

FROM MILLENNIALS TO 'SILVER ECONOMY': AN ANALYSIS OF TECHNOLOGY READINESS, USER EMANCIPATION, AND AI ADOPTION IN THE SOCIO-ECONOMIC TRANSFORMATION ECOSYSTEM

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ABSTRACT

The transition toward cybernetic capitalism and the post-digital era has fundamentally reconfigured how work, value, and social interaction are organised through artificial intelligence, data extraction, and algorithmic systems. In this context, socio-economic transformation is marked not only by innovation opportunities, but also by widening digital inequality, declining autonomy, and the commodification of human behaviour. This study aims to analyse the intersection of technology readiness, user emancipation, and AI adoption across generations, particularly among Millennial and Gen Z entrepreneurs and the Silver Economy population. Using a systematic literature review, this study examined Scopus-indexed journal articles published between 2015 and 2026. From 238 retrieved publications, 27 articles were selected through PRISMA-based screening according to predefined inclusion and exclusion criteria. The findings indicate that Millennials and Gen Z share similarly pragmatic patterns of AI adoption, driven mainly by perceived usefulness rather than technological novelty. At the same time, the Silver Economy represents substantial economic potential but remains vulnerable to exclusion due to digital literacy gaps shaped by age, gender, and education. The review further reveals that AI intensifies risks of surveillance, behavioural manipulation, and cognitive atrophy under cybernetic capitalism. These findings imply that sustainable socio-economic transformation requires a shift from technology acceptance toward technological emancipation through inclusive design, critical digital literacy, and intergenerational learning.

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INTRODUCTION

The 21st century marks a major turning point in human civilisation, as society shifts from industrial production principles to cybernetic capitalism (Komlosy, 2024). Rapid advances in artificial intelligence (AI), big data, and algorithmic decision-making systems have produced a post-digital reality that permeates nearly every aspect of life (Mattiello, 2025). In this socio-economic transformation, the concepts of work, value, and capital accumulation are being fundamentally redefined (Komlosy, 2024). Unlike industrial capitalism, which depended on raw material extraction and labour exploitation, cybernetic capitalism is driven by the commodification of data. Every digital interaction, click, and movement generates data that technology companies accumulate to train and refine AI systems.

In this context, humans are no longer merely consumers or workers, but also “data givers,” whose experiences, behaviours, and preferences are continuously extracted, processed, and fed back into systems that shape new demands (Komlosy, 2024). This condition has led to what (Mattiello, 2025) describes as Mixtopia, a hybrid reality in which algorithmic technologies promise efficiency, service innovation, and improved quality of life, while simultaneously creating risks of mass surveillance, algorithmic bias, and declining individual autonomy. Digital technologies and machine learning algorithms have become “hidden subjectifiers” that structure public and private spaces, blur their boundaries, and shape how individuals access the world (Leontowitsch et al., 2022). Consequently, understanding how different demographic groups respond to, adapt to, and survive within this digital ecosystem has become increasingly urgent.

Among younger generations, Millennials and Generation Z are often positioned as key actors in driving the digital economy. Having grown up amid rapid technological change, they are generally considered digitally fluent and more inclined toward technology-based entrepreneurship (Games et al., 2025). In developing countries, where economic uncertainty and limited resources often constrain business growth, technology adoption among young entrepreneurs can help overcome traditional capital-intensive models and support economic expansion. However, although Millennials and Gen Z are frequently grouped together as digital natives, their responses to technology are not necessarily homogeneous. Within the Technology Readiness and Acceptance Model (TRAM), which combines psychological readiness for technology with perceived usefulness and ease of use, these cohorts may display different adoption tendencies (Games et al., 2025). Gen Z is often characterised as more curious, independent, and adaptive, while Millennials tend to be more cautious and pragmatic when adopting unfamiliar technologies.

Despite these differences, studies indicate a shared behavioural pattern among young entrepreneurs: AI adoption is driven primarily by perceived usefulness rather than novelty (Games et al., 2025). Technologies such as chatbots are accepted when they provide tangible organisational benefits, including improved customer engagement, service automation, lower costs, and short-term profitability (Urbani et al., 2024). This suggests that younger generations are important drivers of AI-enabled transformation, but their engagement remains strongly tied to economic rationality and market survival.

At the other end of the demographic spectrum, the world is experiencing an unprecedented ageing trend due to increasing life expectancy and declining birth rates (Gschwendtner, 2020). This demographic shift has generated the so-called Silver Economy, an economic ecosystem centred on the needs, consumption, and purchasing power of older adults. Since this population controls a significant share of global wealth, older adults have become an increasingly important economic force. To address age-related physical, sensory, and cognitive changes, the field of “gerontechnology” has developed rapidly (Gschwendtner, 2020). Gerontechnology integrates gerontology and technology to create supportive environments for older adults in areas such as healthcare, communication, mobility, and smart housing.

However, technological innovation often leaves older adults behind. Post-digital society is characterised not only by technological sophistication but also by widening digital inequality, shaped strongly by age and educational background (Leontowitsch et al., 2022). Many older adults experience alienation because of limited digital literacy and the absence of clear role models for post-digital living (Leontowitsch et al., 2022). As younger generations dominate digital design and innovation narratives, older adults are often positioned only as passive recipients of monitoring technologies or as market targets, rather than as active subjects with agency in shaping the technologies

they use. This condition not only undermines their well-being, but also weakens the inclusiveness of broader socio-economic transformation.

Beyond these generational differences, both younger and older groups face a common threat in cybernetic capitalism: the erosion of human autonomy and the risk of cognitive atrophy (Leontowitsch et al., 2022). Delegating cognitive tasks, decision-making, and social interaction to AI systems can gradually weaken critical thinking and independent judgment (Sætra, 2023). Under the promise of convenience and instant gratification, power is increasingly concentrated in technology monopolies that exploit user data and shape behaviour. In response to this condition, Adorno's concept of *Mündigkeit* emancipation toward autonomy becomes highly relevant for education and technological adaptation in the digital age (Leontowitsch et al., 2022). Individuals need not only technological competence, but also critical awareness of how algorithmic systems structure their everyday lives.

One promising response to this challenge is intergenerational learning. Intergenerational digital learning spaces can bring together different "generational units," such as Gen Z with its digital agility and seniors with their historical experience and reflective depth. Drawing on Bourdieu's concepts of habitus and cultural field, such interactions allow participants to confront differences, challenge stereotypes, and engage in reflective learning shaped by intergenerational incongruence. Through this process, younger generations may become more aware of the ethical and political implications of algorithmic systems, while older generations may reduce their digital alienation and participate more confidently in AI-mediated environments. Intergenerational learning therefore offers a collaborative setting in which technology is examined critically, not treated as a neutral or magical tool, but understood as a social construction that should serve human well-being.

Although previous studies have examined AI adoption among young entrepreneurs, digital inequality among older adults, and the philosophical significance of autonomy in post-digital society, these discussions remain fragmented. Existing literature tends to focus separately on technology readiness in younger cohorts, gerontechnology in the Silver Economy, or critical reflections on autonomy under data capitalism. There remains limited integrative research that connects technology readiness, user emancipation (*Mündigkeit*), and cross-generational AI adoption within a single socio-economic transformation framework. This fragmentation creates an important gap in understanding how AI-driven transformation can be made not only innovative, but also inclusive, critical, and ethically grounded.

Accordingly, this study addresses the following research question: How does the literature explain the intersection of technology readiness, user emancipation, and AI adoption across generations, from Millennials and Gen Z to the Silver Economy population, within the socio-economic transformation ecosystem? By answering this question, the study seeks to provide a more comprehensive conceptual basis for policymakers, educational institutions, and industry actors to build a digital socio-economic order that is innovative, inclusive, sustainable, and centred on human dignity

METHOD

This study employed a systematic literature review (SLR) to examine the current state of scholarship on artificial intelligence (AI) in relation to socio-economic transformation, social interaction, ethics, values, and user emancipation. The review was designed to provide a structured and transparent synthesis of published research relevant to the topic of technology readiness, user emancipation, and AI adoption in the socio-economic transformation ecosystem. The literature search was conducted in the Scopus database, with the search limited to English-language journal articles published between 2015 and 2026. The search strategy used the following query: ("artificial intelligence" OR AI) AND ("social change" OR "social transformation") AND (ethics OR values OR culture OR "social behavior" OR interaction OR communication). To ensure the quality and relevance of the dataset, only journal articles were included, while reviews, editorials, notes, conference papers, and books were excluded. The initial search yielded 238 publications. These records were then screened using a PRISMA-based selection procedure in accordance with the predefined inclusion and exclusion criteria. The screening process was undertaken to ensure the validity, applicability, and completeness of the reviewed literature in relation to the focus of this study. Following the selection process, 27 articles were retained as the final dataset for analysis. The selected articles were analysed qualitatively to

identify and synthesise key themes concerning patterns of AI adoption, generational differences in technology readiness, the challenges and opportunities of the Silver Economy, and the importance of user emancipation in the context of contemporary socio-economic transformation. Through this approach, the review provides an integrative understanding of how AI-mediated transformation is discussed across different demographic and socio-economic contexts.

RESULT AND DISCUSSION

Result

The review identifies three major findings regarding AI adoption and socio-economic transformation across generations. First, studies on young entrepreneurs show that Millennials and Generation Z display broadly similar patterns of AI adoption. Using the Technology Readiness and Acceptance Model (TRAM), Games et al. (2025) found no significant difference between these two cohorts in terms of readiness and acceptance of AI technology. Although Gen Z is often portrayed as more adaptive and experimentation-oriented than Millennials (Chan & Lee, 2023), the literature indicates that both generations adopt AI primarily on pragmatic grounds. Technologies such as chatbots are valued not because of their novelty, but because of their perceived usefulness in improving customer engagement, automating services, reducing operational costs, and increasing short-term profitability (Games et al., 2025).

Second, the literature confirms that demographic ageing is generating significant opportunities within the Silver Economy. The growing older population has become an important market segment with considerable purchasing power and economic relevance (Álvarez-Diez et al., 2023; Gschwendtner, 2020). At the same time, the review shows that this potential is accompanied by persistent digital inequalities. Older adults' access to and use of digital technologies are strongly influenced by education, gender, and digital literacy (Aslan et al., 2024; Hu & Xu, 2024; Leontowitsch et al., 2022). As a result, many older adults remain marginalised within the post-digital environment, despite being positioned as an increasingly important consumer group.

Third, the literature reveals that AI-driven transformation generates broader structural risks related to autonomy, surveillance, and dependence. In the context of cybernetic capitalism, users' digital activities are transformed into "behavioural surplus" that can be monitored, predicted, and exploited by algorithmic systems (Ridgway, 2023; Schlund & Zitek, 2024). This reflects what (Mattiello, 2025) terms *Mixtopia*, a hybrid condition in which technological progress offers convenience and efficiency while simultaneously intensifying threats such as polarisation, surveillance, and the erosion of human control. Several studies also warn that the increasing delegation of cognitive tasks to AI may contribute to "cognitive atrophy," reducing individuals' critical and reflective capacities over time (Izak et al., 2025; Kabashkin, 2025; Sætra, 2023).

The review further identifies intergenerational learning as a recurring response to these risks. Studies suggest that collaborative spaces involving younger and older generations can reduce stereotypes, foster reciprocal learning, and support critical reflection on technology use (Leontowitsch et al., 2022; Meszaros & Beard, 2022). In this sense, intergenerational learning is not only a pedagogical strategy, but also a social mechanism for strengthening agency in the face of data-driven technological systems.

Discussion

These findings suggest that AI adoption across generations is shaped by different immediate conditions, but converges around a deeper socio-economic tension between utility and autonomy. Among Millennials and Gen Z, AI is primarily understood as an instrument of efficiency, business survival, and competitive advantage. This aligns with studies showing that AI has increasingly become an "uninvited assistant" embedded in organisational and educational settings, reshaping relationships and decision-making processes rather than simply serving as a neutral tool (Okulich-Kazarin & Artyukhov, 2025). The relatively similar adoption patterns between Millennials and Gen Z therefore indicate that generational distinction may be less important than the structural pressures of entrepreneurship in developing contexts, where technological choices are strongly determined by immediate organisational benefit (Chin et al., 2023; Games et al., 2025; Magni et al., 2023).

By contrast, the Silver Economy illustrates that technological transformation is unevenly distributed. Older adults are increasingly recognised as a key economic demographic, and governments in countries such as Japan and South Korea have begun to link industrial innovation and SME development to the needs of ageing populations (Gschwendtner, 2020; Magni et al., 2023; Su et al., 2024). However, the literature makes clear that economic recognition does not automatically translate into technological inclusion. Many older adults remain excluded from meaningful participation in post-digital life because digital infrastructures are often designed around younger users' assumptions, capacities, and experiences (Leontowitsch et al., 2022). Thus, the Silver Economy should be understood not only as a market opportunity, but also as a site where inequalities in digital adaptation become more visible.

At the macro level, these patterns must be interpreted within the broader shift from industrial capitalism to cybernetic capitalism, where value extraction increasingly depends on data capture rather than labour alone (Komlosy, 2024; Kuyken & Costanza, 2025). In this system, both younger and older users are inserted into technological environments that simultaneously enable participation and deepen dependency. The concept of *Mixtopia* is useful here because it captures the duality of the post-digital condition: AI provides efficiency and innovation, yet also normalises algorithmic surveillance, behavioural manipulation, and diminished autonomy (Mattiello, 2025). This helps explain why the reviewed literature moves beyond simple questions of technology acceptance toward more critical concerns about human agency.

From this perspective, the concept of *Mündigkeit* becomes highly relevant. The literature suggests that the challenge is no longer only whether individuals adopt AI, but whether they retain the critical capacity to understand, question, and govern its role in their lives. Adorno's notion of emancipation toward autonomy provides an important interpretive lens for understanding why digital literacy alone is insufficient; what is needed is a form of critical technological consciousness that resists passive adaptation to algorithmic systems (Adorno & Becker, 1999; Macdonald, 2011). Intergenerational learning emerges as particularly significant in this regard because it allows different generational experiences to intersect in reflective dialogue. Younger generations may contribute digital agility, while older generations bring longer historical perspectives and reflective distance, making such encounters valuable for questioning the social and political assumptions embedded in AI systems (Leontowitsch et al., 2022; Meszaros & Beard, 2022).

The findings have several implications for research, policy, and practice. First, the review indicates that socio-economic transformation should not be evaluated solely through rates of AI adoption or the expansion of digital markets. A narrow emphasis on technological uptake risks overlooking the unequal capacities of different demographic groups to engage with AI critically and meaningfully. Future policy frameworks should therefore combine innovation goals with inclusion strategies, particularly for older adults who remain vulnerable to digital exclusion despite their growing economic significance. Second, the findings imply that technology readiness should be understood in broader terms than operational competence or perceived usefulness. While younger entrepreneurs may adopt AI effectively for business purposes, such adoption does not automatically guarantee critical awareness of data exploitation, surveillance, or cognitive dependency. Educational institutions and training programmes should therefore promote not only digital skills, but also critical AI literacy that addresses ethics, autonomy, and the political economy of algorithmic systems. Third, the literature suggests that designing inclusive socio-economic transformation requires stronger intergenerational approaches. Intergenerational learning can serve as a practical mechanism for bridging digital divides, reducing stereotypes, and fostering reflective engagement with AI across age groups (Hong et al., 2025; Leontowitsch et al., 2022; Meszaros & Beard, 2022). This is especially important in the context of the Silver Economy, where older adults should be treated not merely as passive recipients of technology or market targets, but as active subjects whose agency matters in shaping digital futures.

Overall, the review shows that sustainable transformation in the AI era depends not only on technological sophistication, but also on whether societies can cultivate user emancipation, inclusive participation, and critical autonomy across generations. In this sense, the central challenge is not simply technology acceptance, but the development of a socio-economic order in which AI serves human dignity rather than reducing individuals to data commodities.

CONCLUSION

This review demonstrates that AI adoption within the socio-economic transformation ecosystem is shaped by distinct yet interconnected generational dynamics. Among Millennials and Generation Z, AI adoption is primarily driven by pragmatic considerations, especially perceived usefulness, operational efficiency, and short-term business benefits, whereas the Silver Economy represents both a growing economic opportunity and a site of persistent digital inequality, where older adults often face barriers related to literacy, access, and exclusion from technology design. These findings indicate that the contemporary socio-economic transition cannot be understood merely as a process of technology acceptance, but rather as a deeper tension between innovation and autonomy within a post-digital environment increasingly shaped by data extraction and algorithmic control. In this context, the concept of *Mündigkeit* becomes essential because it redirects attention from simple adoption toward critical awareness, reflective agency, and resistance to passive dependence on AI systems. Intergenerational learning is particularly important in this regard, as it provides a space in which digital agility, lived experience, and critical reflection can interact constructively. Therefore, sustainable socio-economic transformation in the AI era requires a shift from technology acceptance to technological emancipation through inclusive design, critical digital literacy, and intergenerational collaboration, so that technological advancement supports a digital social order that is innovative, inclusive, ethically grounded, and centred on human dignity.

REFERENCES

- Adorno, T. W., & Becker, H. (1999). Education for maturity and responsibility. In *History of the Human Sciences* (Vol. 12, Issue 3, pp. 21–34).
- Álvarez-Diez, R. C., Vega-Esparza, R. M., Bañuelos-García, V. H., & López-Robles, J. R. (2023). The evolution research on Silver Economy: Current researches, trends, and implications for future directions. *Transinformação*, 35, e237325. <https://doi.org/10.1590/2318-0889202335e237325>
- Aslan, A., Mold, F., van Marwijk, H., & Armes, J. (2024). What are the determinants of older people adopting communicative e-health services: A meta-ethnography. *BMC Health Services Research*, 24(1), 60. <https://doi.org/10.1186/s12913-023-10372-3>
- Chin, C.-H., Wong, W. P. M., Cham, T.-H., Thong, J. Z., & Ling, J. P.-W. (2023). Exploring the usage intention of AI-powered devices in smart homes among millennials and zillennials: The moderating role of trust. *Young Consumers: Insight and Ideas for Responsible Marketers*, 25(1), 1–27. <https://doi.org/10.1108/YC-05-2023-1752>
- Games, D., Masli, E., Sari, D., Triani, L., & Komalasari, S. (2025). Generational cohort and technology readiness and acceptance of artificial intelligence among young high-growth entrepreneurs. *Digital Transformation and Society*. Scopus. <https://doi.org/10.1108/DTS-02-2025-0040>
- Gschwendtner, P. (2020). Silver Economy Strategies: A Comparative Study of Japanese and South Korean Governmental Measures. *Vienna Journal of East Asian Studies*, 12(1), 62–91. Scopus. <https://doi.org/10.2478/vjeas-2020-0003>
- Hong, W., Liang, C., Ma, Y., & Zhu, J. (2025). Intergenerational digital feedback and digital social integration of older adults: An empirical study from personal initiative perspective. *Humanities and Social Sciences Communications*, 12(1), 1144. <https://doi.org/10.1057/s41599-025-05518-z>
- Hu, H., & Xu, W. (2024). Socioeconomic differences in digital inequality among Chinese older adults: Results from a nationally representative sample. *PLOS ONE*, 19(4), e0300433. <https://doi.org/10.1371/journal.pone.0300433>
- Izak, M., Barros, A., Prasad, A., & Śliwa, M. (2025). Generative artificial intelligence and learning: At the dawn of Idiocracy? *Management Learning*, 56(3), 407–415. <https://doi.org/10.1177/13505076251348575>
- Kabashkin, I. (2025). Cognitive Atrophy Paradox of AI–Human Interaction: From Cognitive Growth and Atrophy to Balance. *Information*, 16(11). <https://doi.org/10.3390/info16111009>
- Komlosy, A. (2024). RE-EXAMINING THE CONCEPT OF SECULAR TRANSFORMATION. HOW CAN WE CAPTURE THE TURN OF AN ERA? THEORETICAL APPROACHES, METHODS AND

- IMPLICATIONS. *Journal of Globalization Studies*, 15(2), 65–80. Scopus. <https://doi.org/10.30884/jogs/2024.02.04>
- Kuyken, K., & Costanza, D. (2025). Because Work is Changing: A New Paradigm for Intergenerational Workplace Knowledge Sharing. *Journal of Intergenerational Relationships*, 23(1), 91–107. <https://doi.org/10.1080/15350770.2024.2302626>
- Leontowitsch, M., Wolf, F., & Oswald, F. (2022). Digital (in)equalities and user emancipation: Examining the potential of Adorno’s maxim of Mündigkeit for critical intergenerational learning. *Frontiers in Sociology*, 7. Scopus. <https://doi.org/10.3389/fsoc.2022.983034>
- Macdonald, I. (2011). Cold, cold, warm: Autonomy, intimacy and maturity in Adorno. In *Philosophy & Social Criticism* (Vol. 37, Issue 6, pp. 669–689).
- Magni, D., Del Gaudio, G., Papa, A., & Della Corte, V. (2023). Digital humanism and artificial intelligence: The role of emotions beyond the human–machine interaction in Society 5.0. *Journal of Management History*, 30(2), 195–218. <https://doi.org/10.1108/JMH-12-2022-0084>
- Mattiello, H. (2025). *Comprehensive Education via the X.0 Wave: Cultivating Future Sustainable Leaders in AI, Ethics, Healthcare, Engineering, and Business Cutting-Edge Competencies*. Scopus. IEEE Global Engineering Education Conference, EDUCON. <https://doi.org/10.1109/EDUCON62633.2025.11016559>
- Meszaros, K., & Beard, R. (2022). ‘IT RESTORED A BIT OF THEIR HUMANITY’’: BRIDGING THE GAP THROUGH HANDS-ON INTERGENERATIONAL LEARNING. In *Innovation in Aging* (Vol. 6, Issue Supplement 1, pp. 760–761).
- Okulich-Kazarin, V., & Artyukhov, A. (2025). (Un)invited Assistant: AI as a Structural Element of the University Environment. *Societies*, 15(11). Scopus. <https://doi.org/10.3390/soc15110297>
- Ridgway, R. (2023). Deleterious consequences: How Google’s original sociotechnical affordances ultimately shaped ‘trusted users’ in surveillance capitalism. *Big Data & Society*, 10(1), 20539517231171058. <https://doi.org/10.1177/20539517231171058>
- Sætra, H. S. (2023). Generative AI: Here to stay, but for good? *Technology in Society*, 75. Scopus. <https://doi.org/10.1016/j.techsoc.2023.102372>
- Schlund, R., & Zitek, E. M. (2024). Algorithmic versus human surveillance leads to lower perceptions of autonomy and increased resistance. *Communications Psychology*, 2(1), 53. <https://doi.org/10.1038/s44271-024-00102-8>
- Su, Z., Bentley, B. L., McDonnell, D., Alimu, T., Dai, W., Jiang, J., Liu, Y., Yu, X., Feng, Y., Diao, Y., Dawadanzeng, Wu, X., Kadier, S., Milawuti, P., Cheshmehzangi, A., Zhang, X., da Veiga, C. P., & Xiang, Y.-T. (2024). Senior employment technology: Leveraging opportunities in population ageing. *Health Policy and Technology*, 13(3), 100883. <https://doi.org/10.1016/j.hlpt.2024.100883>
- Urbani, R., Ferreira, C., & Lam, J. (2024). Managerial framework for evaluating AI chatbot integration: Bridging organizational readiness and technological challenges. *Business Horizons*, SPECIAL ISSUE: WRITTEN BY CHATGPT, 67(5), 595–606. <https://doi.org/10.1016/j.bushor.2024.05.004>