Technology and Policy Implementation Effects on Youth Agricultural Farming

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Abstract: The adoption and patronage of the internet by the current generation has propelled enormous endorsement of agriculture technology applications. Agriculture technology should be prioritized by policymakers to ensure its development and orientation of the youth towards radical amendments to agricultural farming, and food sustainability. Notwithstanding, little or no empirical evidence is there to support policy implementation toward agriculture technology in Ghana. This study brings to discovery the imperativeness to institute and implement policies to support youth technological farming as it serves as the cornerstone to mitigate unemployment, improve food security, and sustainable economic development. We used a content analysis approach and generalized linear models, based on the technology acceptance model theory for analysis. This study outlines policies such as agriculture technology and integration strategies that are required for effective implementation to curtail the constraints within the agricultural sector such as dynamics in climate patterns, inadequate policy enforcement measures, and integration strategies. The study addresses this research gap and elucidates factors that contribute to youth participation in technological farming and the potential achievement of the Sustainable Development Goals. We justify the need to establish a framework such as digital advertisement, formidable implementation, and integration policy to mitigate the misconception about farming.

1 INTRODUCTION

The economic development and sustainability of most developing countries are closely linked to youth participation in agricultural activities. Empirical research predicts that the world's population is increasing, hence, the demand for food and daily necessities from the agricultural sector will continue to soar. According to Betcherman and Khan (2015), the African continent is having the youngest populace with an average age of 18, expected to reach an age range of 21-24 by 2035 and 2050 respectively. Ghana's National Youth Policy in 2010 defined youth as 'persons who are within the age range of fifteen (15) and thirty-five (35) (Kidido et al., 2017). Getting them involved in agriculture technology farming (ATF) will promote the quest in accomplishing food security, youth employment, and sustainable growth. Furthermore, the liveliness and innovativeness of the youth are principal assets to every country that works towards economic and sustainable development, food security, and agricultural farming (AF) diversification (FAO, ILO, and UNESCO, 2009). In addition, the youth possess dynamic ideas with a keen interest in utilizing AT to address basic problems encountered in achieving the Sustainable Development Goals (SDGs), *inter alia,* goal 1(no poverty), goal 2 (no hunger), goal 15 (life on land), and the like. This unswerving interest provides the foundation for using ATF to safeguard household

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food security, and generate income to cater to the basic needs, among others. Kwakye et al. (2021) conceptualized that, ATF is the principal solution to sustain the practice of producing food and raising domesticated animals (livestock).

As established, for developing economics to eradicate hunger via AF, a technological application must be the principal bedrock to this audacious target (Tomchek, 2020). Yet, agriculture technology policy (ATP) integration is slacking in Ghana. There is little empirical research to showcase the implications of the lack of technological policy implementation in the agricultural sectors. Most developing economies including Ghana do not have the established policies to facilitate the requisite technology and resources needed to acquire them. This situation indirectly sends the youth away from AF since the current generation of youth are in a modern era where the use of traditional tools such as cutlass, hoe, and other small equipment for farming does not encourage them to engage in agriculture activities. Kwakye et al. (2021) confirmed in their studies that the youth are moving away from the agriculture sector towards both the industrial and service sectors due to causal factors such as education, family encouragement, unavailability of land, non-lucrativeness of agriculture, urbanization, administrative job, lack of agricultural policies enforcement, and inadequate technology. These factors cause detrimental effects on food sustainability in every developing country (Brenya et al., 2022).

As a result, this study adopts four objectives to investigate this predicament. First, to determine how technology and policy implementation influence youth farming in Ghana. Again, the present study sought to examine the impact of technological policy applications on the sustainable development of Ghana. Next, to determine how it can contribute to poverty alleviation in the country. Finally, it attempted to establish the correlation of current research principal dependable variables' impact on youth farming in the future. To do this, we employed the technology acceptance model (TAM) for theory interpretation, content analysis, and the probit and logit modeling approach for empirical findings. The study further adopts a section of technology acceptance modeling theory to ascertain the attitudes of the youth in applying AT. The theory was first introduced by Davis (1985) based on the theory of reasoned action by Fishbein and Ajzen (1975). The theory elaborates on the reason why people employ a particular technology when working in their habitat. ATPs that are stipulated must house the key elements of Fred Davis's theory, in order to influence the youth to participate in AF. The principal component of Davis's theory is Attitude Toward Using a particular AT, which is made up of Perceived Usefulness and Perceived Ease of Use, all in the neighborhood of other relevant characteristics contributing to the youths' attitude. Although the theory implies less about a particular technology itself. It provides the fundamental consensus that does not relate to user-friendliness and/or usefulness but is a matter of perception which gives an upper hand to the current technological youth. TAM is widely used in subjects and/or disciplines in agriculture, biotechnology, and food sustainability, among others (Ogwuike et al., 2021; Venkatesh and Davis, 2000). The study used this theory, as it provides the platform for better assessment and understanding of the youth in utilizing agriculture technologies, *inter alia*, climate-smart agriculture, robotics, nitrogen modeling, and smart greenhouse.

Furthermore, as the current generation has the acumen to receive new knowledge, the youth harnessing innovative means can facilitate crops and animal production, efficient extension programs, reduction in risk assessment, and improved decision making. In line with this, the study stressed the imperativeness of policy implementation towards youth technological farming by asking the following relevant questions; (i) poor technology and policy implementation, what is the way out for youth farming in Ghana? (ii) What impact does technology policy application have on the sustainable development of Ghana? (iii) How can it contribute to the poverty alleviation of the country? We answer these questions in subsequent sections, indicating the novel contribution of the study toward ATP implementation in Ghana. The study fills in the literature gap, especially from the angle of policy implementation in Africa toward agriculture. Next, TAM theory provides the platform for technology acceptance and future understanding of technology integration and usage in the agrarian sectors. Likewise, other contribution stems from the thorough reflection on the knowledge of policy implementation towards AT with its related obstacles that prevent its implementation. More so, the content analysis used not only enables the nearness of data to be statistically analyzed but also provided an unobtrusive means of evaluating interactions. The rest of the study is arranged as follows. First, the study presents ATP integration, sustainable development, and methods used for the plausible analysis. Next are the results and a detailed discussion answering the research questions and establishing a correlation of studies that looked into the themes that directly and indirectly

promote youth farming. In the end, the study concludes with theoretical and practical implications.

1.1 Agriculture Technology and Policy Integration

Recent technological policy orientation showcases a direct logical influence on youths' decisions if properly integrated into their acumen. According to the United Nations (2015), effective policy integration is all the more important given the range of expertise from different institutions and sectors required to tackle the SDGs, as well as demands for more innovative, responsive, and equitable service delivery, which transcend the competencies of individual ministries. In this regard, various policy implementations right from the angle of innovative food policy, social policy, and climate-smart agriculture policy purposely to sustain the agrarian and economic growth of Ghana have been instituted (Agyepong and Adjei, 2008; Thow et al., 2014) to remedy the prevailing agriculture trend.

In this study, ATP integration is elaborated as the use of direct and indirect directives toward the steering of technological applications in AF. Technology integration in youth AF will not only induce their interest but also increase the cost-effectiveness of agricultural production while reducing the drudgery of farm activities. As predicted in 2017, Ghana Statistical Service asserted over a third (38.8%) of Ghana's population is made of youth, this constitutes a major boost to the agricultural sector if technology is integrated to direct their path (United Nations, 2017). Yet, the ATP integration in Africa and Ghana not being exempted has been a bottleneck for policymakers. Empirical documentation to prove the essence of policy application toward AT is inconclusive. This study points out challenges such as climate change due to excessive carbon emission into the atmosphere, financial constraints that reduce the youth's degree of capabilities in acquiring the necessary machinery, gender bias in technological designs, inadequate technology utilization, lack of effective policy implementation, and the plethora of scientific studies as the principal causes of less youth participation in AF (Sampene et al., 2021; Kwakye et al., 2021).

Hence, policy reforms and integration backed by formidable regulations towards agriculture technological sectors have proven to be the valuable keystone to withhold food sustainability. For example, Mwaijande and Lugendo (2015) indicated that policy reformation and access to technology serve as a key remedy to ensure cheaper products while maintaining quality standards, and food security. With technology at the core of AF, the youth will actively embrace the opportunity to enhance crop fertilization and mechanized production, animal breeding, and dairy farming. And that, technology-driven policies seek to effect skill changes to young farmers in developing new agricultural operations, enhancing productivity, fertilizer application, precision irrigation, digitalized drone spraying, and the like (Groot et al., 2019; Marinello et al., 2016).

1.2 Sustainable Development via Agriculture Technology Policy

This section answers the second question, what impact do technological-driven policies have on the sustainable development of Ghana? In responding to this, we linked the impact of ATP implementation in Ghana, and its associated benefits in achieving the Sustainable Development Goals (SDGs) endorsed by member states under the United Nations (UN). The 2030 SDGs remain vital, forming the basis for several socio-economic policies, formulated by governments around the world since its inception in 2015 (Ghana Statistical Service, 2017). As denoted in Figure 1, this study elaborates on AT-driven applications' influence on three-dimensional achievable goals from the angle of social, economic, and environmental perspectives. The social dimension houses the eradication of poverty, ensuring food sustainability in both developed and developing economies via technological applications. Furthermore, the economic dimension perceives AF as decent work and an active contributor to economic and sustainable growth in most developing countries. Likewise, cost-effective production and reasonable food prices also fall under the umbrella of the economic dimension of the SDGs when effective AT-driven policies are properly enacted in the various geographical regions (Tomchek, 2020). Moreover, technological agriculture ensures efficient technological machinery used on farmlands which indirectly regulates the emission of CO_2, manages land degradation, enables climate-smart farming, soil-water system, and peatland farming which facilitates carbon sequestration, hence promoting the environmental dimension of SDGs, (Visser et al., 2019; Sampene et al., 2021). In this regard, the sustainable development of a country is assured if the government is able to implement agricultural policies toward a well-coordinated operation to support nutritional efficiency, social definition, and fiscal backing while practicing climate-resilient technology.

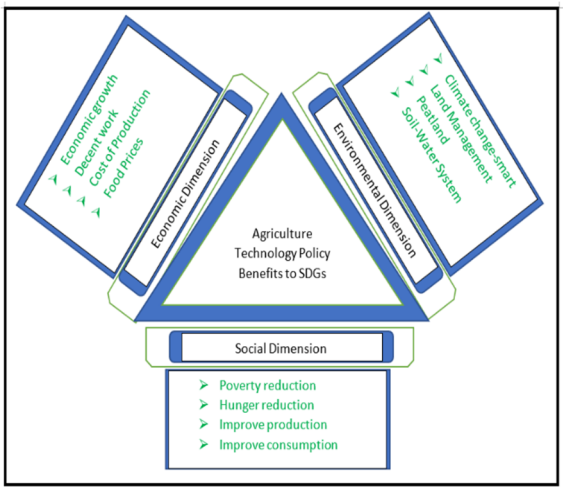

Figure 1: ATP benefits to Sustainable Development Goals.

2 METHODS

2.1 Area of Respondents

As denoted in Figure 2, Ghana is located in West Africa covering 238535 km^2 crossing the Gulf of Guinea and the Atlantic Ocean in the south and sharing borders with Burkina Faso in the north, Togo in the east, and Ivory Coast in the west. According to the World Population Review, Ghana is situated a few degrees above the equator with a latitude of 7.9465° N, and a longitude of 1.0232° W. As of the end of February 2022, Ghana's contemporary population is 32145660 as indicated by the Worldometer embellishment of the newest United Nations data. Presently, there are 16 demarcated regions that house the various forms of natural resources, *inter alia,* gold, petroleum, natural gas, diamonds, silver, and salt. Likewise, it is the most stable country in West Africa since the country's independence in 1957, and the economy is gaining the paybacks of political stability through the improvement of agriculture production, prudent healthcare facilitation, food security, and the like. Notwithstanding, Ghana must enhance its integration of technology in the agrarian sector in order to entice the youth into AF.

$$n = \frac{N}{1 + N(e)^2}$$

$$\text{n} = \frac{310}{1 + 310(0.05)^2}$$

2.2 Data Collection

Furthermore, we applied a cross-sectional survey in 2020 to collect data from Ghanaian youth who are between the ages of 17 and 35. A well-vetted questionnaire was randomly administered to the youth via social networks such as WeChat, WhatsApp, and so on. We had a total of 310 youth who willingly partook in the data collection. Scholars such as Henson and Roberts (2006) and Worthington and Whittaker (2006) recommend a sample size of at least 300 for efficient and effective empirical analysis. The data was coded by assigning 1 to strongly agree (SA), 2 to agree (A), 3 to neutral (N), and 4 to disagree (N) for the analysis of the variables using STATA application software**.** This study certified both the validity and reliability of the survey data to ensure accuracy and consistency of the output as a direct implication of the expected output via us the content validity index (CVI) for accuracy and Cronbach's alpha score for reliability (Westland 2019; Kwakye et al. 2021). This enabled the study to define the descriptive analysis which houses the mean, standard deviation, and distribution percentage of each variable as postulated in Table 1. Using Yamane (1967) arithmetical approach, the study determined the sample size of the respondents, (Equation (1) indicates);

$$n = \frac{N}{1+N(e)^2} \quad (1)$$

n = sample size

N= sample frame

e= margin of error is 5%, therefore, (equation 2)

$$\text{n} = \frac{310}{1+310(0.05)^2} = 174.647887$$

approximately 175 (2)

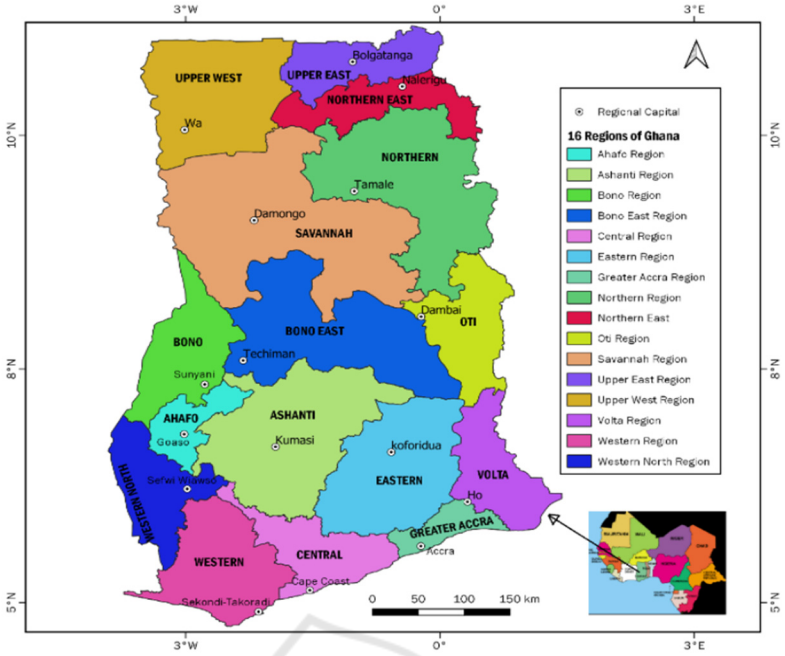

Figure 2: Map of Ghana. (Source: Yeboah et al. (2021)).

Table 1: Variable, definition, mean and coded numbers to percentage.

Variable	Definition (%) Code = Class = Percent	Mean	Std. Dev.
Gender	1= male =69.68;0=female =30.32	1.303	.460
Age	1=18-24=27.42;2=25-29=45.48; 3=30-34 =27.10	1.996	.739
Education	1=Diploma=16.13;2=Degree=36.45;3=Master =38.08;4=PhD=09.35	2.406	.867
WhiteCJob	1=(SA)=55.48;2=(A)=35.81;3=(N)=7.74;4=(DA)=.97	1.541	.680
Fiunemploy	1=(SA)=27.42;2=(A)=40.65;3=(N)=23.23;4=(DA)=8.71	2.132	.916
Ppolicies	1=(SA)=28.71;2=(A)=49.35;3=(N)=11.94;4=(DA)=10.00	2.032	.898
Technology	1=(SA)=19.35;2=(A)=45.48;3=(N)=22.26;4=(DA)=12.90	2.287	.923
Famsup	1=(SA)=6.13;2=(A)=18.06;3=(N)=35.81;4=(DA)=40.00	3.096	.905
Genencourage	1=(SA)=11.94;2=(A)=35.16;3=(N)=27.42;4=(DA)=25.48	2.664	.987
Attitude	0=High=17.42;1=Low=82.58	.825	.379
Knowledge	0=High=12.90;1=Low=87.10	.870	.335

2.3 Data Analysis Technique

The study employed a generalized linear model to back the content analysis via the use of the logit model to estimate and interpret the binary outcome of youth participation in AT. Research theories from Gujarati (2004), and Wooldridge (2006) were adopted to clarify the correlation among the variables via the Stata application software. Logit has been extensively used to assess the dual impact of a particular variable on another. For instance, a unit increase in the explanatory variable increases the explained variable by the interaction unit. So, the hypothesis is that the likelihood of youth participation in AT increases as the policy enacted becomes executable. As signified in equation (3), the binary response variable (participate or otherwise) '1' represents i^{th} respondents select to participate and '0' if otherwise.

$$Youth\ AF = \begin{cases} 1, & if\ participate \\ 0, & \text{otherwise} \end{cases} \quad (3)$$

For the logit model, $F(x^1\beta)$ in equation (4) is used for the Cumulative Distribution Function of the logistic distribution.

$$F(x^1\beta) = \Lambda(x^1\beta) = \frac{e^{X^1\beta}}{1+e^{X^1\beta}} = \frac{exp\,(X^1\beta)}{1+exp\,(X^1\beta)} \quad (4)$$

This implies that the binary outcome model estimates the probability that y = 1 as a function of the independent variables, (Bolang and Isumanu 2019; Katchova 2013) as indicated in Equation (5) with the probability limited between 0 and 1;

$$p = pr\,[\,y=1|X] = F(x^1\beta) \quad (5)$$

In ascertaining the likelihood of the independent variables, marginal effects, (Equation 6) is employed after the reports on the coefficients, this reflects the change in the probability of y = 1 given a 1-unit change in an independent variable X, (Katchova 2013). Comparatively, the odds ratio is difficult to interpret while marginal effects give a clearer understanding, a direct measure, and a more enlightening statistic since it has the ability to bring change in the variable of interest while holding the remaining variables in the model constant.

$$\frac{\partial P}{\partial X_i} = \Lambda\,(x^1\beta)\,[1-\Lambda\,(x^1\beta)]\,\beta_i = \frac{e^{X^1\beta}}{(1+e^{X^1\beta})^2}\beta i \quad (6)$$

Furthermore, the marginal effects depend on X, so we need to estimate the marginal effects at a specific value of X (typically the means). The model (Eq. (7)), was used as the determining measure to quantify how the youth perceived AF.

$$\ln\left(\frac{Pi}{1-Pi}\right) = \beta_0 + \beta_1 Technology + \beta_2 Ppolicy + \beta_3 WhiteCJob + \beta_4 Fiunemploy + \beta_5 Famsup + \beta_6 Genencourage + \beta_7 Attitude + \beta_8 Knowledge + \beta_9 Age + \beta_{10} Education \quad (7)$$

The coefficients of the explanatory variables vary from each other. The study expects factors such as technology, policy, whitecjob, fiunemploy, famsup, genencourage, attitude, knowledge, age, and education to have an effect on youth farming via ATP application.

3 RESULTS

The study observed the determinants which may or may not skew the youths' participation in AT farming. The analysis was built on these variable observations such as technology, policy (ppolicy), white color jobs (whitecjob), forced farming or farm rather than unemploy (fiunemploy), family support (famsup), generational encouragement (genencourage), attitude towards farming (attitude), knowledge about farming (knowledge), age in years (age), and the number of years spent in school (education). As indicated in Tables 1 and 2, the study received answers from both male and female youth with 69.68 % representing the males, whilst the remaining 30.32% constituted females. A greater fraction of the youth was between 25-29 years with 45.48%, followed by the youngest age group (18-24) denoting 27.42%, and lastly, the 30-34 age group (27.10%). In every society, the education of the youth plays a vital role in the socio-economic development and sustainability of the country. As a result, the model analysis of education gave an arithmetic average mean of 2.406, and the standard deviation equals 0.868; diploma as the lowest qualification represented 16.13 %, next is the degree with 36.45%. The youth pursuing master's constituted 38.08% and 9.35% for Ph.D. at the time of data collection (Table 1).

Table 2: Logistic regression details for variables.

Variable	Coef.	Std. Err.	z	P>z	[95% Conf.	Interval]	Marginal Effect (dy/dx)
Age	.008	.172	.050	.962	-.330	.346	.002
Education	-.096	.147	.650	.513	-.192	.385	.019
WhiteCJob***	.634	.184	3.45	.001	.274	.994	.121
Fiunemploy**	-.461	.151	-3.05	.002	-.758	-165	-.089
Ppoliciesi*	.221	.139	1.59	.112	-.051	.493	.044
Technology***	-.549	.154	-3.57	.000	-.851	-.247	-.105
Famsup***	-.627	.142	-4.39	.000	-.907	-.347	-.116
Genencourage***	-.606	.140	-4.32	.000	-.881	-.332	-.113
Attitude**	-.745	.313	-2.38	.017	-1.35	-.132	-.145
Knowledge**	-.908	.348	-2.61	.009	-1.59	-.226	-.177

Notes: *p<0.1; **p<0.05; ***p<0.01.

As energetic as the Ghanaian youth are, most of them prefer to work in administrative offices. Out of the 310 observations, 55.48% strongly agree to work in an office instead of going to the farm. 35.81% assigned themselves to agree in working in offices, whilst less than 9% remained neutral. Consequently, the youth's interest in white color jobs has a 0.01 statistically significant impact on their decision to participate. The results indicate that not only are they actively willing to boycott AF, but also very much willing to join the administrative jobs. Thus, a marginal effect of 0.121 presents a 12.1% decision toward white color jobs upon a high degree of policy inefficiency toward ATF. Likewise, the youth responded that, instead of being unemployed, they often resort to agriculture as the last means of employment. This indicates a negative coefficient (-0.461), and a p-value of 0.02 within the 5% significance threshold. This proves as the rate of unemployment in the country goes down, the youth are 8.9% less likely to drop off from AT, whether the policy instituted is favorable or not. Likewise, the respondents had an average mean of 2.032 and a standard deviation of 0.8989 against ATP implementation. Within this, 28.71% strongly agreed, 49.35% confirmed by agreeing to the inadequate policies application, whilst the remaining 11.94% and 10% represented neutral and disagreement respectively. The regression further indicated 0.221 positive coefficients, this infers that as inadequate policies toward farming continue, the youth move away from technology farming by 4.4%.

Agriculture Technology	Functions	Source
Drones/Aerial Vehicles	Surveying and spraying assistance in hazardous environment	Marinello et al. (2016)
GIS Software and GPS	Enable precision location, up-to-date map and weather information	Grabowski et al. (2021)
Irrigation Control	Enable automatic and/or manual valve control of moistening crops	Marinello et al. (2016)
Robotics	Mitigation of manual drudgery via labor replacement	Marinello et al. (2016)
Satellite Imagery	Enable identification of weak crops on the field via image capturing	Grabowski et al. (2021)
Minichromosomal Technology	Stockpile information to enable geneticists to add more traits to a plant	Goyal et al. (2009)
Farm Data Analytic	Enable comparison of plant data analysis for proper treatment	Carolan (2017)
Nitrogen Modeling	Enable a better nutrient efficiency to soil health and crop development	Walker et al. (2009)
Smart Greenhouse	Ensure the creation of microclimate conditions for perpetual plant growth	Lee et al. (2018)
Climate Smart	Enable climate resilient practices to drought, climate-related risks and shocks	Groot et al. (2019)

Figure 3: Current Agriculture Mechanization Tools.

According to Nafeo and Awal (2020) technology inclusion in any subject has proven to be an indispensable component to back progress. However, in the biodata of respondents, the study observed a low application of technology in the field of farming with 19.35% and 45.48% denoting they strongly agree and agree, respectively. On the other hand, less than 36% disagree with this statement. This correlates negatively to effectively enacting policies, toward youth utilization of AT. Forecasting signifies that the low application of technology is likely to drive the youth away by 10.5% at its unit of change. Family support had an average mean of 3.097 with less than 25% of respondents agreeing to have received support from their families. On the other hand, more than 65% asserted they do not receive any agricultural technological motivation from their families. The regression analysis also indicated that family support was statistically significant with a marginal effect of -0.116. This implies the rate of youth participation decreases by 11.6%, as a result of limited family support within a household.

Globally, the current generation has been described as the technological generation that cannot live without the internet (Kwakye et al. 2021). With a p-value less than 0.001, the result further indicates that 11.94% and 35.16% of the respondents agreed with the generational encouragement, whereas the remaining percentage opined receiving no support from the previous generation. Likewise, the youths' attitude toward farming led to a negative coefficient (-0.745) with a statistically significant figure (0.017), and a marginal effect of (-0.145). This implies that there is a 14.50% likelihood decrease as to how the youth attitude impacts their decision to join AF. Also, the youth's knowledge of AT applications had 12.9% equal to 0.871. Moreover, the knowledge regression provided a negative and statistical significance figure of 0.009, and a marginal effect of -0.177, denoting a 17.7% decrease in the probability of the youth participating in ATF.

4 DISCUSION

Farming in recent years has been adjusted towards the application of AT as the populace sees how it enhances productivity and increases the profit of farmers. Yet, this study observed that not only do the youth have a negative perception of agriculture but also witness the consistent failure of policies towards it, this has exacerbated their reluctance in practicing AT. As presented in Table 2, the youth's degree of knowledge in AT is limited with a coefficient of -0.096 and a marginal effect of 0.019. This indicates that education has an indirect relationship with policy implementation. Thus, as the youth continue to improve their level of education in technology, there is a 1.9% for them to venture into ATF. Thus, the primary question; is poor technology and policy implementation, what is the way out for youth farming in Ghana? This study elaborated the only way out for youth participation in ATF is to enact and implement a robust policy that will directly and indirectly, enforce AT adoption. Ogwuike et al. (2021) postulated, that an undeniable approach to encourage youth farming is to institute policies that initiate extra modern AT equipment that inspires and pushes the youth's interest in farming. This directly confirms respondents' formal education influence on technological farming (Kwakye et al. 2021; Ogwuike et al. 2021). Technologies denoted in Figure 3 have proven to be the panacea for agriculture sustainability and economic growth facilitator in most developed countries (Nafeo and Abdul-Rahaman 2020) and can serve as the springboard for inspiring youth to embrace AF in Ghana. Robotics and drone utilization have advanced the 20th-century harvesters, and tractors use for unmanned agricultural operational activities in chemical-induced environments; this preserves farmers' health and reduces labor intensiveness (Marinello et al., 2016). Furthermore, not only can AT produce the exact position of a missing animal but also remains a significant factor in promoting vivid satellite images over the farm area. Over the decades, the internet of things has facilitated easy accessibility of mobile-phone software applications in areas via remote controlling of irrigation systems to transport water to the farmland. Still, technological advancement in agriculture has given birth to genetic engineering, where Goyal et al. (2009) enunciated minichromosomal technology as an extremely small version of a chromosome that has been produced by *de novo* construction using cloned components of chromosomes or through telomere-mediated truncation of endogenous chromosomes and this technology promote plant development and drought-tolerant. Likewise, in the case of nitrogen modeling, it increases the yield of farmers due to its ability to fertilize the land and efficiently emit the amount of CO_2 (Walker et al. 2009). In this regard, farm technology application enables reliable data analysis that tracks plant creation via heating, ventilation, and air conditioning (HVAC), light-emitting diode, and climate-resilient practice conditions, (Groot et al. 2019; Lee et al. 2018). Food and Agriculture Organization confirmed in 2009 the relevance of these technologies and its target to

reduce the mammoth impact of food insecurity expected to be inexperienced by 9.6 billion people by 2050.Moreover, the policy applied to these technologies greatly initiates fiscal backing towards farming activities that sprout reimbursements in prices and cost reduction during production and consumption and provide precision dispersal of chemicals and fertilizers that promote farm sustainability (Brenya et al. 2022; Makate et al. 2017). However, during the analysis, the study observed that farmers in the household lack the essential benefits derived from technology which indirectly prevents their pursuit of income and sustainable dependency. The youth in these farmers' households avoid farming outright since they use the living conditions as a proxy to determine their future living status should they engage in farming. Thus, among the vital question; what impact does technology policy application have on the sustainable development of Ghana? As indicated the impact of technology policy application in agriculture is countless in terms of food production and storage decisions. Moreso, technology has turned AF into a commercial business that increases revenue to sustain families while providing youth employment. Furthermore, due to the challenges encountered in the acquisition of these technologies, poor households can only be able to alleviate themselves from poverty if the government and non-government agencies can mitigate the cost and/or hiring processes (Brenya et al. 2022). Evidence shown in the analysis indicated that the youth are more interested in the white color jobs, however, if better policies are instituted, then it will skew them towards technological farming. This will indirectly increase production and income, and gradually lessen the degree of poverty among the farmers in the various regions. Furthermore, contemporary technology in agriculture ensures the growth of large quantities of crops in the shortest period of time. As asserted, recent farmers' level in education has propelled them to include AT applications, this has enabled the farmers to cut out middlemen and sell to consumers directly. This approach has significantly increased the farmers' income thereby alleviating them from poverty, which may inspire and deter the youth from moving to urbanized cities to earn income. In addition, poverty reduction has been significantly reduced since farmers can preserve the harvest during and after production compared to the previous decades of food deterioration. This study's policy integration benefit is in line with Yeboah (2018) studies, where study enunciated that, with proactive programs, innovations, and investment that can meet food and nutrition security goals and support job growth, a booming youth population has the potential to transform entire regions, making them more prosperous, stable, and secure.

In a nutshell, Table 3 enables the study to achieve the last objective by tabulating previous empirical studies that linked the principal dependable variables to agriculture. During the analysis, the correlation among studies further justifies the imperativeness for policymakers on the African continent to integrate all the dependable variables in Table 3 as it serves as the benchmark for promoting food sustainability. Furthermore, those mentioned earlier principal dependable variables must be investigated further to promote Africa AF.

5 CONCLUSIONS

This current study reveals a holistic approach to the adoption of technologies in AF as an imperative tool for the youth and sustainable development in Ghana. Technology contributes to a greater percentage of food production, employment, and agricultural sustainability. Findings indicated from the present study have proven that policy implementation towards ATF does not only reward farmers with food sustainability but trickles down youth unemployment while enriching them with income to eradicate poverty. However, youth encounter challenges such as inadequate policy implementation towards ATF, and financial constraints in acquiring technology, among others hindering the youth agricultural participation. The study answered three key questions which brought to light the relevance to enforce constructive policies toward youth ATF.

5.1 Theoretical Implication

The study contributes to theory application by elaborating on TAM which expands the comprehension of how technology application can be adopted to increase youth participation in agriculture. The study also analyzed some causal variables such as technology, policy, generational encouragement, white color job, education, age, and other factors that the youth considered for having a positive or negative impact on ATF. The analysis also confirms these immediate statements above with statistical significance of most of the variables at a 5% significance level. This implies the study presents enough evidence through the sample size among the general population, especially on the part of the youth who opt to adopt technology in agricultural activities.

Thus said, the study established a correlation that exists among previous studies with principal dependable variables that can promote African food sustainability upon further investigation.

Table 3: Functional correlating variables for AT Policy and future works.

Dependable Variable	Functional Measurement	Source
Agriculture Technology	Estimate the field and production quantity of harvest filtered by variations and the application of technology	Davis (1985); FAO, ILO, and UNESCO. (2009); Goyal et al. (2009); Groot et al. (2019); Lee et al. (2018); Makate et al. (2017); Marinello et al. (2016); Nafeo and Awal (2020); Ogwuike et al. (2021); Walker et al. (2009)
Agriculture Policy	Estimate by indexing of agriculture farmer price and the producer subsidy equivalent	Brenya et al. (2022); FAO, ILO, and UNESCO. (2009); Groot et al. (2019); Lee et al. (2018); Makate et al. (2017); Marinello et al. (2016); Mwaijande and Lugendo (2015); Ogwuike et al. (2021)
Sustainable agriculture	The use of sustainable agriculture practice index to determine the degree of sustainability by summing up the technology adopted within the household	Nafeo and Awal (2020); Ogwuike et al. (2021); Tomchek (2020); Visser et al. (2019); Walker et al. (2009)
Technology Policy	Estimate by monitoring the performance of technology adopted farmers to non-adopted farmers	Davis (1985); Grabowski et al. (2021); Groot et al. (2019); Lee et al. (2018); Marinello et al. (2016); Mwaijande and Lugendo (2015)
Sustainable Development Goals	Estimate using the SDGs indicators as about the populace access to work, income, consumption pattern and sustainability	Brenya et al. (2022); Ghana Statistical Service (2017); FAO, ILO, and UNESCO. (2009); Marinello et al. (2016); Nafeo-Abdulai and Abdul-Rahaman (2020); Ogwuike et al. (2021); Spaiser et al. (2017); Tomchek (2020); United Nations (2015)
Youth Farming	Estimated youth population density matched with the agricultural production density	Betcherman and Khan (2015); Brenya et al. (2022); FAO, ILO, and UNESCO. (2009); Kwakye et al. (2021); Nafeo and Awal (2020); Ogwuike et al. (2021); Clark (1986); Yeboah (2018)

5.2 Practical Implication

Consequently, the study recommends to all stakeholders examine the underpinning problem, *thus*, the lack of policy implementation towards technological use in agricultural activities. The implementation could secure the youth's participation via agricultural education that will be included in the primary school education curriculum to encourage the adolescent, especially the girls as they grow. Additionally, the government must create a conducive environment for sustainable agricultural innovative models with collaboration from higher education institutions. Furthermore, a digital advertisement must be established and enhanced to sensitize the youth about the benefits of participating in ATF, aimed to address the misconception about the deprived nature of farmers who engage in farming. Also, the government must invest more funds through scholarship provisions, credit facilities, scientific research centers, and the development of agriculture in the country. This, in essence, will sprout out the lucrativeness of the industry and further deter the youth from opting to travel abroad, instead of venturing into agriculture. Likewise, the youth who have already adopted AT in their activities must receive a fair remuneration to prevent them from losing interest. Similarly, excellent and reliable agricultural policies must be drafted to replace dormant, shallow, and ineffective policies. Policies must be tailored, feasible, dynamic and proactive to ensure effective implementation, without incurring unintended consequences. Lastly, regular youth development programs must be implemented since the youth form a large demographic percentage of the populace, hence, excluding them will be detrimental to the economy.

5.3 Limitations and Future Research

Just like any other empirical result, this study also encountered a challenge. The data that was used for the analysis were only limited to 310 participants, although earlier scholars have already established that; at least 300 participants are enough for scientific analysis. In spite of these constraints, further studies

are recommended for future researchers to consider using a larger dataset and diving deep into youth technology policy implementation from the angle of gender disparity. This research question may help, could gender disparity or difference/ratio influence the study's results or findings?

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