infrastructure, networks, and technology, combined with the need to quickly adapt to digital technology, present a significant challenge (OECD, 2023).

Farmers may be unable to participate in the market if they lack reliable and affordable broadband internet access at their farms and homes (Pesci et al., 2023). Farmers in small-scale agricultural operations not only need mobile networks and devices, but also pay for data services (Mehrabi et al., 2021). Farmers face a digital divide due to restricted access to energy, inadequate ICT infrastructure, and low ICT knowledge (Upadhyaya et al., 2019; Moni, 2017). Poor ICT penetration may also put countries behind and hinder them from receiving the economic and social benefits of ICT deployment, which could widen the economic gap between rich and poor (UNESCAP, 2021).

Digital Divide in the Information Era

The digital divide is a major social and economic issue in the 21st century (Rogers, 2016). The US government coined the term "digital divide" in the 1990s to characterize socio-economic inequities caused by widespread computer and internet use (Lupač, 2018). It refers to the gap between those who can access, accept, and apply new technology and others who cannot, despite the rapid pace of technological innovation.

This inequality can widen, creating the digital divide (Soomro et al., 2020; Ojo & Raman, 2017). Global economic inequality underpins the digital gap (Kumm et al., 2021; Guo & Wan, 2022). Similarly, poverty and the digital divide are linked by limited access to ICTs, hindering development due to factors such as race, income, location, and demographics (Schneider & Droege, 2014). It encompasses not only physical access to computers and the Internet, but also the skills needed to utilize them effectively and user behaviors (Correa et al., 2020).

Digital inequality in various regions is a major concern for sustainable development in developing nations (UNDP, 2023). Lack of access to technology, excitement or incentive to utilize technology, and poor literacy rates may produce the digital divide. The cost of technology, lack of broadband internet, poor access for individuals with impairments, and poor-performing gadgets all contribute to a lack of technological access. Digital gap is now recognized as a social issue that includes social, economic, cultural, and educational inequality (Van Dijk, 2020). For instance, information literacy education will help prevent society from becoming split between those with and without access to information. Additionally, lack of computer and communication technology skills prevents people from accessing digital information (Ha & Chuah, 2023; Aminullah et al., 2022).

Van Dijk and Hacker (2003) argue that the digital divide is complex and dynamic, with no single factor (e.g. gender, age, race, education, income, or geographic location) fully explaining the first order (physical 3access) gap. Digital inequality increases earlier exclusion by excluding people on multiple dimensions (Tongia et al., 2005). Low income levels and financial constraints, inadequate or costly access to electricity and communication networks, limited digital literacy, insufficient technical support, limited availability of high-quality ICT content, and inadequate education can all contribute to uneven community digitalization (Deineko et al., 2022).

Digital gaps in knowledge, economic and social resources, technology performance and dependability, and value realization have been highlighted by scholars. Furthermore, digitalization requires large financial investments and infrastructure development, especially in rural and underdeveloped areas, making socio-economic disparities relevant (Zhang et al., 2022). Low- and middle-income populations find digital technology scarce. This is due to high expenses and a lack of infrastructure for these technologies.

Additionally, these villages struggle with inconsistent electricity and insufficient ICT resources. The digital gap in rural areas is caused by a variety of injustices, including limited access to education and training, which limits their lifetime computer usage (Van Deursen & Van Dijk, 2014; Facer & Selwyn, 2021). As value chains and transactions become more digital, rural stakeholders may face exclusion and disenfranchisement from crucial information (Tilley et al., 2022). Rural residents face isolation, limited training and employment options, and poor telecommunications infrastructure due to their distance from large cities and low population density (Jung et al., 2014). Thus, limiting ICT use negatively impacts rural economies, societies, health, and communities (Palvia et al., 2018). These digital gaps keep rural communities behind urban ones despite their abundant natural resources (Koo & Eesley, 2021). Disparities, affecting all genders and ages, hinder rural community development (Van Dijk, 2017), and the COVID-19 pandemic has exacerbated the digital divide, resulting in greater dispersion of Internet and technology access (Ahmmed et al., 2022).

Existing literature indicates that numerous studies have focused on investigating SC from the buyers' point of view, but there has been limited research undertaken on examining this phenomenon from the sellers' viewpoints (Braojos et al., 2019; Chen et al., 2021; Chen & Zhu, 2021). In addition, while most research studies have concentrated on commercial corporations, particularly big and medium-sized enterprises, there is still a scarcity of studies that specifically target smaller enterprises such as non-profit organizations, cooperatives, and associations (Abed, 2020; Chang & Li, 2019; Dwivedi et al., 2021). Furthermore, there

have been just a few studies that have investigated the extent to which SC is being adopted in the agricultural sector, specifically in the context of the Philippines. Therefore, this research aims to: (1) to identify and analyze the primary factors influencing the adoption of SC among farm cooperatives; (2) to explore the digital inclusion challenges faced by farm cooperatives and their impact on SC adoption; and (3) to assess the role of technological infrastructure and digital resources in enabling or hindering SC adoption within farm cooperatives. In order to address the objectives, a mixed-methods approach will be employed.

2. MATERIALS AND METHODS

This study utilizes a comprehensive methodology to examine the digital inclusion landscape in agriculture, with a specific focus on the factors that affect the adoption of SC among farm cooperatives. In order to fully understand the complex interactions involved, a mixed-methods approach was utilized, incorporating both qualitative and quantitative methodologies. The population being examined consists of agricultural farm cooperatives that are actively engaged in agricultural activities.

Sources of Data

The research focus on 52 farm cooperatives across the Bicol Region in the Philippines that are involved in agricultural activities. The study used a convenience selection method to guarantee inclusion of diverse geographic locations and differing degrees of digital infrastructure.

Data Collection

In-depth interviews of key stakeholders, including farmers and cooperative managers were interviewed to gather rich, context-specific insights into the factors influencing SC adoption. Open-ended questions were used to encourage participants to share their experiences, perceptions, and challenges related to digital inclusion in agriculture. A structured questionnaire was administered to a larger sample of farm cooperatives. The survey was designed to quantify the extent of SC adoption and measure various factors influencing this adoption, including digital literacy, perceived benefits, perceived risks, and external support.

Data Analysis and Synthesis

The quantitative data obtained were evaluated using descriptive statistics. For the qualitative data analysis, thematic analysis was conducted to discover repeating patterns and storylines, providing insights into the contextual intricacies of the adoption of SC.

Ethical Considerations

During the process of gathering the data, informed consent was sought from all participants with clear and comprehensive information regarding the study's purpose, procedures, and potential implications. Confidentiality and privacy safeguards were implemented to protect the identities and personal information of participants. The outcomes and conclusions of this research study were anonymized, and no associations of the respondents, such as their names, were included in any of the findings or results.

3. RESULTS AND DISCUSSIONS

The research findings reveal the current level of acceptance of SC among farm cooperatives in Bicol Region, showing a diverse landscape with different levels of involvement. Figure 1 illustrates that thirteen (13) farm cooperatives have adopted SC utilizing Facebook through the use of smart phones. Thirty four (34) farm cooperatives did not adopt which may be attributed to reasons including restricted digital literacy, unstable internet connectivity, and resource constraints that lead to their unwillingness. And, five (5) farm cooperatives initially engaged in SC but later withdrew due to various reasons. The discontinuation of SC initiatives indicates the challenges of managing online operations, and poor signal strength inside the cooperative. In fact, merely starting SC initiatives may not be enough but rather, ongoing support and resources are essential for their long-term sustainability.

Moreover, transitioning to SC can be particularly challenging for many farmer cooperatives accustomed to traditional sales methods. The majority of these cooperatives, with 50 out of 52 situated in rural locations as depicted in Figure 2, face unique hurdles in adapting to digital marketing practices. In rural areas, access to technology and internet connectivity are limited, exacerbating the difficulties of embracing SC.

Additionally, the lack of familiarity with digital platforms and marketing techniques among cooperative members further complicates the transition process. Furthermore, rural cooperatives often operate within tight-knit communities where face-to-face interactions and word-of-mouth marketing have been the primary means of conducting business. Shifting to an online model requires not only technological adaptation but also a fundamental shift in marketing strategies and customer engagement approaches. Moreover, rural areas lack the necessary infrastructure and support systems to facilitate the adoption of SC, such as reliable delivery services and e-payment options. These challenges can deter cooperatives from fully embracing SC, despite recognizing its potential benefits. Overall, the rural context presents unique challenges for farmer cooperatives seeking to engage in SC, necessitating tailored strategies and support mechanisms to facilitate their digital transition effectively.

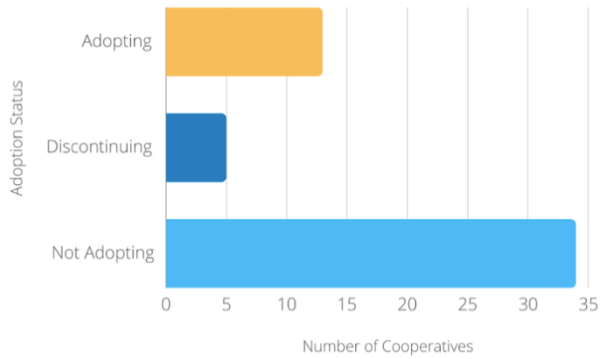

Figure 1: Adoption Status of Social Commerce among Bicol Farm Cooperatives

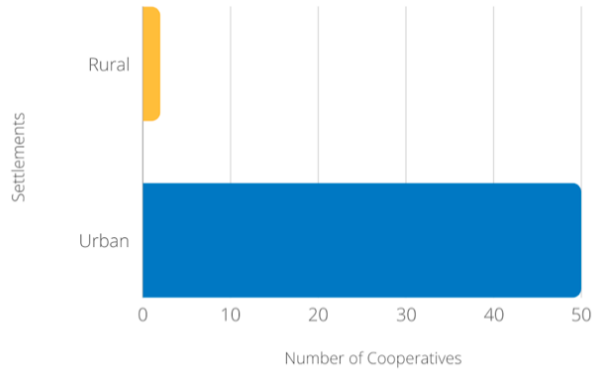

Figure 2: Distribution of Farm Cooperatives in Urban and Rural Areas

Primary factors influencing the adoption of social commerce among farm cooperatives

The amount of digital literacy among cooperative members was a crucial element. Findings from the survey and interviews indicated that cooperatives with greater digital literacy among their members were more inclined to successfully implement SC platforms. Moreover, the presence of training and support for utilizing digital tools significantly aided in the adoption process. Secondly, the importance and convenience of SC platforms were identified as critical elements. Cooperatives that viewed SC platforms as advantageous for their business operations and user-friendly were more likely to implement them. Important concerns included user-friendly interfaces, accessibility, and compatibility with existing workflows. Additionally, adoption was influenced by organizational characteristics inside the cooperatives. This encompassed management backing for digital projects, a corporate culture that fosters innovation, and the existence of specialized staff or committees in charge of overseeing digital platforms. Cooperatives with proactive leadership and a supportive culture were more inclined to adopt SC.

Furthermore, agricultural products are perishable, which hinders their ability to effectively utilize social media platforms. Farmers may hesitate to implement online selling if they see an increase in complexity or risk in providing commodities within a tight timeframe. In fact, some cooperatives do not realize the advantages of digital platforms, which results in a lack of willingness to consider other options. In addition, insufficient productivity poses a significant hindrance for farmer cooperatives to fully embrace SC. Due to limited output, these cooperatives primarily serve local communities and existing markets, constraining their ability to expand their customer base. Consequently, when confronted with potential online orders, they may struggle to fulfill demand due to a lack of supplies. This limitation stems from various factors, including resource constraints, labor shortages, and inefficiencies in production processes. Without sufficient productivity to meet online demand, farmer cooperatives risk losing out on opportunities for growth and market expansion. Therefore, addressing productivity challenges through improved agricultural practices, enhanced supply chain management, and investments in technology and infrastructure is essential for enabling farmer cooperatives to capitalize on the benefits of social commerce and reach a broader customer base.

Digital inclusion challenges faced by farm cooperatives and its impact on social commerce adoption

The research study uncovered various digital inclusion obstacles encountered by farm cooperatives, affecting their uptake of SC. A major obstacle was the limited availability of dependable internet connection, especially in rural areas where several

cooperatives are situated. Inadequate infrastructure and restricted internet coverage impeded cooperative members' capacity to participate in online activities efficiently. In addition, farm cooperatives face challenges in digital inclusion due to scarce resources, hindering their ability to embrace SC, and engage in online markets and utilize digital platforms for business expansion. Also, financial limitations hindered investment in digital technology, and training programs.

Several cooperatives faced challenges in covering the early expenses related to establishing and sustaining SC. Also, confidence in the security of online agricultural transactions does significantly affect cooperatives' interest in adoption. Moreover, the study shed light on key elements influencing the integration of farmer cooperatives into SC. One notable factor is the significant challenge faced by elderly members due to their inadequate digital literacy when attempting to navigate online platforms effectively. Figure 3 illustrates that the majority of cooperative members are elderly, further exacerbating the digital literacy gap within these organizations.

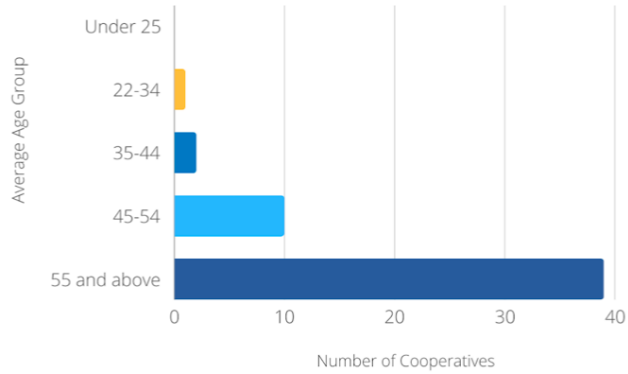

Figure 3: Average Age Group of Members

The reluctance of younger generations to engage in farming exacerbates this issue. As depicted in the findings, many younger individuals express a preference for white-collar professions over agricultural endeavors. Consequently, there is a lack of interest among the youth in participating in cooperative activities, including adopting digital technologies for marketing and sales purposes.

Furthermore, the gap between older individuals and technological advancements widens, leading to their isolation as they persist in relying on traditional marketing methods while the rest of the world progresses with technology. This isolation exacerbates the challenges faced by farmer cooperatives, as they struggle to effectively engage in SC activities without sufficient skills and knowledge among their members. Without embracing technological innovations, farmer cooperatives risk falling behind competitors who leverage social commerce to reach wider audiences and streamline their operations. In addition, the isolation of older individuals within cooperatives can lead to a loss of valuable knowledge and experience, further undermining the cooperative's capacity to innovate and adapt to changing market dynamics. The collective wisdom accumulated over years of farming experience may remain untapped, hindering the cooperative's ability to capitalize on emerging opportunities and navigate challenges effectively. This intergenerational divide presents a formidable barrier to the successful integration of farmer cooperatives into SC. Moreover, the disparity in digital skills between generations not only hinders the adoption of SC but also limits knowledge transfer and capacity building within cooperatives. To address these issues, targeted interventions are needed to empower older individuals within farmer cooperatives with the skills and knowledge necessary to participate in social-commerce activities. This may involve providing training and support tailored to their needs, fostering intergenerational collaboration, and promoting a culture of continuous learning and adaptation within the cooperative community. By bridging the digital divide and harnessing the collective expertise of all members, farmer cooperatives can position themselves for sustainable growth and success in the digital age.

Role of technological infrastructure and digital resources in enabling or hindering social commerce adoption within farm cooperatives

Technological infrastructure and digital resources were crucial in either supporting or hindering the implementation of SC inside farm cooperatives. Cooperatives with strong technological infrastructure, such as high-speed internet and dependable hardware, were more prepared to implement SC. Moreover, the presence of digital resources including online marketplaces, e-payment systems, and social media platforms played a role in the adoption. Cooperatives with access to a variety of digital resources customized to their unique requirements were more effective in incorporating SC into their activities. Insufficient technological infrastructure and restricted access to digital resources were substantial obstacles to implementation. In addition, cooperatives without necessary infrastructure and resources had challenges entering the digital marketplace, which limited their competitiveness and growth prospects.

Despite their diverse stances on SC, the cooperatives unanimously acknowledge the critical importance of several key factors in navigating the digital landscape effectively. Firstly, there is a shared recognition among farmer cooperatives of the necessity to enhance their members' knowledge and skills in digital technologies. This includes understanding how to utilize online

platforms for marketing, sales, and communication purposes, as well as staying updated on emerging digital trends and tools relevant to their agricultural activities. Access to the internet and digital technologies is another universally acknowledged priority. Farmer cooperatives recognize the transformative potential of digital connectivity in accessing markets, gathering information, and facilitating communication both within the cooperative and with external stakeholders. In addition, formal training in digital skills and marketing strategies is identified as essential for empowering cooperative members to navigate the complexities of the digital marketplace confidently. By equipping members with the necessary knowledge and competencies, cooperatives can enhance their capacity to leverage digital platforms effectively and adapt to evolving consumer preferences.

Moreover, the active utilization of digital devices such as smartphones, laptops, and computers is highlighted as crucial for applying acquired knowledge and skills in practical contexts. These devices serve as indispensable tools for accessing online resources, managing digital assets, and engaging with customers and partners in the digital sphere. By prioritizing these foundational elements, cooperatives can position themselves for success in the digital economy and contribute to the sustainable development of agricultural communities.

Furthermore, cultural considerations contributed to digital exclusion, especially among marginalized members in these cooperatives. In addition, government policies and activities are crucial in promoting the adoption of SC among agricultural cooperatives. Governments can support these cooperatives in implementing digital transformation by investing in infrastructure, providing skills training, and offering financial assistance programs.

Ultimately, the decision of Bicol farmers' cooperatives to implement SC is influenced by a complex interplay of interconnected elements. Despite facing ongoing hurdles such as inadequate digital literacy and intermittent internet connectivity, targeted interventions have the potential to support these cooperatives in their digital advancement journey. One key aspect that can significantly impact the adoption of SC is digital inclusion. By addressing the digital literacy gap and providing tailored training programs, cooperatives can empower their members to navigate digital platforms effectively and capitalize on the opportunities presented by SC. Additionally, efforts to improve access to reliable internet connectivity in rural areas can mitigate one of the primary barriers to SC adoption, enabling cooperatives to engage more seamlessly in online commerce activities. Also, stakeholders play a crucial role in promoting greater adoption of SC among farmer cooperatives in the region. By collaborating with local authorities, educational institutions, and non-profit organizations, stakeholders can facilitate initiatives aimed at enhancing digital inclusion and bridging the digital divide. This may involve organizing workshops, providing educational resources, and establishing community-based support networks to assist cooperatives in their digital journey. Furthermore, enhancing access to technology infrastructure and resources is essential for unlocking the full potential of SC for farmer cooperatives in Bicol. This includes investing in the development of digital marketplaces tailored to the needs of agricultural producers, facilitating access to e-payment solutions, and promoting the adoption of digital tools and technologies that streamline agricultural processes and enhance market visibility.

4. CONCLUSION

This study involved a thorough examination of digital inclusion in agriculture, specifically looking at the factors that affect the adoption of SC by farm cooperatives. A mixed-methods approach was used to achieve three main research goals: identifying core factors influencing adoption, investigating problems related to digital inclusion, and evaluating the impact of technological infrastructure and digital resources.

The main elements affecting the adoption of SC in farm cooperatives highlighted the significant roles of digital literacy, perceived utility, and organizational readiness. Cooperatives with advanced digital literacy among members and supportive organizational structures were more likely to effectively adopt SC platforms.

This research study discovered other digital inclusion challenges encountered by farm cooperatives, such as limited internet access, and budgetary limitations. The challenges impeded the adoption of SC and limited cooperatives' participation in the digital economy, affecting their competitiveness and growth prospects.

Finally, the evaluation of the impact of technological infrastructure and digital resources emphasized their importance in facilitating or impeding the development of SC. Access to dependable internet connection, as well as a variety of digital resources designed for agricultural use, was essential in promoting adoption. Inadequate infrastructure and restricted access to digital resources were key obstacles for entering the digital sector.

Ultimately, it is crucial to tackle the issues affecting SC adoption, overcome digital inclusion obstacles, and invest in technology infrastructure and digital resources to enhance digital inclusion in agriculture. Empowering agricultural cooperatives with essential tools and resources may bridge the digital divide, boost competitiveness, stimulate economic growth, and support sustainable development in rural communities. In the future, governments, stakeholders, and industry participants need to work together to create plans and projects that support digital inclusion and utilize the revolutionary capabilities of technology in agriculture.

Limitations of the Research. Although this study offers vital insights into digital inclusion in agriculture in the investigated setting, it is crucial to recognize specific constraints that could affect the application and extent of the findings. The research

findings are dependent on the particular context and may not be universally relevant to all organizational environments. The distinct attributes and corporate culture of the examined setting can impact the efficiency in a manner that differs from other settings. In addition, the data for this study is based on self-reported replies provided by farm cooperatives. Although attempts are made to provide accurate and precise answers, there is a chance of response bias or the impact of social desirability. Participants may have provided answers that were swayed by their personal prejudices, rather than offering a truthful reflection of their real actions or ideas.

Future Research Direction. There have been few studies examining disparities in technology access and usage among farmers who engage in social commerce in agriculture, based on socio-economic, cultural, and infrastructural aspects. Therefore, it is crucial to research the digital gap in social commerce in agriculture to identify challenges to adoption and explore the socio-economic consequences of unequal access to social commerce platforms. Developing strategies to address disparities can bridge the gap and promote widespread technological adoption in the agricultural sector. This can maximize the transformative potential of digital tools, assess the impacts of farmers' market opportunities and information access, enhance economic empowerment, and establish a more inclusive and sustainable digital ecosystem that advances agricultural practices and livelihoods.

Furthermore, there is a lack of study examining the determinants of individuals' intention to continue in adopting social commerce in the agriculture industry. Studying the ongoing use of social commerce is essential to provide insights into the long-term sustainability and efficacy of platforms used in the agricultural industry. Undertaking future study would enable researchers and professionals to investigate the shifting requirements and anticipations of users in the swiftly growing realm of social commerce. Future study could offer solutions to boost user engagement, overcome barriers, and encourage the ongoing adoption of technology in agricultural practices by examining user motivations, barriers, and satisfaction levels.

ACKNOWLEDGMENT

The author extends sincere appreciation to all individuals and institutions that supported the completion of this study.

REFERENCES

[1] Abate, G. T. (2018). Drivers of agricultural cooperative formation and farmers' membership and patronage decisions in Ethiopia. Journal of Co-Operative Organization and Management, 6(2), 53–63.

[2] Abed, S. S. (2020). Social commerce adoption using TOE framework: An empirical investigation of Saudi Arabian SMEs. International Journal of Information Management, 53, 102118.

[3] Abideen, A. Z., Sundram, V. P. K., Pyeman, J., Othman, A. K. & Sorooshian, S. (2021). Food supply chain transformation through technology and future research directions—a systematic review. Logistics, 5(4), 83.

[4] Acosta, L., Eugenio, E. & Sales, J. (2019). Assessment of organic certification in the coconut oil value chain in the Philippines. UNCTAD Project (DA-1617AI): Fostering the Development of Green Exports through Voluntary Sustainability Standards.

[5] ADB. (2018). Internet plus agriculture: A new engine for rural economic growth in the People's Republic of China. Asian Development Bank. https://www.adb.org/sites/default/files/publication/455091/internet-plus-agriculture-prc.pdf

[6] Ahmmed, T., Alidadi, A., Zhang, Z., Chaudhry, A. U. & Yanikomeroglu, H. (2022). The digital divide in Canada and the role of LEO satellites in bridging the gap. IEEE Communications Magazine, 60(6), 24–30.

[7] Aminullah, E., Fizzanty, T., Nawawi, N., Suryanto, J., Pranata, N., Maulana, I., Ariyani, L., Wicaksono, A., Suardi, I., Azis, N. L. L. & Budiatri, A. P. (2022). Interactive components of digital MSMEs ecosystem for inclusive digital economy in Indonesia. Journal of the Knowledge Economy. https://doi.org/10.1007/s13132-022-01086-8.

[8] Braojos, J., Benitez, J. & Llorens, J. (2019). How do social commerce-IT capabilities influence firm performance? Theory and empirical evidence. Information and Management, 56(2), 155–171. https://doi.org/10.1016/j.im.2018.04.006

[9] Camacho, S. & Barrios, A. (2022). Social commerce affordances for female entrepreneurship: the case of Facebook. Electronic Markets, 32(3), 1145–1167.

[10] Chang, X. & Li, J. (2019). Business performance prediction in location-based social commerce. Expert Systems with Applications, 126, 112–123. https://doi.org/10.1016/j.eswa.2019.01.086

[11] Chen, L. & Zhu, F. (2021). Seller information sharing in online marketplaces. Journal of Marketing Management, 37(11-12), 1191-1218., 37(11–12), 1191–1218.

[12] Chen, L., Zhu, F., Mantrala, M. & Wang, N. (2021). Seller creative selling in social commerce. International Journal of Advertising, 40(2), 272–291.

[13] Correa, T., Pavez, I. & Contreras, J. (2020). Digital inclusion through mobile phones?: A comparison

between mobile-only and computer users in internet access, skills and use. Information, Communication & Society, 23(7), 1074–1091.

[14] Couture, V., Faber, B., Gu, Y. & Liu, L. (2021). Connecting the countryside via e-commerce: Evidence from China. American Economic Review: Insights, 3(1), 35–50.

[15] Deineko, L., Hrebelnyk, O., Zharova, L., Tsyplitska, O. & Grebeniuk, N. (2022). Digital divide and sustainable development of Ukrainian regions. Problems and Perspectives in Management, 20(1),

[16] Dwivedi, Y. K., Ismagilova, E., Hughes, D. L., Carlson, J., Filieri, R., Jacobson, J., Jain, V., Karjaluoto, H., Kefi, H., Krishen, A. S., Kumar, V., Rahman, M. M., Raman, R., Rauschnabel, P. A., Rowley, J., Salo, J., Tran, G. A. & Wang, Y. (2021). Setting the future of digital and social media marketing research: Perspectives and research propositions. International Journal of Information Management, 59(May 2020), 102168. https://doi.org/10.1016/j.ijinfomgt.2020.102168

[17] Dzulfikar, M. F., Handayani, R. C., Syahrizal, A., Sensuse, D. I., Satria, D. & Wulandari, I. A. (2019). The role of social commerce features and customer knowledge management in improving SME's innovation capability. 2018 6th International Conference on Cyber and IT Service Management (CITSM).

[18] Facer, K. & Selwyn, N. (2021). Digital technology and the futures of education: Towards 'Non-Stupid' optimism. Paper Commissioned for the UNESCO Futures of Education Report.

[19] FAO. (2017a). Information and Communication Technology (ICT) in Agriculture: A Report to the G20 Agricultural Deputies. Food and Agriculture Organization of the United Nations. https://www.fao.org/family-farming/detail/en/c/1200067/

[20] FAO. (2017b). The future of food and agriculture: Trends and challenges. Food and Agriculture Organization of the United Nations Rome. https://www.fao.org/3/i6583e/i6583e.pdf

[21] Feng, L., Friis, A. & Nilsson, J. (2016). Social capital among members in grain marketing cooperatives of different sizes. Agribusiness, 32(1), 113–126. https://doi.org/10.1002/agr.21427

[22] Giles, J., Macandog, P. B., Sova, C., Digal, L., Balgos, C., Loquias, M. & Grosjean, G. (2019). Climate-Resilient Agriculture in The Philippines: Climate Risk Profile, Mindanao. https://cgspace.cgiar.org/server/api/core/bitstreams/ac16cccb-4a2b-4ac0-86cc-66b22f7d2756/content

[23] Guo, C. & Wan, B. (2022). The digital divide in online learning in China during the COVID-19 pandemic. Technology in Society, 71, 102122.

[24] Ha, H. & Chuah, C. K. P. (2023). Digital economy in Southeast Asia: Challenges, opportunities and future development. Southeast Asia: A Multidisciplinary Journal, 23(1), 19–35. https://doi.org/10.1108/seamj-02-2023-0023.

[25] Hajli, N. (2015). Social commerce constructs and consumer's intention to buy. International Journal of Information Management, 35(2), 183–191. https://doi.org/https://doi.org/10.1016/j.ijinfomgt.2014.12.005

[26] https://www.unescap.org/kp/2021/inequality-access-information-and-communication-technologies-icts-east-and-north-east-asia.

[27] Huang, N., Chen, P., Hong, Y. & Wu, S. (2018). Digital nudging for online social sharing: Evidence from a randomized field experiment. Proceedings of the 51st Hawaii International Conference on System Sciences, 9, 1483–1491. https://doi.org/10.24251/hicss.2018.185

[28] ILO. (2016). Cooperatives and the Sustainable Development Goals: A Contribution to the Post-2015 Development Debate A Policy Brief. International Labour Organization. https://www.ilo.org/wcmsp5/groups/public/---ed_emp/documents/publication/wcms_240640.pdf

[29] Innocent, Y. & Adefila, J. O. (2014). Farmers' cooperatives and agricultural development in Kwali area council federal capital territory Abuja, Nigeria. International Journal of Humanities and Social Science, 4(7(1)), 161–169.

[30] Jung, M. C., Park, S. & Lee, J. Y. (2014). Information network villages: A community-focused digital divide reduction policy in rural Korea. Journal of Telecommunications and the Digital Economy, 2(1), 21-1., 2(1), 21–1.

[31] Kalogiannidis, S. (2020). Economic cooperative models: Agricultural cooperatives in Greece and the need to modernize their operation for the sustainable development of local societies. International Journal of Academic Research in Business and Social Sciences, 10(11), 452–468. https://doi.org/10.6007/ijarbss/v10-i11/8035.

[32] Koo, W. W. & Eesley, C. E. (2021). Platform governance and the rural–urban divide: Sellers' responses to design change. Strategic Management Journal, 42(5), 941–967.

[33] Kumm, A. J., Viljoen, M. & de Vries, P. J. (2021). The digital divide in technologies for autism: Feasibility considerations for low-and middle-income countries. Journal of Autism and Developmental Disorders, 1–14.

[34] Labios, R. J. D., Depositario, D. P. T., Manipol, N. E. P., De Guzman, R. S. C. & Velasco, D. N. F. (2021). Archipelago on lockdown: An assessment of the effects of the COVID-19 pandemic on Philippines' Micro, Small, and Medium Enterprises (MSMEs) across the food value chain. Journal of Economics, Management & Agricultural Development, 7(2390-2022–798), 49–69.

[35] Liu, M., Min, S., Ma, W. & Liu, T. (2021). The adoption and impact of E-commerce in rural China: Application of an endogenous switching

regression model. Journal of Rural Studies, 83, 106–116.

[36] Lupač, P. (2018). Beyond the digital divide: Contextualizing the information society. Emerald Publishing Limited.

[37] Ma, W., McKay, A., Rahut, D. B. & Sonobe, T. (2023). An introduction to rural and agricultural development in the digital age. Review of Development Economics.

[38] Masuku, T. A., Masuku, M. B. & Mutangira, J. P. B. (2016). Performance of multi-purpose cooperatives in the Shiselweni Region of Swaziland. International Journal of Sustainable Agricultural Research, 3(4), 58–71. https://doi.org/10.18488/journal.70/2016.3.4/70.4.58.71

[39] Mehrabi, Z., McDowell, M. J., Ricciardi, V., Levers, C., Martinez, J. D., Mehrabi, N., Wittman, H., Ramankutty, N. & Jarvis, A. (2021). The global divide in data-driven farming. Nature Sustainability, 4(2), 154–160.

[40] Moreno, M. L., Kuwornu, J. K. M. & Szabo, S. (2020). Overview and constraints of the coconut supply chain in the Philippines. International Journal of Fruit Science, 20(S2), S524–S541. https://doi.org/10.1080/15538362.2020.1746727

[41] OECD. (2023). Rural regions of the future: Seizing technological change. Organisation for Economic Co-Operation and Development. https://www.oecd-ilibrary.org/sites/ae6bf9cd-en/index.html?itemId=/content/component/ae6bf9cd-en

[42] Ojo, A. O. & Raman, M. (2017). Differences in individual usage of the internet: Cognitive, motivational and contextual aspects of the digital divide. Paper Presented at the Pacific Asia Conference on Information Systems (PACIS).

[43] Palvia, P., Baqir, N. & Nemati, H. (2018). ICT for socio-economic development: A citizens' perspective. Information & Management, 55(2), 160–176.

[44] Pérez-González, M. D. C. & Valiente-Palma, L. (2021). Cooperative societies and sustainability: A spatial analysis of andalusia as a tool for implementing territorial development policies, strategies and initiatives. Sustainability (Switzerland), 13(2), 1–16. https://doi.org/10.3390/su13020609

[45] Pesci, S., Galt, R. E., Durant, J. L., Manser, G. M., Asprooth, L. & Pinzón, N. (2023). A digital divide in direct market farmers' online sales and marketing: Early pandemic evidence from California. Journal of Rural Studies, 101, 103038.

[46] Piabuo, S. M., Yakan, H. B., Puatwoe, J. T., Nonzienwo, V. Y. & Mamboh, T. R. (2020). Effect of rural farmers' access to information on price and profits in Cameroon. Cogent Food and Agriculture, 6(1). https://doi.org/10.1080/23311932.2020.1799530

[47] Rashida, V. K. (2020). Digital technologies for transforming agriculture: Prospects and challenges.

[48] Rogers, S. E. (2016). Bridging the 21st century digital divide. TechTrends, 60(3), 197–199. Schneider, M. A. & Droege, S. B. (2014). Poverty and the digital divide in developing nations. Studies in Asian Social Science, 1(2), 35–36.

[49] Soomro, K. A., Kale, U., Curtis, R., Akcaoglu, M. & Bernstein, M. (2020). Digital divide among higher education faculty. International Journal of Educational Technology in Higher Education, 17(1). https://doi.org/10.1186/s41239-020-00191-5.

[50] Sumalde, Z. M. & Quilloy, K. P. (2015). Improving marketing efficiency through agricultural cooperatives: Successful cases in the Philippines.

[51] Tilley, A., Shikuku, K. M., Cohen, P. J., Khor, L., Henriksson, P. J., Hossain, P. R. & Delamare-Deboutteville, J. (2022). Digital Innovations for resilient aquatic food systems. Tongia, R., Subrahmanian, E. & Arunachalam, V. S. (2005). Information and communications technology For sustainable development: Defining a global research agenda. Allied Publishers.

[52] UN Global Compact. (2017). Disruptive Technologies, Digital Agriculture: Feeding the future. http://breakthrough.unglobalcompact.org/disruptive-technologies/digital-agriculture/

[53] UNDP. (2023). What are the Sustainable Development Goals? United Nations Development Programme. https://www.undp.org/content/undp/en/home/sustainable-development-goals.html

[54] UNESCAP. (2021). Inequality in Access to Information and Communication Technologies (ICTs) in East and North-East Asia and South-East Asia. UN Economic and Social Commission for Asia and the Pacific.

[55] Upadhyaya, L., Roy Burman, R., Sangeetha, V., Lenin, V., Sharma, J. P. & Dash, S. (2019). Digital inclusion: Strategies to bridge digital divide in farming community. Journal of Agricultural Science and Technology, 21(5), 1079–1089.

[56] Van Deursen, A. J. & Van Dijk, J. A. (2014). The digital divide shifts to differences in usage. New Media & Society, 16(3), 507–526.

[57] Van Dijk, J. & Hacker, K. (2003). The digital divide as a complex and dynamic phenomenon. The Information Society, 19(315–326).

[58] Van Dijk, J. (2020). The digital divide. John Wiley & Sons.

[59] Van Dijk, J. A. (2017). Digital divide: Impact of access. The International Encyclopedia of Media Effects, 1–11.

[60] Verhofstadt, E. & Maertens, M. (2015). Can agricultural cooperatives reduce poverty? The heterogeneous impact of cooperative membership on farmers' welfare in Rwanda. Applied Economic Perspectives and Policy, 37, 86–106.

[61] Wahyuni, S., Widodo, J., Zulianto, Mm. & Islami,

N. N. (2020). The analysis of e-commerce utilization in Micro, Small and Medium Enterprises (MSMEs) at Jember. IOP Conference Series: Earth and Environmental Science, 485(1). https://doi.org/10.1088/1755-1315/485/1/012037

[62] World Bank. (2016). World Development Report 2016: Digital Dividends. World Bank, Washington, DC. https://www.worldbank.org/en/publication/wdr2016.

[63] World Bank. (2023). Agriculture and Food. https://www.worldbank.org/en/topic/agriculture

[64] Zhang, J., Zhao, W., Cheng, B., Li, A., Wang, Y., Yang, N. & Tian, Y. (2022). The impact of digital economy on the economic growth and the development strategies in the post-COVID-19 era: evidence from countries along the "Belt and Road." Frontiers in Public Health, 10, 856142.