TAF
Journal of Administrative and Business Studies
JABS
2023, 8(2): 35-51

PRIMARY RESEARCH

Unraveling the path to IoT adoption in agriculture: exploring the impact of mass media and interpersonal sources, mediating role of technological anxiety, and the moderating influence of farmer's psychological capital

Hastirullah Fitrah, *

Faculty of Agriculture, Universitas Achmad Yani, Banjarmasin, Indonesia

Keywords
IoT adoption in agriculture
Perceived behavior control
Mass media
Interpersonal sources
Technological anxiety
Farmer's psychological capital

Received: 5 February 2022
Accepted:8 April 2022
Published:19 May 2022

Abstract
In this cross-sectional quantitative research study, the researcher aimed to determine whether South Kalimantan Province in Indonesia serves as an optimal location for investigating the application of Internet of Things (IoT) technology in agriculture. The researcher also explored the effects of mass media and interpersonal sources, the moderating role of psychological capital and psychological capital theory, and the mediating influence of technological anxiety on farmers' adoption intentions of IoT in agriculture. Our data collection involved survey questionnaires administered to a sample of 305 farmers from South Kalimantan Province. Through rigorous Smart PLS (Partial Least Squares) analysis, we examined the complex interplay of variables in this context. Our findings will shed light on the suitability of this region for IoT in agriculture research and provide insights into the multifaceted factors that influence farmers' technology adoption decisions. This research contributes to the growing body of knowledge in the field of agricultural technology adoption and can inform policies and strategies aimed at fostering IoT adoption among farmers, not only in South Kalimantan but also potentially in other similar agricultural regions.

INTRODUCTION

In Indonesia, technology has revolutionized every aspect of business and industry, and this is also true of the agricultural sector. Technology known as the Internet of Things (IoT) has completely changed how businesses operate in every sector, and the agriculture sector is no exception (Takagi, Purnomo, & Kim, 2021). The term IoT was first used by technology pioneer Bryant and Higgins (2021). According to Caffaro, Cremasco, Roccato, and Cavallo (2020), the Internet of Things (IoT) is defined as "an open and comprehensive network of intelligent objects that have the capacity to auto-organize, share information, data, and resources, reacting and acting in case of situations and changes in the environment" (Caffaro et al., 2020). IoT technology is a dynamically global architecture based on the Internet that is expanding quickly around the globe. The common communication protocols form the foundation of IoT. Because of this, it may integrate into an information network and self-configure with both digital and physical identification (Aldosari, Al Shunaifi, Ullah, Muddassir, & Noor, 2019; Duang-Ek-Anong, Pibulcharoensit, & Phongsatha, 2019). Improving crop productivity is now essential to feed the world's expanding population due to the rapid increase in people and resource restrictions. An appropriate technical breakthrough to tackle this expanding issue is the Internet of Things. IoT adoption in agriculture benefits the agriculture sector by displacing humans and enabling efficiency as well as tracking from any loca-

*corresponding author: Hastirullah Fitrah
†email: hastirullah@uvayabjm.ac.id

tion (Madushanki, Halgamuge, Wirasagoda, & Syed, 2019). The agricultural sector has a rich history of technological adoption, from the mechanization of farming processes to the introduction of genetically modified crops (Khanna & Kaur, 2019). The agricultural sector has experienced significant transformations in recent times, necessitating the modernization of work techniques and utilization of the Internet of Things (IoT) to capitalize on available prospects (Strong, Wynn, Lindner, & Palmer, 2022). IoT is important to agriculture because sensors can measure multiple variables continuously. Additionally, by leveraging cloud processing power, Ronaghi and Forouharfar (2020), models can be developed to assess the growth of crops, resources in the soil, and access to water to aid in decision-making or even automate agriculture. One of the primary technologies for the agricultural revolution is the goal to adopt the IOT for agriculture (Pillai & Sivathanu, 2020). As the Internet of Things spread, this idea emerged at the start of the twenty-first century as an advancement of the interpersonal source and mainstream media concepts (Monteleone, De Moraes, & Maia, 2019). There has not been much research done on agriculture technologies, specifically on operations management in this environment (Madushanki et al., 2019). The implementation of agriculture technologies remains theoretically constrained and exclusive to a few leading companies (Khanna & Kaur, 2019). This indicates that a deeper examination is required to define agriculture technologies (Duang-Ek-Anong et al., 2019).

Mass media has emerged as a powerful source of information and influence in modern society. Mass media channels, such as television, radio, newspapers, and online platforms, play a crucial role in disseminating information about emerging technologies, including IoT in agriculture (Anwar, Malik, Raees, & Anwar, 2020). Farmers often turn to these sources for insights into the benefits and drawbacks of adopting new technologies. Consequently, mass media can significantly influence farmers' attitudes and intentions regarding IoT adoption. In addition to mass media, interpersonal sources also play a vital role in shaping individuals' perceptions and decisions. Farmers frequently engage in discussions with peers, family members, and agricultural experts (Khan et al., 2020). These interpersonal interactions can provide valuable insights, share success stories, or raise concerns related to IoT adoption in agriculture. Thus, the influence of interpersonal sources on farmers' intentions to adopt IoT technology is an area that merits exploration Popoola, Yusuf, and Monde (2020).

In the context of agriculture, technological anxiety is the uneasiness, trepidation, or discomfort that people, farmers and other agricultural stakeholders in particular may feel while interacting with or contemplating the integration of cutting-edge technologies into farming practises (Ribot, Faye, & Turner, 2020). The introduction of cutting-edge technologies, such as digital tools, automation, and data-driven systems, which are meant to boost productivity and improve agricultural operations, is frequently linked to this fear. Anxiety over technology can take many forms and influence how decisions are made in the agricultural industry (Liu, 2022). Farmers' fear of the unknown may make them hesitant to adopt new technologies. They might be worried about how difficult technology is to use, how it might affect their customs, or how much learning will be involved in using it efficiently (Jones-Bitton, Best, MacTavish, Fleming, & Hoy, 2020). Agricultural technology is changing quickly, which might lead to uncertainty. Farmers can be concerned about the new instruments and systems' dependability and long-term viability, as well as the expenses involved and possible disturbances to their routines (Flachs, 2019).

According to Asbari, Prasetya, Santoso, and Purwanto (2021), psychological capital is a type of non-cognitive talent that characterizes a person's thinking and influences their likelihood of making wise decisions throughout their life. It is the main resource that can explain why people with identical resources and working conditions might perform differently from one another, a characteristic shared by smallholder farmers (Chipfupa, Tagwi, & Wale, 2021). Additionally, it is the most important resource that decides how well a person or household uses all the other resources that they own (Chipfupa & Wale, 2018). Later, as various mental illnesses were treated more thoroughly, psychologists developed a novel strategy known as positive psychology (Chipfupa & Wale, 2020). This strategy is focused on two objectives: assisting regular people in leading better, more fulfilling lives and assisting people in realizing their potential. The four elements of psychological capital are optimism or a positive self-image, the belief that one can achieve their goals, the ability to react constructively with stress and disappointment, and hope for a successful life. These are crucial ideas for any farmer to understand in order to succeed in the agricultural industry, given the significance of agriculture in Indonesia (Mirzaei, Azarm, Yazdanpanah, & Najafabadi, 2022).

The present study determines that unraveling the path to IOT adoption in agriculture and exploring the impact of mass media and interpersonal sources, mediating role of technological anxiety, and the moderating influence of farmer's psychological capital and psychological capital theory involved among farmers belongs to South Kaliman-

ISSN: 2414-309X
DOI:https://doi.org/10.20474/jabs-8.2.5

tan Province of Indonesia. It is an idea in management and organisational psychology that emphasises people's positive psychological traits and resources at work. This relatively new concept has drawn interest due to its potential to enhance job performance, employee well-being, and overall organisational success ((Ronaghi & Forouharfar, 2020; Youssef-Morgan & Luthans, 2013).

LITERATURE REVIEW

The foundation of psychological capital theory is the positive mental state of an individual, which is indicated by higher levels of the following four aspects: resilience, hope, optimism, and confidence (Ronaghi and Forouharfar (2020); (Youssef-Morgan & Luthans, 2013)). Research has shown that evaluating these four facets of psychological capital theory is simple. This theory has four components. The first component, confidence, is the conviction that one is capable of exerting effort and achieving objectives. Hard work and improved performance are correlated with increased confidence Ronaghi and Forouharfar (2020). Studies have shown that a variety of processes, including cognitive, motivational, effective, and selecting processes, can influence our confidence (Youssef-Morgan & Luthans, 2013). Researcher can enhance our confidence in the following ways. Knowing all the elements that contributed to prior success gives us the ability to apply them in the future, which eventually increases our confidence (Youssef-Morgan & Luthans, 2013). Secondly, researcher can be inspired to succeed when we witness others effectively conquering obstacles in a particular circumstance. Third, researcher can increase our confidence in our ability to reach those achievement levels by visualizing successful future scenarios. Youssef-Morgan and Luthans (2013), those who possess self-confidence believe they can achieve their goals despite facing obstacles.

The second component of psychological capital theory is Hope, which denotes a person's conviction that they can work hard and find means to accomplish their goals (Youssef-Morgan & Luthans, 2013). By establishing objectives that are clear, quantifiable, reachable, pertinent, and time-bound, we may cultivate optimism. By establishing objectives, we should expect to succeed in achieving them by diligence and drive (Flachs, 2019). Such people can look forward to a brighter future and see obstacles as possibilities thanks to their optimism and hope, which gives them the willpower to consider other options for dealing with obstacles. Resilience, the third component, is the ability to resist being engulfed by negative emotions like stress, fear, failure, etc (Çavuş & Gökçen, 2015). The last component, optimism, is the ability to think positively about what lies ahead. In this regard, there are two types of people: those who believe that hard work is the key to good things in life, and those who assert that good things will come to them no matter what. The optimists hold the latter belief. Their resilience enables them to overcome obstacles. Based on these concepts, the paper makes the case and hypothesizes that psychological capital influences smallholder farmers' demand for adaptable techniques as well as how they react to climate change (Ronaghi and Forouharfar (2020); Youssef-Morgan and Luthans (2013).

These four facets of the idea are critical to success and delivering one's best effort (TabatabaeiLotfi, 2016). Possessing even one of these four characteristics can have a favourable impact on the others. Although this theory was initially investigated at the individual level, it is currently also being studied at the group level to assess performance within the group. Since this theory is being examined in relation to agriculture, we can state that in order for farmers to accomplish their goals and show great performance and high output, they need to possess the four features of this theory (Youssef-Morgan & Petersen, 2019). Advances in positive psychology have shown that it is feasible to quantify an individual's psychological capital endowment in a standardized manner. Research (Luthans & Youssef-Morgan, 2017; Youssef-Morgan & Dahms, 2017; Youssef-Morgan & Petersen, 2019) that has tried to incorporate the impact of non-cognitive factors in climate change adaptation research has not been able to offer such an accurate assessment that captures all the facets of psychological capital. Additionally, no universal metrics exist to assess smallholder farmers' non-cognitive skills; instead, each study creates its own framework. The problem is that the two theories' shortcomings stem from their incapacity to handle the various non-cognitive facets of hope (the will to succeed) and resilience (perceptions of one's capacity for adaptation and adjustment). This study suggests using the "psychological capital theory," which is a more thorough and reliable hypothesis (Youssef-Morgan & Dahms, 2017; Youssef-Morgan & Luthans, 2013; Youssef-Morgan & Petersen, 2019)

Hypothesis testing and conceptual framework

Indonesian agriculture has historically benefited from mass media (magazines, radios, TVs, and the internet) (Khan et al., 2020), and this trend will continue as social networking sites continue to overtake other news sources as the country's primary news source (Anwar et al., 2020). Exposure to media that aids in the formation of viewers' attitudes toward topics can lead to informal learning ((Anwar

ISSN: 2414-309X
DOI:https://doi.org/10.20474/jabs-8.2.5

et al., 2020); (Khan et al., 2020)). The agenda-setting theory, which holds that the public's perception of the relevance of issues is influenced by the frequency of news coverage, is consistent with the finding that exposure to controversial themes in the mass media is associated with worry (Han, Rodriguez, & Qu, 2023). The mass media, which encompasses radio, newspapers, television, and internet platforms, is essential for spreading knowledge about new technologies, their possible advantages, and practical uses. Within the agricultural domain, mass media outlets serve as channels for disseminating information, case studies, and professional viewpoints regarding Internet of Things technologies (Khanna & Kaur, 2019). These resources can provide farmers with information about the benefits of using IoT, including higher crop yields, more efficient use of resources, and less influence on the environment. Furthermore, the media can assist farmers in seeing the viability of IoT in their particular circumstances by presenting real-world instances and useful applications in agriculture (Duang-Ek-Anong et al., 2019). Because mass media outlets have the ability to raise awareness and pique interest in this game-changing technology, they are therefore frequently regarded as having a significant influence on farmers' attitudes and plans regarding IoT adoption. Scholars have investigated the framing of mass media messages and the differing effects that media platforms can have on adoption intention, providing insight into the subtleties of this powerful source in agricultural stakeholders' decision-making processes (Monteleone et al., 2019; Strong et al., 2022). Regardless of the accuracy of these portrayals, scholars Duang-Ek-Anong et al. (2019); Madushanki et al. (2019) have noted that popular U.S. media outlets consistently promote negative stories about Indonesia, drowning out the positive aspects of Indonesian business practices and daily life. Pillai and Sivathanu (2020) contend that media exposure, through defending the harsh trade sanctions imposed on a "rogue" trading partner, for example, contributes to the formation of Indonesia's unfavorable opinions of Indonesia. Thus, we propose that:

H1: Mass media source influences on adoption intention of IOT for agriculture.

Extension agricultural representatives, academics, other landowners, fertilizer vendors, crop specialists, seed providers, and meetings held by growers' connections or commodity associations have traditionally supplied farmers with a large portion of the information they need. This preference has persisted even with the introduction of online and other digital sources (Zeng, Qiu, & Zhang, 2022). Interpersonal relations, whether among individuals or in groups, aid in people's formation of a better understanding of political issues, which may result in notable shifts in attitudes, according to (Tian, Yu, Xiang, & Li, 2021). While it remains unclear whether interpersonal relations strengthen or weaken people's political beliefs Njeri and Mberia (2019), researchers Tian et al. (2021); (Zeng et al., 2022) have contended that the degree of homophile among those interacting determines how effective interpersonal interactions are. The possible uses of IoT technology include immediate processing and persistent computing, which can provide users with smarter services. The Internet of Things (IoT) is a huge network that uses the Internet to link people, data, and services. According to Caffaro et al. (2020), it makes interactive networking, digital administration, and service control possible. The Internet of Things' basic network infrastructure can link a wide range of smart things, from huge agricultural equipment to micro-sensors, over the Internet. The intention to embrace Internet of Things (IoT) technology in agriculture is greatly influenced by interpersonal factors, which include interactions with family, friends, and agricultural professionals (Aldosari et al., 2019). In contrast to mainstream media, interpersonal sources provide a more individualised and regional viewpoint, and their impact is frequently based on reputation and trust. Within their agricultural communities, farmers often participate in debates and knowledge-sharing that might influence their attitudes and beliefs towards the use of IoT (Takagi et al., 2021). Good experiences and success stories from other farmers who have adopted IoT can serve as strong incentives since they offer tangible proof of the technology's advantages.

Furthermore, peers and family members might affect adoption intention by expressing doubt or skepticism or, on the other hand, by offering advice and support. Advisors and specialists in agriculture are essential because they provide direction, expertise, and comfort to farmers thinking about implementing IoT. Researchers have looked into the dynamics of these relationships and the social networks that serve as information exchange platforms (Aldosari et al., 2019; Caffaro et al., 2020; Lobo, Tomás, Viruel, Ferrero, & Lucca, 2019). This has helped to illuminate the persuasive and motivational aspects of interpersonal sources that influence farmers' decision-making when it comes to implementing IoT technology in agriculture (Popoola et al., 2020; Wójcik, Jeziorska-Biel, & Czapiewski, 2019). Consequently, we suggest two mutually beneficial relationships:

H2: Interpersonal source influences on adoption intention of IOT for agriculture.

A considerable amount of technological anxiety arises

ISSN: 2414-309X
DOI:https://doi.org/10.20474/jabs-8.2.5

from the fact that the majority of the villagers have become wealthy in the area, but they are also reluctant or scared to work with government officials to reduce poverty (Rudolphi, Berg, & Parsaik, 2020). This can be attributed to a variety of factors, including outdated psychological beliefs, fear of challenges, and backward thinking. Long-term technological anxiety will negatively impact these farmers' sense of contentment and happiness in life, limit their ability to make positive spiritual changes in their circumstances, and in some cases even cause them to lose the psychological will to defy fate and pursue an eternally happy life (Ribot et al., 2020). The majority of these paradoxical farmers do, however, own certain resources for agricultural output, such as rights to field management and mountain forest development. Their lives will likely be significantly improved, and their material living conditions will be improved, allowing them to have the psychology and concepts of a positive life and reducing or eliminating their technological anxiety (Murray et al., 2019). This will likely happen if modern agricultural technology is taught to them and they receive some technical and financial support. As with other novel agricultural technology, there is contention that smart farming raises questions about costs and benefits, delaying or possibly eliminating farmer adoption (Jones-Bitton et al., 2020; Liu, 2022; Rudolphi et al., 2020)). The reason for this is that smart farming helps farmers "move from experiential decision-making to data-driven processes, changing their mode of working" (Flachs, 2019). According to Jones-Bitton et al. (2020), farmers should be cautious of any changes that "differ significantly from which they are familiar and comfortable" and that "involve a shift in their identity from cultivators to office managers". Negative experiences with smart farming technologies, like compatibility issues Murray et al. (2019) or access issues Rudolphi et al. (2020), are likely to make this worse. These experiences may act to stall uptake from farmers who are already having difficulty adjusting to new working practises (Ribot et al., 2020). Farm advisers and agronomists are examples of scale actors who are seen as being crucial in controlling farmer uncertainty to boost adoption of smart farming technologies (Liu, 2022; Murray et al., 2019).

Farming and agriculture automation increased productivity while reducing human contact. The population of any nation is dependent on agriculture, thus users of these resources ought to make the best use of the land and water resources available (Bryant & Higgins, 2021). Furthermore, to optimize profitability, high-quality crop management and output are essential. Therefore, IoT-based agricultural management solutions are essential for a nation that relies heavily on agriculture (Tian et al., 2021). Farmers now enjoy numerous benefits from the new systems created with IoT technology, which have lessened the disadvantages of traditional methods. For instance, IoT-based water management systems use sensors to gather environmental data like temperature, water level, and humidity in order to precisely time irrigations (Duang-Ek-Anong et al., 2019; Marescotti, Demartini, Filippini, & Gaviglio, 2021). Moreover, IoT-based crop management systems use sensors to measure soil, temperature, and humidity, giving farmers the necessary data to manage their crops effectively Ronaghi and Forouharfar (2020). All things considered, these IoT-based solutions assist in decreasing power consumption, human involvement, and expense in the agricultural sector. IoT-based agricultural applications have also been applied to fertilizer management, insect control, weather monitoring, and greenhouse management. (Takagi et al., 2021) discovered that people's awareness and knowledge of IoT applications in agriculture can be greatly impacted by their exposure to mass media sources. However, media exposure is not the only factor that influences adoption intentions; worry about technology can also act as a moderator in this process. According to Njeri and Mberia (2019), people who are more anxious about technology may be less likely to use IoT solutions, even if they have been exposed to favourable material in the media. This implies that the intention to embrace IoT in agriculture can be strongly impacted by the concern engendered by media messaging. Previous research has demonstrated the significant impact that recommendations and conversations with experts, peers, or other members of the farming community can have on adoption decisions (Lobo et al., 2019; Marescotti et al., 2021). In their research on the agricultural industry, (Duang-Ek-Anong et al., 2019) emphasised the value of human contact in knowledge dissemination and building confidence in IoT technologies. In this case, as with mainstream media sources, it is impossible to ignore the mediating role that technological fear plays. Caffaro et al. (2020) has shown that people who experience higher levels of technological anxiety may be less trusting of interpersonal sources, which may eventually reduce their intentions to adopt. This highlights the need for strategies that address and mitigate technological anxiety in order to facilitate the successful integration of IoT in agricultural practises (Bryant & Higgins, 2021). Technological anxiety thus emerges as a critical factor that mediates the relationship between both mass media and interpersonal sources and the adoption intention of IoT for agriculture.

H3: Technological anxiety has mediating role between mass

ISSN: 2414-309X
DOI:https://doi.org/10.20474/jabs-8.2.5

media source and adoption intention of IOT for agriculture. **H4**: Technological anxiety has a mediating role between interpersonal sources and the adoption intention of IOT for agriculture.

The Internet of Things adoption in agriculture can be used for keeping track of assets, smart greenhouses for cultivation, medical illnesses and pest evaluation, controlled fertilizer use, property movement tracking, farm evaluation, water and soil quality tracking, smart greenhouses as well, and monitoring and evaluation (Asbari et al., 2021). The use of IOT in agriculture is providing farmers with tools for making choices and automation that allow knowledge, services, and products to be fully interconnected for improved quality, efficiency, and profitability (Caffaro et al., 2020). Studies that describe the uses of IOT adoption in agriculture are already available ((Chipfupa et al., 2021); (Chipfupa & Wale, 2018); (Chipfupa & Wale, 2020)). IoT, which combines global data with objects or things connected to the internet, is a crucial part of the Internet of the future. IoT is centred on process automation through reduced human engagement. Automation is the method by which IoT uses sensors to gather data, controllers to process the data, and actuators to finish the automation operations (Khan et al., 2020). The goal of IoT in farming and agriculture is to automate every facet of farming and agricultural practises in order to improve productivity and efficiency. Traditional methods of managing livestock (such as cattle identification) include more human engagement, labour costs, power and water usage, and are not entirely automated (W. Li et al., 2020; Luthans & Youssef-Morgan, 2017). Analysing IoT sub-verticals, gathering data for measurements, and utilising technologies to create applications are the main ideas behind this assessment. To develop new Internet of Things applications in the future, it is important to determine the most studied sub-verticals, data sets, and technologies (Lobo et al., 2019).

Monteleone et al. (2019) discovered that farmers' resistance to IoT adoption was significantly predicted by their level of technological fear. Farmers who expressed more reluctance and skepticism about incorporating IoT technologies into their agricultural practises were also more likely to have higher degrees of technical anxiety. This anxiety is frequently caused by worries about the intricacy of Internet of Things systems, the possible dangers of technological failure, and the necessary skill set for effective deployment. Furthermore, Norton and Alwang (2020) highlighted the detrimental impact that technological fear has on the desire to embrace IoT in agriculture. According to Okwu and Umoru (2019), farmers who thought IoT technology was overwhelming or scary were less likely to investigate its advantages and were reluctant to make the investment necessary to embrace it. These results demonstrate the concrete influence of technology anxiety on agricultural stakeholders' decision-making process with relation to IoT technology. The corpus of research to date supports the idea that adoption intention of IoT for agriculture is significantly impacted by technological apprehension (Pillai & Sivathanu, 2020). A major obstacle to the widespread adoption of IoT in the agricultural sector is the likelihood of reluctance and delay from farmers and other agricultural stakeholders who suffer elevated levels of technology anxiety. Effective methods aiming at increasing the adoption of IoT technologies in agriculture and realizing their potential benefits require an understanding of and attention to technological anxiety (Popoola et al., 2020; Raj et al., 2021). **H5**: Technological anxiety has influence on adoption intention of IOT for agriculture.

According to Youssef-Morgan and Petersen (2019), psychological capital is composed of four main constructs: resilience, optimism, hope, and confidence. When presented with barriers, people with a positive mindset see them as chances for creative problem-solving, whilst those with self-confidence persevere when faced with difficulties. Youssef-Morgan and Luthans (2013) also point out, these people demonstrate the ability to overcome adversity and, with hope, can devise new routes to goals. Those with a positive psychological capital are more likely to make well-informed decisions and use more resilient adaption techniques when resources are limited and people must make risky selections. Positive psychological capital is therefore a crucial instrument for efficiently handling and utilising all other aspects of psychological capital. The setting has a bigger influence on farmers' development when viewed through the lens of the original source of their psychological capital (Youssef-Morgan & Dahms, 2017). Farmers can become more hopeful, self-assured, and optimistic in a good and stable political and social environment, and more resilient in a laid-back economic climate (TabatabaeiLotfi, 2016). Conversely, a difficult and unsettling environment could cause farmers' psychological capital to drop and possibly even cause them to adopt negative behaviors and negative psychology, such as despair, suicide, stealing money, etc. (Suksod, Dangsuwan, & Jermsittiparsert, 2019). Farmers' psychological capital is the psychological reflection of individuals on something; via building their own psychological capital, people construct a set of behaviors that match it. Differences in farmers' capacity to seize opportunities when they present themselves, the tendency towards de-

ISSN: 2414-309X
DOI:https://doi.org/10.20474/jabs-8.2.5

pendency that some small farmers exhibit, the degree of confidence that farmers have in agriculture as a viable strategy for a sustainable livelihood, and the range of skills they possess in handling various challenges can all be explained by psychological capital (Luthans & Youssef-Morgan, 2017; Mirzaei et al., 2022)).

Primarily, it is critical to understand the importance of technology anxiety. The adoption of new technologies may be hampered by technological anxiety, according to a number of studies. H. Li, Qi, Li, and Ma (2022) discovered that farmers with high levels of technical anxiety were less likely to use IoT solutions. Fear of the unknown and the intricacy of new technologies are common causes of technological anxiety, which raises concerns about how well they will integrate into current farming methods. On the other hand, psychological capital, which includes ideas like resilience, hope, optimism, and confidence, is a major factor in determining how people behave and think about technological progress. Chipfupa et al. (2021); Chipfupa and Wale (2018) revealed that farmers who possess a high psychological capital are more likely to be adaptive and receptive to new technology, even when confronted with potentially unsettling circumstances. They are more inclined to see difficulties as chances and possess the self-assurance necessary to go past difficulties. Asbari et al. (2021) examined the impact of psychological capital on the uptake of precision agriculture technologies, which are similar to IoT in terms of complexity and innovation. According to Youssef-Morgan and Petersen (2019), farmers who possessed greater psychological capital were more capable of reducing the negative effects of technology fear and were more likely to indicate a desire for adoption. This shows that having a strong psychological capital can help farmers adopt IoT technologies in agriculture by acting as a buffer against the negative effects of technology fear.

H6: Farmer's psychological capital has moderating role on technological anxiety and adoption intention of IOT for agriculture.

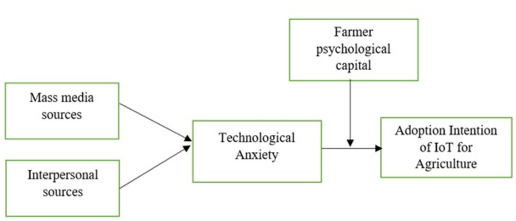

FIGURE 1. Conceptual framework

METHODOLOGY

The primary goal of the study is based on the deductive technique, and it takes a quantitative approach by utilising descriptive research methodology. The effects of interpersonal and mass media sources, the mediating role of technological anxiety, the moderating influence of psychological capital and psychological capital theory among farmers, and the best place to investigate the adoption of IOT in agriculture are all included in this conceptual research model that was developed. Testing hypotheses were also developed. Using the modified questionnaire as an instrument, which was based on a 5-point Likert scale, the time horizon was cross-sectional. In the absence of precise population data, non-probability sampling was employed. Convenience sampling, a non-probability sampling technique, was employed to collect the data. It was also taken into account that most of the time, respondents find it difficult to comprehend the goal of the study and how to participate. In light of this, a brief explanation was included in the questionnaire to aid in respondents' understanding. It was essential to obtaining more accurate results and real data for this research's generalizability. This study also took ethical considerations into account, assuring all respondents that the information they submitted would be kept confidential and used solely for this study's research needs. In all, 305 farmers in Indonesia's South Kalimantan Province participated in this study as framer respondents. The farmers in the Indonesian province of South Kalimantan were chosen for the data collection, and all of the respondents were asked to complete the questionnaires. Following that, SMART PLS was used to conduct all of the statistical tests needed for this study based on the data. Tests of instrument reliability, correlation, and regression were run to evaluate the South Kalimantan Province of Indonesia's development prospective.

Measurements

A three-part, five-point Likert scale-adapted questionnaire was used to gather the data. The demographics section and the final section of the questionnaire had questions on the variables that were employed in this investigation. Information about the participants' age, gender, agricultural productivity, firm size, use of technology of any kind, and media trustworthiness. Items such as independent, mediating, moderating, and dependent variables make up the other portion of the study. The items were modified of this breakdown. The first predictor in this study was mass media sources, for which a total of five items based on a five-point Likert scale were taken from the study of Khan et al. (2020). Four items from the study's interpersonal source variable, Zeng et al. (2022), were also modified and used a five-point Likert scale. Technology anxiety's moderating ef-

ISSN: 2414-309X
DOI:https://doi.org/10.20474/jabs-8.2.5

fect on this variable's measurement Three elements were modified based on the Murray et al. (2019) study. To keep the scale consistent, these items were likewise based on a 5-point Likert scale. Farmers' psychological capital plays a moderating impact in the measuring of this variable. Five of the items were modified from the (Youssef-Morgan & Dahms, 2017) study. Using a five-point Likert scale, the three items in the Pillai and Sivathanu (2020) category were used to gauge the adoption of IOT in agriculture. These items were likewise based on a 5-point Likert scale, where 1 represented the respondent's strong disagreement, and 5 represented the maximum closed-ended option that signals strong agreement. Following data collection, the instrument's reliability was assessed by a reliability analysis that included an assessment of the Cronbach alpha value. When every item was checked against every variable that was modified, the Cronbach alpha value was greater than 0.70 for every variable (Hair, Sarstedt, Matthews, & Ringle, 2016). Following the instrument's validation, every statistical test was run.

RESULTS

The current study concludes that South Kalimantan Province in Indonesia is the best place to investigate the adoption of IOT in agriculture, as well as the effects of interpersonal and mass media sources, the mediating role of technological anxiety, and the moderating influence of psychological capital and psychological capital theory among farmers. In line with the goal of the study, the findings of the questionnaire survey and the testing of the hypothesis are presented. First, the South Kalimantan Province of Indonesia's farmer response rate was emphasized. The respondents' demographic profile is shown in the following section. This chapter used PLS route modeling to illustrate the current study's findings. Descriptive statistics findings were reviewed for all variables, both endogenous and exogenous. Subsequently, the primary findings of this investigation were categorized into two primary segments. The initial segment covered the model's measurement, which relied on loading item reliability, internal consistency reliability, discriminant validity, and convergent validity. The structural models that describe the coefficient significance of variables for testing hypotheses, effect sizes, predictive relevance of the model, and level of the R-square value are represented. Lastly, the findings of the complementary PLS-SEM analysis are given. This analysis examines the mediating role of technological anxiety and the moderating influence of psychological capital.

Demographic profile

This study aims to investigate the adoption of IOT in agriculture, as well as the effects of interpersonal and mass media sources, the mediating role of technological anxiety, and the moderating influence of psychological capital and psychological capital theory among farmers of South Kalimantan Province of Indonesia. The assessment of the measurement and structural models was conducted using Smart PLS. The study's demographics are displayed in Table 1, which below lists the demographic profile of farmers in South Kalimantan Province of Indonesia, including gender, age, firm size, crop yield, using any type of technology, and media credibility.

ISSN: 2414-309X
DOI:https://doi.org/10.20474/jabs-8.2.5

TABLE 1. Demographic profile

Demography	Description	Responses	%
Gender	Male	222	73%
	Female	83	27%
Age	Less than 25 Years	80	26%
	25-40	107	35%
	40-60	90	30%
	Above 60 Years	28	9%
Farm size	Below 5 acres	86	28%
	5–10 acres	129	42%
	10 acres and above	90	30%
Crop yield	Sugar cane	70	23%
	Rice	102	33%
	Cotton	79	26%
	Fruits (Banana/Mango/ Grapes)	54	18%
Using any type of technology	Less than five months	56	18%
	5-10 months	97	32%
	More than 1 year	152	50%
Media Credibility	TV news	55	18%
	Printed newspapers	89	29%
	Online newspapers	48	16%
	Radio	23	7%
	Social media	90	30%

Assessment of measurement model

Risher and Hair Jr (2017) suggested that the outer loading of items should ideally be 0.5 or higher when assessing the validity and reliability of a model. Furthermore, it is advised that the extracted average variance be greater than 0.5. It is usual practice to remove items with outer loadings below 0.5 iteratively, starting from the item with the lowest loading value, in order to guarantee the robustness of the measurement model. It has been demonstrated that using this tactic, which is also supported by Risher and Hair Jr (2017), improves the overall quality of the data as it is being evaluated.

Validity and reliability test

As a precondition for the measurement model, the researcher examined the item loadings and cross-loadings for all study variables before evaluating convergent validity. The validity and reliability of the measurement model were examined during the model evaluation procedure. It's important to note that every item utilised in this study was modified from another study, and that only SmartPLS 2.0 M3Hair et al. (2016), which has a built-in CFA function, was used for confirmatory component analysis. According to Risher and Hair Jr (2017), internal consistency reliability measures how closely each item on a given subscale measures the same underlying idea. Composite reliability should ideally meet a minimum criterion of 0.70, and the Average Variance Extracted (AVE) should be at least 0.50, as advised by Risher and Hair Jr (2017). All of the constructions in Table 2, which is shown below, show strong reliability, with AVE values above the 0.50 cutoff mark, indicating the dependability of the measurement model. Additionally, Cronbach's Alpha was calculated in this study to assess the data's internal consistency. Furthermore, the following rules are provided by Risher and Hair Jr (2017) for the interpretation of alpha values: Excellent is defined as $\alpha > 0.9$, good as $\alpha < 0.8$, and acceptable as $\alpha < 0.7$. The resulting Table 2 provides the AVE, composite reliability, and Cronbach's Alpha values for each construct.

ISSN: 2414-309X
DOI:https://doi.org/10.20474/jabs-8.2.5

TABLE 2. Validity and reliability test

Construct	Item	Loadings	CA	CR	AVE
Mass media sources	MMS1	0.91	0.945	0.958	0.82
	MMS2	0.901			
	MMS3	0.908			
	MMS4	0.912			
	MMS5	0.898			
Interpersonal sources	IS1	0.801	0.873	0.913	0.725
	IS2	0.889			
	IS3	0.906			
	IS4	0.805			
Technological Anxiety	TA1	0.875	0.897	0.936	0.829
	TA2	0.919			
	TA3	0.937			
Farmer psychological capital	FPC1	0.864			
	FPC2	0.788			
	FPC3	0.889			
	FPC4	0.892			
	FPC5	0.887			
Adoption Intention of IoT for Agriculture	IOT1	0.672	0.722	0.843	0.645
	IOT2	0.866			
	IOT3	0.855			

Discriminant validity

The degree to which a particular latent variable may be discriminated from other latent variables is known as discriminant validity, according to Risher and Hair Jr (2017). Within the framework of this investigation, the Average Variance Extracted (AVE) approach put forward by Risher and Hair Jr (2017) was utilised to evaluate discriminant validity. Following the guidelines provided by Risher and Hair Jr (2017), discriminant validity was determined by comparing the correlations between latent variables with the square root of each of their individual AVE values. In accordance with their recommendations, proof of discriminant validity requires that the square root of the AVE for a specific latent variable exceeds the correlation values between that latent variable and others. In the discriminant validity evaluation, the significant level of outside loading is contrasted with cross-loading. When the outside load of a construct exceeds its cross-loading significance, it deviates significantly from other comparable structures (Sarstedt & Cheah, 2019). Table 3 shows that the built outer loadings (bold) are higher than the cross-loading. It means that each construct evaluates a unique concept.

TABLE 3. Discriminant validity

	IOT	FPC	IS	MMS	TA
Adoption Intention of IoT for Agriculture	0.803				
Farmer psychological capital	0.681	0.865			
Interpersonal sources	0.68	0.539	0.852		
Mass media sources	0.762	0.803	0.683	0.906	
Technological Anxiety	0.64	0.748	0.712	0.75	0.911

Assessment of R-square

According to Risher and Hair Jr (2017), the path coefficients are required for the study to be deemed essential. The recommended values of 0.19, 0.33, and 0.67 are considered low, modest, and substantial. The R-square in a regression model shows how much the independent variables can explain the variance in the dependent variable. According to Table 4, the R square values for adoption intention of IOT for agriculture were 0.503, and technological anxiety value of R square was 0.637.

ISSN: 2414-309X
DOI:https://doi.org/10.20474/jabs-8.2.5

TABLE 4. Assessment of R square

	R Square
Adoption Intention of IoT for Agriculture	0.503
Technological Anxiety	0.637

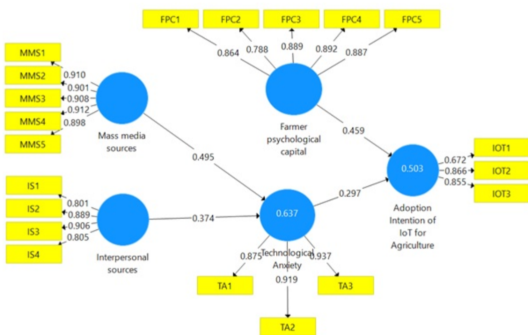

FIGURE 2. Assessment of measurement model

Assessment of structural model

Three structural models, the direct relationship structural model, the mediation structural model, and the structural model with moderating variables, are used in this study. Using the PLS-SEM bootstrapping approach, the structural model route coefficients that supported the hypothesised associations were statistically determined. An example of a statistical model that illustrates the connections between a group of latent variables and their observable indicators or variables is the structural equation model (SEM). Structural equation model is a practical and adaptable statistical technique that can be applied to assess intricate theoretical models and theories. Structural equation model creates a comprehensive model that can account for both the direct and indirect interactions between variables by utilising factor analysis, regression analysis, and path analysis. The variables in the model are classified as either observable variables, or the variables that are measured, or latent variables, or unobserved components thought to underlie the observed variables (Risher & Hair Jr, 2017; Sarstedt & Cheah, 2019).

Direct and indirect analysis

Hair et al. (2016), the structural model addresses the dependency of the relationship in the study's hypothesised model after the evaluation of measurement model direct relationships. PLS's structural model provides an internal modelling analysis of the direct correlation between the study's constructs' t-values and path coefficients. According to Hair et al. (2016), the path coefficient in regression analysis is equivalent to the standardised beta coefficient. Where t-values and the beta values of the regression's coefficient are analysed to determine the significance. The primary goals of this research are to first evaluate the model by looking at direct links, and then use a structural model to assess the linkages between the constructs that have been hypothesised. A mediation test was conducted, according to Hair et al. (2016), primarily to determine which mediating variable increased the influence of the independent variable on the dependent variable. Accordingly, from the perspective of the current investigation, the researchers tested the indirect effect of each prospective variable by using the re-sampling mediation approach, also known as bootstrapping. Similarly, most researchers found that prospective researchers were becoming more interested in bootstrapping a non-parametric resampling approach due of is among the most effective and thorough methods for determining if the mediation effect exists (Sarstedt & Cheah, 2019). Hair et al. (2016) claim that while bootstrapping for mediation analysis may be used with small sample sizes, PLS-SEM is the ideal fit for it. According to Hair et al. (2016), researchers should bootstrap the sampling distribution of the indirect effects that function for simple and multiple models when assessing the mediation effects. This is in accordance with Hair et al. (2016); Risher and Hair Jr (2017). This study uses a strategy that involves first using the PLS algorithm to identify the path coefficients, then bootstrapping to obtain the t-values and see whether there are direct links between the independent and dependent variables before assessing the mediation effect. According to Hair et al. (2016), a test of moderation was conducted to determine which moderator variable influences the strength or direction of the link between the independent and dependent variables. In line with the research conducted by Hair et al. (2016), moderator variables are commonly incorporated when there exists an inconsistent or weak association between the independent and dependent variables. In addition, there are other methods for examining the moderating effects, such as the three-step hierarchical regression procedure. However, this method has the disadvantage of requiring the manual computation of interaction terms through the use of functions, transforms, compute, and taking the product of each pair. Using the cross-products of the moderator and the independent variable's indicator, one further method is to use the moderating variable as an extra construct (Hair et al., 2016; Risher & Hair Jr, 2017; Sarstedt & Cheah, 2019).

ISSN: 2414-309X
DOI:https://doi.org/10.20474/jabs-8.2.5

TABLE 5. Direct and indirect relationship

	Relationships	Original Sample	T Statistics	P Values	Decision
H1	Mass media sources -> Technological Anxiety	0.495	13.537	0	Supported
H2	Interpersonal sources -> Technological Anxiety	0.374	10.655	0	Supported
H3	Mass media sources -> Technological Anxiety -> Adoption Intention of IoT for Agriculture	0.152	4.287	0	Supported
H4	Interpersonal sources -> Technological Anxiety -> Adoption Intention of IoT for Agriculture	0.115	4.026	0	Supported
H5	Farmer psychological capital -> Adoption Intention of IoT for Agriculture	0.424	5.965	0	Supported
H6	Moderating Effect 1 -> Adoption Intention of IoT for Agriculture	0.082	2.163	0.031	Supported

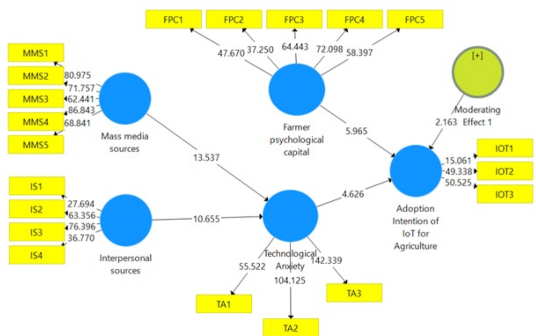

FIGURE 3. Assessment of measurement model

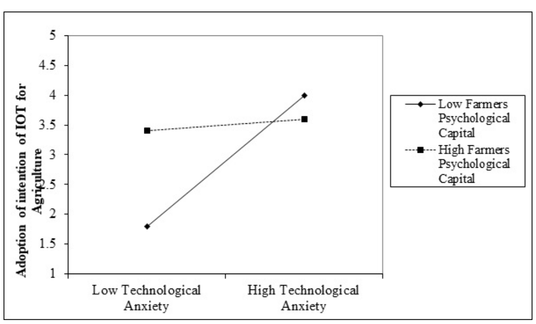

FIGURE 4. Moderating Effect 1

The moderation effect affects the slopes of the correlations, however Graph 1's slopes show significance at low, moderate, and high levels of findings by Hair et al. (2016); Risher and Hair Jr (2017). Stated differently, low psychological capital among farmers correlates with low technical fear and poor adoption of IOT intentions for agriculture. On the other hand, technological fear and the use of IOT for agriculture also seem to be higher among farmers with more psychological capital. Put another way, as the graph illustrates, technological anxiety is a key factor in strengthening the relationship between high levels of psychological capital among farmers and their favourable adoption of IOT for agriculture.

DISCUSSION AND CONCLUSION

The study sought to ascertain whether South Kalimantan Province in Indonesia is the most suitable location for examining the use of IOT in agriculture, along with the impacts of mass media and interpersonal sources, the moderating influence of psychological capital and psychological capital theory, and the mediating role of technological anxiety among farmers. The study put out a few theories on how these variables relate to one another. Researchers found that generally speaking, farmers' opinions of South Kalimantan Province in Indonesia were negative, which is in line with the findings of Pew public opinion polls conducted over the previous five years (Yu, 2022). Farmers generally agreed that Indonesia's South Kalimantan Province engaged in cyber espionage, abuses American intellectual property rights, and controls an excessive amount of the country's currency. Farmers were particularly worried about the massive trade gap with South Kalimantan Province in Indonesia and the enormous US debt that the province possessed. Midwest farmers, however, had a more positive opinion of South Kalimantan Province in Indonesia when contrasted with the gravity of the public's worries. This could be the result of farmers realizing that this nation has a long history of being a signifi-

ISSN: 2414-309X
DOI:https://doi.org/10.20474/jabs-8.2.5

cant and reliable importer of rice and other agricultural products (Wǒjcik et al., 2019). This result implies that different demographic groupings have differing levels of unfavorable attitudes. These theories were put through a variety of rigorous testing procedures, and following the testing phase, the theories were examined and the findings were described as follows. The first hypothesis in this study was mass media source influences on adoption intention of IOT for agriculture. Similar to the conclusions of other researchers Tajpara, Kalsariya, and Dadhania (2020), we did not detect a substantial influence of mass media on adoption intention of IOT for agriculture. This could be the case since, according to Monteleone et al. (2020); TabatabaeiLotfi (2016). Researcher assessed the objective adoption intention of IOT for agriculture about trade-related numbers rather than necessarily farmers' perceptions of the mass media sources. Strong et al. (2022) advise the possible contributions of mass media on adoption intention of IOT for agriculture. The second hypothesis in this study was interpersonal source influences on adoption intention of IOT for agriculture. Many were skeptical of triumph, thinking that the trade war would not be settled in a way that favored South Kalimantan Province in Indonesia, even as they accepted the pain of retaliatory tariffs in the hope that Indonesia would be compelled to change its trade practises. This implies that we should pay closer attention to how trade policies affect food producers. Knowing what matters to them will not only help with a quick effect analysis when trade policy decisions are finalized, but it may also help during the negotiation process. Farmers used social media and other outside sources to keep updated about the trade dispute, but they did not do it frequently or consistently. Our results show that the intention to implement IOT for agriculture was unaffected by information seeking from any source, whether it be interpersonal or not.

The mediating hypothesis in this study was technological anxiety has a mediating role between mass media sources, interpersonal sources, and the adoption intention of IOT for agriculture. Despite a high correlation between the two factors, farmers' mass media source and interpersonal source towards South Kalimantan Province in Indonesia did not always translate into positive adoption intention of IOT for agriculture. The perception that the agriculture sector would probably suffer greatly from the trade stalemate probably contributed to the widespread pessimism among our farmer respondents regarding the results of the trade war (Duang-Ek-Anong et al., 2019; Monteleone et al., 2019). Indeed, the loss of a sizable market caused farmers to incur enormous financial losses. Farmers expressed a modicum of optimism that the trade war will ultimately prove advantageous, despite their current economic struggles. The next hypothesis was technological anxiety has influence on adoption intention of IOT for agriculture. Technological anxiety arises from various sources, including the fear of the unknown, concerns about the complexity of new technologies, and worries about potential negative consequences or security issues. In the context of agriculture, farmers may be hesitant to adopt IoT solutions due to concerns about data security, the cost of implementation, and the learning curve required to use these technologies effectively. Additionally, the rural and often remote nature of agricultural operations may lead to connectivity and infrastructure issues, further increasing anxiety about the successful integration of IoT. To encourage the adoption of IoT in agriculture, it is essential for technology providers and policymakers to address these anxieties. This can be achieved through education and training programs, affordable and accessible IoT solutions, robust data security measures, and support for rural infrastructure development. By mitigating technological anxiety and demonstrating the tangible benefits of IoT in agriculture, stakeholders can foster a more positive adoption intention and drive the transformation of the agricultural sector towards greater efficiency and sustainability. The last hypothesis was farmer's psychological capital has moderating role on technological anxiety and adoption intention of IOT for agriculture. In the context of IoT adoption, technological anxiety frequently results from doubts and anxieties regarding the strange and complicated nature of these technologies. Farmers who possess greater psychological capital, however, are better able to control and lessen these fears. People who have high levels of self-efficacy, for example, are more likely to have confidence in their capacity to pick up new skills and adjust to new technologies, which helps them to be less anxious when implementing IoT solutions (Khanna & Kaur, 2019). Farmers who possess optimism, hope, and resilience are better able to keep a positive attitude in the face of difficulties and can recover from setbacks with more ease. Farmers with high psychological capital might be more confident and open-minded when it comes to using IoT in agriculture. They have a higher desire to adopt because they are more likely to believe that the advantages of IoT outweigh the initial difficulties and uncertainty. However, farmers with poorer psychological capital can be more prone to worry related to technology, which could make them less likely to embrace IoT solutions. It can be beneficial to work towards increasing farmers' psychological capital in order to promote the use of IoT in agriculture. This can include resilience-fostering support

ISSN: 2414-309X
DOI:https://doi.org/10.20474/jabs-8.2.5

networks, workshops that encourage optimism and positivity, and training programmes that build self-efficacy. Stakeholders in the agriculture industry can help lower the hurdles caused by technology anxiety and promote a more positive intention to adopt IoT technologies by supporting these psychological qualities.

Implications of study

The examination of the effects of interpersonal and mass media sources highlights the variety of communication channels that influence farmers' attitudes and intentions towards the adoption of IoT, adding to the body of knowledge on the spread of innovations. Moreover, the focus of the research on the moderating impact of psychological capital and the incorporation of psychological capital theory enhance our comprehension of the distinct psychological elements that influence the adoption of technology. This understanding can direct the creation of customised interventions and support networks to strengthen farmers' psychological assets and, in turn, increase their readiness to embrace the Internet of Things technologies. Furthermore, by examining technological anxiety as a mediating variable, the study provides stakeholders with a useful framework for comprehending the psychological processes at work and addressing anxiety-related hurdles to IoT adoption. Farmers were more likely to be in favor of the trade conflict if they used interpersonal sources more frequently. Using mass media sources had the opposite effect on IOT adoption for agriculture as we had anticipated. This research emphasises how important it is to provide accurate information on intricate and multifaceted trade issues. Farmers can make more adaptive judgements if they are better informed about agricultural trade policy through more sophisticated media coverage. The outcome also indicates that farmers' constituency should be informed about trade-related concerns through strategic channel selection, implying that there is potential for further research into the ways in which farmers' attitudes and behaviours are influenced by various communication channels. For example, scholars can investigate in great detail how different information sources reflect and mirror the social and individual ideas that are probably on display in the majority of tariff showdowns. From a practical standpoint, these results can guide national and regional agricultural policies, offering a path for technology adoption plans that take into account the particularities of South Kalimantan Province and related agricultural areas. In order to successfully integrate IoT in agriculture, policymakers and technology providers can use this knowledge to customize their infrastructure development, training, and support programmes to the unique demands and challenges faced by local farmers. This research can help with the development of awareness campaigns and training programmes that use mass media and one-on-one communication channels to spread knowledge and lessen farmers' apprehension about technology. Furthermore, it emphasises how crucial it is to help farmers develop psychological capital in order to increase their self-assurance and adaptability to technological change. This will eventually encourage the adoption of IoT technologies in agriculture, not only in South Kalimantan but also possibly in other agricultural regions dealing with comparable difficulties.

Limitations and future research

While this study provides valuable insights into the adoption of IoT in agriculture in South Kalimantan Province, there are several limitations that should be acknowledged. First, the generalizability of the findings may be constrained due to the focus on a specific geographical area. The region's unique characteristics may not fully represent the diverse agricultural landscapes in Indonesia, let alone in other countries. Therefore, future research should consider a broader geographic scope to enhance the external validity of the findings. Second, the study's reliance on self-reported data from farmers may introduce response bias and subjectivity. To mitigate this, future research could incorporate more objective measures, such as actual IoT adoption rates or technological infrastructure assessments, to complement self-reported data and provide a more comprehensive understanding of the situation. Third, the study's analysis of the impacts of mass media and interpersonal sources, the moderating role of psychological capital, and the mediating effect of technological anxiety provides valuable insights into the factors influencing IoT adoption. However, the study does not delve into the intricacies of the technology itself. Further research could explore the specific attributes and functionalities of IoT solutions in agriculture that are most relevant to farmers, as this can influence their adoption intentions and experiences. Combining qualitative and quantitative data collection methods, such as surveys, interviews, and field observations, can offer a more holistic view of the adoption process. This approach can also help validate self-reported data and provide a more accurate assessment of IoT adoption in agriculture. Investigate the specific features and functionalities of IoT solutions in agriculture that farmers find most beneficial or challenging. This will help technology providers tailor their offerings to better align with the needs and preferences of farmers, ultimately improving the adoption process. Conduct

ISSN: 2414-309X
DOI:https://doi.org/10.20474/jabs-8.2.5

longitudinal studies to track the changes in IoT adoption intentions and behaviors among farmers over time. This can help identify trends and evolving challenges, offering valuable insights for policymakers and technology providers to adapt and enhance their support mechanisms.

REFERENCES

Aldosari, F., Al Shunaifi, M. S., Ullah, M. A., Muddassir, M., & Noor, M. A. (2019). Farmers' perceptions regarding the use of information and communication technology (ict) in khyber pakhtunkhwa, northern pakistan. *Journal of the Saudi Society of Agricultural Sciences*, *18*(2), 211-217.

Anwar, A., Malik, M., Raees, V., & Anwar, A. (2020). Role of mass media and public health communications in the covid-19 pandemic. *Cureus*, *12*(9).

Asbari, M., Prasetya, A. B., Santoso, P. B., & Purwanto, A. (2021). From creativity to innovation: The role of female employees' psychological capital. *International Journal of Social and Management Studies*, *2*(2), 66-77.

Bryant, M., & Higgins, V. (2021). Securitising uncertainty: Ontological security and cultural scripts in smart farming technology implementation. *Journal of Rural Studies*, *81*, 315-323.

Caffaro, F., Cremasco, M. M., Roccato, M., & Cavallo, E. (2020). Drivers of farmers' intention to adopt technological innovations in italy: The role of information sources, perceived usefulness, and perceived ease of use. *Journal of Rural Studies*, *76*, 264-271.

Çavuş, M. F., & Gökçen, A. (2015). Psychological capital: Definition, components and effects. *British Journal of Education, Society and Behavioural Science*, *5*(3), 244--255.

Chipfupa, U., Tagwi, A., & Wale, E. (2021). Psychological capital and climate change adaptation: Empirical evidence from smallholder farmers in south africa. *Jàmbá: Journal of Disaster Risk Studies*, *13*(1), 1-12.

Chipfupa, U., & Wale, E. (2018). Farmer typology formulation accounting for psychological capital: Implications for on-farm entrepreneurial development. *Development in Practice*, *28*(5), 600-614.

Chipfupa, U., & Wale, E. (2020). Linking earned income, psychological capital and social grant dependency: Empirical evidence from rural kwazulu-natal (south africa) and implications for policy. *Journal of Economic Structures*, *9*(1), 1-18.

Duang-Ek-Anong, S., Pibulcharoensit, S., & Phongsatha, T. (2019). Technology readiness for internet of things (iot) adoption in smart farming in thailand. *Int. J. Simul. Syst. Sci. Technol*, *20*, 1-6.

Flachs, A. (2019). Planting and performing: Anxiety, aspiration, and "scripts" in telangana cotton farming. *American Anthropologist*, *121*(1), 48-61.

Hair, J. F., Jr, Sarstedt, M., Matthews, L. M., & Ringle, C. M. (2016). Identifying and treating unobserved heterogeneity with fimix-pls: part i--method. *European business review*, *28*(1), 63-76.

Han, G., Rodriguez, L., & Qu, S. (2023). American farmers' attitudes toward china and the us--china trade dispute: A mediated relationship. *International Food and Agribusiness Management Review*, *1*(aop), 1-21.

Jones-Bitton, A., Best, C., MacTavish, J., Fleming, S., & Hoy, S. (2020). Stress, anxiety, depression, and resilience in canadian farmers. *Social psychiatry and psychiatric epidemiology*, *55*, 229-236.

Khan, N., Siddiqui, B. N., Khan, N., Ahmad, Z., Ismail, S., Javed, H. H., ... Abdullah & Khan, K. (2020). Mass media role in agricultural and rural development. *International Journal of Advanced Research in Biological Sciences*, *7*(4), 199-209.

Khanna, A., & Kaur, S. (2019). Evolution of internet of things (iot) and its significant impact in the field of precision agriculture. *Computers and electronics in agriculture*, *157*, 218-231.

Li, H., Qi, N., Li, Z., & Ma, W. (2022). The relationship between farmers' entrepreneurial behavior and macroeconomics based on the probit regression model and entrepreneurial psychological capital. *Frontiers in Psychology*, *13*, 954874.

Li, W., Shuai, C., Shuai, Y., Cheng, X., Liu, Y., & Huang, F. (2020). How livelihood assets contribute to sustainable development of smallholder farmers. *Journal of International Development*, *32*(3), 408-429.

Liu, Z. (2022). The influence of revitalizing modern agricultural model on farmers'anxiety. *Psychiatria Danubina*, *34*(suppl 1), 604-605.

Lobo, C. B., Tomás, M. S. J., Viruel, E., Ferrero, M. A., & Lucca, M. E. (2019). Development of low-cost formulations of plant growth-promoting bacteria to be used as inoculants in beneficial agricultural technologies. *Microbiological research*, *219*, 12-25.

ISSN: 2414-309X
DOI:https://doi.org/10.20474/jabs-8.2.5

Luthans, F., & Youssef-Morgan, C. M. (2017). Psychological capital: An evidence-based positive approach. *Annual review of organizational psychology and organizational behavior*, *4*, 339-366.

Madushanki, A. R., Halgamuge, M. N., Wirasagoda, W. S., & Syed, A. (2019). Adoption of the internet of things (iot) in agriculture and smart farming towards urban greening: A review. *International Journal of Advanced Computer Science and Applications*, *10*(4), 11-28.

Marescotti, M. E., Demartini, E., Filippini, R., & Gaviglio, A. (2021). Smart farming in mountain areas: Investigating livestock farmers' technophobia and technophilia and their perception of innovation. *Journal of Rural Studies*, *86*, 463-472.

Mirzaei, A., Azarm, H., Yazdanpanah, M., & Najafabadi, M. M. (2022). Socio-economic, social-capital, and psychological characteristics and climate change adaptive behavior of farmers in iran. *Climate Research*, *87*, 1-12.

Monteleone, S., De Moraes, E. A., & Maia, R. F. (2019). Analysis of the variables that affect the intention to adopt precision agriculture for smart water management in agriculture 4.0 context. In *2019 global iot summit (giots)* (p. 1-6).

Monteleone, S., Moraes, E. A. d., Tondato de Faria, B., Aquino Junior, P. T., Maia, R. F., Neto, A. T., & Toscano, A. (2020). Exploring the adoption of precision agriculture for irrigation in the context of agriculture 4.0: the key role of internet of things. *Sensors*, *20*(24), 7091.

Murray, J., Wickramasekera, N., Elings, M., Bragg, R., Brennan, C., Richardson, Z., ... others (2019). The impact of care farms on quality of life, depression and anxiety among different population groups: A systematic review. *Campbell Systematic Reviews*, *15*(4), e1061.

Njeri, C. A., & Mberia, H. (2019). Effect of group interpersonal communication methods on adoption of organic farming among maize farmers in machakos county, kenya. *International Journal of Social Sciences and Information Technology*, *5*(5), 147-159.

Norton, G. W., & Alwang, J. (2020). Changes in agricultural extension and implications for farmer adoption of new practices. *Applied Economic Perspectives and Policy*, *42*(1), 8-20.

Okwu, O., & Umoru, B. (2019). A study of women farmers' agricultural information needs and accessibility: A case study of apa local government area of benue state, nigeria. *African Journal of Gender and Women Studies*, *4*(2), 1.

Pillai, R., & Sivathanu, B. (2020). Adoption of internet of things (iot) in the agriculture industry deploying the brt framework. *Benchmarking: An International Journal*, *27*(4), 1341-1368.

Popoola, O. O., Yusuf, S. F. G., & Monde, N. (2020). Information sources and constraints to climate change adaptation amongst smallholder farmers in amathole district municipality, eastern cape province, south africa. *Sustainability*, *12*(14), 5846.

Raj, M., Gupta, S., Chamola, V., Elhence, A., Garg, T., Atiquzzaman, M., & Niyato, D. (2021). A survey on the role of internet of things for adopting and promoting agriculture 4.0. *Journal of Network and Computer Applications*, *187*, 103107.

Ribot, J., Faye, P., & Turner, M. D. (2020). Climate of anxiety in the sahel: emigration in xenophobic times. *Public Culture*, *32*(1), 45-75.

Risher, J., & Hair Jr, J. F. (2017). The robustness of pls across disciplines. *Academy of Business Journal*, *1*, 47-55.

Ronaghi, M. H., & Forouharfar, A. (2020). A contextualized study of the usage of the internet of things (iots) in smart farming in a typical middle eastern country within the context of unified theory of acceptance and use of technology model (utaut). *Technology in Society*, *63*, 101415.

Rudolphi, J. M., Berg, R. L., & Parsaik, A. (2020). Depression, anxiety and stress among young farmers and ranchers: a pilot study. *Community mental health journal*, *56*, 126-134.

Sarstedt, M., & Cheah, J.-H. (2019). *Partial least squares structural equation modeling using smartpls: a software review.* Springer.

Strong, R., Wynn, J. T., Lindner, J. R., & Palmer, K. (2022). Evaluating brazilian agriculturalists' iot smart agriculture adoption barriers: Understanding stakeholder salience prior to launching an innovation. *Sensors*, *22*(18), 6833.

Suksod, P., Dangsuwan, M., & Jermsittiparsert, K. (2019). A positive intervention of farmer's psychological capital to improve perceived farming performance: Role of agricultural extension knowledge. *Int. J. Innov. Creativity Change*, *7*, 87-106.

TabatabaeiLotfi, M. (2016). *Poverty, stress, and happiness: Examining the moderating role of psychological capital on the relation between poverty and happiness among farmers and fish farmers in ghana*. Unpublished doctoral dissertation.

Tajpara, M., Kalsariya, B., & Dadhania, V. (2020). Knowledge of dairy farmers towards improved animal husbandry practices. *Guj. J. Ext. Edu*, *31*(2), 163-168.

ISSN: 2414-309X
DOI:https://doi.org/10.20474/jabs-8.2.5

Takagi, C., Purnomo, S. H., & Kim, M.-K. (2021). Adopting smart agriculture among organic farmers in taiwan. *Asian Journal of Technology Innovation*, *29*(2), 180-195.

Tian, Q., Yu, Y., Xiang, Z., & Li, C. (2021). Agricultural technical education, interpersonal trust, and pesticide use by vegetable farmers in china. *The Journal of Agricultural Education and Extension*, *27*(2), 211-227.

Wójcik, M., Jeziorska-Biel, P. , & Czapiewski, K. (2019). Between words: A generational discussion about farming knowledge sources. *Journal of Rural Studies*, *67*, 130-141.

Youssef-Morgan, C. M., & Dahms, J. P. (2017). 15. developing psychological capital to boost work performance and well-being. *Research handbook on work and well-being*, *4*(1), 332-348.

Youssef-Morgan, C. M., & Luthans, F. (2013). Psychological capital theory: Toward a positive holistic model. In *Advances in positive organizational psychology* (p. 145-166). Emerald Group Publishing Limited.

Youssef-Morgan, C. M., & Petersen, K. (2019). The benefits of developing psychological capital in the workplace. *Creating psychologically healthy workplaces*, 113-132.

Yu, Y. (2022). Social psychological analysis on the problems and causes of the training of new professional farmers in the new era. *Psychiatria Danubina*, *34*(suppl 4), 338-338.

Zeng, Y., Qiu, F., & Zhang, J. (2022). The impacts of observational learning and word-of-mouth learning on farmers' use of biogas in rural hubei, china: does interpersonal trust play a role? *Energy, Sustainability and Society*, *12*(1), 21.

ISSN: 2414-309X
DOI:https://doi.org/10.20474/jabs-8.2.5