

A Study of Factors Affecting Adoption of Conservation Agriculture Practices by Farmers - An Analytical Framework Based on UTAUT Theory

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Abstract—China is known for its agricultural productivity but increasingly burdened by soil degradation, water scarcity, and pollution resulting from intensive conventional farming. In response to these challenges, conservation-based methods such as reduced tillage, permanent soil cover, and crop rotation have been promoted as sustainable alternatives. Despite policy support and financial incentives, adoption rates remain low, particularly among small- and medium-scale farmers. To address this problem, the study proposes a research framework grounded in the Unified Theory of Acceptance and Use of Technology (UTAUT), aiming to explore how information ability, performance expectation, effort expectancy, social influence, and facilitating conditions shape both the behavioral intentions and the actual adoption behavior of farmers.

Keywords— Factors; Adopting; Conservation Agriculture Practices; UTAUT Theory.

I. INTRODUCTION

Agriculture holds a really crucial place in China's economy. It has deep effects on national food security as well as rural livelihoods (Liang, et al., 2022). But for a long time, China has been relying a lot on intensive farming methods. These methods involve frequent tillage, using lots of chemical fertilizers and pesticides, and doing extensive irrigation. And this has caused more and more environmental problems (Pretty & Bharucha, 2014; Rhodes, 2014; Moore, et al., 2019). There are issues like soil getting degraded, soil fertility going down, water becoming scarce, and pollution from agrochemical runoff. All these things are threatening the long-term ability to keep going and the productivity of the agricultural systems.

In response to these environmental pressures, and also in line with China's broader push for ecological modernization, Sustainable Conservation Agriculture Practices (SCAP) has come up as a good alternative. It is founded on three main tenets: reducing soil disturbance, maintaining continuous soil cover, and rotating crops. SCA wants to make the soil healthier, get better at using water efficiently, cut down on input costs, and lessen environmental degradation.

Central and provincial authorities offer clear policy support. This is shown through financial incentives, demonstration projects, and extension services. Still, the rate of SCA adoption among China farmers isn't even. Generally

speaking, it's also quite limited (Liu, et al., 2019). Empirical observations point out that some larger or more progressive farms have started using conservation tillage and cover-cropping techniques (Aguilar & Paulino, 2025). Another thing worth mentioning is that the majority of small- and medium-scale farmers keep on preferring conventional intensive methods.

The difference between policy intent and what actually happens on the ground highlights how complex adoption decisions can be. These decisions are affected by many factors. First, it's about farmers' ability to get and understand relevant information. Then, there are their expectations regarding economic returns and agronomic performance. Also, how difficult they think it is to switch to new techniques matters. The influence of peers and community norms plays a part too. And don't forget about the availability of resources, machinery, and institutional support.

The present study focuses especially on how they impact farmers' Behavioral Intention to adopt SCA. Also, it looks at how this intention turns into actual adoption behavior. This research uses a partial mediation framework. In this framework, Information Ability, Performance Expectation, Effort Expectancy, Social Influence, and Facilitating Conditions are thought to affect actual adoption behavior both directly and indirectly through Behavioral Intention. The aim here is to make clear the psychological and contextual mechanisms that are behind adoption decisions. You know, initially it's presumed that understanding these mechanisms isn't that important. But when you really dig into it, subsequent analysis reveals that it's actually super crucial. Because understanding them is key for coming up with more effective interventions. These interventions could be in different forms like targeted training programs, improved extension services, or tailored financial incentives. And all of these are aimed at speeding up the shift towards sustainable farming. With actually practical steps like these, we might just achieve that goal he takes on his own.

II. THEORETICAL FRAMEWORK

The Unified Theory of Acceptance and Use of Technology (UTAUT), which Venkatesh et al. created in

2003, is a significant step forward in comprehending how users accept technology. Synthesizing constructs from eight earlier theoretical models—including the Technology Acceptance Model (TAM), Theory of Reasoned Action (TRA), Theory of Planned Behavior (TPB), and Motivational Model (MM)—UTAUT aims to provide a unified framework for predicting user intentions and subsequent usage behavior across technological contexts. This integrative theory was established through an extensive empirical comparison of

preexisting models, resulting in a parsimonious structure that captures the core predictors of technology adoption (Venkatesh, 2022). The foundational underpinning of UTAUT lies in social cognitive theory and behavioral intention models, drawing particularly on the assumption that behavioral intention is the most immediate antecedent of actual behavior and is influenced by cognitive beliefs shaped by social and facilitating conditions.

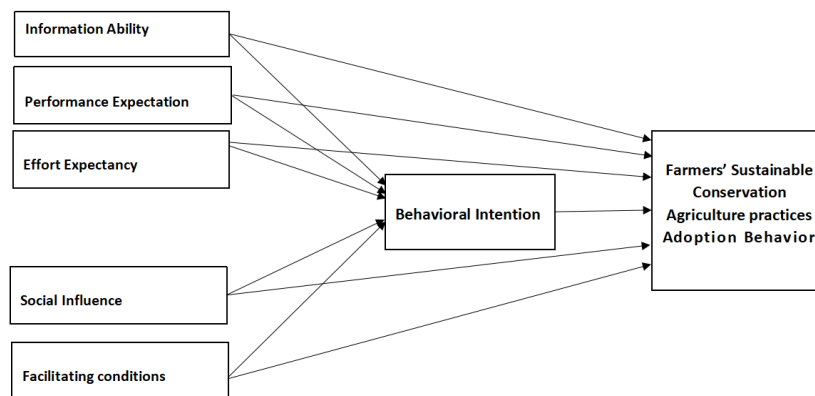


Figure 2.1 Unified Theory of Acceptance and Use of Technology

UTAUT posits four core determinants of behavioral intention and use behavior: performance expectancy, effort expectancy, social influence, and facilitating conditions. Performance expectancy reflects the degree to which individuals believe that technology will enhance their task performance, and is often the strongest predictor of behavioral intention in both personal and organizational settings. Effort expectancy denotes the perceived ease of use associated with the technology. Social influence represents the perceived social pressure to adopt and use a system, while facilitating conditions encompass the organizational and technical infrastructure supporting use. These constructs function within a broader framework moderated by factors such as age, gender, experience, and voluntariness of use (Venkatesh, 2022). A key assumption in applying UTAUT is that users' behavioral intentions are shaped through rational evaluation of expected outcomes, ease of adoption, and perceived social or organizational support, which subsequently determines actual usage behavior when sufficient facilitating conditions are present.

Existing research affirms the Unified Theory of Acceptance and Use of Technology (UTAUT) as a comprehensive model for understanding farmers' behavioral intentions toward adopting agricultural technologies. Central constructs such as performance expectancy and effort expectancy play pivotal roles in shaping these intentions. Studies by Molina-Maturano et al. and Schukat et al. demonstrate that when farmers perceive a technology as capable of improving productivity or simplifying operations, their willingness to adopt it increases significantly (Molina-Maturano et al., 2021; Schukat et al., 2020). Similarly, Nguyen et al. found that technologies requiring less effort are more readily adopted by smallholder rice farmers, confirming

the importance of ease of use in influencing technology uptake (Nguyen et al., 2023). These findings highlight the direct connection between farmers' information capabilities—such as understanding functionality and benefits—and their behavioral responses to innovation.

Social influence and facilitating conditions further enrich the explanatory power of UTAUT in rural agricultural contexts. Siregar et al. revealed that farmers are more inclined to adopt a new technology when it is endorsed by trusted peers or community leaders, underlining the role of collective norms in rural decision-making (Siregar et al., 2022). Facilitating conditions—such as access to irrigation systems, internet connectivity, and training—are also crucial. Research by Veltheim and Heise, as well as Ronaghi and Forouharfar, indicates that when supportive infrastructure is in place, farmers are more likely to engage with technological innovations (Veltheim & Heise, 2021; Ronaghi & Forouharfar, 2020). Thus, limited access to resources or technical support can impede even the most promising technological interventions, emphasizing the need for integrative policies that support capacity-building.

Empirical applications of UTAUT in diverse regional settings, such as Romanian farmers' engagement with digital tools, demonstrate the model's adaptability and effectiveness in generating locally tailored recommendations (MARKOVITS, 2024). As agricultural systems globally face increasing pressure to modernize and remain sustainable, using the UTAUT framework to enhance information capacity, tailor interventions, and address specific adoption barriers offers a strategic path toward fostering widespread technology uptake and sustainable farming outcomes (Lianying et al., 2024).

The rationale for employing UTAUT in this study lies in its robustness and flexibility in capturing both individual-level and contextual determinants of technology adoption. Specifically, this study investigates factors influencing the adoption of Sustainable Conservation Agriculture (SCA) practices in China—a context characterized by technological change and institutional intervention. UTAUT's structure is particularly suitable for empirical modeling in this context, as it allows for the incorporation of key variables such as performance expectancy (i.e., expected benefits of SCA), effort expectancy (ease of implementing SCA), social influence (peer/family/farmer group attitudes), and facilitating conditions (support from local governments or agricultural extension services). These elements collectively offer a comprehensive empirical framework to examine how behavioral intention mediates the relationship between influencing factors and actual SCA adoption behavior. The model's prior success in contexts with similar decision-making dynamics—such as healthcare technology or digital learning—further supports its relevance to agricultural technology adoption.

III. CRITICAL LITERATURE REVIEW AND JUSTIFICATION TO CREATE THE RELATIONSHIPS (BETWEEN AND AMONG) EACH VARIABLES

3.1 Justifying relationship between information ability and behavioral intention

The interplay between information ability and behavioral intention is foundational to understanding decision-making processes across diverse domains. Anchored in the Theory of Planned Behavior (TPB), this relationship highlights how information capacity—encompassing the abilities to access, understand, and apply information—shapes attitudes, subjective norms, and perceived behavioral control, which in turn influence intention (Moshi et al., 2020; Nursanti & Ellina, 2022). Effective information ability enhances attitudes by fostering clarity and confidence about specific actions, thus strengthening behavioral intention. In healthcare, for instance, access to information about medical services positively influences individuals' intentions to utilize those services (Moshi et al., 2020).

Beyond attitudes, information ability contributes to perceived behavioral control. When individuals believe they are equipped with sufficient and accurate information, they are more likely to perceive themselves as capable of performing a behavior. Empirical evidence supports this; individuals exposed to trustworthy health information felt more empowered to act during crises like the COVID-19 pandemic (Li et al., 2022a). Similarly, in the context of sustainable finance, informed individuals showed greater behavioral intentions toward eco-friendly banking practices (Nisar et al., 2023).

Subjective norms are also shaped by information ability. Accurate and accessible information can either reinforce or counteract social pressures, depending on whether it aligns with dominant norms. During pandemics, for example, those with higher informational awareness were more inclined to conform to positive public health behaviors, showing how

social influences are filtered through cognitive evaluations (Norman et al., 2022).

However, not all information supports intention formation. The complexity of information can act as a barrier. Research reveals that when data becomes too dense or intricate—such as in medical reports—intention may decline due to cognitive overload, underscoring the need for clarity and relevance in information design (Wang et al., 2021). Similarly, information must instill not just understanding but also confidence and temporal consistency. Stable intentions, fostered by reliable and comprehensible information, are more likely to result in corresponding behaviors over time (Conner et al., 2023).

In technological settings, these dynamics are echoed in the Technology Acceptance Model (TAM). Perceptions of ease of use and usefulness—both grounded in information ability—strongly predict users' intentions to engage with digital tools. For instance, students' proficiency in handling e-learning systems significantly correlates with their intention to participate in online education (Hasbie et al., 2023; Humida et al., 2021). The alignment between perceived competence and technological engagement reaffirms the central role of information ability in digital behavioral intentions.

3.2 Justifying relationship between performance expectation and behavioral intention

Performance expectancy—the belief that using a system will improve performance—is a central determinant of behavioral intention across various technology adoption scenarios. Strong empirical support confirms its influence, particularly in professional and health settings. For example, when medical professionals perceive electronic medical records as enhancing their effectiveness, their intention to adopt these systems increases significantly (Faida et al., 2022). This aligns with research on mobile health tools, where perceived utility positively correlates with stronger adoption intentions due to improved health self-management outcomes (Alkhalifah, 2022).

In the fintech domain, users' perception of performance gains from e-wallets also directly impacts behavioral intention, indicating that perceived utility in business activities encourages higher technology uptake (Paat et al., 2022). Similarly, in education, the effectiveness of online learning platforms during the COVID-19 pandemic was found to significantly influence students' intention to engage, showing that performance expectancy is a key driver in digital learning environments (Kadir & Ismail, 2022).

However, performance expectancy does not universally predict behavioral intention. In some consumer technology studies, it was found to have minimal impact, suggesting that contextual factors such as effort expectancy or social influence may dominate in certain use cases (Ramdhani et al., 2023; Hoang et al., 2021). This highlights the importance of user context and the need to examine interacting constructs rather than relying on a single determinant.

The role of individual self-efficacy has also been emphasized as a factor enhancing performance expectations. Users with high mobile self-efficacy perceive mobile health

services as more beneficial, which in turn elevates their adoption intentions (Mensah et al., 2022). These insights underscore the interconnectedness of psychological traits and perceived performance outcomes in shaping behavior.

Behavioral intention is also influenced by the interaction of performance expectancy with other constructs in the UTAUT model. Behavioral intention often acts as a bridge between performance and effort expectancy, indicating that users' motivation is shaped by a constellation of perceived benefits and required efforts (Suyanto et al., 2024).

Temporal consistency further strengthens the link between performance expectancy and behavior. Stable performance beliefs support the durability of intentions, especially in contexts such as health behaviors where clarity and long-term benefit perception are essential (Conner et al., 2023; Norman et al., 2022). Likewise, demographic and contextual factors—such as in government system adoption—demonstrate that performance expectancy effects can vary across user groups, requiring tailored implementation strategies (Devi & Ariyanto, 2024).

3.3 Justifying relationship between effort expectancy and behavioral intention

Effort expectancy, defined as the perceived ease of using a technology, is a crucial determinant of behavioral intention across multiple sectors. Within the UTAUT framework, it plays a central role in shaping individuals' willingness to engage with technological systems. Studies consistently find that when users believe a system is easy to learn and operate, their intention to adopt it increases accordingly (Sari et al., 2024). This relationship is particularly strong when ease of use complements perceived performance benefits, reinforcing user confidence.

In agriculture, effort expectancy stands out as a primary predictor of behavioral intention. Research on broiler farmers' adoption of management systems reveals that perceived simplicity of system interfaces significantly boosts adoption rates (Wichean & Sungsanit, 2022). When technological tools are seen as manageable, farmers are more open to incorporating them into routine operations, highlighting the essential role of usability in driving innovation in agricultural settings.

Effort expectancy also operates in conjunction with other behavioral constructs. In FinTech adoption, both ease of use and social influence jointly impact users' intentions, suggesting that positive peer opinions and manageable interfaces work together to foster engagement (Rubaii & Pria, 2022). Similarly, healthcare studies show that users are more likely to adopt AI-based virtual assistants when they are easy to use, reinforcing the idea that user-friendly design is vital for behavioral change (Alanzi et al., 2023).

Optimistic alignment between expected effort and actual experience enhances user engagement. Users tend to embrace technologies more readily when their perceptions of required effort match or are lower than anticipated (Nagase et al., 2022). This supports the notion that reducing interface complexity and streamlining operations can substantially increase adoption rates.

Differences in user demographics also affect how effort expectancy influences behavioral intention. Younger, tech-experienced users tend to perceive less difficulty in adopting technologies compared to older individuals, emphasizing the need for targeted support strategies based on user profiles (Molina-Maturano et al., 2021). Customization of training materials and onboarding approaches can thus improve adoption across diverse user segments.

Barriers arise when perceived effort is high. In mobile banking contexts, rural populations are discouraged by complex systems or steep learning curves, which suppress their intention to use digital tools (Shah & Bhatt, 2024). This illustrates the importance of minimizing cognitive and operational effort in system design, particularly for underserved populations.

Moreover, continuous feedback loops can enhance perceptions of ease. Engagement-driven platforms that adapt based on user experience tend to foster higher behavioral intentions, as evidenced in mobile payment systems where ongoing feedback mechanisms improved user attitudes toward technology (Tsai, 2021). As a result, including user feedback into development cycles might reinforce the perception of simplicity and promote continued usage.

3.4 Justifying relationship between social influence and behavioral intention

Social influence plays a critical role in shaping behavioral intention, particularly in agricultural contexts where farmers' adoption of sustainable practices often depends on communal norms and peer behaviors. When farmers perceive support and encouragement from their social environment, their willingness to adopt sustainable conservation agriculture increases significantly (Nugraha et al., 2024). Subjective norms, rooted in social expectations, provide motivational pressure that influences individual decision-making.

Social capital further amplifies this effect. Strong networks, shared trust, and embedded norms within farming communities facilitate the diffusion of green technologies and support adoption behaviors (Ren et al., 2022). In regions like Shandong Province, trust-based relationships strengthen the credibility of sustainability messaging, making farmers more receptive to innovation.

Digital social environments also shape behavior. Social media serves as a powerful tool for disseminating information and fostering communities that promote sustainable practices. Peer recommendations shared online can enhance behavioral intention, suggesting that social media platforms are becoming increasingly influential in agricultural decision-making (Jabeen & Gul, 2023).

Community dynamics extend beyond online interaction. In Jiangsu Province, local social embeddedness, including village relationships and collective norms, strongly influenced the adoption of low-carbon technologies. This indicates that when farmers feel integrated into a socially responsible community, they are more likely to conform to environmentally conscious behaviors (Hua-wei et al., 2022).

Participation in social groups also matters. Farmers active in cooperatives or community organizations demonstrate higher adoption rates of sustainable practices, as these structures provide shared learning environments and collective motivation (Oyewole & Sennuga, 2020). Social participation thus creates informal channels through which sustainability knowledge and attitudes are transferred.

Social networks produce spillover effects. Farmers are influenced by the visible behaviors of their neighbors, leading to widespread behavioral shifts within local communities. Proximity-based learning and support have been shown to foster adoption of pesticide-free and other eco-friendly practices (Wang et al., 2023).

However, not all social influence is supportive. In some cases, traditional practices and conformity pressures may inhibit adoption. Farmers may face tension between adopting innovations and maintaining alignment with community norms that resist change (Jayaraman et al., 2020). This highlights the need to manage social influence thoughtfully, addressing barriers while leveraging social support for change.

3.5 Justifying relationship between facilitating conditions and behavioral intention

Facilitating conditions—defined as the availability of resources, infrastructure, and support—play a crucial role in influencing behavioral intention, particularly in agriculture where access to tools and information determines the feasibility of adopting sustainable conservation practices. When farmers perceive adequate technical, financial, and informational support, their willingness to adopt new methods significantly increases (Kaur et al., 2024).

Training programs and the accessibility of agricultural technologies further enhance intention. Favorable external conditions such as institutional support and extension services contribute to shaping positive adoption behavior among farmers (Ramdhani et al., 2023). These support structures reduce the burden of transition and encourage the uptake of sustainable practices.

Social environments also contribute to perceived facilitating conditions. Positive community norms and peer assistance reinforce the idea that support is available, making adoption appear more manageable and less risky (Abdullah et al., 2022). This interplay between social reinforcement and infrastructure creates a supportive ecosystem for behavioral change.

Outside agriculture, research on mobile payments among rural users illustrates that facilitating conditions—such as connectivity and service availability—strongly predict adoption intentions, reinforcing their relevance in similar agricultural technology contexts (Rasyidatushshalihah & Hidayati, 2021). This finding reflects the need for adequate logistical frameworks when introducing innovations to farming communities.

In the education sector, infrastructure and training access directly influence behavioral intentions toward e-learning systems, mirroring how these same conditions affect farmers considering sustainable techniques (Hasan et al., 2023). Such parallels reinforce the notion that without foundational

support, behavioral intention may remain low despite awareness of benefits.

The perception of resource availability is also a key driver. When farmers feel supported by financial systems and local institutions, their intention to adopt conservation practices is strengthened (Marto et al., 2023). Ensuring clear pathways to access resources can shift behavior in favor of sustainability.

However, some findings introduce nuance to this relationship. In some contexts, facilitating conditions may not show statistically significant direct effects on intention, suggesting their influence may depend on moderating variables like individual readiness or institutional effectiveness (Ramli et al., 2024). Similarly, facilitating conditions might rank lower than other factors like performance expectancy but still remain essential in creating an enabling environment (Xue et al., 2021).

3.6 Justifying relationship between behavioral intention and farmers' sustainable conservation agriculture practices adoption Behavior

Behavioral intention is a crucial predictor of farmers' adoption of sustainable conservation agriculture practices, shaped by attitudes, perceived control, and social norms. Within the Theory of Planned Behavior (TPB), intention reflects a farmer's motivation to act and is strongly influenced by beliefs about the outcomes, societal expectations, and perceived ability to execute the behavior (Atta-Aidoo et al., 2022; Sangali et al., 2024; Xiao et al., 2020).

Having a good outlook on sustainable practices greatly enhances behavioral intention. When farmers view these practices as economically and environmentally beneficial, their willingness to adopt increases (Atta-Aidoo et al., 2022). Similarly, better awareness and understanding of organic methods enhance intentions, indicating that informed farmers are more likely to embrace sustainability (Jumpanyarach, 2021).

Subjective norms also play a vital role. The influence of peer behaviors and perceived social expectations can drive farmers to align with sustainability-oriented community practices (Hüttel et al., 2020; Savari et al., 2023). When reference groups support sustainable farming, individual farmers are more likely to follow suit, reinforcing the power of collective influence.

Perceived behavioral control—how capable farmers feel in adopting sustainable methods—is another essential factor. Access to resources and technical support can strengthen intention by reducing perceived barriers. Conversely, limited resources often create a gap between intention and action (Bi & Zou, 2024). Compatibility with existing practices also affects ease of adoption, thus shaping intention (Faisal et al., 2020).

Psychosocial models, such as the integration of the TPB and the norm activation model, provide a broader view of the motivations behind intention. Both self-driven and socially influenced factors are crucial in determining behavioral outcomes, pointing to the need for holistic intervention strategies (Savari et al., 2023).

Knowledge, especially environmental awareness, further enhances intention. Studies confirm that well-informed farmers are more likely to pursue organic and sustainable practices (Wang et al., 2023). In digitally connected contexts, social media platforms also foster intention by enabling knowledge-sharing and community building (Qi et al., 2021).

Educational programs that promote understanding of environmental and social benefits reinforce positive behavioral intentions. Workshops and community training initiatives help normalize sustainability and encourage practical adoption steps (Miyake et al., 2022; Atta-Aidoo et al., 2022).

Nevertheless, barriers such as economic constraints, psychological resistance, and inadequate institutional support can inhibit action, even when intentions are strong. Acknowledging these constraints is vital for designing policies that transform intention into actual adoption behavior (Bazrafkan et al., 2022).

3.7 Justifying mediating effect of the behavioral intention between information ability and farmers' sustainable conservation agriculture practices adoption behavior

Behavioral intention serves as a vital mediator linking information ability to the adoption behavior of farmers in sustainable conservation agriculture. Rooted in the Theory of Planned Behavior and the Norm Activation Model, this mediating role reflects how farmers' ability to access, comprehend, and apply agricultural information influences their intention to adopt sustainable practices, which in turn drives their actual adoption behavior (Savari et al., 2023; Atta-Aidoo et al., 2022).

Information ability is foundational in this chain. Farmers with better access to knowledge about sustainable techniques demonstrate stronger intentions to adopt these methods. Studies show that well-informed farmers are more likely to form positive intentions due to a clearer understanding of environmental benefits and productivity gains (Ghanian et al., 2020). Similarly, knowledge about organic farming significantly shapes behavioral intention, emphasizing that enhanced information ability can effectively act as a motivational precursor (Jiumpanyarach, 2021).

However, intention alone does not guarantee behavior. In agriculture, perceived financial and operational burdens often delay or prevent adoption despite positive intentions. Research shows that farmers may hesitate to act on their intentions due to high implementation costs or resource limitations (Gumasing et al., 2023). In such cases, behavioral intention helps reduce the psychological distance between knowledge and action, framing sustainable practices as achievable despite constraints.

Perceived behavioral control further strengthens this mediating role. When farmers feel capable of implementing what they intend—due in part to the confidence built through accessible and reliable information—they are more likely to adopt sustainable methods (Savari et al., 2023). Thus, information ability not only shapes intention but also contributes to building efficacy, enhancing farmers' belief in their capacity to act.

Social influence also enhances intention. Supportive peer environments and community norms reinforce the value of sustainable practices, making farmers more likely to intend adoption when others around them do the same (Gumasing et al., 2023). These subjective norms act in tandem with information-driven attitudes, bridging the gap between intention and action.

Technology plays a supporting role in this mediation process. Digital platforms improve access to agricultural knowledge, facilitate decision-making, and strengthen behavioral intentions (Chen et al., 2021; Shi et al., 2023). Agricultural extension systems and mobile tools help improve information flow, indirectly promoting sustainable behavior through enhanced intention (Bi & Zou, 2024).

3.8 Justifying mediating effect of the behavioral intention between performance expectation and farmers' sustainable conservation agriculture practices adoption behavior

Behavioral intention serves as a key mediator between performance expectation and farmers' adoption behavior in sustainable conservation agriculture. According to the Theory of Planned Behavior, intention is the most immediate determinant of actual behavior, and it is shaped by performance-related beliefs about the benefits of the behavior (Moshi et al., 2020; Nursanti & Ellina, 2022).

Performance expectation reflects the anticipated benefits—such as higher yields, soil improvement, or long-term profitability—that farmers associate with sustainable practices. When these expectations are strong and positive, farmers are more likely to form the intention to adopt. Studies have confirmed that perceived performance outcomes play a major role in motivating adoption behavior through the formation of behavioral intention (Putra et al., 2023). This motivational link is strengthened when sustainable practices are viewed as practical and results-driven (Istiqomah & Anisykurlillah, 2020).

Behavioral intention acts as the mechanism through which performance expectations translate into real behavioral change. Strong intentions, when stable and reinforced by confidence, serve to bridge the gap between belief and action (Conner & Norman, 2022). As shown in empirical studies, performance expectations influence attitudes and perceived feasibility, which subsequently enhance the strength of farmers' behavioral intentions (Nursanti & Ellina, 2022).

This mediating role can be further moderated by factors such as social influence, information access, and behavioral control. Farmers who perceive social validation and peer support regarding sustainable practices are more likely to convert strong performance expectations into actual behavior. In such cases, intention becomes a stronger predictor of adoption (Rhodes et al., 2021). Additionally, supportive environments that facilitate discussions and showcase positive outcomes from conservation practices can raise both expectations and intentions. Community-driven reinforcement significantly enhances the mediating effect (Mensah et al., 2022).

Understanding this mediation pathway has practical implications. Stakeholders can boost adoption by focusing on

strategies that raise farmers' expectations about the benefits of sustainable agriculture and build strong behavioral intentions. Interventions should include demonstration programs, knowledge-sharing platforms, and farmer-to-farmer success stories that make benefits more tangible (Abdullah, 2023). Moreover, external supports—such as infrastructure, financing, and extension services—are critical for enabling farmers to act on their intentions (Duan, 2022).

3.9 Justifying mediating effect of the behavioral intention between effort expectancy and farmers' sustainable conservation agriculture practices adoption behavior

The mediating role of behavioral intention between effort expectancy and the adoption of sustainable conservation agriculture practices is essential in understanding how perceived ease influences farmers' decision-making. Effort expectancy, a construct derived from the Technology Acceptance Model and the Theory of Planned Behavior, refers to the degree to which farmers believe sustainable practices are simple and easy to implement. When these practices are perceived as user-friendly, farmers are more likely to form favorable intentions toward adoption (Wicaksono et al., 2020).

Effort expectancy has a direct influence on behavioral intention. When the complexity of sustainable methods is low, farmers express stronger willingness to adopt them (Negera et al., 2022). The perception of reduced effort—whether due to clearer instructions, training, or streamlined procedures—strengthens farmers' motivational readiness. Consequently, behavioral intention emerges as the critical mechanism that converts these perceptions into actual behavior.

Behavioral intention acts as the bridge that links perceived ease to real-world adoption. Farmers are more likely to adopt sustainable practices when they first form clear intentions influenced by manageable expectations. Research confirms that intention is the pathway through which effort expectancy results in environmental action (Kimuli et al., 2020). This mediation suggests that enhancing farmers' beliefs about the simplicity of sustainable practices is not sufficient alone; it must also translate into actionable commitment.

External influences further shape this relationship. Media framing and peer exposure help alter perceptions of effort and increase the likelihood of intention formation (Wald et al., 2024). Similarly, structured education programs can positively influence perceived effort by clarifying processes and demonstrating real-life benefits, ultimately reinforcing intention (Gladkikh et al., 2020).

Environmental pressures also play a moderating role. Farmers' perceived risks from environmental degradation or regulatory pressures can amplify the importance of intention in the decision process (Li et al., 2022b). Thus, the socio-environmental context reinforces behavioral intention as a key mediator between how easy a practice appears and whether it is adopted.

Intervention strategies that enhance effort expectancy and strengthen behavioral intention are critical. Demonstration-based training, peer-led learning, and information technologies that simplify access to sustainable techniques all contribute to lowering perceived difficulty. Socialized services and

community-based programs, such as those promoted through digital agriculture networks, have proven effective in making sustainable farming seem more approachable (Shi et al., 2023).

3.10 Justifying mediating effect of the behavioral intention between social influence and farmers' sustainable conservation agriculture practices adoption behavior

Behavioral intention plays a central mediating role in translating social influence into the actual adoption of sustainable conservation agriculture practices among farmers. Social influence—rooted in peer norms, community expectations, and collective behavior—shapes farmers' intentions by creating pressure or encouragement to conform to sustainability standards within their social circles (Nursanti & Ellina, 2022).

Farmers often adjust their behavioral intentions based on the perceived support and endorsement of sustainable practices from trusted social networks. These normative pressures, when strong, increase the likelihood of forming intentions aligned with environmentally sustainable behaviors (Rhodes, 2023). Community groups, agricultural cooperatives, and local influencers thus act as key vehicles of influence that channel social expectations into actionable intent.

Behavioral intention serves as the pathway through which social influence impacts actual farming behavior. When social support is perceived as strong, it enhances farmers' motivation and commitment to act (Nisa & Solekah, 2022). This relationship is complex and often interwoven with other psychological variables such as self-perception and perceived behavioral control, which collectively influence behavior (Chen et al., 2022).

Social networks further strengthen behavioral intentions by building shared values and mutual reinforcement. Farmers embedded in supportive communities are more likely to internalize sustainable norms and form stronger adoption intentions (Prayitno et al., 2022). These networks create a collective identity around sustainability, which enhances both the intention and likelihood of adoption.

External factors such as trust, resource availability, and policy context also shape this mediating relationship. Social capital—including trust, reciprocity, and shared norms—can enhance or constrain intention formation depending on the reliability of information and support available (Ruslan & Khalid, 2023). Agricultural policies that incentivize cooperation and knowledge sharing can institutionalize social norms, reinforcing farmers' intentions to adopt sustainable methods (Arnott et al., 2021).

Strategic interventions must therefore target behavioral intention as the critical link. Farmer-to-farmer workshops, social media platforms, and peer-led storytelling can strengthen intentions by promoting visibility of successful adoption cases and cultivating group identity (Liao et al., 2022; Nisa & Solekah, 2022). Educational programs embedded in social structures can bridge knowledge gaps while reinforcing normative behaviors.

3.11 Justifying mediating effect of the behavioral intention between facilitating conditions and farmers' sustainable conservation agriculture practices adoption behavior

Behavioral intention serves as a vital mediator between facilitating conditions and the actual adoption of sustainable conservation agriculture practices by farmers. Facilitating conditions—such as access to information, financial resources, technology, and training—significantly shape farmers' willingness and readiness to adopt sustainable practices. When these resources are perceived as adequate, farmers develop stronger behavioral intentions to engage in conservation agriculture (Kaur et al., 2024).

Perceived support and available infrastructure directly enhance farmers' motivation to adopt sustainable methods. Farmers who have access to extension services, credit schemes, or agricultural inputs are more confident in their ability to engage in new practices, which reinforces their intentions to adopt them (Abdullah et al., 2022). This intention, in turn, acts as the psychological engine that transforms enabling environments into observable behavioral outcomes.

The mediating role of behavioral intention is central to this transformation. Rather than facilitating conditions leading directly to behavior, they first influence the formation of intention, which then predicts adoption. Empirical evidence confirms that when facilitating conditions are strong, farmers' intentions become more favorable, resulting in higher adoption rates of sustainable practices (Turki et al., 2021; Istiqomah & Anisykurlillah, 2020).

This mediation process is often shaped by interacting factors. Social influence, perceived behavioral control, and individual attitudes can amplify or constrain how facilitating conditions shape behavioral intention. Supportive community environments, where group participation and shared learning are encouraged, can enhance both the perception of facilitating conditions and the intentions that follow (Conner et al., 2023; Abdullah et al., 2022).

For practical impact, strategies should focus not only on increasing access to physical resources but also on building social and cognitive supports. Programs that combine resource provision with hands-on training and farmer-to-farmer learning reinforce both facilitating conditions and behavioral intention. Mentorship models and digital platforms that showcase successful adoption stories can further stimulate intention formation by making sustainability practices more accessible and relatable (Norman et al., 2022).

IV. SUMMARY

The empirical literature reviewed in Section 2.3 demonstrates that the adoption of Sustainable Conservation Agriculture Practices (SCAP) among farmers is a complex behavioral outcome shaped by multiple interrelated factors. Among these, Information Ability consistently emerges as a foundational variable, encompassing farmers' capacity to access, comprehend, and apply agricultural information. Studies confirm that information awareness, access, and application significantly enhance farmers' understanding of the long-term benefits and practical procedures of SCAP,

thereby strengthening their motivation to adopt such practices. This relationship is not only direct but is also shown to operate indirectly through behavioral intention, indicating a mediating process grounded in cognitive behavioral models.

Performance Expectation has been empirically validated as a significant predictor of farmers' adoption decisions. Research indicates that when farmers perceive SCAP as a means to improve productivity, reduce input costs, or stabilize yields under climatic stress, their adoption likelihood increases. This finding aligns with the technology acceptance literature, which highlights perceived usefulness as a driver of behavioral intention. Similarly, Effort Expectancy, which captures the perceived ease or difficulty of adopting SCAP, is found to influence adoption behavior through its effect on intention formation. If the practices are viewed as labor-intensive, technically complicated, or time-consuming, farmers tend to demonstrate lower intention and adoption rates.

The role of Social Influence has also been substantiated through multiple empirical investigations. Farmers are more likely to adopt SCAP when trusted peers, village leaders, or agricultural extension agents endorse or demonstrate the use of such practices. Social norms and observational learning thus play a crucial role in normalizing and reinforcing SCAP adoption. In addition, Facilitating Conditions, such as access to subsidies, agricultural machinery, technical training, and institutional support, have been shown to directly influence both behavioral intention and actual practice. Studies consistently emphasize that even high levels of intention may not translate into behavior without enabling conditions.

Finally, the literature supports the mediating role of Behavioral Intention, which acts as a psychological bridge between attitudinal, social, and resource-based variables and actual adoption behavior. This mediating mechanism underscores the value of integrated behavioral models, such as the Unified Theory of Acceptance and Use of Technology (UTAUT) and the Theory of Planned Behavior (TPB), in explaining SCAP adoption dynamics. Overall, the empirical review suggests that a comprehensive, multidimensional framework is necessary to capture the full range of drivers influencing farmers' decisions, justifying the research model proposed in this study.

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