

## Article

# Sustaining Consumer E-Commerce Adoption in Sub-Saharan Africa: Do Trust and Payment Method Matter?

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**Abstract:** The long-term sustainability of e-commerce usage for improving quality of life is dependent on several factors. Presently, trust and payment methods have emerged as critical factors influencing e-commerce adoption. Consequently, this study investigates the UTAUT determinants of consumer e-commerce adoption in Ghana by focusing on the mediating and moderating roles of trust and payment method. The study employs the Partial Least Square Structural Equation Model (PLS-SEM) to estimate the survey response of 535 purposively selected respondents from six regions in Ghana. The results corroborate a direct relationship between the UTAUT variables and e-commerce adoption. However, the payment method suggests no moderating effect on trust and e-commerce adoption connection. Nevertheless, trust significantly mediates the UTAUT variables and e-commerce adoption. Finally, the mediation was highest between social influence and trust but lowest between effort expectancy and trust. This challenges practitioners and managers of e-commerce platforms to consider the mediating role of trust to improve adoption and the sustainable usage of e-commerce.

**Keywords:** e-commerce adoption; UTAUT; trust; Sub-Saharan Africa; Ghana; Structural Equation Modelling



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## 1. Introduction

The previous decade has witnessed growth in technology-mediated transactions worldwide for the improvement in quality of life [1,2]. While these were expected given the age of digital transformation, COVID-19 propelled this further [3]. E-commerce as a technology-mediated transaction has become a powerful tool for the elimination of trade barriers, the creation of employment, and the generation of revenue worldwide [4,5]. However, it is largely undeveloped in Sub-Saharan Africa [6,7]. Several challenges were identified to inhibit the mass diffusion and sustainable usage of e-commerce in these countries [4,8]. Therefore, past and current studies explore both technological and non-technological factors [1,9,10], which have long-term implications for consumers in the decision to accept and adopt e-commerce in Sub-Saharan Africa. While this is significant for policymaking, in addition to these factors, emerging issues such as trust and payment methods require empirical inquisition to minimize the possibility of policy imbalance.

E-commerce is gradually gaining the needed popularity in Sub-Saharan Africa because of the presence of Jumia, Takealot, and Konga [7,11]. These platforms improve the quality of life by making available a variety of products to consumers and also making it easier for individuals to start personal businesses [12]. However, users (customers and shop owners) are pessimistic because of the fear of information leakages, cybercrimes, product quality, and delivery [13]. Per the Federal Bureau of Investigation (FBI) Internet Crime Report, a total of 351,936 complaints resulting in monetary losses exceeding USD 2.7 billion were reported in 2018. The top of these crimes included electronic purchases scam, personal data

breaches, and extortion [14]. In particular, Ghana lost USD 105 million, USD 69 million, and USD 35 million in 2018, 2017, and 2016, respectively, to cybercrime [15]. Consequently, although e-commerce offers several advantages [8], the lack of trust in the system by users could inhibit the sustainable diffusion and usage of e-commerce in the sub-region.

Another significant problem that limits the diffusion of e-commerce in the sub-region is the payment method [16]. However, financial product and service delivery has improved with the emergence of financial technology (FinTech). Currently, FinTech promotes accessibility, affordability, and secure means of using financial services without borders in Sub-Saharan Africa [6,7]. Thus, using a simple mobile phone, telecommunication companies in these regions can include many of these services [7]. Consequently, this makes online payments easier, affordable, and secure [7]. Thus, given the challenges associated with accessing and making payments through the traditional financial system, FinTech service providers can harness this technology to influence the decisions of consumers toward the sustainable adoption of e-commerce in the sub-region.

Literature on e-commerce adoption in Sub-Saharan Africa is in abundance; however, most studies focus on the challenges associated with e-commerce adoption [1,8,12]. Further, other studies also focus solely on already established factors in theories [4,5,17]. Although these studies offer insights into the ecosystem of e-commerce in Africa, ignoring emerging issues such as trust and payment methods creates policy imbalance for practitioners and platform managers. Consequently, this study closes this gap by examining the mediating role of trust and the moderating role of payment method in the UTAUT factors-Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), and Facilitating Conditions (FC) influencing e-commerce adoption in Ghana. Specifically, the study seeks answers to (1) the direct effect of PE, EE, SI, FC, and TR on AD, (2) mediating role of TR, (3), and the moderating role of Payment Method (PM). Trust and payment methods are employed because studies appreciate that the absence of trust inhibits the e-commerce ecosystem since the elimination of the human interface raises issues of uncertainty and vagueness [13,18–20]. Furthermore, the relevance of payment methods in innovation adoption is empirically documented to support e-commerce [6,21,22].

Using data from online survey responses from 535 purposively selected respondents across six regions in Ghana, the results from the partial least square structural equation model suggest a direct relationship between UTAUT and e-commerce adoption. The payment method has no moderating effect on the relationship between trust and e-commerce adoption. However, trust significantly mediates UTAUT and e-commerce adoption. Therefore, unlike existing studies focusing only on the UTAUT factors, the outcome contributes theoretically to existing knowledge with the introduction of TR as a mediator and PM as a moderator in B2C e-commerce adoption. This challenges platform owners and FinTech service providers to collaborate or co-create products and services that promote convenience, security, and affordability to boost e-commerce adoption in the sub-region.

## 2. State of E-Commerce in Ghana

Per Albashrawi [4], e-commerce adoption is a systematic usage of the Internet for ordering and purchase decisions. Adam et al. [2] suggested that the World Wide Web (WWW) stimulates e-commerce. The selection of Ghana as the case study for the estimation of consumer e-commerce adoption is mainly based on the development in information technology and policies. Ghana's telecommunication industry has experienced growth because of the liberalization of the sector by the government. Currently, more than five (5) telecommunication companies provide data or voice services or both [23]. As of 31 December 2000, there were 30,000 Internet users in Ghana, but as of 30 June 2019, the figure has risen to 11,400,732 with a penetration rate (% of the population) of 37.9% and recorded an Internet growth of 37,902% between 2000 and 2019 [24]. Awiagah et al. [23] mentioned a penetration rate of 10% of the population, meaning there has been an increment in the penetration rate in Ghana, which suggests a great potential for e-commerce revolution. As of 2013, the

penetration rate was 10% [25,26]. Awiagah et al. [23] also reported a penetration rate of 37.9% as of 30 June 2019, which indicates a fertile ground for the phenomenon to thrive.

Ghana has a vibrant mobile telecommunication market with giants such as MTN Ghana, Vodafone Ghana, and AirtelTigo in the industry. The presence of these heavy-weights and competition has resulted in lower Average Revenue per User (ARPU) and pressure on revenue [27,28]. Stats [25] reports that Ghana ranks high in Budde.com's Telecom Maturity Index. Per Stats [25], the sector has seen tremendous growth with the launch of Long Term Evolution (LTE) services by MTN Ghana in mid-2016 and by Vodafone in March 2019. Other service providers have also been encouraged by the regulator to refrain from 2G and opt for at least 3G to enhance Internet services in rural areas. Due to the vibrant nature of the market, online activities are also increasing in some sectors of the economy such as banking, tourism, and now online passport application but steadily in B2C e-commerce. B2C e-commerce platforms such as tonaton.com, jumia.com, Jumia market, OLX, Carmudi, and Lamudi are gradually gaining roots in the sector. Yeboah (2018) re-echoed that the Mobile Money Interoperability (MMI), which allows online payments and financial transactions promotes e-commerce in Ghana. Quarshie and Ami-Narh [29] posit that 40% of the population use the Internet to enquire information on goods and services. This makes Ghana a fertile ground for e-commerce development.

## 2.1. Theoretical Framework and Development of Hypotheses

### 2.1.1. Theoretical Framework

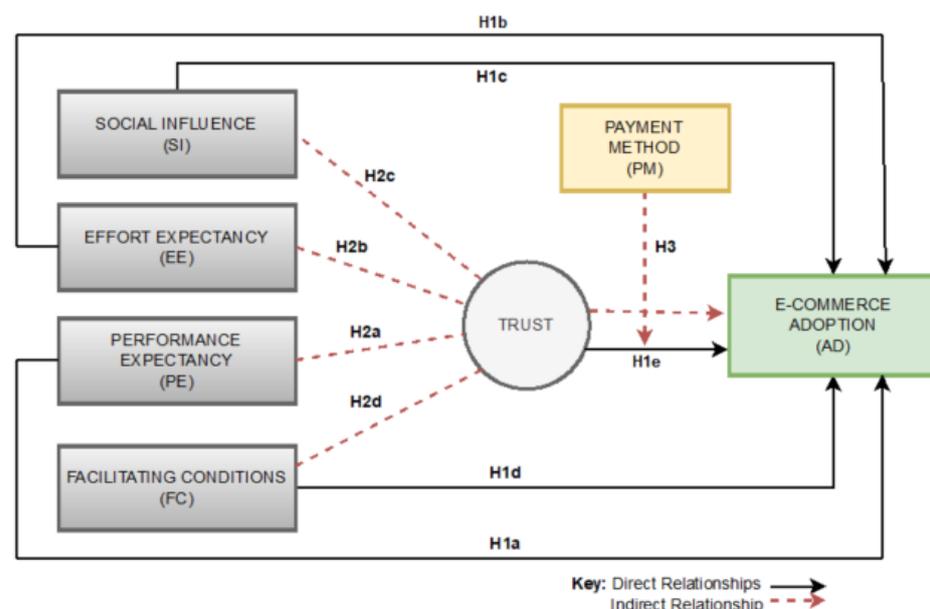
The adoption of e-commerce in Ghana to improve the livelihood of individuals and to generate employment is dependent on several factors. Consequently, the innovation diffusion theories become significant to this study. Adoption theories have attracted considerable interest from academic and industrial sectors due to their significant role in today's economic structure concerning the diffusion of innovation [30–41]. The literature outlines popular theories employed for predicting adoption and technology usage such as the TRA, TAM, MM, TPB, C-TAM/TPB, IDT, model of PC utilization (MPCU), social cognitive theory (SCT), and UTAUT [30–36]. However, this study seeks to employ a theory that significantly covers the vital areas of e-commerce adoption. Thus, unlike the other theories, Ventakesh et al.'s [36] framework amalgamates all these into one theoretical framework called UTAUT. We employ the UTAUT theory ahead of the other theories because it encompasses elements of the other theories. Furthermore, it has the highest variance explained at 0.56 [36,37] compared to other theories such as TRA with 0.36, TAM with 0.53, TPB with 0.39, DTPB with 0.36, MPCU with 0.47, SERVQUAL with 0.32, and DIT with 0.40 variances explained, respectively. Innovation diffusion theories focus on either individual Information Technology (IT) adoption or organizational Information Technology (IT) adoption [38]. Specifically, individual-level theories such as TPB, TAM, and UTAUT [32,36,39] focus on how individuals adopt innovation, while IDT and the Technology Organization Environmental (TOE) focus on organizational or institutional level adoption [40]. These theories are also employed for research at the firm level. However, in some cases, no one theory can adequately explain all aspects of innovation adoption [6]. Thus, studies on IT adoption employ one or a combination of theories that UTAUT addresses. Consequently, studies show that UTAUT's constructs, namely PE, EE, FC, and SI, impact an individual's intention and usage of technology [36,38]. Thus, for the current study focused on consumer adoption of e-commerce in Sub-Saharan Africa, the UTAUT theory is perfect for examining this phenomenon.

Prior studies assess the effect of adoption theories on the intention to adopt innovation from the individual level and organizational level [31,39]. However, these studies do not integrate trust and payment methods to determine innovation adoption. This is because these studies follow the factors outlined in theories. Therefore, we close a significant gap by including payment methods and trust in the UTAUT theory. According to Ibam et al. (2018), a serious challenge facing e-commerce adoption in Africa is distrust. Ezennia and Marimuthu [8] confirm that among traders in Sub-Saharan Africa, specifically Ghana and

Nigeria, trust is one important factor that steers day-to-day online transactions. Thus, trust influences repurchase intention in B2C e-commerce. Therefore, there is a need to extend these studies [31,39] by considering the issue of trust while maintaining the UTAUT factors. Studies in Asia [42–44] confirm the significance of trust in promoting sustainable e-commerce adoption. However, these studies are from a mature e-commerce ecosystem; thus, we cannot expect a similar outcome in the case of Sub-Saharan Africa. Therefore, the current study would provide insight into e-commerce adoption in Ghana. Finally, because the issue of trust in business transactions birthed the blockchain technology, there is a need to consider the subject of trust in all forms of business conducted over the Internet [41]. Furthermore, while the study of e-commerce adoption employs several theories, past and current studies ignore payment methods (PM) [6,10,24]. However, Pobee [1] argues that PM affects potential e-commerce clients because it promises convenience and security. Furthermore, the growth of e-commerce in China and other Asian countries is attributed to the existence of convenient and secure payment methods such as Alipay and WeChat [45]. Thus, as suggested by studies [7,22], the Sub-Saharan African continent can improve the adoption of e-commerce with superior payment methods. Nevertheless, the payment method available in the sub-region is mainly “Mobile Money” running on simple technology via “PIN” [42]. Therefore, unlike in other countries where the method for payment verification is simple (face recognition, Quick Response (QR), and Fingerprint), the process of using MoMo could discourage users. Thus, a superior payment method is likely to improve e-commerce adoption.

### 2.1.2. Hypotheses Development

The study probes how Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), and Facilitating Conditions (FC) influence e-commerce adoption through the mediation and moderation of trust (TR) and payment method (PM), respectively. Figure 1 shows the conceptual framework. Therefore, this section presents the developed research hypotheses to find answers to the research questions identified earlier in the study. These hypotheses are developed considering the objectives of the study, existing literature, and the theoretical foundation of the study.



**Figure 1.** Study framework.

Venkatesh et al. [36,46] believe that job outcome is positively affected when a particular system is used with minimal effort by saving resources such as time. Table 1 identifies elements from different models similar to PE and contributes to the construct PE [37].

The perceived benefit impacts perception and willingness to adopt technologies or applications [4]. The intention to adopt technologies as in the case of perceived usefulness (TAM/TAM2 and C-TAM-TP) similar to the PE construct (UTAUT) strongly predicts one's intention to adopt technology [37,47]. Ocloo et al. [38] affirmed the position of other studies concerning PE's positive effect on adoption intention. Therefore, the study hypothesizes that individuals considering e-commerce applications as useful are likely to adopt the innovation.

**Table 1.** UTAUT Construct and Definition.

Constructs	Definition	Similar Constructs and Their Corresponding Models
PE	The belief that a job outcome is positively affected when a particular system is used with minimal effort.	<ol style="list-style-type: none"> <li>1. Perceive usefulness-(TAM/TAM 2, C-TAM-TPB)</li> <li>2. Extrinsic motivation (MM)</li> <li>3. Relative advantage (IDT)</li> <li>4. Job-Fit (MPCU)</li> <li>5. Outcome expectations (SCT)</li> </ol>
EE	"The belief of ease attached to a system and its use".	<ol style="list-style-type: none"> <li>1. 'Perceived ease of use (TAM/TAM 2)'</li> <li>2. Complexity (MPCU)</li> <li>3. 'Ease of use (IDT)'</li> </ol>
SI	Is the belief that others think one should use a system.	<ol style="list-style-type: none"> <li>1. 'Subjective norms (TRA, TAM 2, TPB/DTPB, and C-TAM-TPB)'</li> <li>2. 'Social factors (MPCU)'</li> <li>3. 'Image (IDT)'</li> </ol>
FC	Is the belief in the existence of organizational and technical infrastructure to assist in the use of a system.	<ol style="list-style-type: none"> <li>1. 'Perceived behavioral control (TPB/DTPB and C-TAM-TPB)'</li> <li>2. 'Facilitating conditions (MPCU)'</li> <li>3. 'Compatibility (IDT)'</li> </ol>

Source: Venkatesh et al. [36].

**Hypothesis 1 (H1a).** *Performance expectancy positively influences consumer e-commerce adoption in Ghana.*

Effort expectancy (EE) is the belief of ease attached to a system's usage [36,46]. Table 1 identifies elements from different models with similarities to EE. The similarities are noticed in prior studies [36,46]. Technology adoption hinges on the perceived usefulness [37,47], but significant to this is the ease of use that includes simplicity and easiness with which one can use technology, which is significant to consider when adoption is under the academic lens [48]. Studies found that when individuals find e-commerce applications effortless and simple to use, there is a likelihood of adoption [4,15]. It is, therefore, worth mentioning that EE/ease of use positively influences e-commerce adoption intention [47]. Therefore, following the submission of Johnson and Iyamu [5], the study hypothesizes that effort expectancy positively influences individuals' intent to adopt the technology.

**Hypothesis 1 (H1b).** *Effort expectancy positively influences consumer e-commerce adoption in Ghana.*

Venkatesh et al. [36] opines that SI is one's understanding that others influence the use of a system. Per Table 1, these similar constructs to SI are represented by subjective norms, social factors in MPCU, and images in IDT; these three (3) constructs relate to SI. Venkatesh et al. [36] found that TRA, TAM2, TPB/DTPB, C-TAM-TPB (subjective norm), social factor in MPCU, and image in IDT behaved similarly to SI. SI considers the impact of others on an individual. Individuals may seek information and approval from others [47,49,50]. Studies confirm that SI is positively related to the intent to adopt e-commerce [47,49,50]. Although Tarhini et al. [37] found no linkage between SI and intention to adopt e-commerce in the UK, Johnson and Iyamu [5] found a positive relationship between SI and intention to adopt e-commerce in Malaysia. Per Clemes et al. [51], subjective norms, which is a construct similar to SI, also impact e-commerce adoption. Ingham et al. [47] confirmed that SI positively affects e-commerce adoption. Consequently, the study hypothesizes that SI positively impacts one's intention to adopt technology [8,38].

**Hypothesis 1 (H1c).** *Social influence positively influences consumer e-commerce adoption in Ghana.*

Venkatesh et al. [36] suggests that facilitating conditions includes the following: ‘FC is the belief of the existence of organizational and technical infrastructure to assist system usage’. This confirms three (3) different constructs in Table 1 that are similar to FC. Each of these constructs identified in Table 1 incorporates aspects of the organizational/technical environment to eliminate hindrances to technology adoption in an e-commerce environment. Per Venkatesh et al. [36], FC impacts actual behavior because aspects of FC such as staff training are available to all staff while in the case of the consumer, FC available to each consumer may be seen across application vendors, technology generations, mobile devices, and telecommunication services. Considering the consumer or an individual, FC acts similarly to a perceived behavioral control in TPB and influences behavior and intentions for adoption [32]. A consumer disposed to favorable FC is likely to adopt the technology. A higher level of FC such as high Internet access and high access to mobile devices drives individuals to adopt technology while lower FC such as low Internet access and low access to mobile devices discourages individuals [46]. Thus, following the study outcome of Venkatesh et al. [46] and Ocloo et al. [38], the study hypothesizes that FC influences consumer e-commerce adoption.

**Hypothesis 1 (H1d).** *Facilitating conditions positively influence consumer e-commerce adoption in Ghana.*

Customer trust in e-commerce is the reliance on a website concerning business activities on an electronic platform [52]: ‘Willingness of a party to be vulnerable to the action of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control the other party is trust’ [42]. This definition considers two salient aspects of trust, namely confidence to perform what is promised and readiness to avail one’s self to vulnerability. This hinges on expectations that are always within a context with constraints. Per Gefen et al. [53], ‘trust is an individual willingness to depend on a belief based on ability, benevolence, and integrity’. Thus, customer trust assumes a pivotal function in an e-commerce environment. Thus, online platforms must portray the ability to deliver what it promises, benevolence, and integrity [52]. Studies reveal that consumers adopt trust as a way of mitigating fear when engaged in online transactions [52]. TR affects exchange and helps mitigate the seemingly complex nature of online uncertainty [43]. There is a positive linkage between TR and willingness to adopt e-commerce [36,47]. Thus, the study suggests that trust promotes consumer e-commerce adoption in Ghana.

**Hypothesis 1 (H1e).** *Trust positively influences consumer e-commerce adoption in Ghana.*

Trust has attracted research because of the significance of online retail shops in the modern business environment [44]. Thus, the question of trust must be resolved by consumers who intend to transact online [44]. Online transactions have determinants, and these factors are assessed by trust antecedents. The perception and assessment of the antecedents influencing trust will determine online consumer trust in e-commerce. When trust is high, it can mediate between its antecedents and online transactions. Hong and Cha [54] affirmed the mediating role of trust between trust antecedents and purchase intention. Blut et al. [43] identified an important antecedent of TR called dispositional trust with the subjective quality of individual with regards to disposition. Dispositional trust is ‘trust that stems from an individual propensity to trust, describe as the general willingness to trust’. Dispositional trust emanates from one’s faith and trusting stance. How technology usage is evaluated might impact the dispositional trust of an individual [55]. EE impacts TR in e-commerce transactions positively [8]. Venkatesh et al. [36] posits that ‘SI is the belief that important others think one should use a system’. Thus, individuals who believe there is an affirmation by others in the usage of technology are prone to trust technology [11].

The conviction in which others believe the salient role of adopting a specific technology plays in one's life enhances trust and impacts adoption.

Venkatesh et al. [36] suggests that 'FC is the belief of the existence of organizational and technical infrastructure to assist in the use of a system'. Technical and personnel competence, which is a function of an organizational FC, affects customer trust concerning e-commerce [46]: 'Technological trust is derived from institutional structures, which is the belief that impersonal structures are enabling one to act in anticipation of a successful future endeavor' [56]. Institutional structures such as standardized operation procedure, quality, adequate infrastructure, user-friendly applications, quality customer relationships, availability of qualified personnel, dependency, integrity, and technical competence, which constitute FC (technical and personnel conditions), do influence trust. Consequently, the salient role online trust may play between UTAUT variables, namely PE, EE, SI, and FC, and e-commerce adoption (AD) may be crucial for e-commerce platforms [52].

**Hypothesis 2 (H2a).** *Trust positively mediates performance expectancy and consumer e-commerce adoption in Ghana.*

**Hypothesis 2 (H2b).** *Trust positively mediates effort expectancy and consumer e-commerce adoption in Ghana.*

**Hypothesis 2 (H2c).** *Trust positively mediates social influence and consumer e-commerce adoption in Ghana.*

**Hypothesis 2 (H2d).** *Trust positively mediates facilitating conditions and consumer e-commerce adoption in Ghana.*

Financial technology (FinTech), which is an innovation in the financial sector, is a game-changer in financial services delivery. Coffie et al. [6] suggested that traditional electronic methods of payment have limitations, such as security and convenience, in e-commerce, which FinTech resolves. Electronic payment (EP) methods such as mobile money, digital wallet, Apple Pay, and Samsung pay are important FinTech applications [57]. Yermack [7] posited that EP includes credit cards, debit cards, mobile payment, and web payment. Thus, EP is significant in the world of e-commerce [6]. Furthermore, the adoption of mobile payments, which is increasing, helps its diffusion. The question of concern in developing countries surrounds privacy and security issues with PM in the e-commerce ecosystem. Comparing traditional EP to biometric systems, the question that arises is: which of these will be more robust to provide security and privacy to an online customer? Biometric technology has received wider diffusion because it is easy to use and secure when making payments online [57]. Mobile payment assumes a strategic position concerning EP with available infrastructure, which is a common denominator both in advanced and emerging economies [6]. The mobile payment method provides an opportunity for non-bank customers to transact electronically. Thus, when a PM adopted by an e-commerce platform is convenient and secure, it influences consumer adoption. Per Yermack [7] FinTech provides a higher assurance of trust and security in an online environment. Therefore, the study hypothesizes that PM mediates the trust and consumer e-commerce adoption nexus in Ghana.

**Hypothesis 3.** *Payment method positively moderates the relationship between trust and consumer e-commerce adoption in Ghana.*

### 3. Materials and Methods

#### 3.1. Research Design and Data

The study is quantitative in nature. This is preferred over the qualitative method because of the type of data employed in carrying out the study. Although the qualitative

method of research provides results that are equally significant, in the study of e-commerce adoption in Ghana, the quantitative method is preferred. Furthermore, this study employs a correlational research design to explore the relationship between the variables. The correlational research design is preferred over the descriptive and experimental designs because of the purpose of the study, which warrants the establishment of a positive or negative and a stronger or weaker relationship between variables. To achieve this purpose, the study employs quantitative primary cross-sectional data gathered by using a survey. This approach is preferred because there is currently no longitudinal data on this phenomenon. Consequently, per the objectives of the study, Table 1 outlines the study constructs, which guides the survey's instrument design and data collection.

### 3.2. Population and Sampling

Ghana is home to sixteen regions (16) with unique characteristics. In all, the population of Ghana during 2020 stood at 30 million. Out of the total population, more than 50% are classified as adults and, therefore, are potential e-commerce customers. However, given the purpose of the study, there is the need to scale down to a number that would be a significant representation. Therefore, the study employed the purposive non-probability sampling technique to include six (6) regions out of the total sixteen (16). These six (6) regions (Greater Accra, Ashanti, Eastern, Central, Western, and Brong-Ahafo) are purposively selected because of their superior information technology infrastructural development over the other regions. Furthermore, these regions are cosmopolitan and the availability of at least one public university helps in accessing trainable human resources to administer the questionnaire and individuals that also high consumers of the Internet. Nonetheless, these six (6) regions altogether provided a huge number to work with in terms of the population of the study. Consequently, we set the criterion to include only respondents who are e-commerce users. Finally, while observing the COVID-19 protocols, we employed the accidental non-probability sampling technique to include as many individuals that are willing to participate in the study. This suggests that our sample is undetermined at this point until the completion of the data collection exercise.

### 3.3. Measurements Scale

Table 2 presents the measurement scale of the study (Kindly check the Appendix A for detailed questions). To ensure the reliability and validity of items concerning the UTAUT model (PE, EE, SI, and FC), the study employs a measurement scale from existing studies [37,45,46]. Specifically, performance expectancy (PE) had two (2) main components; convenience and time savings are employed to understand how e-commerce adoption makes consumers productive. Furthermore, seven (7) specific survey items were generated from these components [46]. Next, two (2) components such as ease of use and skill required were employed to measure how easy it is for consumers to use e-commerce services. Out of these components, three (3) specific questions were developed. Again, for social influence, the study employs online reviews and friends as the main components to measure how individuals are influenced by others to adopt e-commerce in the country. Furthermore, seven (7) questions were developed for SI. Furthermore, for facilitating conditions, the study employs infrastructure and platform support as the main components and develops five (5) specific questions from this to find out how these factors affect e-commerce diffusion. On e-commerce adoption [57], the study uses adoption and continual usage as the main components with five (5) specific questions. For trust [20,58–60] and payment method [6,45,61], the study employed two (2) and three (3) main components and developed seven (7) and three (3) questions, respectively.

**Table 2.** Measurement Scale.

Constructs	Abbreviation	Components	Items	References
Performance Expectancy	PE	Convenience	4	[46]
		Time-saving	3	
Effort Expectancy	EE	Ease of use	2	[46]
		Skill required	1	
Social Influence	SI	Online reviews	4	[46]
		Friends	3	
Facilitating Conditions	FC	Infrastructure	3	[46]
		Platform support	2	
E-commerce Adoption	AD	Adoption	2	[57]
		Continual usage	3	
Trust	TR	Platform	4	[20,59,60]
		Payment Channel	3	
Payment Method	PM	Availability	1	[6,45,61]
		Security	1	
		Cost	1	

Source: Authors Construct.

### 3.4. Survey Instrument Design and Data Collection

To examine the mediating effect of trust, we employed a survey questionnaire with fifty (50) items for data collection from persons who have experienced online retail shopping. The data were collected between November 2018 and January 2019. Section one of the questionnaire obtained items related to demographics, while section two obtained items related to the elements, which may affect e-commerce adoption in Ghana. To guarantee the exactness and pertinence of items, the questionnaire was pre-tested with experts in the area of the study; this confirmed the ability to measure what it was designed for. This was performed to obtain content validity. Constructive feedback led to the reformulation of some research questions before the final questionnaire. Bryman [62] posits that to ensure clarity of questionnaire items and whether data collected can answer the questions of the research and provide face validity and reliability, a questionnaire must be piloted. The questionnaire was subsequently piloted with fifty (50) participants in Accra. The survey instrument was revised with feedback before we finally proceeded to the field for the exercise. In total, 600 questionnaires were distributed and 540 were retrieved, which represents an 89.2% response rate. However, 535 were retained for analysis because of missing data and unengaged responses.

### 3.5. Model Specification and Analysis

A two-stage Structural Equation Modelling (SEM) approach was adopted for the study. Confirmatory factor analysis (CFA) was employed with the aid of AMOS 21.0 to ascertain the model fitness, validity, and reliability of the study framework. Confirmatory factor analysis (CFA) was for the six components generated from Exploratory factor analysis (EFA) using Promax as a rotation method and principal components analysis as the extraction method. At the second stage of the two-stage approach, the hypothesis path model was examined with the help of a structural model [63], and to test for mediation, Baron and Kenny's mediation testing approach was employed [64]. Items used for the CFA are shown in the descriptive statistical Table 3. The average mean score of Trust was 4.02, which was the highest and with an average mean score of 2.92, and items under SI had the lowest mean score.

**Table 3.** Cross-Factor Loading, AVE, and Descriptive Statistics.

Items	TR	SI	AD	PE	EE	FC	PM	Mean	Average Mean	SD
TR1	<b>0.805</b>	0.441	−0.051	0.385	0.112	0.424	0.024	3.39		1.21
TR2	<b>0.885</b>	0.021	0.231	0.501	0.324	0.175	0.223	4.02		1.31
TR3	<b>0.761</b>	>0.337	0.432	−0.112	0.032	0.300	0.171	3.99	4.02	1.12
TR4	<b>0.833</b>	0.342	0.307	0.008	0.245	0.356	0.251	4.08		1.15
TR5	<b>0.709</b>	0.086	0.271	0.465	0.321	0.543	0.301	4.09		1.14
SI1	0.564	<b>0.737</b>	0.091	0.234	0.540	0.132	0.380	2.88		1.23
SI2	0.333	<b>0.892</b>	0.211	0.097	0.222	0.324	0.528	2.88	2.92	1.26
SI3	0.658	<b>0.797</b>	−0.034	−0.309	0.086	0.453	0.307	2.86		1.20
SI5	0.551	<b>0.714</b>	0.275	0.137	0.150	−0.043	0.147	3.07		1.21
AD1	0.451	0.008	<b>0.845</b>	0.233	0.316	0.321	0.434	3.59		1.28
AD2	0.570	0.084	<b>0.789</b>	0.200	0.355	0.096	0.251	3.47	3.44	1.19
AD3	0.428	0.332	<b>0.790</b>	0.230	0.406	0.312	0.312	3.45		1.26
AD5	0.507	0.045	<b>0.763</b>	0.031	0.031	0.471	0.370	3.23		1.24
PE1	0.447	0.532	0.531	<b>0.807</b>	0.307	0.350	0.452	3.29		1.22
PE3	0.534	0.036	0.302	<b>0.734</b>	0.034	0.027	0.523	3.51	3.57	1.21
PE4	0.471	0.326	0.052	<b>0.708</b>	0.231	0.097	0.420	3.69		1.28
EE1	0.412	0.350	0.077	0.345	<b>0.766</b>	0.043	0.414	3.28		1.11
EE2	0.570	0.431	0.372	0.453	<b>0.867</b>	0.320	0.501	3.21	3.04	1.13
EE3	0.365	0.527	0.082	0.037	<b>0.776</b>	0.511	0.252	2.62		1.22
FC2	0.429	0.410	0.501	−0.031	−0.342	<b>0.776</b>	0.342	3.02		1.35
FC3	0.500	0.332	−0.023	0.098	0.231	<b>0.866</b>	0.432	3.12	3.24	1.24
FC4	0.544	0.272	0.256	0.222	0.332	<b>0.772</b>	0.452	3.59		1.28
PM1	0.451	0.291	0.420	−0.073	0.021	0.345	<b>0.828</b>	3.13		1.23
PM2	0.345	0.432	−0.341	0.450	−0.059	0.442	<b>0.823</b>	2.96	3.01	1.21
PM3	0.456	0.031	0.344	−0.127	0.342	−0.231	<b>0.729</b>	2.93		1.20
<b>AVE</b>	<b>0.742</b>	<b>0.711</b>	<b>0.662</b>	<b>0.617</b>	<b>0.657</b>	<b>0.670</b>	<b>0.681</b>			

Note. PE = Performance expectancy; AD = Ecommerce adoption; EE = Effort expectancy; SI = Social influence; FC = Facilitating conditions; TR = Trust.

Generally, the model is as depicted in Equation (1), where Y is the response variable (AD) with Xs as the explanatory variables.

$$\begin{bmatrix} y_1 \\ \dots \\ y_p \end{bmatrix} = \begin{pmatrix} 0 & \dots & \beta_{1p} \\ \vdots & \ddots & \vdots \\ \beta_{p1} & \dots & 0 \end{pmatrix} \begin{bmatrix} y_1 \\ \dots \\ y_p \end{bmatrix} + \begin{pmatrix} \delta_{11} & \dots & \delta_{1q} \\ \vdots & \ddots & \vdots \\ \delta_{p1} & \dots & \delta_{pq} \end{pmatrix} \begin{bmatrix} x_1 \\ \dots \\ x_q \end{bmatrix} + \begin{bmatrix} \varepsilon_1 \\ \dots \\ \varepsilon_p \end{bmatrix} \tag{1}$$

The matrix equation in Equation (1) is reformulated as follows:

$$Y = BY + \Gamma X + \varepsilon \tag{2}$$

where *p* represents the number of regression equations to be estimated simultaneously, and *p* by *p* B square matrix contains the parameter coefficients of the regressors of Y variables on the other Y variables with the 0 diagonal values implying that a variable cannot cause itself. Moreover, the *p* by *q* Γ matrix contains coefficients of the Ys on Xs, whereas ε is a *p* by 1 vector consisting of residual terms. Thus, the series of regression equations to be estimated is specified as follows.

$$FE_i = \beta_0 + \beta_a AD_i + \varphi_i \tag{3a}$$

$$EE_i = \beta_0 + \beta_a AD_i + \varphi_i \tag{3b}$$

$$SI_i = \beta_0 + \beta_a AD_i + \varphi_i \tag{3c}$$

$$FC_i = \beta_0 + \beta_a AD_i + \varphi_i \quad (3d)$$

$$TR_i = \beta_0 + \beta_a AD_i + \varphi_i \quad (3e)$$

$$PE_i = \beta_0 + \beta_b TR_i + \beta_a AD_i + \varphi_i \quad (3f)$$

$$EE_i = \beta_0 + \beta_b TR_i + \beta_a AD_i + \varphi_i \quad (3g)$$

$$SI_i = \beta_0 + \beta_b TR_i + \beta_a AD_i + \varphi_i \quad (3h)$$

$$FC_i = \beta_0 + \beta_b TR_i + \beta_a AD_i + \varphi_i \quad (3i)$$

$$TR_i = \beta_0 + \beta_c PM_i + \beta_a AD_i + \varphi_i \quad (3j)$$

Equations (3f)–(3i) estimate the mediating effect of TR, while Equation (3j) estimates the moderating effect of PM.

## 4. Results

### 4.1. Cross-Factor Loading, AVE, and Descriptive Analysis

Table 3 presents the result from the Cross-Factor Loading, the Average Variance Extracted (AVE), and descriptive statistics. Per the results on the cross-factor loadings, all various elements in the constructs loaded above 0.700 to indicate that the elements are justified to be included as a part of the constructs. Consequently, none of the elements are eliminated. Again, AVE indicates values above 0.500 to support the inclusion of the constructs in the study. Furthermore, Table 3 indicates a descriptive statistic table; all values significantly authenticate the measuring items. Standard deviation figures depict a narrow spread around the mean, and factor loadings are all significant for the items with very good Cronbach's alpha.

### 4.2. Reliability and Validity Tests

Fundamental to the estimation of a structural equation model is the verification of survey instrument reliability and validity. This is necessary to ensure that the instrument measures what it was originally intended to measure following the recommendation of Hair et al. [61]. To achieve this, we employed Cronbach's Alpha, rho\_A, and the composite reliability tests. Per the outcome of Cronbach's test depicted in Table 4, the research instrument fulfills the internal consistency requirement. This is supported by Cronbach's Alpha values of more than 0.700. Furthermore, the rho\_A test validates the outcome of the Cronbach's Alpha results with values more than 0.700. This suggests that the instrument is internally consistent in measuring the constructs outlined in the study. Gaskin and Lim [65] contend that Cronbach's alpha may be less than 0.70 (<0.70) and acceptable when items under a construct are three (3) or less, which is supported by Kingsbury [66] who states that Cronbach alpha <0.70 or  $\geq 0.6$  is acceptable. Next, the composite reliability tests that prove the internal consistency of the study's constructs prove that the constructs are consistent in measuring what the study intends to measure. This is supported by values over 0.500. Again, to examine the adequacy of the sample employed for the study, we employed KMO and Bartlett's test. The result as shown in Table 4 justifies the selected sample with a value of 0.863 and a probability of 0.000. Furthermore, because of the possibility of common method variance (CMV), we employed the Harman single-factor test through principal axis factoring (PAF) with 25 research instrument items to investigate this issue. The result of 36.46% suggests that common factor variance is an issue in this study because the reported value is less than 50%. Consequently, these tests provide the basis for the estimation of the model to ensure robustness.

**Table 4.** Construct Reliability and Validity.

Constructs	Cronbach's Alpha	rho_A	Composite Reliability	KMO and Bartlett's	Herman Single Factor
TR	0.867	0.859	0.899	Value	
SI	0.817	0.867	0.861	0.863	
AD	0.784	0.819	0.836		36.46%
PE	0.733	0.852	0.764	Probability	
EE	0.789	0.827	0.786	0.000 <sup>a</sup>	
FC	0.705	0.750	0.718		
PM	0.711	0.808	0.839		

Note. <sup>a</sup> represents statistically significant levels at 1%.

Per the results in Table 5, the discriminant validity of the instrument was tested using the Fornell and Larcker criterion. It suggests the level to which measures of the constructs are not a reflection of other constructs. All of the constructs show satisfactory discriminant validity to show that our measurement model is valid and reliable.

**Table 5.** Fornell–Larcker Criterion.

Constructs	TR	SI	AD	PE	EE	FC	PM
TR	0.799						
SI	0.560	0.841					
AD	0.604	0.517	0.892				
PE	0.593	0.500	0.579	0.880			
EE	0.522	0.603	0.670	0.530	0.872		
FC	0.620	0.518	0.500	0.501	0.501	0.892	
PM	0.574	0.520	0.555	0.577	0.502	0.594	0.836

#### 4.3. Multicollinearity Tests

Given the possibility of multicollinearity due to a high correlation between the study constructs or variables. There is a need to eliminate this issue to prevent erroneous or biased study outcomes. Consequently, we employed the correlation matrix and the variance inflation factor (VIF). Per the results depicted in Table 6, the correlation amongst the variables shows values less than 0.500. This is an indication of a weaker correlation between the constructs or the variables. This is an indication of the absence of multicollinearity between the variables. Furthermore, the VIF values for each construct show values less than 10.00 to corroborate the outcome of the correlation. Thus, the study is free from issues of multicollinearity.

**Table 6.** Correlation Matrix and VIF.

Construct	TR	SI	AD	PE	EE	FC	PM	VIF
AD	1							-
SI	0.157 <sup>a</sup>	1						1.56
TR	0.389 <sup>a</sup>	0.451 <sup>b</sup>	1					2.04
PE	0.441 <sup>a</sup>	0.386 <sup>a</sup>	0.446 <sup>a</sup>	1				1.76
EE	0.313 <sup>b</sup>	0.418 <sup>b</sup>	0.476 <sup>b</sup>	0.409 <sup>b</sup>	1			1.88
FC	0.277 <sup>a</sup>	0.464 <sup>a</sup>	0.464 <sup>b</sup>	0.459 <sup>a</sup>	0.363 <sup>a</sup>	1		2.31
PM	0.215 <sup>a</sup>	0.344 <sup>b</sup>	0.039 <sup>a</sup>	0.459 <sup>b</sup>	0.488 <sup>a</sup>	0.285 <sup>b</sup>	1	1.56

Note. <sup>a,b</sup> represent statistically significant levels at 1% and 5% respectively.

#### 4.4. Structural Model and Hypothesis Testing

Structural model and hypothesized relationships were examined and tested respectively after discriminant validity and convergent validity were met. The direct relationships between the independent and dependent variables are observed by their coefficients.

Table 7 presents the results, which showed that PE, EE, SI, FC, and TR relate significantly positively with e-commerce adoption with influences of  $\beta = 0.268$ ,  $\beta = 0.196$ ,  $\beta = 0.176$ ,  $\beta = 0.150$ , and  $\beta = 0.165$ , respectively. These submit that performance expectancy, effort expectancy, social influence, facilitating conditions, and trust influence e-commerce adoption. Thus, H1a–H1e are affirmed. The study also calls attention to the mediating role of trust between the independent variables and e-commerce adoption. The results as presented in Table 8, and Figure 2 shows that there is an indirect relationship between TR and the independent variables, which means that TR significantly mediates the relationships with  $\beta = 0.376$ ,  $\beta = 0.159$ ,  $\beta = 0.182$ , and  $\beta = 0.426$ , respectively. These results show that when trust in the phenomenon increases, it could stimulate the rate of e-commerce adoption. Hence, H2a–H2d are affirmed. Lastly, the moderating effect of PM on the relationship between trust and e-commerce adoption was examined. As shown in Table 4,  $TR \times PM$  is not significant in e-commerce adoption with the coefficient  $\beta = -0.011$ . This depicts that PM does not moderate the relationship between trust and e-commerce adoption. Hence, H3 is not supported.

**Table 7.** Hypotheses Testing (Direct, Mediation, and Moderation Paths).

Hypotheses	Relationship	Path Coefficient ( $\beta$ )	Prob.	Expected Sign	Adj. R <sup>2</sup>	Decision
Direct						
H1a	PE→AD	0.268	0.002 <sup>a</sup>	+	0.786	Affirmed
H1b	EE→AD	0.196	0.005 <sup>a</sup>	+		Affirmed
H1c	SI→AD	0.176	0.030 <sup>b</sup>	+		Affirmed
H1d	FC→AD	0.150	0.010 <sup>a</sup>	+		Affirmed
H1e	TR→AD	0.165	0.000 <sup>a</sup>	+		Affirmed
Mediation						
H2a	PE→TR→AD	0.376	0.000 <sup>a</sup>	+	0.875	Affirmed
H2b	EE→TR→AD	0.159	0.031 <sup>b</sup>	+		Affirmed
H2c	SI→TR→AD	0.182	0.020 <sup>b</sup>	+		Affirmed
H2d	FC→TR→AD	0.426	0.002 <sup>a</sup>	+		Affirmed
Moderation						
H3	TR × PM→AD	−0.011	0.065	+		Not affirmed

Note: <sup>a,b</sup> represent statistically significant levels at 1% and 5%, respectively. + represent the expected direction of the relationships between the constructs.

**Table 8.** Model Summary.

Fit Index	Recommended Range	Measurement Model	Structural Model
$\chi^2/df$	Between 1 and 3	2.575	1.970
GFI	>0.90	0.921	0.999
AGFI	>0.80	0.896	0.974
CFI	>0.95	0.933	0.999
RMSR	<0.08	0.055	0.013
RMSEA	<0.06	0.054	0.043
NFI	>0.90	0.896	0.998

Note. GFI = Good-of-fit index; AGFI = Adjusted goodness-of-fit index; CFI = Comparative fit index; RMSR = Root mean squared residuals; RMSEA = Root mean squared error of approximation; NFI = Normal fit index.

#### 4.5. Model Fit Tests

To ensure a significant goodness model-of-fit, Gaskin and Lin [65] proposed indices to consider. These indices are shown in Table 8 in the recommended range column. The results from GFI, AGFI, CFI, RMSR, RMSEA, and NFI all corroborate the robustness of the model to show that the model performs better and is well above a zero model. Consequently, the outcome of the study is robust enough for interpretation and recommendation.

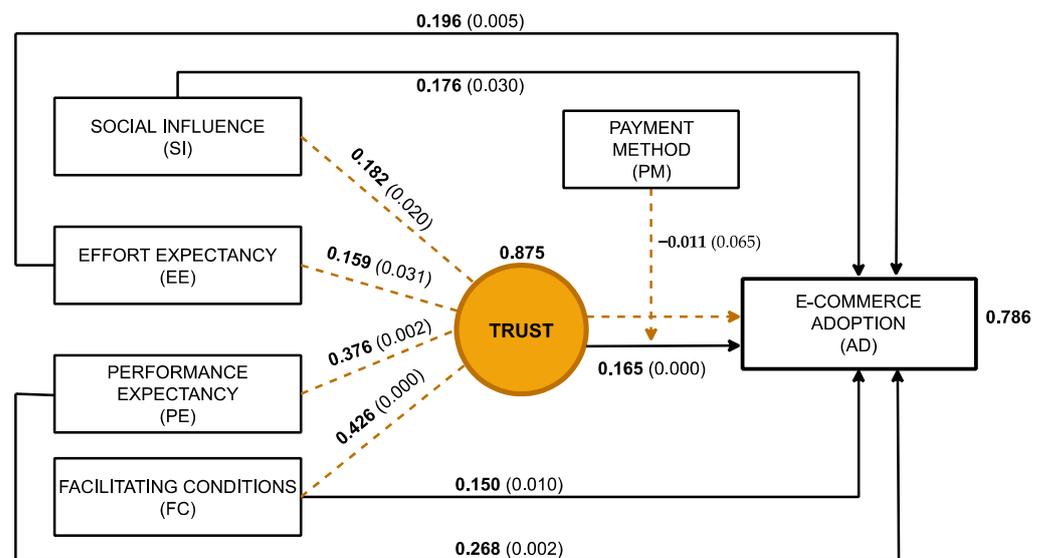


Figure 2. Estimation output of the Model.

## 5. Discussion

The study explores the mediating and moderating role of trust and payment methods in the relationship between UTAUT factors and e-commerce adoption in Ghana. Accordingly, trust positively mediates the relationship between business-to-business (B2C) e-commerce adoption and UTAUT factors. Thus, although positive connections are documented between UTAUT factors and the adoption of e-commerce, trust explains the existence of these relationships. This is consistent with studies [37,55,67] confirming trust as a hinge on which factors determining e-commerce adoption depend. Furthermore, in Ghana, the recent online scams and fraudulent transactions could also explain this result. Therefore, platform designers must consider avenues to increase transaction security with technologies that promote know your customer (KYC), create trust, prevent fraud, and promote sustainable adoption for consumers. Again, blockchain is known for ensuring secure transactions without human mediation. Therefore, this is the time for the sub-region to invest in this technology to resolve the issue of trust in online transactions.

Furthermore, the results suggest that payment methods do not moderate the relationship between trust and e-commerce adoption. This outcome is inconsistent with existing studies confirming the significance of payment methods in the adoption of e-commerce [6,57]. However, the result provides insight into the nature of payment methods preferred in Ghana. Currently, mobile money is the preferred payment method in Ghana and Sub-Saharan Africa [7]. Unlike WeChat, Alipay, Apple Pay, and Samsung pay, mobile money is not convenient for e-commerce because it runs on simple technology which makes it difficult to integrate into e-commerce platforms for seamless payments. Therefore, to improve the quality of life through sustainable e-commerce adoption, FinTech developers in the sub-region should consider optimal designs (QR codes, biometrics, and facial recognition) that support easy and secure payments online. This can be achieved through the promotion of domestic FinTech firms that can develop services that fits the needs of the sub-region.

Focusing on the traditional UTAUT factors, the study confirms a direct relationship between the variables and consumer e-commerce adoption in Ghana. Therefore, online retail shops must position themselves by ensuring that Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, and Trust are considered as salient parts of their marketing mix that will help facilitate the penetration and adoption of e-commerce and its survival. However, trust must assume a crucial role when practitioners consider factors that propel the adoption and sustainability of e-commerce in Ghana. The government of Ghana has an agenda to improve economic growth and the quality of life

through digitization; therefore, this is the best opportunity for e-commerce platforms to form a divergent partnership with innovation firms to provide the most secure ecosystem in order to promote sustainable growth.

In order of their regression weights, Performance expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, and Trust were found to significantly influence e-commerce adoption concerning path analysis (direct), proving the salient role that these factors play when it comes to e-commerce adoption in Africa and Ghana in particular. These results are supported by previous studies [9,37,47,51]. Therefore, although trust is confirmed to explain the relationship between these factors and e-commerce adoption in Ghana, industry practitioners and platform managers should not ignore the UTAUT factors in the design and promotion of e-commerce platforms.

## 6. Conclusions

The study estimates how trust and payment methods, respectively, explain and strengthen the relationship between UTAUT factors and e-commerce adoption in Ghana. Based on the outcome of the data analysis and discussion, the study concludes with the following.

Trust positively and significantly mediates the relationship between UTAUT factors and e-commerce in Ghana. This outcome is because UTAUT factors (social influence and performance expectancy) have close associations with trust. Furthermore, this result reflects the current security concerns with the e-commerce and FinTech ecosystem of Ghana and Sub-Saharan Africa. Nevertheless, it portrays the challenges of a developing ecosystem. Therefore, policymakers and industry practitioners must build an ecosystem that promotes trust to drive the interest of businesses and individuals. Advanced technologies such as blockchain should be explored further in the sub-region.

The relationship between UTAUT factors and the adoption of e-commerce in Ghana is not moderated by payment methods. This is explained by two main factors; first, mobile money cannot support seamless payments similarly to how other payment methods such as Alipay, Apple Pay, and card payments can. Second, the cost associated with using mobile money for transactions in Ghana and Sub-Sahara Africa is relatively higher compared to other parts of the world. Consequently, users prefer cash payment or card payment. Therefore, to promote the usage of FinTech in e-commerce, FinTech developers must provide easy and affordable payment methods.

The UTAUT factors are significantly and positively related to the adoption of e-commerce in Ghana. Although new factors evolve with the age of technology and the growth of other industries, theoretically, factors such as Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating conditions are still relevant in the adoption of e-commerce or technology. This is explained by the fact that these factors have been proven and confirmed by several studies from several regions.

## 7. Limitations and Implications for Future Research

Despite the contribution of this study, there are a few limitations. The study considered six (6) regions in Ghana. Thus, other studies can expand this scope. Again, this study uses trust and payment methods as mediating and moderating variables; therefore, other studies can employ emerging issues such as the effect of different generations and aging on e-commerce adoption in Sub-Saharan Africa. Furthermore, the study employed a quantitative research approach with structural equation analysis. Future studies can employ time series or panel econometric methods or opt for a qualitative approach for further exploration. It is, therefore, imperative for future studies to carefully look at the limitations for a better perspective and possible generalization.

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## Appendix A

### • QUESTIONNAIRE

This questionnaire is designed to collect data for an academic work only. It aims at extracting information to guide the researcher in analyzing the factors influencing e-commerce (online commerce). The researcher would be grateful if you could assist him by taking a few minutes to answer the questions that follow. Answers provided shall be treated with utmost confidentiality. Thank you.

#### • SECTION A: Demographic Factors

This section seeks information on demographic factors, please tick where appropriate.

1. Age . . . . .
2. What is your gender? Male  Female
3. Educational level? Basic  Secondary  Tertiary
4. Do you use Internet? Yes  No
5. Do you have an experience with online purchase or e-commerce platform? Yes  No

#### • SECTION B: Performance Expectancy

This section seeks your response on the performance expectancy of e-commerce usage. Kindly choose the appropriate response following the Likert scale 1-5. Strongly Agree (SA), Agree (A), Neutral (N), Disagree (D), and Strongly Disagree (SD).

S/N	Items	SA	A	N	D	SD
1	I can focus on my work while making online purchases					
2	E-commerce usage give me the freedom to spend more time on my work					
3	I do not have to skip work to make purchases					
4	I can make purchases anytime anywhere					
5	I do not have to stop my work when making online purchases					
6	I spend limited time on making online purchases					
7	E-commerce helps me save time on making purchases					

#### • SECTION C: Effort Expectancy

This section seeks your response on the effort expectancy of e-commerce usage. Kindly choose the appropriate response following the Likert scale 1-5. Strongly Agree (SA), Agree (A), Neutral (N), Disagree (D), and Strongly Disagree (SD)

S/N	Items	SA	A	N	D	SD
8	The e-commerce platforms have simple user interface					
9	The e-commerce platforms have online real-time support					
10	No computing skill is required to use the e-commerce platforms					

- **SECTION D: Social Influence**

This section seeks your response on the social influence of e-commerce usage. Kindly choose the appropriate response following the Likert scale 1–5. Strongly Agree (SA), Agree (A), Neutral (N), Disagree (D), and Strongly Disagree (SD).

S/N	Items	SA	A	N	D	SD
11	The platform provides access to online reviews					
12	The customers provide honest online reviews					
13	I read online reviews before making purchases					
14	The online reviews make it easier for me to use e-commerce					
15	Most of my friends use e-commerce					
16	I was introduced to e-commerce by my friends					
17	I believe the opinion of my friends about e-commerce usage					

- **SECTION E: Facilitating Conditions**

This section seeks your response on the facilitating conditions of e-commerce usage. Kindly choose the appropriate response following the Likert scale 1–5. Strongly Agree (SA), Agree (A), Neutral (N), Disagree (D), and Strongly Disagree (SD)

S/N	Items	SA	A	N	D	SD
18	I have access to internet services always to support my online purchases					
19	I can access the platforms on different devices					
20	The platform provides a walk-through support for new users					
21	The platform provides after sale services					

- **SECTION F: E-commerce Adoption**

This section seeks your response on e-commerce usage. Kindly choose the appropriate response following the Likert scale 1–5. Strongly Agree (SA), Agree (A), Neutral (N), Disagree (D), and Strongly Disagree (SD)

S/N	Items	SA	A	N	D	SD
22	I use e-commerce on a regular basis					
23	I use e-commerce only on specific occasions					
24	I intend to use e-commerce in the future					
25	I do not intend to stop using e-commerce in the future					

- **SECTION G: Trust**

This section seeks your response on trust of e-commerce usage. Kindly choose the appropriate response following the Likert scale 1–5. Strongly Agree (SA), Agree (A), Neutral (N), Disagree (D), and Strongly Disagree (SD)

S/N	Items	SA	A	N	D	SD
26	The platform always warns users on the possibility of fraud					
27	The platform provides regular update on new security measures					
28	I can trust the platform with all my details					
29	The platforms offer several authentication processes					
30	Do you feel safe using mobile money to buy online?					
31	Do you feel secure using debit card on these platforms?					
32	The payment method ensures security of my details?					

### • SECTION H: Payment Method

This section seeks your response on the payment method of e-commerce usage. Kindly choose the appropriate response following the Likert scale 1–5. Strongly Agree (SA), Agree (A), Neutral (N), Disagree (D), and Strongly Disagree (SD).

S/N	Items	SA	A	N	D	SD
33	Do you buy online using mobile money or debit card?					
34	Is it easy to use these payment methods in buying online					
35	Do you feel secure using these methods in buying online?					
36	Is it affordable to use these payment methods in online purchases?					

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