Agri-Marketing in Business 5.0: Impact of Digital Technologies in Transforming Rural Economy

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ABSTRACT - In India, rural development strategies are being redefined by the convergence of digital technologies and agriculture. Agri-marketing is changing dramatically in the context of Business 5.0, an innovative model that emphasizes sustainable, human-centered, and digitally intelligent systems. This paper explores the rural economy of Bundelkhand, a historically underdeveloped and drought-prone region that includes parts of Madhya Pradesh and Uttar Pradesh, is being revolutionized by the incorporation of digital technologies into agri-marketing. Due to its rural foundation and socioeconomic difficulties, Bundelkhand has historically experienced poor infrastructure, low farmer incomes, and restricted market access. The advent of Business 5.0 principles, however, presents a suitable chance to deal with these problems. The study emphasizes how public-private partnerships, government programs like eNAM (National Agriculture Market), and digital agri-startups can help close the digital divide. In order to access real-time market data, weather forecasts, and crop advisory services, Bundelkhand farmers are increasingly turning to smartphones and agri-apps. There are difficulties associated with this change. Many small and marginal farmers in Bundelkhand still have low levels of digital literacy. The full potential of Business 5.0 in rural areas is also hampered by infrastructure deficiencies, such as inadequate internet connectivity and a lack of practical delivery systems. The study suggests that Bundelkhand can be used as a model for rural transformation in comparable agrarian regions throughout the developing nations, if the proper policy support, skill development, and digital inclusivity initiatives are put in into effect. In summary, this study argues that agri-marketing in the context of Business 5.0 presents a revolutionary avenue for rural economies such as Bundelkhand.

Key Words: Business 5.0, Agri-Marketing, eNAM (National Agriculture Market), Agri-Startups

1. INTRODUCTION

Agriculture remains the heart of the rural economy in India and nearly half of the country's workforce is engaged in agriculture, which directly supports livelihoods in rural areas. While the agricultural sector has nearly limitless future potential, it faces, in the present and past, a variety of issues from productivity to income inequality to inefficiency in markets. The shift from traditional subsistence farming to a digitally enabled, market-oriented agricultural structure is perhaps one of the most monumental revolutions of the 21st century. In recent years, digital technologies, including mobile apps, artificial intelligence (AI), blockchain, and the Internet of Things (IoT), have begun to reform the agricultural value chain. Both production systems and marketing and distribution systems will be more efficient, as well as increase farmers' access to information, finance, and global markets.

The beginning of digital transformation has coincided with the emergence of Business 5.0, a new trend where human-centric values are combined with digital intelligence and sustainability. Rather than prioritizing automation and industrial efficiency as in older paradigms of business, Business 5.0 envisages the need for a mutual relationship between technological capabilities, people, and the planet. In the case of agri-marketing in Agricultural Business 5.0, the emphasis is on the transformative potential of digital technologies to enable value-driven, inclusive, and sustainable agriculture systems. This approach is especially needed to solve the issues facing rural India, a large area where agriculture is both a source of income and a way of life.

Bundelkhand, a semi-arid region of parts of southern Uttar Pradesh and northern Madhya Pradesh, is a case in point for examining the intersections of digital transformation and rural development. Bundelkhand has historically been characterized as a region of high drought, low agricultural productivity, fragmented land holdings, and chronic poverty. Because of its dependence

upon rain-fed agriculture and little industrial development, Bundelkhand has been subject to social and economic marginalization for years. It has been referred to as one of India's most underdeveloped agrarian regions (Singh & Tiwari, 2019).

But recently there have been some inceptions of digital awakening. The spread of smartphones, improving access to the internet and a government initiative like Digital India and eNAM (National Agriculture Market) are beginning to open up some opportunities for farmers in the region. Farmers can use mobile based applications to access weather forecasts, crop advisories, and real-time prices for crops. Digital payment systems and agri-fintech platforms are making it easier to transact and get access to credit. Also, the entrance of a new cluster of digital agri-startups like DeHaat, AgroStar and Gramophone has opened up new marketing linkages and efficiencies in supply chains. However, while this has begun to happen in some parts of Bundelkhand, the region still faces important structural and infrastructural challenges to achieving meaningful digital agri marketing.

Using Business 5.0 practices in agri-marketing effectively builds digitally intelligent ecosystems that integrate producers, consumers, policymakers, and intermediaries with transparency and sustainable practices. For example, blockchain-based traceability systems can provide for enhanced trust in supply chains, while artificial intelligence can support the optimization of market predication and demand forecasting efforts. Cloud-based and data-driven analytics can also enable policymakers to design relevant interventions that support rural development efforts. Undoubtedly, one of the most important aspects of digital inclusion initiative from Business 5.0, is that it ensures that marginalized farmers, women, and smallholders are not left behind in the modernization process.

1.1 Research Problem

Although digitalization of agriculture in India has prompted considerable academic and policy attention, the localized ramifications for economically insecure areas such as Bundelkhand, remain relatively understudied. Most of prior work has examined developed or well-connected agricultural states, such as Punjab, Maharashtra, or Karnataka. There is limited conceptual work on how Business 5.0 frameworks might accelerate rural transformation in backward regions with systemic infrastructure and socio-economic limitations. Additionally, while there is evidence of potential change associated with digital efforts, such as eNAM and Kisan Suvidha App, there is still large vertical gap between policy design and ground policy adoption.

Consequently, the primary issue is to appreciate how the coming together of digital technology and Business 5.0 principles can transform the agri-marketing conditions in rural economies that are structurally weak. This study responds to the need for a conceptual framework that establishes linkages between Business 5.0 ideals, human-centric digital innovation, sustainability, and inclusivity on the one hand, and the lived experiences of rural agri-cultural communities on the other. Bundelkhand, given its distinctive socio-economic settings and emerging interventions in digital technology, presents the potential to serve as a place to examine this transformative relationship.

1.2 Research Objectives

The research seeks to conceptually understand how digital technologies are changing agri-marketing and rural livelihoods in Bundelkhand, within the framework of Business 5.0. The specific and technical objectives of this study are:

1. To examine the business cluster and challenges within agri-marketing in Bundelkhand region.
2. To understand the implications of digital technologies and related government programs to contribute to better agricultural marketing and well-being of farmers.
3. To examine how the principles of Business 5.0, especially human-centered innovation, sustainability and digital intelligence can transform rural agricultural systems.
4. To suggest a conceptual framework for agri-marketing transformation usefully and in a sustainable way for developing rural purpose in Bundelkhand.

1.3 Significance of the Study

This conceptual paper adds to the increasing conversation on digital transformation and sustainable rural development in India. While focusing the discussion with the framework of Business 5.0, this paper highlights the socio-economic and ethical issues associated with digitalization in agriculture and shifts away from a focus that suggests the technology is the solution. The goal here is to provide actors - policymakers, academicians, and practitioners - a holistic understanding of how digital agri-marketing can be purposefully aligned with human-centered development objectives. For policymakers, the findings indicate ways

to initiate inclusive, region-specific strategies based on the literature review findings that encourage digital literacy, infrastructure build-out, and equitable technology access in order to improve well-being outcomes. For academics, it has extended the theoretical construct of Business 5.0, while showcasing how it can bridge the gap between business model innovation and agricultural sustainability. Finally, for rural communities and agri-entrepreneurs, the paper also addressed how digital inclusion, digital literacy, and capacity building with collective partnerships are critical ingredients for change that can lead to transformation.

2. LITERATURE REVIEW

Agricultural marketing in India has traditionally been dependent upon a system that resulted in traditional, fragmented, and localized markets. In the pre-independence period, the majority of farmers were subsistence farmers that produced primarily for consumption in households and did not produce primarily for commercial markets in which they could sell into. The first forty years after independence produced more formal structures for agricultural marketing that developed structures like the Agricultural Produce Market Committees (APMCs), regulated mandis, and cooperative societies, designed to protect farmers from intermediaries who could take advantage of their relative lack of information (Acharya & Agarwal, 2018).

The liberalization of the Indian economy in the early nineties marked a shift in the structure of agricultural marketing. The introduction of privatization, improving transport links, and the opening up of markets allowed for better price-discovery as competition developed, as well as improved trading conditions. Unfortunately, the benefits of liberalization were often not equally shared amongst agricultural producers due to lack of access to information and modern technology by small and marginal farmers. The new era of agricultural marketing was facilitated through the use of digital channels, which would facilitate better access to data linked to production, distribution, and consumption systems. Ecommerce platforms, mobile-based information systems, and digital payment models are now beginning to add structures that address traditional limitations in agri-marketing (Chand & Srivastava, 2019).

Digital agriculture, commonly referred to as "smart farming" or "e-agriculture," involves the utilization of information and communications technology (ICT) with agricultural production or marketing systems. As defined by the Food and Agriculture Organization (FAO, 2020), digital agriculture refers essentially to a wide range of innovations that includes precision agriculture, sensor-based irrigation, data analytics, and market information systems, among others, which ultimately influence decision-making and efficiency across the value chain.

In the most recent and rapid expansion of mobile networks and internet connectivity in India, the acceptance of digital solutions, even in remote rural regions, have also had an impact on some level. Recent studies have suggested that ICT-based interventions can reduce transaction costs and thus improve farmers' bargaining power and strengthen access to intelligence in relation to the market (Mittal & Mehar, 2016). For instance, mobile applications such as Kisan Suvidha, IFFCO Kisan, and AgroStar provide farmers with updates regarding changes in weather, crop disease, and market price in real-time. eNAM, launched in 2016, attempts to consolidate disparate agricultural markets through an online trading platform in which over 1,000 APMC mandis across India is connected (Department of Agriculture & Farmers Welfare, 2023).

To be sure, while significant advances have been made, the dissemination of digital technology continues to exhibit disparity across regions. Significant barriers including infrastructural deficits, digital skills, and affordability continue to restrict adoption particularly among farmers in states like Uttar Pradesh and Madhya Pradesh (Kumar & Chand, 2020). The digital divide presents real challenges to equitable participation in the digital economy

Farmer agri-marketing transformation at the rural level faces multiple structural, institutional and behavioral challenges. Poor infrastructure - like rural roadway networks, storage facilities, and internet connection - limits farmer access to markets and information (Singh & Gupta, 2021). An additional compounding factor is that the vast majority of farmers in India are small or marginal farmers (those farming less than two hectares), which limits what they can produce while simultaneously limiting the efficiencies of scale in production. Thus, farmers are usually very limited by levels of formal credit access, price volatility, and reliance on intermediaries.

An important challenge is the digital literacy divide that persists between urban and rural populations. Although the penetration of smartphones is increasing significantly, older and less-educated farmers still have limited capacity to effectively utilize digital platforms for agricultural purposes. Research indicates that without

digital literacy programs, the benefits of digitalization may be realized predominantly by farmers who are either tech-savvy or connected to the internet resulting in widening inequalities (Raj & Sinha, 2022). Additionally, there are significant concerns about trust in online transactions, no localized content in vernaculars, and lack of institutional support for digital agri-marketing systems.

Highlighting its transformative possibilities, several policy interventions have been initiated by the Government of India to modernize agricultural marketing systems. The National e-Governance Plan in Agriculture (NeGPA) was launched to support ITC utilization to provide information, services, and market intelligence for farmers while the eNAM (National Agriculture Market) initiative strives to create a national agricultural market by linking mandis for farmers to sell their crops beyond state borders (Government of India, 2023).

The Digital India initiative, which began in 2015, is the overall digital ecosystem that underpins agricultural initiatives. Digital India efforts are concentrated on improving the level of digital infrastructure, and using digital means to deliver services, and improve digital literacy. Additionally, initiatives such as the Pradhan Mantri Gramin Digital Saksharta Abhiyan (PMGDISHA) provide rural citizens with digital literacy to subsequently engage on digital platforms (Mehta, 2021).

Public-private partnerships (PPPs) have also been essential in facilitating greater digital agri-marketing. Companies such as AgroStar, Ninjacart, and DeHaat partner with farmers to deliver integrated approaches to procurement of inputs, logistics, and market access to consumers. It is here, reflection of the models that have emerged demonstrate synergy of innovation and social inclusion, closely aligning with the principles of Business 5.0. However, experts contend for PPP's to have a sustainable impact, they should include public policy frameworks that align technology and community training programs (Patel & Verma, 2022).

The idea of Business 5.0 is derived from the larger notion of Society 5.0, a Japanese effort of envisioning a human-centered society that leverages advances in technology in cyberspace and physical space. Business 5.0 takes this idea further into the world of economics by emphasizing the simultaneous priorities of technology, sustainability, and humanity (Miyake, 2021). Business 5.0 envisions a new type of business development that enhances inclusive and sustainable innovation beyond what is possible through a focus on efficiency through automation (as understood in Industry 4.0).

Jaiswal (2022) describes Business 5.0 as a new paradigm, a business is an agent of the betterment of human and ecological welfare through systems of through circular economies and ethical supply chains. In this context, digital agri-marketing is a platform for agricultural commercialization, but also a process of change at a community level, with regard to empowerment of farmers and degree of sustainability and transparency at the community level. This theory-making has promising applicability to the transformation of the rural economy of Bundelkhand. Business 5.0 suggests "technology with a heart," an anthropophilic bias for foregrounding technology to develop opportunity and equity particularly for communities managing extreme poverty, environmental stress and exclusion from society.

Business 5.0 advocates for marketing strategies that take social, environmental, and ethical factors into consideration. This transition involves the use of technologies such as AI-based demand forecasting, blockchain-based traceability, and access to digital finance to deliver more transparent and resilient food systems (Choudhary & Nair, 2022). Several conceptual models have been developed linking Business 5.0 to agricultural innovation. Singh and Verma (2023), for example, developed a Human-Centric Agri-Technology Framework that supports participatory decision-making, localized innovation, and digital inclusivity. They maintain that Business 5.0 will link technology to human well-being through community-driven digital adoption. Similarly, Sharma (2022) states Business 5.0 cultivates "co-creation ecosystems" with farmers, startup organizations, and policymakers co-designing solutions based on local needs.

Despite the potential for transformative change, the digital divide continues to be perhaps the most significant issue facing rural India. Research indicates that rural areas are already behind urban centers with respect to digital literacy, broadband access, and device ownership (NITI Aayog, 2023). Many small and marginal farmers in Bundelkhand, for example, have yet to fully utilize digital tools, which has kept them reliant on traditional market intermediaries. Additionally, a gender gap exists in digital uptake, meaning women farmers often have less access to mobile phones, educational training, and financial capital. This means that digital inclusion must be understood as both a technological and social process. Patel and Singh (2021) emphasize that for effective digital transformation of agriculture, local communities are equipped to effectively and meaningfully engage with technology, in addition to infrastructure development.

Business 5.0 echoes this thought by focusing on the importance of equitable access to technology. Business 5.0 calls for inclusivity as a moral and strategic imperative ensuring that innovations would contribute to shared prosperity rather than deepening the existing gap.

2.1 Conceptual Gaps in Existing Research

While there are not many publications focused on digitalization and rural development, some important conceptual voids remain evident. First, most studies focus either on technical adoption or on economic efficiency; little focus has been placed on addressing the human and ethical aspects of digital transformation. Second, the few studies involving peripheral regions such as Bundelkhand have been limited, making it difficult to understand how digitalization might correct for systems of about rigged resource-inequality in under-resourced contexts. Third, theoretical linkages between Business 5.0 and agri-marketing are underdeveloped, with next to no attempts to form theoretical frameworks for agri-marketing practices that link sustainability, inclusivity, and digital intelligence in rural economies. This paper addresses these voids, offering the Business 5.0 lens to conceptualize agri-marketing through digitalization as pathways to holistic rural development. Further, the paper extends the conversation around Business Innovation theory, as related to rural development practice, by making the argument that digital agriculture must be socially equitable, environmentally sustainable and utilize advanced technologies as a business model for practices in agri-marketing.

3. RESEARCH METHODOLOGY, FINDINGS, AND DISCUSSION

3.1 Research Design

This article utilizes a conceptual research design drawing upon secondary data, literature synthesis and analytical interpretation. Conceptual research is useful for analysing an emerging or under-theorized phenomenon, in this case, the concept of Business 5.0 and its role within digital agri-marketing and rural transformation. This research does not employ a primary field study and instead creates an analytical model based upon the examination of government reports, policy documents, academic literature, and institutional research. The secondary documents comprising the study include documents from the Ministry of Agriculture and Farmers Welfare, NITI Aayog, the World Bank and the FAO, alongside peer-reviewed articles on digital farming,

Business 5.0 and rural development. A qualitative form of analytical interpretation will be utilized used to interpret the relationships between technology uptake, policy initiatives and socio-economic benefits. The aim will be to produce conceptual insights for the use of policymakers, academics and practitioners in developing sustainable rural development interventions.

A **thematic framework analysis** method has been used to structure findings around four key themes:

1. The socio-economic landscape of Bundelkhand;
2. The digital transformation of agri-marketing;
3. The alignment of Business 5.0 principles with rural development; and
4. Challenges and opportunities for sustainable transformation.

Bundelkhand consists of 13 districts across Uttar Pradesh and Madhya Pradesh, measuring roughly 70,000 square kilometers with a population of more than 18 million (Census of India, 2011). It's characterized by semi-arid climatic conditions, erratic rainfall, and low soil fertility, all of which provide serious risks for agricultural livelihood. Approximately 75% of the population directly or indirectly depends on agriculture for their livelihoods (Singh & Tiwari, 2019). Productive levels in Bundelkhand are significantly below the national average partially due to smaller landholding sizes, poor irrigation, and low levels of mechanization.

Socio-economically, Bundelkhand has low per capita income, high levels of poverty, and poor human development demographics. Seasonal migration arrangements work in practice in areas alongside seasonal agricultural labor. The public investment in infrastructure has been historically limited, although there has been a push for more recent attention to the area with public infrastructure programs like the Bundelkhand Package and Aspirational Districts Programme. There has been an improved opportunity for digital engagement into the lives of some residents of Bundelkhand to a limited extent, but their abilities are lower than the state and national average. Hence, there is a significant potential for digital transformation of agricultural marketing, but this is restricted by the infrastructure and skills present in Bundelkhand.

In Bundelkhand, agricultural marketing is moving increasingly toward digital, thanks to some combination of government programs, technologies and innovations from the private sector, and community engagement.

The availability of 4G, greater smart phones penetration, and multimedia awareness of digital have all fueled the change. eNAM (the National Agriculture Market) and Kisan Suvidha App are among initiatives that have provided farmers with a digital market option by enabling farmers to register a product online, compare prices, and engage with buyers beyond their local mandis. Under eNAM, more than 1,000 mandis across the country including Jhansi, Banda, Chhatarpur have been connected to offer farmers transparency and less dependence on middlemen. Common Service Centres (CSCs) under the Digital India initiative play an important role in bridging the digital divide by assisting individuals to access e-services including market prices, weather forecasts, and government schemes. Similarly, programs like the PMGDISHA (Pradhan Mantri Gramin Digital Saksharta Abhiyan) are working to build digital literacy and try and promote increased participation in digital markets.

In addition to these initiatives, digital agri-startups such as DeHaat, AgroStar, and Gramophone have emerged as agents of innovation in the sector by providing farmers access to quality inputs, crop advice, and connections to buyers. DeHaat's hybrid approach - blending digital platforms with on-the-ground networks - demonstrates how AI-driven analytics can improve demand prediction and logistics. In Bundelkhand, early partnerships between startups and local cooperatives have begun introducing farmers to smartphone-based applications for crop monitoring, input buying and price prediction, exemplifying Business 5.0's "co-creation" principle where human cognition and technology come together to create sustainable solutions. NGOs such as the Development Alternatives Group have also engaged with communities to enable digital access through programs focused on literacy, renewable energy and sustainable farming practices. Yet, challenges linked to lack of knowledge, language issues, inconsistent electricity, device access and unstable internet connection serve as limiting factors to widespread adoption of agri-tech.

3.2 Key Findings

An analysis of the literature, policy reports, and digital initiatives reveals several conceptual findings:

1. **Digitalization promotes market efficiency**: Digital platforms have improved transparency, price discovery, and connectivity around agricultural markets. In adopting digital tools, farmers generally enjoy better price realization and less reliance on mediators.

2. **Adoption varies by region and is often unequal**: In Bundelkhand, digital adoption is constrained by socio-economic differences and infrastructure challenges. Farmers with a better education, access to credit, and proximity to big towns tend to be engaged in digital markets.

3. **Public-Private Partnerships are important**: PPPs are typically useful vehicles for the delivery of digital services. Start-ups are more innovative and nimble while the government institutions provide scale and legitimacy to services. There is no reason why programs cannot be tested in partnership and the impact scaled when working with initiatives informed by B5.0.

4. **Digital inclusivity has yet to be achieved**: Many disadvantaged farmers will be left behind without some typology of digital literacy development programs or localized content, therefore, bridging this gap will be vital for achieving equitable rural transformation.

5. **There is potential for replication**: Bundelkhand's developing digital landscape has meaning for other underdeveloped regions. If supported by policy frameworks and capacity building mechanisms being located in the region it could be effectively sped up as an example of possible inclusive digital agri-marketing.

3.3 Discussion

The results highlight the transformative prospects of digital agri-marketing when examining through the Business 5.0 framework. Contrary to past frameworks that concentrated mostly on mechanization or automation processes, Business 5.0 puts emphasis on human empowerment facilitated by technology. This framing is especially important in regions such as Bundelkhand, where the potential for economic resiliency will rely not only on agricultural productivity, but greater participation within the community and social inclusion. The digitalization frameworks used in the past have tended to emphasize efficiency analytics, such as improvements in yields or speed of transactions, but Business 5.0 frames success in terms of empowerment, participation and sustainability. For example, the benefits of farmers using mobile applications in Bundelkhand for market information are not only economic, they also build independence and trust in decision-making as digital technologies can be understood as enabling agency rather than efficiency.

The integration of AI, data analytics, and cloud computing will empower policymakers to base decisions on facts through effective crop insurance, subsidy

allocation, and supply chain optimization. It will pave way for a rural development model wherein technology augments, rather than supplants, human judgment. Predictive analytics can spot areas most in need of drought assistance; IoT sensors can provide vital readings on environmental indicators. Institutional collaboration is the essential framework to boost digital agri-marketing in Bundelkhand, and Business 5.0 strengthens multi-stakeholder partnerships, merging innovation with governance. Engendering cooperatives and farmer producer organizations (FPOs) is key to scaling digital solutions; Business 5.0 applies to these institutions when they reflect inclusivity, transparency, and innovation and which thus become agents of transformation. Based on this literature synthesis with accompanying analysis, this paper proposes the following Conceptual Framework for Business 5.0-Driven Rural Transformation.

Figure - Conceptual Framework for Business 5.0-Driven Rural Transformation.

4. CONCLUSION

The interconnection of agriculture, digital technology, and the human-centric values of Business 5.0 represents a shift in rural development approaches. This study explored how digital agri-marketing could serve as a transformative change agent for the Bundelkhand region, reported to be one of India's most underdeveloped regions socially and economically. The findings suggest that digital transformation, corroborate by sustainable business practices and inclusive innovation, could meaningfully and holistically rethink market linkages, empower farmers, improve agency, and build resilience in rural economies. The Business 5.0 framing advances the discussion beyond a space of technology adoption, arguing that co-creation, sustainability, and empowerment and liberation of humans must be the ultimate objectives of digitalization. However, the analysis notes the ongoing challenges present including inadequate digital infrastructure, literacy levels, affordability and levels of agricultural smallholder awareness, which will require not only targeted technological investment, but also appropriate policy reform and institutional coordination.

The Bundelkhand region shows that rural digital transformation is a social as much as a technological process, where socio-technical system outcomes will depend on the ability of the region to establish inclusive, relevant sustainability frameworks that displace the digital potential toward human capabilities. Business 5.0 can be viewed as a model for "humanizing digital agriculture," where technology serves as something that supports an expanded level of community participation instead of replacing the community, with progress assessed not only in terms of financial aspects but also, and underlined in its name, regarding empowerment, inclusiveness, and sustainability.

5. POLICY IMPLICATIONS

There is some policy implications for stakeholders aiming to implement Business 5.0-based rural development considering the conceptual insights generated from this research. Investments in strengthening the digital infrastructure would necessitate providing priority for broadband improvements and 5G rollout in rural clusters of Bundelkhand, creating solar-powered ICT kiosks to support the existing unreliable electricity supply, and for telecom companies to partner to provide affordable smartphone and data plans for rural users. Efforts to enhance digital literacy and capacity building efforts may include integrating digital literacy modules in existing agricultural extension services, setting up Agri-Digital Resource Centers at the block level that have training for farmers around eNAM, mKisan, and startup platforms available, and incentivizing current and future youth-led and women-led Digital Mitra programs for reliable peer learning support.

To enhance public-private partnerships (PPP) we need to promote partnerships across government, start-ups, and universities, create PPP models that support co-development of contextualized solutions such as local-language apps or AI-based crop advisory services, and include NGOs and/or SHGs (self-help groups) as community facilitators in the context of digital technology. Promoting inclusiveness and gender equity can be accomplished by providing priority digital training and financial access to women farmers and marginalized groups in the PPP models. These models will then take care to promote gender sensitivity in the use of digital agri-marketing platforms, and encourage women-led Farmer Producer Organizations (FPO) to establish online e-commerce registration. We can promote sustainable and responsible technology-experience by advocating for councils to audit sustainability approaches to the digital agri-enterprise app, as well as, supporting regulation of data privacy and algorithmic transparency in agri-tech applications, and promoting blockchain-systems for traceability, in an effort to support ethical and ecological supply chains. Additionally, to drive regional integration and replicability, we can promote Bundelkhand, as a pilot innovation zone for digital rural transformation, scale up successful practices of similarly drought-prone or low-income practices, like Vidarbha and Marathwada, and develop cross-state collaboration among farmers and other stakeholders through knowledge sharing and exchange and collaboration networks.

6. LIMITATIONS AND SCOPE FOR FUTURE RESEARCH

This research is conceptual and primarily based on second-hand information and theoretical discussion. This approach offers insights into the strategic alignment between Business 5.0 and digital agriculture, but studies would also benefit by empirical validation. Implications for future research include:

• Field studies to establish the levels of digital adoption and its impact on income among Bundelkhand farmers.

• Comparative studies between Bundelkhand and other states in India involving the same digital projects.

• Quantitative models of the social and economic benefits derived from digital projects aligned with Business 5.0 concepts.

Empirical extensions would contribute to understanding and provide usable evidence for policy makers and practitioners.

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