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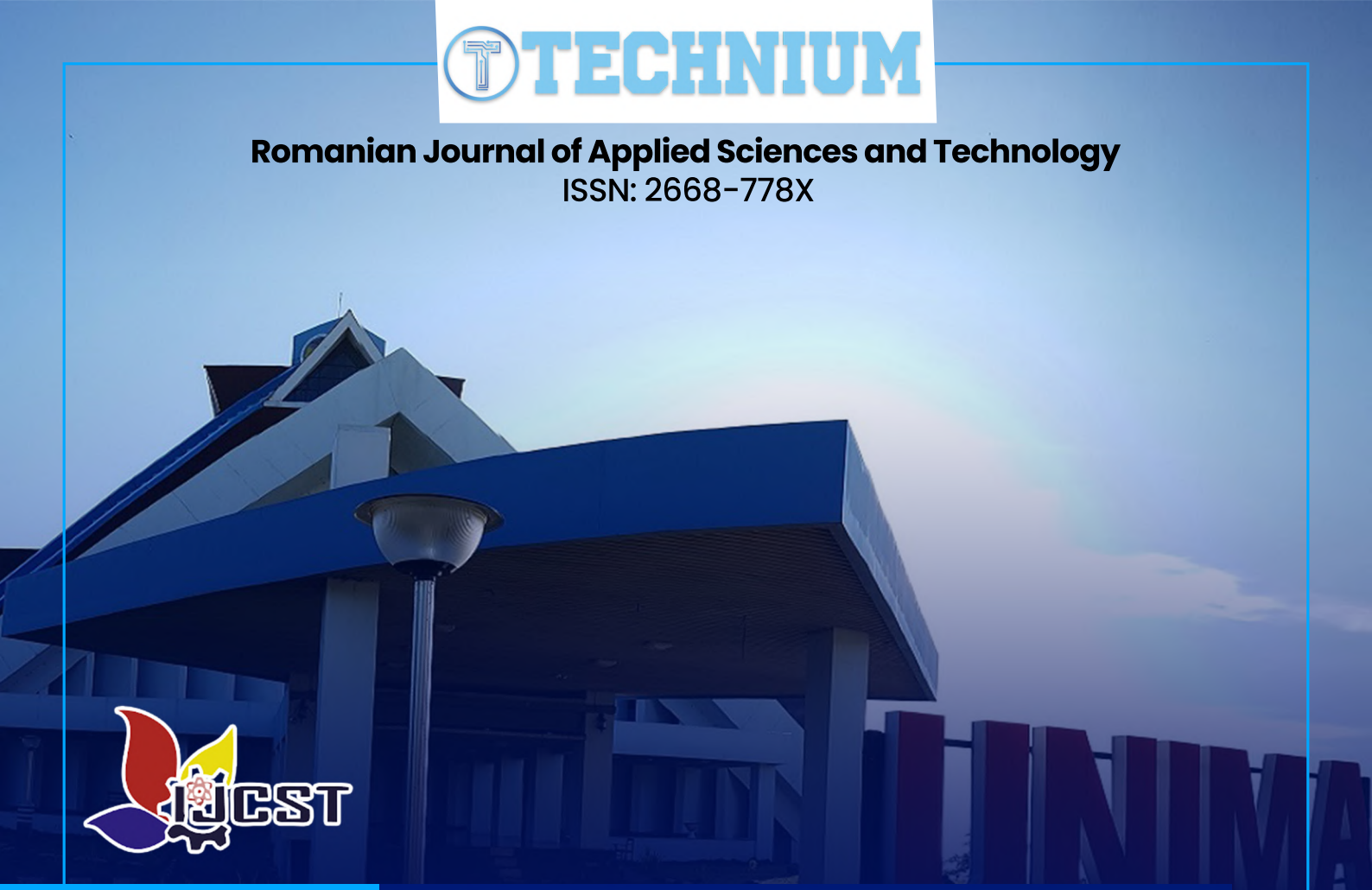

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Age-Dependent User Perception Analysis of Web Application Using Technology Acceptance Model Approach: A Case Study

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Abstract. In the pursuit of technologically advanced governance, the Ministry ABC has integrated technology into daily operations, particularly through web applications like an employee administration information system. However, challenges persist in the implementation of online administration, especially in terms of technology adoption among the older generation. This study employs the Technology Acceptance Model (TAM) to investigate the usage of the administrative information system, focusing on System Quality (SQ), Perceived Ease of Use (EU), Perceived Usefulness (PU), and Behavioral Intention (BI). Surveying 147 respondents via questionnaires, the findings reveal that system quality positively influences perceived ease of use and perceived usefulness, while unexpectedly establishing a negative relationship between system quality, perceived ease of use, perceived usefulness, and behavioral intention. These insights hold significance for both theory and practice, reaffirming the crucial roles of perceived ease of use and perceived usefulness in shaping behavioral intentions and augmenting the TAM model.

Keywords : Age-Dependen Perception, Web Application, Technology Acceptance Model.

1 Introduction

Rapid technological developments have penetrated into all sectors, including the public sector[1], such as the Ministry ABC of the Republic of Indonesia. In its pursuit of fostering the advancement of technology-based governance, the Ministry ABC incorporates technology into its daily activities to bolster performance improvements. This initiative is further accentuated by the challenges posed by the COVID-19 pandemic, driving the Ministry ABC to maximize its online performance. The Ministry ABC has instituted a teacher administration information system within its framework, known as Information and Administration System. This application is designed with the primary objective of streamlining diverse forms of data collection. Among the array of features offered, a notable inclusion is the monthly monitoring of performance[2].

However, the online administration implementation is not carried out easily[3,4]. The implementation of technology requires appropriate adjustments for users, especially for the older generation. Although in the past decade it has been adopted more by the younger generation, the Internet is increasingly integrated into the daily routines of adults. Younger and older users may utilize the Internet in significantly different ways[5,6]. The Ministry of ABC in Indonesia, which is the subject of the case study in this research, has a workforce numbering in the hundreds of thousands, spread across all provinces of Indonesia. Each employee possesses a personal account used to access and carry out various activities within the application. However, in practice, many among them are reluctant to utilize the application, especially among the older generation. They frequently encounter difficulties in navigating the web application. Consequently, they seek assistance from others to be able to use the application using their accounts. This phenomenon is undoubtedly quite risky, considering that the application stores their personal data which is susceptible to misuse[7].

To study the relationship between age differences and perceptions, as well as participation in the usage of applications, this study employs the [8,9] (TAM) approach. TAM is applied to two key variables, namely perceived usefulness (PU) and perceived ease of use (PEOU), which researchers have utilized to delve into crucial determinants of technology adoption. While there have been studies related to TAM in application usage, not many research endeavors have delved into administrative systems and the comparison of user age concerning their usage perceptions. Therefore, this research focuses on the utilization of online administrative systems with a comparative analysis of user age. The aim of this study is to apply the TAM within the context of information system usage. Furthermore, this study seeks to unveil the relationship between user age and usage perceptions. Building upon this background, the research question: "How do age differences influence application usage?". It is anticipated that future endeavors in information system

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development will incorporate a comprehensive approach that caters to diverse user profiles.

2 Theories and Hypothesis

2.1 Technology Acceptance Model

There are four main theories that explain the acceptance process[10,11]. These four theories are: (1) Theory of Planned Action (TRA); (2) Theory of Planned Behavior (TPB); (3) Innovation Diffusion Theory (IDT); and (4) Technology Acceptance Model (TAM). In the concept of TAM, the acceptance or utilization of technology is determined by behavioral intention. Behavioral intention, in turn, is influenced by the attitude towards usage, as well as the direct and indirect effects of perceived ease of use and perceived usefulness. Both perceived ease of use and perceived usefulness collectively influence the attitude towards usage, while perceived ease of use has a direct impact on perceived usefulness.

2.2 Age Groups' Perspectives

The workplace revolution in the past decade has yielded significant impacts. However, currently, there exist potent demographic forces that are poised to solidify a shift in workplace culture[12,13] as follows:

- ✓ Firstly, individuals from the Schwarzkopf Generation (born before 1946) are gradually exiting the workforce, carrying with them decades of wisdom, knowledge, and expertise.
- ✓ Secondly, the Baby Boomer Generation (born between 1946 and 1964) is aging within the workforce; each day, eight to ten thousand members of the Baby Boomer Generation reach the age of 55.
- ✓ Thirdly, the productive-age workforce — those aged 35 to 45 years and serving as prime candidates for leadership positions — will increasingly be populated by the Generation X (born between 1965 and 1977), closely followed by Generation Y (born between 1978 and 1989)[14].
- ✓ The fourth refers to Generation Z or Milenial, which encompasses individuals born roughly from the mid-1990s to the early 2000s. They have grown up in the era of digital technology and the internet, exhibiting a propensity for high digital literacy and strong social awareness.

In this study, we employed the generational terms proposed by Martin & Tulgan[14]. To facilitate the research, Generation X is referred to as the older generation, while Generation Y and Z are designated as the younger generation or millennials.

Based on TAM was developed to explain user behavior in information system or technology adoption. This model places the attitude and behavior factors of each user within constructs, namely perceived usefulness, perceived ease of use, and actual system usage. Therefore, this study employs TAM. TAM consists of three key variables: Perceived Ease of Use (PEOU), Perceived Usefulness (PU), and potential users' behavioral intention (BI) to adopt the implemented technology[15].

2.3 System Quality (SQ)

SQ is defined as the "extent to which users receive assistance from an information system"[16]. SQ encompasses aspects of ease, accessibility, and the system's acceptability[17]. The quality of web-based services exerts a substantial and positive impact on students' behavioral intentions. As a result, it can be deduced that system quality indeed influences the technology acceptance in developed regions. Hence, it is incorporated in this study to ascertain the influence of SQ on behavioral intention, utilizing the fundamental framework of TAM[16].

- ✓ H1a: System quality has a significant positive impact on perceived ease of use for web application administration.
- ✓ H1b: System quality has a significant positive impact on perceived usefulness for web application administration.
- ✓ H1c: In the older generation, age does not have a significant positive impact on system quality.

2.4 Perceived ease of use (EU)

As per the definition in this study, it is characterized as the user's sense of being relieved from the effort—both mentally and physically—when utilizing the Administration Information System. Prior research has elucidated the positive correlation between this intention to use.

- ✓ H2: perceived ease of use has a significant positive impact on behavioral intention for web application administration.
- ✓ H2a: In the older generation, age does not have a significant positive impact on perceived ease of use.

2.5 Perceived usefulness (PU)

PU is defined as the "extent to which an individual believes that utilizing a specific system would enhance their job performance"[7]. Previous research has substantiated the significant influence of PU on the intention to employ a specific system.

- ✓ H3: Perceived usefulness has a substantial and positive impact on the behavioral intention toward web application administration.
- ✓ H3a: Within the older generation, age does not exert a significant and positive impact on perceived usefulness.

2.6 Behavioral intention (BI)

BI is chosen as the independent variable in this research endeavor. Furthermore, the literature substantiates the significant and direct correlation of EU and PU with the intention to use, as opposed to usage behavior or attitude.

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- ✓ H4: Within the older generation, age does not yield a significant positive influence on the behavioral intention to utilize web application administration.

3 Model and Method

3.1 Research Model

The research model can be shown in Fig 1.

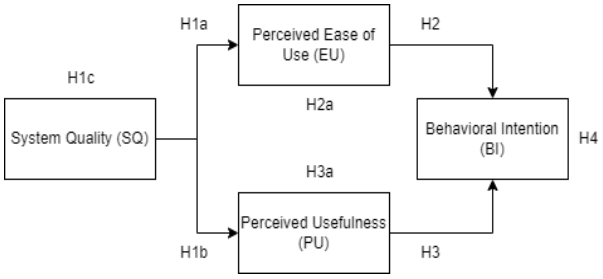

Fig. 1. Model of Hypothesis.

Figure 1 depicts the relationships among various hypotheses (H1a, H1b, H1c, H2a, H3a, H3 and H4) proposed for testing their alignment with the conducted empirical confirmations and validations.

3.2 Research Method

In this study, a quantitative research approach was employed. The utilization of a quantitative approach aimed to elicit numerical data through the systematic observation and quantification of issues, behaviors, opinions, and attitudes[13]. The selection of a quantitative approach aligns with the research's objective, which involves observing and analyzing individuals' behaviors, opinions, and attitudes towards the utilization of a web application. The chosen research method for data collection was a survey.

3.2.1 Questionnaire design

The survey questionnaire is divided into two sections: one capturing personal information (age, gender), and the other addressing the research inquiries. The questionnaire employs a 5-point Likert scale, where responses range from 1, indicating strong disagreement, to 5, indicating strong agreement. The research queries presented in the questionnaire have been modified from prior investigations.

3.2.2 Questionnaire readability

A readability assessment was conducted on the questionnaire to verify its comprehensibility in line with the research goals. This assessment was executed through an online questionnaire platform. Three users of the administration web application participated in evaluating the questionnaire's readability. These participants offered feedback on the questionnaire, contributing to the refinement of its final version. The feedback encompassed rectifying perplexing or unclear statements, in addition to identifying pertinent personal data that would be inquired from respondents subsequently.

3.2.3 Sampling and survey administration

This study utilizes convenience sampling, a non-probability method, where participants meeting specific criteria and readily available are included. This approach was chosen for its swift data collection within a limited timeframe. Data was collected through online distribution of research questionnaires in 2022 via platforms like WhatsApp. The gathered primary data directly originates from field-relevant sources and is based on respondents' completion of the questionnaires.

3.2.4 Measurement

Following the data collection conducted in the preceding phase, the collected questionnaire data undergoes analysis. This stage involves subjecting the formulated hypotheses to testing through Structural Equation Modeling (SEM) to determine their confirmation or refutation based on statistical findings. The structural model of the study will be evaluated employing Partial Least Squares (PLS). Subsequently, hypothesis testing will ascertain the acceptance or rejection of individual hypotheses.

4 Result and Discussion

4.1 Statistic Validation

From the distributed questionnaires, a total of 147 respondents were obtained, and after preliminary data review, 142 respondents proceeded to the subsequent processing and analysis stages. These respondents comprised 93 males (65.4%) and 49 females (34.6%). In terms of age, 84 respondents belonged to the younger generation (59.2%), while 58 were categorized as older generation participants (40.8%). Prior to hypothesis testing, the research instrument underwent evaluation, with results detailed in Table 1. The data in Table 1 demonstrates that all item CR values exceed the minimum threshold of 0.7, along with factor loading and AVE values surpassing the recommended levels of 0.7 and 0.5, respectively[18,19]. The research instrument's reliability, assessed using CA, also surpasses the required minimum of 0.7.

Table 1. Items Reability.

Items	FL[a]	CR[a]	AVE[a]	CA[a]	Cons.
SQ1	0.78	0.78	0.70	0.83	SQ
SQ2	0.80				
SQ3	0.74				
EU1	0.80	0.87	0.82	0.89	EU
EU2	0.82				
EU3	0.76				
PU1	0.73				PU
PU2	0.74				

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PU3	0.71	0.78	0.80	0.76	

[a]FL:Factor Loading; CRa: Composite reliability; AVEa: average variance extracted; CAa: Cronbach's Alpha.

4.2 Hypothesis Validation

The subsequent step involves hypothesis testing using processed data from Smart PLS and SPSS, revealing the impacts of the studied factors. Results confirm that system quality significantly and positively influences perceived ease of use ($\beta = 0.39$, $p < 0.05$), supporting H1a. Similarly, system quality significantly contributes to perceived usefulness ($\beta = 0.15$, $p < 0.05$), validating H1b. Concerning the dependent variable of behavioral intention (BI), both perceived ease of use ($\beta = 0.12$, $p < 0.05$) and perceived usefulness ($\beta = 0.16$, $p < 0.05$) significantly impact it, affirming H2 and H3. Negative correlations ($r = -0.14$) between age and variables (system quality, perceived ease of use, perceived usefulness, and behavioral intention) validate H1c, H2a, H3a, and H4. Model analysis findings are depicted in Figures 2 and 3, with a summary of hypotheses in Table 2.

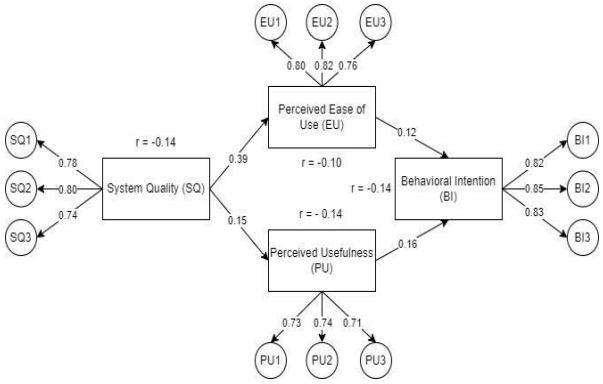

Fig. 2. Result of factors loading.

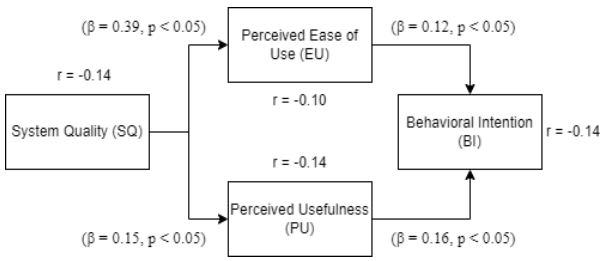

Fig. 3. Result of the analysis hypothesis.

Table 2. The Result of Hypothesis Analysis.

Hypothesis	Description	Results
H1a	SQ → EU	Valid
H1b	SQ → PU	Valid
H1c	Age → SQ	Valid
H2	EU → BI	Valid
H2a	Age → EU	Valid
H3	PU → BI	Valid
H3a	Age → PU	Valid
H4	Age → BI	Valid

This study employs the TAM model in information system administration, exploring age-related perceptions and identifying key factors influencing intentions to use these systems. The study successfully validates TAM for information system administration, revealing positive impacts of ease of use and usefulness perceptions on behavioral intention, alongside system quality's influence. Age disparities in perceptions are discussed, highlighting older users' struggles due to system quality issues and revealing disparities in ease-of-use perceptions between older and younger users.

4.3 Discussion

This study applies the Technology Acceptance Model (TAM) to the realm of information system administration and explores age-related differences in perceptions of system usage. The investigation uncovers critical factors that influence the intention to adopt information systems administration.

The study effectively validates the applicability of the TAM model within the context of information system administration. The alignment between End-User Perceived Ease of Use (EU) and Behavioral Intention (BI), as well as between Perceived Usefulness (PU) and BI, substantiates TAM principles. Notably, the research establishes a positive correlation between system quality and both EU and PU. This finding supports the idea that enhanced system quality facilitates user access to web applications, enabling them to derive valuable benefits. Consequently, the quality of the web application emerges as a key determinant in shaping users' perceptions of ease and usability.

Age-related disparities in perceptions of information system administration are also examined, revealing a negative relationship involving system quality, perceived ease of use, perceived usefulness, and behavioral intention. The inverse correlation between age and system quality underscores the challenges older generations face in using web applications due to subpar system quality. This observation aligns with prior research highlighting the role of system difficulty in shaping older individuals' technology adoption reluctance[20]. Additionally, the study reveals discrepancies in the perception of system ease of use between older and younger generations. Older individuals significantly benefit from user-friendly systems with uncomplicated features, which facilitate their understanding of web application usage. These disparities extend to perceived usefulness and behavioral intention, underscoring the presence of a notable generational gap, in accordance with earlier research[9].

The intent to engage with the system is explained by perceived ease of use and perceived usefulness. System users, encompassing both the younger and older generations with internet access, express interest in systems that offer user-friendliness and functional advantage.

5 Conclusion

This study applies the TAM model within the realm of information system administration, specifically addressing the impact of age differences on the utilization of the Web Application. The congruence between End-User (EU) and Behavioral Intention (BI), as well as between Perceived Usefulness (PU) and BI, aligns with TAM principles. Additionally, a positive influence of system quality on both EU and PU is observed, emphasizing its significance in enhancing user experience. However, the study also highlights a negative relationship between age and system quality, perceived ease of use, perceived usefulness, and behavioral intention.

The research yields valuable theoretical and practical insights. It reaffirms the importance of perceived ease of use and perceived usefulness in driving behavioral intention, thereby bolstering the TAM model. Furthermore, the study's focus on age-related disparities in perception offers practical recommendations for web application design. These findings underscore the need for user-friendly features and broad accessibility across age groups. While the research enriches the application of the TAM model to administrative information systems, its limitations include a narrow focus on external variables—primarily system quality. Future studies could consider broader variables like privacy concerns, self-efficacy, and perceived technology affordance. In the context of administration information system, examining privacy concerns related to personal data usage could provide valuable insights. Moreover, expanding respondent participation and incorporating workplace-related questions would enhance the study's validity and applicability across regions.

References

1. Perpres No.95 Tahun 2018 *Sistem Pemerintahan Berbasis Elektronik (SPBE)*; 2018; p. 110;.
2. Tepylo, N.; Straubinger, A.; Laliberte, J. Public Perception of Advanced Aviation Technologies: A Review and Roadmap to Acceptance. *Progress in Aerospace Sciences* 2023, *138*.
3. Veit, D.J.; Parasie, N.P. Can National E-Government Standards Find Acceptance? *Proceedings of the 42nd Hawaii International Conference on System Sciences (HICSS-42)* 2009, 132 (1-10).
4. Wirtz, B.W.; Piehler, R. EGovernment Applications and Public Personnel Acceptance: An Empirical Analysis of the Public Servant Perspective. *International Journal of Public Administration* **2016**, *39*, 238–247, doi:10.1080/01900692.2014.1003384.
5. Chang, Y.-L.; Zhang, N.; Lank, E. Perception and Decision Making on Electronic Tax Software for the Younger Population. *10th European Conference on e-Government (ECEG 2010)* 2010, 99–106.
6. Hirzalla, F.; Banaji, S.C.N.-J.A.A. 2019 Young People, Civic Participation, and the Internet. In *Advanced methodologies and technologies in government and society*; Khosrow-Pour, M., Ed.; Information Science Reference: Hershey, PA; pp. 305–316 ISBN 978-1-5225-7661-7.
7. Lemay, D.J.; Doleck, T.; Bazelais, P. Context and Technology Use: Opportunities and Challenges of the Situated Perspective in Technology Acceptance Research. *British Journal of Educational Technology* **2019**, *50*, 2450–2465, doi:10.1111/bjet.12859.
8. Taherdoost, H. Development of an Adoption Model to Assess User Acceptance of E-Service Technology: E-Service Technology Acceptance Model. *Behaviour & Information Technology* **2018**, *37*, 173–197, doi:10.1080/0144929x.2018.1427793.
9. Chung, J.E.; Park, N.; Wang, H.; Fulk, J.; Mclaughlin, M. Age Differences in Perceptions of Online Community Participation among Non-Users: An Extension of the Technology Acceptance Model. *Comput Human Behav* **2010**, *26*, 1674–1684, doi:10.1016/j.chb.2010.06.016.
10. Chung, J.E.; Park, N.; Wang, H.; Fulk, J.; Mclaughlin, M. Age Differences in Perceptions of Online Community Participation among Non-Users: An Extension of the Technology Acceptance Model. *Comput Human Behav* **2010**, *26*, 1674–1684, doi:10.1016/j.chb.2010.06.016.
11. Bagozzi, R.P. *The Legacy of the Technology Acceptance Model and a Proposal for a Paradigm Shift*; 2007; Vol. 8;.
12. Masters, Z.; Macintosh, A.; Smith, E. Young People and E-Democracy: Creating a Culture of Participation. *Electronic Government: Proceedings of the 3rd IFIP WG 8.5 International Conference, EGOV 2004* 2004, *3183*, 15–22.
13. Sørum, H. Young People's Views of Municipality Websites: Use, Attitudes, and Perception of Quality. *7th International Conference on Electronic Government and the Information Systems Perspective (EGOVIS 2018)* 2018, 86–100.
14. Martin, C.A.; Tulgan, Bruce. *Managing the Generation Mix : From Urgency to Opportunity*; HRD Press, 2006; ISBN 087425941X.
15. Sun, H.; Zhang, P. The Role of Moderating Factors in User Technology Acceptance. *International Journal of Human Computer Studies* **2006**, *64*, 53–78, doi:10.1016/j.ijhcs.2005.04.013.
16. Jeong, H. An Investigation of User Perceptions and Behavioral Intentions towards the E-Library. *Library Collections, Acquisitions, & Technical Services* **2011**, *35*, 45–60, doi:10.1080/14649055.2011.10766298.
17. Khan, A.; Qutab, S. Understanding Research Students' Behavioural Intention in the Adoption of Digital Libraries: A Pakistani Perspective. *Library Review* **2016**, *65*, 295–319, doi:10.1108/LR-06-2015-0070.
18. Whitmore, A. A Statistical Analysis of the Construction of the United Nations E-Government Development Index. *Gov Inf Q* **2012**, *29*, 68–75, doi:10.1016/j.giq.2011.06.003.
19. Xue, S. Web Usage Statistics and Web Site Evaluation: A Case Study of a Government Publications Library Web Site. *Online Information Review* **2004**, *28*, 180–190.
20. Jung, Y.; Peng, W.; Moran, M.; Jin, S.A.; McLaughlin, M.; Cody, M.; Jordan-Marsh, M.; Albright, J.; Silverstein, M. Low-Income Minority Seniors' Enrollment in a Cybercafé: Psychological Barriers to Crossing the Digital Divide. *Educ Gerontol* **2010**, *36*, 193–212, doi:10.1080/03601270903183313.