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The Global Co-operative Movement in the Age of Automation and AI

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ABSTRACT

The global cooperative movement rooted in principles of shared ownership, democratic governance and social equity which faces new challenges and opportunities in the age of automation and artificial intelligence (AI). While these technologies offer significant advantages such as improved efficiency, enhanced decision-making and optimized processes they also pose risks, including job displacement and governance complexities. This paper explores how cooperatives across sectors are adapting to these changes, from using AI in predictive analytics and blockchain based governance to leveraging automation for operational efficiency. It highlights strategies such as skill development, ethical AI frameworks and inclusive digital governance to ensure cooperatives maintain their core values while embracing technological innovation. Finally, the article emphasizes the need for supportive policies and collaborative efforts to ensure that the integration of automation and AI aligns with the movement's commitment to fairness, sustainability, and social justice.

Key Words*: AI, Automation, Cooperative Model, Global Cooperative Movement*

1. INTRODUCTION

Automation and artificial intelligence (AI) are reshaping industries worldwide, posing both challenges and opportunities for the cooperative movement. Cooperatives, defined as member-owned enterprises that prioritize shared economic benefits and democratic governance, must find ways to adapt to these changes without compromising their core principles (Ramos et al., 2022). This paper explores the potential impact of automation and AI on cooperatives and provides insights into how co-ops can harness these technologies to foster inclusive economic growth.

Cooperatives are highly entrepreneurial groups. The International Cooperative Alliance (ICA) in Manchester defined the "Statement of Cooperative Identity" in 1995. It was based on a set of values based on the mutual support, self responsibility, democracy, equality, equity, and solidarity. Thus, Cooperatives had seven principles including voluntary and open membership, Democratic control, Member Economic Participation, Autonomy and Independence, Education, Training and Information, Cooperation among Cooperatives, Concern for Community.

Cooperative members uphold the moral principles of integrity, transparency, social responsibility and compassion in the vein of their founders that influence those values, as well as on what constitutes a cooperative (ICA has defined a cooperative as “an autonomous association of persons united voluntarily to meet their common economic, social and cultural needs and aspirations through a jointly-owned and democratically-controlled enterprise”.

The ICA's cooperative identity which emphasizes cooperative ideals, offers a shared framework for international legislation. Therefore, we did not discover any significant variations in ideas or workable solutions among the various nations. Cooperatives currently face many challenges, which may force them to reinvent themselves from a legal point of view. However, we foresee some problems in the future. how can cooperative governance keep up with this trend of using AI? This paper aims to draw attention to some practices used in AI, namely at the level of the algorithm (which makes the “intelligent” decisions), that may go against the cooperative principles of democratic member control, autonomy and independence, and the mission of serving communities to respond to social and societal challenges.

Since no research has been done on the effects of implementing AI in cooperatives. This article is unique in the literature. The effects of AI on society and businesses in the public and private sectors have been the subject of some research. Furthermore, some research addresses the Governance of AI and the implications of AI in the Governance domain. Because of their unique characteristics, SE sector organizations like cooperatives make up a significant topic for contemplation on the effects of AI.

Objectives of the Study

Main Objective

Explore the concept of Automation and AI towards the Global Cooperative Movement.

Sub Objectives

01. Review how various cooperative models are integrating with automation and AI.

02. Identify the opportunities offered by automation and AI for cooperatives in enhancing efficiency, productivity, and member participation.

03. Examine the challenges associated with automation, such as job displacement, governance issues, and ethical concerns in Cooperative movement

04. Explore strategies for cooperatives to align technological innovation with core cooperative principles.

02. LITERATURE REVIEW

The concept of Automation and AI

Automation refers to the use of technology to perform tasks with minimal human intervention, often streamlining repetitive processes in industries like manufacturing, finance, and logistics. Artificial Intelligence (AI), on the other hand, involves machines simulating human cognitive abilities, such as learning, reasoning, and problem-solving, often through algorithms like machine learning or neural networks (Russell & Norvig, 2021).

Automation and AI complement each other automation handles routine operations, while AI enables decision making based on patterns and predictions, driving efficiency and innovation across sectors (McKinsey, 2022). Automation, digitalization and, more recently, artificial intelligence (AI) is fundamentally reshaping the employment structure of postindustrial societies. The introduction of computers, robotics or the internet changes the way workers perform their jobs, modifies the value of skills and creates entirely new job titles. This profound transformation is raising recurring concerns about the potential of labor markets to create sufficient employment and about the capacity of workers to acquire the skills needed to succeed in tomorrow's world of work.

It should not come as a surprise that the strong distributive implications of introducing new technologies in the workplace have sparked a academic debate about the political consequences of such transformation. More pessimistic views point to historical precedents in arguing that digitalization, automation or AI pose a threat to democratic stability because citizens will revolt if economic modernization does not favor a large enough part of the population and states fail to sufficiently compensate those left behind. Other arguments, in contrast, highlight the role of technology as a unique source of innovation and prosperity, providing economic opportunity for many and thus shoring up support for twenty first-century democracy.

Cooperatives in the age of Automation and AI

The cooperative movement is based on principles of democratic governance, member ownership, and social responsibility. Cooperatives operate in diverse sectors worldwide, including agriculture, finance, labor, and housing.

These principles of shared ownership and democratic decision making create a distinct value based framework that influences how cooperatives adopt and use new technologies (Ramos et al, 2022). The International Cooperative Alliance (ICA) has emphasized the role of technology in supporting cooperatives' social mission but also warned against potential threats to member autonomy and equity if technological advancements are not managed carefully.

Morover, Automation and AI offer significant benefits for cooperatives in terms of efficiency, productivity and member engagement. For example, agricultural cooperatives can use ***AI-powered predictive analytics*** to improve crop yields and optimize supply chains. Similarly, worker cooperatives in the manufacturing sector can implement ***automation to handle repetitive tasks*** allowing members to focus on more value-added activities. In consumer cooperatives ***chatbots*** and ***AI-driven recommendation systems*** can enhance the customer experience by providing personalized services (Wanyama, 2020). Such technologies allow co-ops to remain competitive with large corporations, giving them the agility needed to thrive in a fast-changing economic landscape. It is essential for cooperatives to develop ***AI ethics guidelines*** aligned with cooperative principles.

This ensures that automated systems uphold fairness, inclusivity, and transparency. Co-operative entities can also adopt ***open-source AI tools*** to prevent dependence on large tech firms and ensure collective ownership of technologies (Scholz, 2016). Several cooperatives are already embracing AI and automation. For example, agricultural cooperatives in Europe use ***drones and IoT sensors*** for precision farming, improving efficiency and reducing environmental impact. In India, credit cooperatives use ***AI-powered credit scoring systems*** to provide loans more efficiently while minimizing risks (Singh & Singh, 2022). These examples illustrate how co-ops can successfully integrate new technologies without.

03. METHODOLOGY

This review article is an exploratory article in qualitative nature which understand the evolving role of cooperative movements amid advancements in automation and AI. It focuses to identify how cooperatives adapt to, adopt, or resist automation and AI. Morover, assess their influence on cooperative values, employment and economic models based on the literature on cooperative movements, automation, AI and economic transitions. Secondary data collected through academic articles, case studies and reports from various databases such as Google Scholar, Science direct and other in order to address the research objectives. Also have looked in to some Case Studies on, global cooperatives that have adopted or rejected automation and AI, particularly in sectors heavily impacted by these technologies and analyzed their experiences, strategies, challenges, and outcomes. Data was analyzed using content anaysis and thematic anaysis.

04. DATA ANALYSIS

Objective 01: To review how various cooperative models (e.g., worker, agricultural, financial) are integrating automation and AI.

The incorporation of automation and artificial intelligence within cooperatives, such as multipurpose cooperatives, agricultural cooperatives, and financial cooperatives, is enabling these organizations to utilize technology in distinct ways to address their specific operational requirements and objectives. Here is an analysis of how each category is embracing these innovations.

1. Multipurpose cooperatives

These cooperative societies are owned and operated by members, are increasingly adopting automation and AI to improve productivity and reduce repetitive tasks. Many multipurpose cooperatives, especially in sectors like manufacturing, logistics, and digital services, use AI-driven tools to streamline operations in abroad. These technologies can aid in forecasting, scheduling, and even quality control, allowing workers to focus on tasks requiring human creativity and decision-making (Singh et al., 2022). For example, Spanish worker cooperative Mondragon has invested in AI to enhance supply chain logistics and maintain competitive productivity levels, illustrating how cooperatives in labor-intensive sectors adopt AI to remain competitive in global markets (Mondragon Corporation, 2023).

2. Agricultural Cooperatives

Agricultural cooperatives are early adopters of AI and automation, employing technologies like drones for crop monitoring, predictive analytics for yield forecasting and robotic systems for harvesting. These advancements are particularly useful in increasing productivity, improving crop quality and enabling sustainable practices. For instance, dairy cooperatives in the United States and Europe use AI for precise feeding and health monitoring of livestock, optimizing production and resource efficiency. One prominent example is the use of autonomous tractors and harvesting robots in farming cooperatives, which reduce labor dependency and address seasonal labor shortages.

3. Financial Cooperatives

Financial cooperatives including credit cooperative societies or cooperative rural banks in countries like japan, china, New zeland integrated with AI tools for data analytics, risk management and customer service enhancement. With AI-powered chatbots and customer support systems, these cooperatives can provide 24/7 service and personalized financial advice. For example, some financial cooperatives use AI to assess creditworthiness and detect fraud, offering a faster and more accurate loan approval process. Moreover, AI helps these cooperatives analyze member data, thereby improving financial inclusion by offering products tailored to the cooperative's specific membership base (Martinez & Nguyen, 2023).

Objective 02: To identify the opportunities offered by automation and AI for cooperatives in enhancing efficiency, productivity, and member participation.

Automation and AI offer cooperatives a range of opportunities to enhance efficiency, productivity and member participation. Here are some key ways these technologies can benefit cooperative models.

1. ***Enhancing Efficiency***

Automation and AI streamline operations within cooperatives, allowing tasks to be performed faster and with greater precision.

For instance,

- **Process Automation:** In sectors such as manufacturing and agriculture, cooperatives use robotic systems and automated machinery to handle repetitive tasks like packaging, sorting, and quality control. This reduces labor intensity and minimizes errors, leading to more consistent output.

- **Data Management and Analysis:** AI-driven data analytics can process vast amounts of data in real-time, helping cooperatives monitor financials, inventory, and logistics. Financial cooperatives, for example, leverage AI to improve resource allocation and risk management by analyzing transactional and behavioral data (Martinez & Nguyen, 2023).

2. Boosting Productivity

AI and automation can improve productivity across various cooperative sectors, helping to maximize output with available resources.

- **Precision Agriculture:** Agricultural cooperatives use AI and IoT devices to monitor crops, analyze soil conditions, and manage water usage more precisely, resulting in optimized yields and reduced waste. Drones and autonomous vehicles can also aid in planting, spraying, and harvesting, reducing labor dependency.
- **Smart Scheduling and Workforce Management:** Cooperatives in sectors like logistics and retail can use AI-driven scheduling software to optimize work hours and shifts, ensuring efficient utilization of labor resources while minimizing downtime. This also allows members to better plan around their personal commitments, enhancing work-life balance.

3. Enhancing Member Participation

AI offers tools for cooperatives to enhance communication and engagement with members, fostering stronger participation.

- **Personalized Member Services:** Financial cooperatives, for instance, can use AI to develop personalized financial products and offer tailored advice. This encourages more active participation by meeting members' specific needs, promoting a stronger sense of ownership (Ramos et al., 2022).
- **Decision-Making Support:** AI can facilitate democratic decision making by providing data-driven insights on proposals, projects, or investment plans. Some cooperatives use AI to analyze member

feedback and voting patterns, making it easier to capture and respond to members' voices (Ramos et al., 2022).

- **Training and Skill Development:** By automating routine tasks, AI can free up time for members to engage in skill development and training. Many cooperatives are also incorporating AI tools for online learning and knowledge sharing, equipping members with skills in data management, project planning and governance.

4. Supporting Sustainable Practices

AI and automation allow cooperatives, especially agricultural and manufacturing cooperatives, to integrate sustainable practices into their operations.

- **Resource Optimization:** AI-driven sensors and analytics can monitor resource usage, helping cooperatives reduce waste and optimize energy and water consumption. For example, dairy cooperatives employ AI to monitor livestock health and adjust feed, resulting in a more sustainable operation.

- **Environmental Impact Assessment:** Agricultural cooperatives are using AI to track and analyze environmental impacts, supporting more sustainable practices. For instance, AI helps identify the most sustainable crops, predict environmental risks, and implement eco-friendly practices.

Objective 03: To examine the challenges associated with automation, such as job displacement, governance issues and ethical concerns in Cooperative movement.

The automation and AI bring efficiency and innovation to cooperatives, also pose several challenges that can conflict with cooperative values like member control, inclusivity and equity. Here are some key challenges in automation for cooperatives, particularly around job displacement, governance, and ethical concerns.

01. Job Displacement

One of the primary challenges of automation in cooperatives is the potential for job displacement. In cooperatives, where members are often both owners and employees, this challenge directly impacts the cooperative's core mission of providing stable employment.

- **Reduction in Member Employment:** Automation in sectors such as manufacturing and agriculture can significantly reduce the need for human labor. For instance, in agricultural cooperatives, the use of AI-powered tractors and harvesting robots reduces demand for manual labor during peak harvest seasons. This could disproportionately affect seasonal workers, who may also be cooperative members (Singh et al., 2022).

- **Reskilling Needs:** Cooperatives often have limited resources for reskilling displaced members in new technologies. As automation continues to advance, members may need extensive training to adapt to new roles in managing, maintaining, or analyzing data

from AI systems, which can be a costly and time-consuming endeavor (Smith, 2023).

02. Governance Issues

Governance in cooperatives relies on democratic principles and member participation and the adoption of AI can complicate these processes.

- **Decision-Making Autonomy:** AI-driven decision support systems might reduce the role of human judgment, impacting collective decision-making. For instance, AI can recommend investment or operational decisions based on data analysis, which might conflict with member-driven priorities, especially if the technology's logic isn't transparent to members (Ramos et al., 2022).

- **Ownership of AI Tools and Data:** Since cooperatives prioritize collective ownership, questions arise over who owns the data generated and the tools themselves. In cases where cooperatives rely on third-party AI providers, they may face a loss of control over the data and insights derived from their operations, potentially undermining member ownership principles.

- **Representation in AI Training:** If cooperatives use AI models trained on datasets that do not reflect their unique organizational values or member demographics, this can lead to biased outcomes. For example, financial cooperatives using AI in loan assessments could inadvertently disadvantage members with non-traditional financial backgrounds (Martinez & Nguyen, 2023).

03. Ethical Concerns

Automation in cooperatives can raise ethical questions, particularly as it relates to transparency, accountability and alignment with cooperative principles.

- **Transparency and Trust:** Cooperatives are built on trust and transparency, but AI systems can be complex and opaque. Members may find it difficult to understand how automated decisions are made, potentially reducing trust in cooperative governance and decision-making. For example, if AI is used to prioritize work tasks or assess productivity, members may question how the technology evaluates their contributions (Singh et al., 2022).

- **Privacy and Data Security:** Automation and AI often require extensive data collection, raising privacy concerns among members. Cooperatives, particularly those in financial services, need robust data governance frameworks to protect sensitive information, as AI often relies on granular member data for personalizing services or assessing risks. Data breaches could compromise member privacy, damaging trust and loyalty.

- **Alignment with Cooperative Values:** A significant concern is ensuring that AI applications align with cooperative values like inclusivity, equality and democratic control. There is a risk that adopting AI to boost efficiency might prioritize profitability over member welfare. For example, a worker cooperative using AI to maximize productivity could face ethical dilemmas if this leads to increased workload or lower job security for its members.

04. Financial and Technical Barriers

Implementing AI and automation is often expensive and requires significant technical expertise, posing additional challenges for cooperatives that may lack these resources.

- **High Initial Investment:** AI and automation systems require upfront investments for infrastructure, training and ongoing maintenance, which can strain a cooperative's finances, particularly in smaller organizations with limited access to capital.

- **Technical Skills Gap:** Many cooperatives may not have access to skilled professionals in AI and automation. This lack of technical expertise can make it challenging to implement, maintain, and optimize these technologies effectively, which is especially relevant for worker cooperatives that prioritize employee involvement in operational decisions.

Objective 04: To explore strategies for cooperatives to align technological innovation with core cooperative principles.

To harness technological innovation while upholding their foundational principles, cooperatives can adopt strategies that focus on enhancing member control, promoting equitable access and maintaining transparency and accountability. Here's an exploration of these strategies to align technological advancements like automation and AI with core cooperative principles.

1. Enhancing Democratic Control and Member Participation

A fundamental principle of cooperatives is democratic member control. To align technological innovation with this value, cooperatives can ensure that technology serves, rather than replaces, democratic processes.

- **Inclusive Decision-Making:** Cooperatives can adopt participatory technology governance, where members are involved in decisions about technology adoption and usage. Regular forums, surveys and consultations can help members express preferences and concerns regarding new technologies, ensuring that innovation decisions reflect the collective interest (Martinez & Nguyen, 2023).

- **Transparency in Technology Operations:** Cooperatives can use open source software for certain AI and automation tools, allowing members to access and understand the technology's functioning. This transparency helps prevent "black box" decisions, building trust and reinforcing democratic control. Some cooperatives have successfully integrated open-source AI in their decision-making tools to ensure visibility and accessibility.

- **Member Education and Training:** Providing regular training helps members understand and work effectively with new technologies. In worker cooperatives, for example, reskilling and upskilling programs can allow members to take on new roles in managing automated processes, strengthening their role in the cooperative.

2. Prioritizing Equitable Access and Inclusivity

To avoid the potential for inequality that technology might bring, cooperatives can prioritize equitable access to resources, ensuring that all members benefit from innovation.

- **Data Ownership and Privacy Safeguards:** Cooperatives can adopt policies that treat member data as a shared resource, managed with transparency and consent. Clear data ownership frameworks, especially in financial cooperatives, help members feel secure about how their information is used, aligning with cooperative values of equity and trust (Jones & Johnson, 2023).

- **Broad Access to Technology Benefits:** Agricultural cooperatives ensure that technologies like AI for crop monitoring or precision farming are available to all members, including small-scale farmers. This approach can reduce technological disparities within the cooperative and prevent resource concentration.

- **Shared Economic Gains:** Profits or savings generated through automation can be reinvested in ways that benefit all members. Worker cooperatives, for example, might use gains from productivity improvements to increase member wages or invest in member services, reinforcing the value of shared ownership and equitable distribution (Singh et al., 2022).

3. Ensuring Transparency and Accountability

Cooperatives, by nature are value driven organizations that emphasize accountability and transparency which are crucial when implementing complex technologies.

- **Ethical AI Frameworks:** Developing an ethical framework for AI usage can help cooperatives maintain transparency in how decisions are made. Ethical guidelines might include restrictions on AI use in certain sensitive areas or stipulate those automated decisions be reviewed by human members to avoid unchecked reliance on AI.

- **Regular Audits and Impact Assessments:** Conducting regular impact assessments allows cooperatives to measure the effects of technology on member welfare, job security and overall equity. Transparent reporting of these assessments can help members understand the benefits and challenges associated with the cooperative's technology strategy, strengthening trust.

- **Third-Party Reviews of AI Models:** Cooperatives can establish partnerships with independent, third-party organizations to review their AI models for bias, fairness and accuracy. This helps cooperatives avoid unintentional biases that may emerge from AI decision-making and reinforces accountability to their members.

4. Leveraging Technology to Foster Cooperative Values

Finally, cooperatives can use technology not only to improve operations but also to reinforce their foundational values of solidarity, social responsibility and community development.

- **Member-Centric Digital Platforms:** Cooperatives can build or adopt digital platforms that enhance communication, participation and social engagement. Digital spaces designed with cooperative values in mind allow members to stay connected, share information, and collaborate more effectively. Some worker cooperatives have used member-only apps to facilitate direct voting on major issues, enhancing member involvement (Martinez & Nguyen, 2023).
- **Sustainable Technology Practices:** Many cooperatives are committed to social responsibility which can guide choices around environmentally friendly technologies. For instance, agricultural cooperatives may choose sustainable automation options, such as low-energy precision farming tools, to align with environmental goals and cooperative principles.
- **Supporting Community Development:** By focusing on AI and automation tools that address local or community-specific needs, cooperatives can align their technological innovation with their mission to serve members and support local development. Financial cooperatives might prioritize AI tools that enhance access to financial services for underserved communities, reinforcing their social responsibility.

These strategies enable cooperatives to maintain their unique identity and values while adopting and benefiting from technological advancements. By fostering inclusive decision-making, equitable access, transparent governance and community-centric development, cooperatives can harness automation and AI in ways that support their members and advance their missions.

7. CONCLUSION

The Cooperative movement has a unique opportunity to leverage automation and AI to enhance productivity and member participation. However, this requires careful planning to mitigate the risks of job displacement and inequality. By focusing on digital education, ethical AI practices and inclusive governance, Cooperatives can remain competitive while staying true to their core principles. With the right support from policymakers, cooperatives can lead the way in creating a fairer, more sustainable economy in the age of technological disruption. Designing frameworks for ethical AI and responsible automation within cooperatives requires a balanced approach that respects cooperative values, prioritizes member interests and safeguards against potential harms associated with these technologies. Here are four proposed frameworks that cooperatives can adopt to integrate AI and automation ethically and responsibly. Moreover, AI technology has several limitations that should not be ignored when deciding to incorporate it into the cooperative movement.

The decision on the adoption and incorporation of AI in the cooperative requires the management body to perform the appropriate due diligence in order to comply with the duty of information, according to the standard of the judicious and orderly manager, in charge of the members of the management body and of the representation of the cooperative. The democratic structure of cooperatives is being threatened by a number of AI systems since decision making is unclear and huge data can be biased, which means that decisions and actions based on this data are similarly biased.

It is still necessary for artificial intelligence to possess consciousness. Human conscience is the ability to discriminate between right and wrong. An ethical framework for good, which is founded on essential ideas shared by all civilizations, is the foundation of values. Cooperatives must adhere to "corporate social responsibility" and are founded on a set of values. Cooperatives are fundamentally based on values like equity, solidarity, and concern for the environment and community among others. the implementation of AI is a challenge for Sri Lankan Cooperative entities in future.

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