

The Influence of the Prevalence of Generation Z and Millennial Age Groups on the Neuroticism Personality Trait: Implications for Employee Performance at the Education Office of Garut Regency

Bulan Tati Fitria¹, Vicky Achmad Zulfikar²

^{1,2} Sekolah Tinggi Ilmu Ekonomi Pasundan,

E-mail: bulantfitria@gmail.com¹, vicky.a.zulfikar@gmail.com²

ABSTRACT

This study aims to analyze the influence of Generation Y and Generation Z characteristics on personality neuroticism and its implications for employee performance at the Garut District Education Office. Differences in generational traits, technological adaptation patterns, and work orientations are considered as factors that shape variations in neuroticism within the workplace. A quantitative approach was employed using a four-point scale questionnaire, and the data were analyzed using Structural Equation Modeling (SEM) with 340 respondents. The findings indicate that Generation Y tends to exhibit greater emotional stability, which helps suppress neuroticism, whereas Generation Z shows higher vulnerability to anxiety and pressure, leading to increased neuroticism. In addition, neuroticism serves as a significant mediator linking generational characteristics to employee performance. These results highlight the importance of understanding psychological dynamics across generations to support decision-making in public sector human resource management.

Keywords: Generation Y, Generation Z, Personality Neuroticism, Employee Performance

INTRODUCTION

Demographic changes in the Indonesian world of work currently show the dominance of two generation groups, namely Generation Y (millennials) and Generation Z. Generation Y was born between 1981-1996, while Generation Z was born between 1997-2012 (Taibah & Ho, 2023). The issue of differences in characteristics between generations has become a major focus in contemporary human resource management studies, given its significant implications for organizational dynamics and employee productivity (Karácsony, 2019). These two generations have different psychological, social, and cultural characteristics, which have the potential to influence their personality traits and work behavior (Appelbaum

et al., 2022). The neuroticism personality trait, which is one of the dimensions of the Big Five Personality model, reflects an individual's tendency to experience negative emotions such as anxiety, depression, and emotional instability. Neuroticism, which is defined as an individual's tendency to experience negative emotions such as anxiety, emotional instability, and responsiveness to stress, is an essential personality construct to study, given its close link to a person's psychological well-being and professional effectiveness (Ulrichová, 2014). Neuroticism has been shown to have a significant effect on employee performance, where high levels of neuroticism can decrease productivity and work quality due to stress and inability to manage emotions (Sosnowska et al., 2019).

Studies show that generation Y and generation Z are more prone to neuroticism (Chhansiya & Jogsan, 2015). This vulnerability could be due to constant exposure to intense social, economic, and digital pressures, which form a typical psychological response in both groups of generations. This phenomenon demands an in-depth analysis of how demographic characteristics, such as year of birth and socio-cultural environment, correlate with the manifestation of neuroticism among these generations. A comparison of these characteristics is important to understand the implications for performance, given that each generation has different values and work attitudes (Leijen et al., 2022). Optimal employee performance contributes to the progress of the company/organization, so the development of their performance needs to be considered. Employee performance can fluctuate due to various factors that affect it (Damarsiwi et al., 2021). Factors that affect employee performance include personality neuroticism and age diversity, especially Generation Z and Y. The urgency of this study is to examine how the characteristics of Generation Z and Y can affect personality neuroticism as well as its impact on employee performance. With a deep understanding of these interactions, organizations/companies can take preventive measures to achieve optimal performance quality.

This study will review personality theories, especially the Big Five Personality theory, with a focus on the neuroticism dimension, as well as review relevant literature on the psychological and social characteristics of Generations Y and Z, including their implications for mental health and performance in the modern work environment (Stelling, 2023)

(Stelling, 2023). The discussion will also include how the unique characteristics of each generation, such as the level of resilience and adaptation to change, can affect the manifestation of neuroticism (Cramarenco et al., 2023). Furthermore, the impact of globalization and digitalization on intergenerational communication patterns and their impact on stress and anxiety levels will also be comprehensively analyzed, considering that Gen Z shows higher levels of anxiety than previous generations (Nekić, 2023).

Globalization and the rapid development of digital technology shape the characteristics of intercultural communication for Generation Z. This facilitates faster and wider cross-cultural interactions, but also creates adaptation challenges that can affect emotional stability (Wiratih et al., 2022). Nonetheless, their ability to leverage digital technologies and social media to interact with diverse cultures shows high adaptability, which in turn can mitigate the negative impact of globalization on psychological well-being (Pacheco, 2020). This adaptability makes Generation Z more tolerant of differences and tends to be more careful in maintaining their privacy, a lesson learned from the experience of previous generations. This phenomenon, which Kasali calls the "Strawberry Generation" because of its visual beauty yet internal fragility, also illustrates how Generation Z, who almost entirely own smartphones, is imaginatively easily fragile but also has the potential to become more inclusive and collaborative through their digital connectivity (Taufik et al., 2021). In contrast to Generation Y who may still be transitioning from the analog to digital era, Generation Z has grown fully within the digital ecosystem, which fundamentally shapes their communication and digital literacy patterns (Elkatmış, 2024).

The same thing is also experienced by generation Y or known as the millennial generation. This generation, born between 1981 and 1996, often shows a tendency to be more independent and have high expectations for a balance between personal and professional life, so excessive stress can trigger an increase in neuroticism (Dudija & Apriliansyah, 2024). These differences in characteristics not only affect workplace preferences, but can also alter personality traits such as neuroticism, which then have a major impact on organizational performance. Generation Y characters have a high adaptability to technological changes, but they still show significant differences in social media use compared to Generation Z,

who tend to be more creative in building their digital identities. These fundamental differences affect the way they interact socially, seek information, and even shape their personalities (Elkatmış, 2024).

This psychological condition demands that organizations adapt a more holistic approach to human resource management, considering mental well-being as an integral component of employee productivity. In addition, technological developments and unlimited access to information have also shaped Generation Z's view of work, who tend to seek flexibility and meaning in work, and have different expectations of the work environment. These differences in expectations, if not managed properly, can trigger dissatisfaction and increased neuroticism, which ultimately negatively impacts employee performance and retention (Indriani et al., 2021). This phenomenon underscores the urgent need for research that examines specifically how genetic characteristics, socio-cultural environment, and exposure to technology interact in modulating the expression of neuroticism among Generations Y and Z (Dwidienawati et al., 2025). This in-depth understanding of these complex interactions will contribute to the development of a more comprehensive theoretical and practical framework to support optimal mental health and performance in a work environment dominated by these two generations.

This investigation is expected to identify key factors that can be leveraged to design interventions that target increased resilience and reduction of neuroticism, thereby creating a more productive work environment and supporting the psychological well-being of employees of both generations (Dominica & Wijono, 2022). Specifically, this study will examine how the characteristics of Generation Y and Generation Z affect the level of neuroticism and its impact on performance. With this approach, it is hoped that it will be possible to identify the specific patterns that differentiate the two generations regarding negative emotional experiences and their impact on work effectiveness, so that intervention strategies can be more targeted.

METHOD

This study adopts a quantitative approach to identify patterns of causal relationships between generational characteristic variables (Y and Z), trait neuroticism, and employee performance empirically. The research sample was employees working under the Garut Regency Education Office as many as 340 respondents with a proportion of 170 respondents from Generation Y and 170 respondents from Generation Z. This proportional stratification sampling aims to ensure an accurate representation of the two generation groups that are the focus of the research (Satriyono et al., 2022; Yulianti & Hartati, 2023).

The survey instrument in this study uses a structured questionnaire with four response options (Strongly Agree, Agree, Disagree, Strongly Disagree) to measure the characteristics of Generation Y, Generation Z, personality neuroticism, and employee performance within the organizational context (Gunawan et al., 2019). (GENY) Generation Y is assessed using an instrument adapted from (Noviandri, 2019), consisting of four key dimensions: adaptability, flexibility, a strong work ethic, and listening skills. (GENZ) Generation Z is measured using an instrument adapted from (Hanifah, 2016), which includes four defining characteristics, namely sociability, a preference for challenges, self-confidence, and independent authority. (NEUR) The neuroticism variable refers to the instrument developed by John and Srivastava (McCrae & John, 1992), capturing six aspects of emotional instability: anxiety, hostility or anger, depression, self-consciousness, impulsiveness, and vulnerability. (KIN) The performance variable consists of six dimensions relevant to employee performance assessment, namely quantity, quality, timeliness, discipline and attendance, teamwork and communication, and integrity.

Data analysis was carried out using Structural Equation Modeling (SEM) to test the hypothesis of causal relationships between the variables studied. This approach allows for the analysis of complex relationships between variables that cannot be directly observed, or latent constructs, as well as observable variables (Shook-Sa et al., 2017). Structural Equation Modeling is considered a second-generation statistical technique that addresses complex problems such as the handling of unobserved variables and the management of models with multiple causes and effects (Castilho et al., 2016). In addition, this study will

identify specific factors in the work environment that may mitigate or exacerbate neuroticism among Gen Y and Z, providing insights for designing more effective human resource management interventions.

RESULTS AND DISCUSSION

SEM Analysis Results

Common Method Bias Examination. Before defining and testing the SEM model, a Common Method Bias (CMB) examination was conducted to ensure there was no systematic bias due to the use of a single self-report instrument. The examination employed Harman's Single Factor Test, in which all indicators were analyzed without rotation. The results showed that no single factor explained more than 50% of the variance, indicating that CMB was not a significant threat to data quality.

Additionally, the CFA model demonstrated good fit, confirming the absence of a *common latent factor* that could distort the relationships among variables. Therefore, the data quality was considered adequate for further SEM analysis.

Model Specification. The model specification stage involved establishing the relationships between latent variables and their indicators, as well as mapping structural relationships between constructs based on theoretical foundations.

This study used a Second-Order Construct approach from the beginning, meaning that first-order and second-order analyses were not separated. This approach is appropriate because the constructs under investigation are multidimensional and conceptually operate at a higher-order level. Consequently, the full hybrid model was developed directly using second-order SEM, which is methodologically suitable when lower-order indicators form stable dimensions. The full hybrid model is visualized in Figure 1.

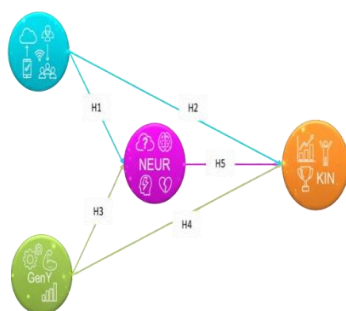


Figure 1. Hybrid Model Path Diagram

Model Identification. The model was confirmed to be **overidentified**, making it statistically estimable and suitable for SEM analysis.

Measurement Model Fit. Convergent validity was tested using standardized loading factors, with a minimum threshold of ≥ 0.50 . For reviewer reference, Figure 2 presents the standardized factor loadings of all indicators.

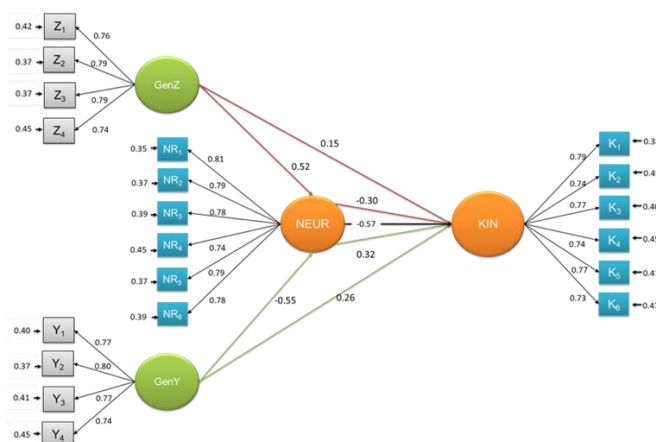


Figure 2. Standardized Loading Factors Results

Figure 2 shows that all indicators have loadings ≥ 0.50 . This confirms that the constructs at the second-order level are well represented by their first-order dimensions, making the measurement model valid without the need for separate first-order and second-order testing.

Structural Model Fit. The structural model fit was evaluated using goodness-of-fit indices based on Hooper (Fan et al., 2024). All indices in Table 1 fall within recommended thresholds, confirming that the model is suitable for hypothesis testing.

Table 1. Overall Model Fit Test

Index	Acceptable Match Rate	Scores	Information
Chi-square (df=164)	(p-value $\geq 0,50$)	167.47 (p=0.41)	Good
RMSEA [90% CI]	RMSEA $\leq 0,50$ good fit	0.0079 [0.000–0.026]; p(close fit)=1.00	Good
CFI	CFI $\geq 0,90$ good fit	1.00	Good
NNFI (TLI)	NNFI $\geq 0,90$ good fit $0,80 \leq$ NNFI $\leq 0,90$ marginal fit	1.00	Good
NFI	NFI $\geq 0,90$ good fit $0,80 \leq$ NFI $\leq 0,90$ marginal fit	0.98	Good
IFI	IFI $\geq 0,90$ good fit $0,80 \leq$ IFI $\leq 0,90$ marginal fit	1.00	Good
RFI	$> 1 \rightarrow$ good fit	0.98	Good
SRMR	$\leq 0,08 \rightarrow$ good fit $0,08 - 0,10 \rightarrow$ acceptable fit. $0,10 \rightarrow$ poor fit.	0.030	Good
GFI	GFI $\geq 0,90$ good fit $0,80 \leq$ GFI $\leq 0,90$ marginal fit	0.95	Good
AGFI	AGFI $\geq 0,90$ good fit $0,80 \leq$ AGFI $\leq 0,90$ marginal fit	0.94	Good
ECVI [90% CI]		0.77 [0.76–0.87]	Good

Total and Indirect Effects. Total and indirect effects are summarized in Table 2, showing that neuroticism acts as a mediator in the relationship between GENY/GENZ and employee performance (KIN).

Table 2. Total and Indirect Effects

Total Effect (Std.)	Value
GENY $\rightarrow$ NEUR	-0.55
GENZ $\rightarrow$ NEUR	0.52
GENY $\rightarrow$ KIN	0.58
GENZ $\rightarrow$ KIN	-0.15
Indirect Effects (Std.)	Value
GENY $\rightarrow$ KIN (via NEUR)	0.32
GENZ $\rightarrow$ KIN (via NEUR)	-0.30

DISCUSSION

Based on data analysis, two structural equations were obtained, namely $NEUR = -0.55Y + 0.52Z$ with an R^2 value of 0.62 or 62% and $KIN = -0.57 NEUR + 0.58Y - 0.15Z$ R^2 of 0.50 or 50%. This shows that Generation Y characters tend to be able to reduce neuroticism in employees and can ultimately contribute to increased performance. This can be due to the attitude of generation Y who have adaptive and flexible tendencies and are good listeners. The characteristics of Generation Z can contribute to increased neuroticism in employees which can ultimately reduce performance. This is due to the phenomenon called "strawberry generation" due to its visual beauty but internal fragility (Vieira et al., 2024). This shows that Generation Z known as "digital natives" have a remarkable adaptation to the incoming culture as well as high abilities in technology. The existence of intense interaction with social media and the ease of technology actually has a negative effect by forming a character who is easily anxious which can lead to difficulties in controlling emotions and depression if not overcome properly. In the existing analysis, although the characteristics of generation Z have contributed to the increase in neuroticism, it does not mean that the characters of generation Z can decrease performance. This can be seen from the direct influence of 0.15 where the characteristics of generation Z can improve performance. This is because of the advantages of generation Z who are creative and superior in the use of technology considering that generation Z was born and grew up together with technology when compared to the previous generation. In the existing data, it shows that good adaptive abilities and attitudes in generation Z are able to improve performance, but nevertheless efforts are needed to improve the mentality of generation Z so as not to increase personality neuroticism.

While these results provide an important picture, it should be noted that factors of the work environment, organizational culture, and social support also play a role in moderating the relationship between neuroticism and performance (Vachhrajani et al., 2022). In addition, differences in generational characteristics can be influenced by Indonesia's unique cultural context, so the generalization of results must be done carefully. This research is in line with a study (Enggira et al., 2021) that found an increase in neuroticism in Generation Z globally. However, this study adds to Indonesia's local context that shows real implications for employee performance in the formal sector. The study (Cramarenco et al., 2023) also supports the finding that Generation Y is more emotionally resilient than Generation Z.

CONCLUSION

This study concludes that the characteristics of Generation Y and Generation Z differ significantly in influencing neuroticism and employee performance. Generation Y demonstrates better emotional regulation and lower levels of neuroticism, which positively affect performance. Conversely, Generation Z shows a higher tendency toward neuroticism, particularly in terms of anxiety and emotional vulnerability, although they still contribute positively to performance through creativity and technological competence. Neuroticism is proven to be a crucial mediating variable that links generational traits to performance, making the management of this psychological factor essential within organizations.

Based on these findings, organizations need to develop human resource strategies that are responsive to generational differences, such as emotional support programs, stress management training, strengthened intergenerational communication, and optimized use of work-related technology. This study is limited by its focus on a single governmental institution and the use of self-report measures that may introduce perceptual bias. Future research is recommended to broaden the organizational context, incorporate additional variables such as resilience or social support, and employ longitudinal designs to observe changes in neuroticism and performance over time.

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REFERENCES

- Appelbaum, S. H., Bhardwaj, A., Goodyear, M., Gong, T., Sudha, A. B., & Wei, P. (2022). A Study of Generational Conflicts in the Workplace. *European Journal of Business Management and Research*, 7(2), 7–15. <https://doi.org/10.24018/ejbmr.2022.7.2.1311>
- Castilho, P., Carvalho, S. A., & Marques, S. (2016). Self-Compassion and Emotional Intelligence in Adolescence : A Multigroup Mediation Study of the Impact of Shame Memories on Depressive Symptoms. *Journal of Child and Family Studies*, 0–1. <https://doi.org/10.1007/s10826-016-0613-4>

- Chhansiya, B. M., & Jogsan, Y. A. (2015). Neuroticism and Academic Achievement Motivation in Adolescent. *International Journal of Indian Psychology*, 2(4). <https://doi.org/10.25215/0204.025>
- Cramarencu, R. E., Burcă-Voicu, M. I., & Dabija, D. (2023). The impact of artificial intelligence (AI) on employees' skills and well-being in global labor markets: A systematic review. In *Oeconomia Copernicana* (Vol. 14, Issue 3, pp. 731–767). Institute of Economic Research, Polish Economic Society Branch in Toruń, Faculty of Economic Sciences and Management at Nicolaus. <https://doi.org/10.24136/oc.2023.022>
- Damarsiwi, E. P. M., Nurzam, N., & Nasution, S. (2021). The Influence Of Leadership And Reward Style On Employee Performance (Case Study: DPRD Offices Seluma District). *BIMA Journal (Business Management & Accounting Journal)*, 2(1), 13–22. <https://doi.org/10.37638/bima.2.1.13-22>
- Dominica, V. S., & Wijono, S. (2022). The Relationship Between Job Demand And Workplace Well Being For Generation Z Employees In Jakarta. *Psikologia Jurnal Psikologi*, 4(2), 1–9. <https://doi.org/10.21070/psikologia.v4i2.1640>
- Dudija, N., & Apriliansyah, M. D. (2024). Psychological Well-Being among Generation Z employees: A Literature Review. In *International Journal of Scientific Research and Management (IJSRM)* (Vol. 12, Issue 8, pp. 79–87). <https://doi.org/10.18535/ijssrm/v12i08.gp01>
- Dwidienawati, D., Pradipto, Y. D., Indrawati, L., & Gandasari, D. (2025). Internal and external factors influencing Gen Z wellbeing. *BMC Public Health*, 25(1). <https://doi.org/10.1186/s12889-025-22124-5>
- Elkatmış, M. (2024). Examination of social media usage habits of generation Z. *Frontiers in Psychology*, 15. <https://doi.org/10.3389/fpsyg.2024.1370823>
- Gunawan, J., Aungsuroch, Y., Fisher, M. L., & McDaniel, A. M. (2019). Comparison of managerial competence of Indonesian first-line nurse managers: a two-generational analysis. *Journal of Research in Nursing*, 25(1), 5–19. <https://doi.org/10.1177/1744987119880237>
- Hanifah, N. (2016). Pengaruh Kepuasan Kerja Terhadap Kinerja Karyawan Melalui Komitmen Afektif (Studi Pada Karyawan PT. Petrokopindo Cipta Selaras Gresik). *Jurnal Ilmu Manajemen (JIM)*, 4(3), 1–10.
- Indriani, D. P., Hubeis, A. V. S., & Kuswanto, S. (2021). PENGARUH KEJUTAN BUDAYA ASING (CULTURE SHOCK) TERHADAP PERILAKU DAN KINERJA KARYAWAN BANK WOORI SAUDARA WILAYAH BOGOR. *Jurnal Aplikasi Bisnis Dan Manajemen*. <https://doi.org/10.17358/jabm.7.2.440>

- Inggira, C. K., Suryanto, S., & Windijarto, W. (2021). Pengaruh Budaya Organisasi dan Kepemimpinan Transformasional Terhadap Kinerja Karyawan Generasi Milenial dengan Motivasi Kerja Sebagai Variabel Intervening. *JENIUS (Jurnal Ilmiah Manajemen Sumber Daya Manusia)*, 5(1), 195. <https://doi.org/10.32493/jjsdm.v5i1.13158>
- Karácsony, P. (2019). Generational Differences in Motivation at Work in Slovakian Small and Medium Sized Companies. *Open Journal of Social Sciences*, 7(3), 182–191. <https://doi.org/10.4236/jss.2019.73015>
- Leijen, I., van Herk, H., & Bardi, A. (2022). Individual and generational value change in an adult population, a 12-year longitudinal panel study. *Scientific Reports*, 12(1). <https://doi.org/10.1038/s41598-022-22862-1>
- Nekić, M. (2023). How Anxious and Stressed Are Emerging Adults? The Role of Mindfulness and Intolerance of Uncertainty. *Psych*, 5(4), 1019–1029. <https://doi.org/10.3390/psych5040068>
- Noviandri, P. D. (2019). THE EFFECT OF INDIVIDUAL AND SITUATIONAL FACTORS ON CAREER SATISFACTION AND AFFECTIVE COMMITMENT AMONG GENERATION Y EMPLOYEES: A CASE STUDY OF TELECOMMUNICATION COMPANY IN INDONESIA. *Russian Journal of Agricultural and Socio-Economic Sciences*, 92(8), 252–259. <https://doi.org/10.18551/rjoas.2019-08.27>
- Pacheco, E.-M. (2020). Culture learning theory and globalization: Reconceptualizing culture shock for modern cross-cultural sojourners. *New Ideas in Psychology*, 58, 100801. <https://doi.org/10.1016/j.newideapsych.2020.100801>
- Satriyono, A. Y., Sulistyoningih, H., & Hidayani, W. R. (2022). Knowledge, Attitudes and Behaviors of the Adolescent Reproductive Health Triad. *Buletin Ilmu Kebidanan Dan Keperawatan*, 1(1), 20–31. <https://doi.org/10.56741/bikk.v1i01.36>
- Shook-Sa, B. E., Chen, D., & Zhou, H. (2017). Using Structural Equation Modeling to Assess the Links between Tobacco Smoke Exposure, Volatile Organic Compounds, and Respiratory Function for Adolescents Aged 6 to 18 in the United States. *International Journal of Environmental Research and Public Health*, 14(10), 1112. <https://doi.org/10.3390/ijerph14101112>
- Sosnowska, J., Hofmans, J., & Fruyt, F. De. (2019). Revisiting the neuroticism – performance link: A dynamic approach to individual differences. *Journal of Occupational and Organizational Psychology*, 93(2), 495–504. <https://doi.org/10.1111/joop.12298>
- Stelling, D. (2023). Do applicants from Generation X, Y, Z differ in personality traits? data from selection procedures in aviation (1987–2019). *Frontiers in Psychology*, 14.

<https://doi.org/10.3389/fpsyg.2023.1173622>

Taibah, D., & Ho, T. C. F. (2023). The Moderating Effect of Flexible Work Option on Structural Empowerment and Generation Z Contextual Performance. *Behavioral Sciences*, 13(3), 266.

<https://doi.org/10.3390/bs13030266>

Taufik, R., Piliang, Y. A., Ahmad, H. A., & Gunawan, I. (2021). Representation of Digital Native Generation in Visual Images. *Arts and Design Studies*. <https://doi.org/10.7176/ads/90-03>

Ulrichová, M. (2014). The Connection between Personality Traits and Resistance to Stress. *Procedia - Social and Behavioral Sciences*, 112, 1246–1254.

<https://doi.org/10.1016/j.sbspro.2014.01.1290>

Vachhrajani, M., Mishra, S. K., Rai, H., & Paliwal, A. (2022). The direct and indirect effect of neuroticism on work engagement of nurses during COVID-19: A temporal analysis. *Frontiers in Psychology*, 13. <https://doi.org/10.3389/fpsyg.2022.947887>

Vieira, J., da Costa, C. G., & Santos, V. (2024). Talent Management and Generation Z: A Systematic Literature Review through the Lens of Employer Branding. *Administrative Sciences*, 14(3), 49.

<https://doi.org/10.3390/admsci14030049>

Wiratih, H. W. R., Witono, A. B. M., Havidz, I. L. H., Aima, M. H., & Dewi, M. P. (2022). Peningkatan Kesadaran Berinvestasi bagi Gen-Z sebagai Digital Native melalui Kegiatan Sosialisasi. *Jurnal Komunitas Jurnal Pengabdian Kepada Masyarakat*, 5(1), 43–49.

<https://doi.org/10.31334/jks.v5i1.2422>

Yulianti, I., & Hartati, N. (2023). Analisis Faktor-Faktor Yang Mempengaruhi Keputusan Investasi Generasi Z Di Kabupaten Bekasi. *Jurnal Ekobistek*, 12(2), 608–613.

<https://doi.org/10.35134/ekobistek.v12i2.575>



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