondents reported generally positive perceptions of the constructs under study. Social Influence, Facilitating Conditions, and Behavioral Intention all achieved satisfactory levels of internal consistency, with Cronbach's alpha values of .815, .828, and .860, respectively. Trust was measured as a single item, and thus reliability could not be assessed. Mean values were above the midpoint of the scale, with Behavioral Intention recording the highest score, suggesting that most respondents intended to continue using gamified e-government services. These results are reported in Table 1.

Table 1. Descriptives and Reliability of Constructs

	Mean	SD	Alpha
SI	3,833613445	0,77342265	0,828224742
FC	3,65210084	0,757543839	
TRUST	3,638655462	1,014564217	0,861831677
BI	4,153361345	0,801289509	0,814519125

Source: Own research

Correlations between the constructs were positive and in line with theoretical expectations. Behavioral Intention was strongly correlated with Trust ($r = .572$) and moderately correlated with both Social Influence ($r = .585$) and Facilitating Conditions ($r = .627$). These associations suggest that both peer-related and infrastructural factors, as well as perceptions of institutional reliability, are linked to users' intentions to engage with such services.

To test the direct effects of the predictors, an OLS regression was conducted with Behavioral Intention as the dependent variable and Social Influence and Facilitating Conditions as independent variables. Both predictors were statistically significant, with Social Influence ($\beta = 0.308$, $p < .001$) and Facilitating Conditions ($\beta = 0.482$, $p < .001$) positively influencing Behavioral Intention. Together, these variables explained 43.8% of the variance in Behavioral Intention, highlighting their robust role in shaping adoption. These findings are reported in Table 2.

Table 2. Regression Results Predicting Behavioral Intention from Social Influence and Facilitating Conditions

	coef	se	t	p
const	1,211	0,318	3,811	0
SI	0,308	0,085	3,649	0
FC	0,482	0,086	5,585	0

Source: Own research

The next step examined the antecedents of Trust. Regression analysis indicated that Facilitating Conditions significantly predicted Trust ($\beta = 1.117$, $p < .001$), while the effect of Social Influence was negligible and not statistically significant ($\beta = 0.023$, n.s.). This suggests that perceptions of infrastructural reliability and support are stronger determinants of institutional trust than peer or community encouragement. The results are displayed in Table 3.

Table 3. Regression Results Predicting Trust from Social Influence and Facilitating Conditions

	coef	se	t	p
const	-0,527	0,289	-1,826	0,07
SI	0,023	0,077	0,297	0,767
FC	1,117	0,078	14,25	0

Source: Own research

Finally, mediation analysis was conducted to assess whether Trust acted as a mechanism linking Social Influence and Facilitating Conditions to Behavioral Intention. When Trust was included in the regression model alongside Social Influence and Facilitating Conditions, its coefficient was positive but not statistically significant ($\beta = 0.145$, $p = .157$). Bootstrap analysis with 5,000 resamples confirmed that the indirect effects were not significant: the indirect effect of Social Influence through Trust was $ab = 0.004$, 95% CI [-0.022, 0.040], and the indirect effect of Facilitating Conditions through Trust was $ab = 0.161$, 95% CI [-0.093, 0.411]. Since both confidence intervals include zero, mediation cannot be confirmed. The bootstrap mediation results are presented in Table 4.

Table 4. Bootstrap Mediation Analysis of Trust as a Mediator

Predictor	Indirect (a*b)	Boot CI 2.5%	Boot CI 97.5%
SI	0,004	-0,022	0,04
FC	0,161	-0,093	0,411

Source: Own research

Taken together, these findings indicate that Social Influence and Facilitating Conditions exert direct and significant effects on Behavioral Intention, while Trust, as operationalized in this study, does not mediate these relationships. Trust remains correlated with Behavioral Intention but appears to function as a parallel factor rather than as an explanatory mechanism for the influence of social or infrastructural drivers.

5. DISCUSSION & CONCLUSIONS

The study's conclusions offer important new information about Generation Z's behavioral patterns in relation to gamified e-government services. It was discovered that social influence and facilitating circumstances both significantly predicted behavioral intention, which is in line with the Unified Theory of Acceptance and Use of Technology (UTAUT). These findings demonstrate that peer approval and infrastructure support continue to play a crucial role in influencing adoption choices for digital natives. The collective aspect of technology use is reflected in social influence, where peer and social network recommendations and actions promote engagement. When adoption is contingent on opinions about the competence and dependability of the government, facilitating conditions emphasize the significance of system functionality, uptime, and institutional support. The results of the

trust analysis were more intricate. According to correlation analysis, behavioral intention and trust were highly correlated, suggesting that sustained engagement is positively correlated with institutional dependability and confidence in system performance. However, the mediation analysis showed that the relationship between social influence, facilitating conditions, and behavioral intention was not significantly explained by trust. Social influence had no correlation with trust, but facilitating conditions turned out to be a powerful predictor. According to this pattern, Generation Z's confidence in gamified government systems is based more on direct institutional performance and infrastructure delivery than it is on social endorsement.

These results add to the continuing theoretical discussion about how trust affects the adoption of digital government. Although earlier research frequently posits trust as a mediating mechanism (Carter & Bélanger, 2005; Gefen, Karahanna, & Straub, 2003), the current findings suggest that trust might function in tandem with social and infrastructure drivers instead of serving as the conduit via which they impact intention. This is consistent with viewpoints that highlight the complex nature of trust (McKnight, Choudhury, & Kacmar, 2002), which, depending on the situation and how it is operationalized, can function as an antecedent, moderator, or parallel factor all at once. System reliability, which may only measure one component of the larger construct and leave out elements like fairness, benevolence, or integrity that may have more potent mediating effects, was the narrow measure of trust used in this study. The findings provide depth to current conversations regarding sustained engagement in the context of gamification literature. Long-term engagement is dependent on deeper institutional signals, according to this study, even though gamification features like rewards, points, and social recognition can promote short-term participation (Hamari, Koivisto, & Sarsa, 2014; Tondello et al., 2016). It is not a given that usability or peer pressure will inevitably lead to trust among Generation Z, a group that is frequently characterized as being skeptical of traditional authorities but extremely receptive to digital experiences. Rather, it needs to be actively fostered through open governance, unambiguous results communication, and consistent provision of dependable services.

These findings have two practical implications. First, when creating gamified e-government services, policymakers should make sure that infrastructure dependability is a top concern. In addition to being technical factors, system uptime, responsive support, and functional stability are important indicators of an institution's credibility. Second, while social influence was found to be a significant predictor of behavioral intention, its inability to predict trust raises the possibility that community-driven engagement strategies and peer campaigns alone may not be enough. Governments must combine trust-building tactics like user feedback loops, data protection guarantees, and open reporting of system impacts with social reinforcement mechanisms to promote sustainable adoption. By doing this, short-term compliance can become long-term dedication. There are a number of limitations to the study that present chances for further investigation. First, a single item emphasizing dependability and uptime was used to gauge trust. Future research should use multi-item trust measures that capture competence, benevolence, and integrity, even though they are suitable for exploratory analysis (McKnight et al., 2002). With this method, it would be possible to test whether various aspects of trust have different functions as moderators or mediators. Second, the results can't be applied to other age groups and cultural contexts because the sample was limited to North Macedonia's Generation Z respondents.

A more comprehensive understanding of how trust dynamics differ in the adoption of e-government would be possible through comparative studies across generations and nations. Third, causal inference is limited by the cross-sectional design. As gamified government services develop or institutional conditions shift, longitudinal studies could monitor the evolution of trust and behavioral intention over time. Lastly, combining self-reported metrics with objective usage data would lessen the possibility of recall or social desirability biases and validate adoption patterns. In summary, this study shows that social influence and favorable circumstances directly affect Generation Z's behavioral intention to use gamified e-government services, whereas trust—as defined here—does not mitigate these effects. Although there is still a strong correlation between trust and intention, its function seems to be more supplementary than explanatory. These results theoretically imply that extending UTAUT with trust necessitates paying close attention to the contextual relevance and dimensionality of trust. The findings practically show that governments must combine strong trust-building tactics with usability and peer influence to make sure that gamified services are not only entertaining but also dependable, transparent, and institutionally credible. To properly capture its role in maintaining the adoption of digital government, future research that improves the measurement of trust and broadens the scope of analysis will be crucial.

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