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DIGITAL TRANSFORMATION AND ARTIFICIAL INTELLIGENCE (AI) FOR COOPERATIVE COMPETITIVENESS IN THE FREE MARKET ERA: A SYSTEMATIC LITERATURE REVIEW

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ABSTRACT
The rapid development of digital technology and artificial intelligence (AI) has significantly transformed the business landscape, including the cooperative sector. As member-based institutions, cooperatives must embrace digital transformation to enhance efficiency, transparency, and competitiveness while maintaining their social values. This study aims to explore strategies for digital transformation and AI adoption that strengthen cooperative competitiveness in the free market era through a systematic literature review approach. The findings reveal that digitalization of financial management, AI-based decision-making, enhancement of digital literacy, and government support are key factors driving cooperative competitiveness. These strategies not only improve operational efficiency but also foster innovation, inclusivity, and sustainability within the cooperative ecosystem. Therefore, collaboration among cooperatives, government, and technology-based enterprises is crucial to ensuring resilience and sustainable growth in the digital economy era.

Key words: Digital Transformation; Artificial Intelligence (AI); Cooperative Competitiveness; Digital economy

INTRODUCTION

The rapid advancement of globalization and the integration of the world economy have created a free market system that demands every economic entity to operate efficiently, adaptively, and innovatively. In this competitive environment, cooperatives, as people-based economic institutions, are also required to transform to remain relevant. Despite being founded on principles of solidarity, democracy, and equitable welfare, many cooperatives still rely on conventional systems with low levels of technological adoption (Irmansyah et al., 2023). This delay in digitalization limits efficiency in services, data management, and decision-making, thereby reducing their competitiveness compared to private enterprises that have already undergone digital (Nashoha, 2024).

The digital economy era requires cooperatives to adapt to an environment characterized by transparency, speed, and innovation (Dalimunte, 2015) Digital transformation not only involves adopting technology but also changing business paradigms and governance systems. Artificial Intelligence (AI) has emerged as a vital tool for improving performance, enabling cooperatives to analyze member data, predict financial risks, and enhance personalized services. However, this transformation demands adequate preparation in terms of digital literacy, human resource competence, and infrastructure (Andjarwati & Wulan, 2021). Many cooperatives still struggle with these aspects, highlighting that digital transformation is not only a technical process but also an organizational and cultural challenge (Rustariyuni, 2022).

Given the growing importance of digitalization, the adoption of AI and digital technologies has become a strategic necessity for cooperatives to maintain competitiveness in the free market era (Nurjawahir, 2022). Digital transformation and AI integration offer opportunities to enhance efficiency, transparency, and innovation, allowing cooperatives to strengthen their economic role and sustainability. Therefore, this study aims to analyze strategies for digital transformation and AI implementation to enhance cooperative competitiveness, identify enabling and inhibiting factors, and propose a conceptual framework to support the development of sustainable digital cooperative policies(Manginte & Boari, 2025).

METHOD

This study employed a Systematic Literature Review (SLR) method using the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework to analyze strategies of digital transformation and artificial intelligence (AI) implementation in strengthening cooperative competitiveness in the free market era. This approach provides a structured process for identifying, reviewing, and synthesizing relevant literature related to the research topic. The literature search was conducted through major academic databases such as Scopus, ScienceDirect, Emerald Insight, and Google Scholar using the Publish or Perish application. The keywords used included “digital cooperatives,” “cooperative digital transformation,” “Artificial Intelligence in cooperatives,” “cooperative competitiveness,” and “digital innovation in cooperatives” (Ardiansyah and Prasetyo (2023). The search was limited to studies published between 2015 and 2025 to ensure the relevance of the findings with current developments.

The screening process was conducted in two stages based on inclusion and exclusion criteria following Ardiansyah and Prasetyo (2023). The inclusion criteria consisted of studies discussing digital transformation or AI adoption in cooperatives, containing empirical data or relevant theoretical analysis, and published in English or Indonesian. Studies that did not focus on cooperatives, lacked clear methodology, or were unavailable in full-text

format were excluded. After initial filtering based on titles and abstracts, a full-text evaluation was performed to assess quality, validity, reliability, and thematic relevance. Eligible studies were extracted and organized into a systematic table that included general information, research methods, key findings, and success factors for digital transformation and AI adoption. Thematic analysis was then conducted to identify patterns, trends, and conceptual relationships related to cooperative competitiveness in the digital economy (Widhajati & Susilo, 2023).

Table 1. Inclusion & Exclusion Criteria

Inclusion Criteria	Exclusion Criteria
Titles related to cooperative governance and cooperative organizational management	Titles not related to cooperative governance or organizational management
Published between 2015 and 2025	Published before 2015
Open-access journals	Non–open-access journals
Journal articles only	Other types of publications (e.g., books, reports, theses)

Source: Author, 2025

The study identification process was conducted via a systematic search on the Google Scholar database, which initially yielded 400 records. An initial deduplication and screening process removed 20 duplicate records and 50 records deemed ineligible, resulting in 330 records for the title and abstract screening stage. During this screening, 138 records were excluded for not meeting the preliminary criteria, leaving 192 records sought for full-text retrieval. However, 47 of these records could not be accessed, resulting in 145 full-text articles being assessed for eligibility. After a rigorous evaluation of the full texts against the predefined inclusion and exclusion criteria, a number of records were excluded for specific reasons, culminating in a final set of 18 studies being included in the systematic review.

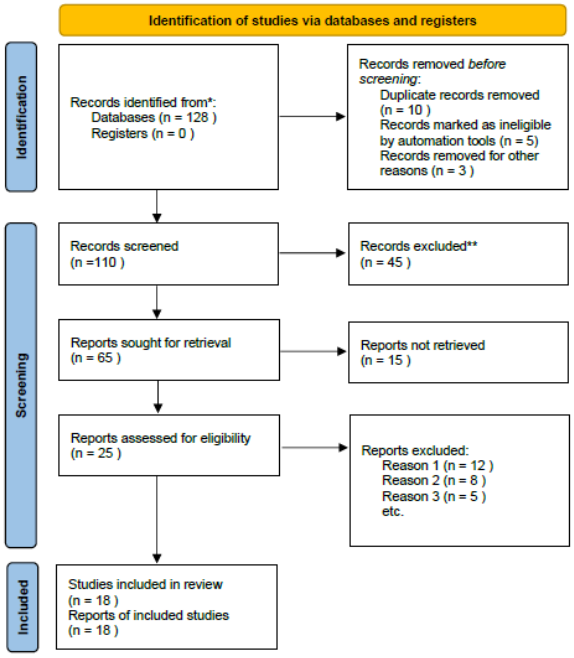

Figure 1. Identification of studies via databases and registers
Source: Author, 2025

RESULTS AND DISCUSSION

The systematic review process on digital transformation and AI in cooperatives identified four relevant studies for in-depth analysis. The synthesized findings from these studies are presented below.

Author & Year	Discussion
(Hermawan et al., 2025)	The digital transformation significantly impacts cooperative membership and participation. Statistical analysis using an independent sample t-test demonstrated that cooperatives which had adopted digitalization (Group A) possessed an average of 114.77 members, a figure substantially higher than the 82.00 members found in non-digitalized cooperatives (Group B). This finding, with a significance value of 0.000, led to the rejection of the null hypothesis and confirmed that strategic management practices integrating digital technology tangibly enhance member engagement. This outcome indicates that within the context of competitiveness in the free market era, digitalization acts as a catalyst for strengthening a cooperative's membership base a fundamental asset that directly contributes to its economic resilience and growth.
(Sukardi et al., 2024)	The digital transformation is no longer an option but a necessity for Indonesian cooperatives to survive and compete. The research highlights that while Indonesia's legal framework supports digital initiatives through various regulations in trade, banking, and electronic transactions, it requires refinement, particularly to address emerging issues such as data privacy and consumer protection. Furthermore, the article positions Indonesia's G20 Presidency as a strategic opportunity to encourage cooperatives to transform and align with international standards. By leveraging this momentum, cooperatives are urged to adopt digital tools such as websites, social media, and marketplaces to expand their market reach, improve operational efficiency, and ultimately build sustainable competitiveness within the global economic landscape.
(Indriastuti et al., 2025)	The quantitative study successfully identified a key mechanism through which digitalization contributes to the welfare of savings and loan cooperative members, with trust serving as a mediating variable. Results from Structural Equation Modeling (SEM) confirmed that digitalization not only exerts a direct positive influence on member welfare (β=0.36) but also a stronger indirect influence by first building trust. Digitalization significantly enhanced member trust (β=0.64), and this trust, in turn, had a substantial impact on improving their welfare (β=0.49). This finding underscores that in the context of enhancing competitiveness, the benefits of digitalization and AI extend beyond operational efficiency; more critically, they lie in their capacity to foster transparency, accountability, and service experiences that ultimately cultivate trust an invaluable social capital for member loyalty and cooperative sustainability in the free market.
(Nurdany & Prajasari, 2020)	Providing a critical counterpoint, the research by Nurdany and Prajasari concludes that digitalization is not a universal solution for all cooperatives. Based on field studies in Yogyakarta, the adoption of digital technology was found to be remarkably low, with only 35% of cooperatives using websites, 60% using social media, and a mere 10% possessing smartphone applications. This phenomenon is explained by the characteristics of the target market, which often consists of communities with low digital penetration, such as the elderly and rural residents, who are more responsive to traditional marketing models like word-of-mouth (*getok tular*). The practical implication of this finding is that digital transformation strategies and AI integration must be contextual. A "one-size-fits-all" policy is ineffective; a cooperative's competitiveness in the free market era can be bolstered by considering member readiness and local wisdom, rather than forcing the adoption of technology misaligned with its customer base.

Digital Transformation and Operational Automation

Digital transformation has proven to be a key factor in improving cooperative participation and performance. (Hermawan et al., 2025) found that cooperatives that have adopted digital systems recorded a higher average number of members (114.77) compared to non-digital cooperatives (82.00), with a significance value of 0.000. This finding indicates that the implementation of digital technology not only enhances operational efficiency but also strengthens the social foundation of cooperatives by increasing member participation. Similarly, Sukardi et al. (2024) emphasized that digitalization is not an option but a strategic necessity for cooperatives to survive in a globally competitive market. The use of websites, social media, and online marketplaces enables cooperatives to

expand their market reach while improving transparency and service efficiency. Therefore, process automation and AI integration serve as important catalysts for improving cooperative competitiveness and relevance in the digital economy era.

Human Resource Competence and Digital Literacy Enhancement

The success of cooperative digital transformation largely depends on the ability of human resources to understand and utilize technology effectively. Indriastuti et al., (2025) revealed that digitalization positively influences the welfare of cooperative members, both directly ($\beta = 0.36$) and indirectly through increased trust ($\beta = 0.64$ for trust and $\beta = 0.49$ for welfare). This finding highlights trust as an essential mediating variable in the success of digital adoption. The higher the level of digital literacy and technological understanding, the stronger the members' trust in digital cooperative systems. Conversely, Nurdany & Prajasari, (2020) found that low digital literacy among members, particularly in rural areas, remains a major obstacle to transformation. Therefore, strengthening human resource capacity through digital marketing training, financial software utilization, and AI-based learning must be prioritized to ensure sustainable and inclusive technology adoption in cooperatives.

Digital Ecosystem Collaboration

The review also indicates that the success of cooperative digitalization cannot be achieved individually but requires cross-sector collaboration. Sukardi et al., (2024), highlighted the importance of partnerships between cooperatives, digital startups, and MSMEs in building an interconnected digital economy ecosystem. Such collaborations provide cooperatives with access to technological innovation, knowledge transfer, and broader market networks. Furthermore, Cao et al., (2025), found that digitalized cooperatives exhibit higher levels of social interaction and member engagement, which can be further enhanced through digital network-based collaboration. Kien (2025), also emphasized that trust-based collaboration between cooperatives and digital partners fosters a more transparent and sustainable business environment. Thus, a collaborative digital ecosystem forms the foundation for cooperatives to build competitiveness based on innovation and collective participation.

Government Policy and Digital Infrastructure

Government policy plays a strategic role in accelerating cooperative digitalization. Rabanes & Janamjam (2025), noted that although Indonesia's legal framework already supports digitalization through regulations in trade, banking, and electronic transactions, it still has gaps in areas such as data privacy and consumer protection. The government must strengthen digital governance policies for cooperatives to make them more adaptive to technological progress. Additionally, Indonesia's G20 Presidency provides a strategic opportunity to mainstream cooperative digitalization within global economic agendas. However, as highlighted by Nurdany & Prajasari (2020), the digital infrastructure gap in rural areas remains a significant barrier. Therefore, investments in digital infrastructure such as internet connectivity, data centers, and technology literacy should be prioritized to ensure that cooperatives across all regions can equally benefit from digital transformation.

Overall, the findings of this systematic literature review indicate that cooperative competitiveness in the free market era is not solely determined by the adoption of digital and AI technologies but also by human resource readiness, supportive government policies, and partnerships within digital ecosystems. Digitalization plays a dual role as a means of improving operational efficiency and as a mechanism for strengthening social capital through trust, transparency, and collaboration (Ramos et al., 2023). With an integrated strategy that combines technology, people, and policy, cooperatives have great potential to evolve into adaptive, innovative, and sustainable economic entities within the competitive global economy.

CONCLUSION

This study concludes that digital transformation and artificial intelligence (AI) play a crucial role in enhancing cooperative competitiveness in the free market era. The integration of digital systems improves operational efficiency, transparency, and member participation, while AI supports innovation and data-driven decision-making. The success of these efforts depends on human resource competence, digital literacy, ecosystem collaboration, and supportive government policies and infrastructure. By combining technology, people, and policy, cooperatives can strengthen their institutional resilience and achieve sustainable growth in the digital economy. Therefore, strategic investment in digital capacity building, partnership development, and adaptive policy frameworks is essential to ensure that cooperatives remain innovative, inclusive, and competitive within the global economic landscape.

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