

ECONOMIC ANALYSIS OF THE ADOPTION OF E-COMMERCE BY BUSINESSES IN CAMEROON

Mpabe Bodjongo
Mathieu Juliot

Working Paper 055-2026

Bringing Rigour and Evidence to Economic Policy Making in Africa

CONSORTIUM POUR LA RECHERCHE ÉCONOMIQUE EN AFRIQUE

Economic Analysis of The Adoption of E-Commerce by Businesses in Cameroon

By

**Mpabe Bodjongo
Mathieu Juliot**

Faculty of Economics and Management, University of Dschang, Cameroon
Fondo Economic Research Centre (FORCE)
MINCOMMERCE Research and Projects Unit

AERC Research Paper 055-2026
African Economic Research Consortium,
Nairobi March 2026

Disclaimer: The findings, opinions and recommendations are, those of the author, and do not necessarily reflect the views of the Consortium, its individual members or the AERC Secretariat.

Published by: The African Economic Research Consortium
P.O. Box 62882 - City Square
Nairobi 00200, Kenya

© 2026, African Economic Research Consortium

Abstract

The objective of this article is to identify factors likely to stimulate e-commerce in Cameroon. The analysis focuses on a sample of 145,439 companies from the 2nd General Business Census (INS, 2018). Drawing on the economic literature, the results obtained using the probit model that combines endogeneity bias treatment and selection bias correction, and the Heckman selection bias correction probit model, reveal that increases in company size, the use of mobile money, education levels, and proximity significantly promote the adoption of e-commerce by businesses. At the sectoral level, these results are only verified in the "Trade and transport" and "Construction and other tertiary services" sub-sectors.

Keywords: e-commerce, mobile money, company size, proximity effect, education

Jel code: L81, L86, D21, D29, E26

Introduction

The INS¹ (2018) defines e-commerce as "the process of purchasing, selling, transferring or exchanging products, services and/or information using computer networks, mainly the internet and intranets". This definition is similar to that used in many studies (Zaied et al., 2007; Turban et al., 2010; Oliveira & Martins, 2010; Wanyoike et al., 2012; Ahmad et al., 2014) and the². E-commerce has boomed in a context marked by restrictions on the movement of people imposed by governments in response to the COVID-19 pandemic (UNCTAD, 2020). Physical distancing measures, coupled with strict lockdown measures, have brought much of traditional brick-and-mortar retail to a halt, at least temporarily (OECD, 2020a). For example, retail and food service sales in the United States in the period from February to April 2020 were down 7.7% compared to the same period in 2019 (OECD, 2020b). In contrast, sales by food stores and non-store retailers (mainly online retailers) rose by 16% and 14.8% respectively (OECD, 2020b). Similarly, in the European Union, e-commerce sales in April 2020 jumped by 30% year-on-year, while total retail sales contracted by 17.9% over the same period (OECD, 2020b).

Cameroon is not far behind, as e-commerce has revived business sales in a health context marked by the COVID-19 pandemic (Mauger, 2021). In the 2020 UNCTAD ranking³ (2021) on the development of B2C e-commerce⁴, Cameroon ranks 111th globally with a score of 35.5 points, an increase of 0.8 points and four places compared to the 2019 ranking. Despite this progress, Table 1 shows that Cameroon lags behind certain African countries in terms of e-commerce development, notably Mauritius (58.4 points⁵), South Africa (56.5 points), Ghana (51.9 points), Kenya (49 points), Nigeria (46.2%), Senegal (44.1 points) and Gabon (38 points). RGE-2 data show that only 3.97% of companies in Cameroon have carried out purchases or sales via the internet. Globally, the top three countries in e-commerce development are Switzerland (95.9 points), the Netherlands (95.8 points), and Denmark (94.5 points). The figures in Table 1 justify the ECA's call⁶ (2020) for African countries to shake off their lethargy in e-commerce.

¹ INS: National Institute of Statistics of Cameroon

² E-commerce has been defined in several ways depending on the context and research objective of the author (Grandon & Pearson, 2004; Lefebvre et al., 2005; Ahmad et al., 2014).

³ UNCTAD: United Nations Conference on Trade and Development

⁴ B2C: Business to consumer

⁵ UNCTAD B2C E-commerce Development Index (2021)

⁶ ECA: Economic Commission for Africa

Table1 : B2C e-commerce development index in Africa

Global ranking in 2020	Country	Score in 2020	Change in score compared to 2019	Global ranking in 2019
69	Mauritius	5	-	58
7	South Africa	56.5	0	73
77	Tunisia	54.6	-1.4	74
80	Algeria	52.2	14	109
81	Ghana	51.9	12.7	101
88	Kenya	49	0	89
94	Niger	46.2	-	88
99	Senegal	44.1	1	98
105	Gabon	38	-0.3	108
111	Cameroon	35.5	0	115
119	Ivory Coast	30.4	-0.9	1

Source: UNCTAD (2021)

E-commerce is considered a technology that offers many advantages and opportunities for businesses. For example, e-commerce can enable them to: (i) expand their catchment area, (ii) reach a wider target customer base, (iii) add a distribution channel, (iv) market their products at any time, (v) present their products differently, (vi) reduce their fixed costs and thus improve their margins, (vii) take greater advantage of Internet-related technologies, (viii) better understand their return on investment, (ix) develop their customer relationships, (x) facilitate purchasing, (xi) collect various data on their customers, (xii) identify products before purchasing them, and (xiii) find the best products. Hadjimanolis (1999) believes that the use of e-commerce in developing countries can help reduce expenses or costs related to communication, marketing, advertising, as well as supply chains and the delivery of goods and services.

Numerous empirical studies have examined the development of e-commerce in developed and emerging countries (Hsu et al., 2006). Few studies have been conducted on e-commerce in African countries: in South Africa (Cloete et al., 2002; Molla & Licker, 2005), Egypt (Zaied, 2007), Kenya (Migiro, 2007; Wanyoike et al., 2012; Okadapau et al., 2016), Nigeria (Olatokun & Bankole, 2011; Agwu, 2015) and Rwanda (Uwamariya et al., 2015). No study has focused on Cameroon, considered the economic powerhouse of the Central African Economic and Monetary Community¹. However, these studies admit some shortcomings.

Firstly, these studies have focused solely on the behaviour of companies in the formal sector, particularly small and medium-sized enterprises, ignoring very small enterprises and large companies. However, in the business environment of African countries, very small enterprises (particularly those in the informal sector) predominate. The development of e-commerce in Cameroon requires the strong participation of these enterprises. In the empirical literature, the debate on the effect of enterprise size on the adoption

¹ This is a regional economic community with six member countries: Cameroon, Congo, Gabon, Equatorial Guinea, the Central African Republic and Chad.

of e-commerce is not settled (Hitt et al., 1990; Geroski, 2000; Hall & Khan, 2002; Hollestein, 2004; Bocquet et al., 2007; Gallego et al., 2015).

Secondly, these studies did not conduct an empirical analysis of the effect of mobile money on the adoption of e-commerce. However, mobile money is booming in Cameroon, as in many countries south of the Sahara. Furthermore, it is often considered one of the potential drivers of e-commerce (CEA, 2020).

Thirdly, to our knowledge, there is no empirical work that has focused on the role of the proximity effect or the epidemic effect in the adoption of e-commerce in Africa. However, although the results are controversial, the influence of this factor on the adoption of new information and communication technologies (such as the internet) has been examined.

Fourthly, continuing with the list of shortcomings in the economic literature, it should be noted that no empirical work has specifically analysed the determinants of e-commerce adoption by sub-sector. For example, Uwamariya et al. (2015) focused solely on the tourism sector.

Furthermore, econometric studies conducted in Africa to date show that the level of education does not promote the adoption of e-commerce (Awa et al., 2015). However, the lack of digital literacy attributable to low levels of education has often been considered one of the causes of African countries' lag in e-commerce development (GSMA, 2019). This relationship deserves to be re-examined.

Finally, it should be noted that some studies have failed to correct for selection bias in estimating the relationship between internet access and e-commerce adoption (Ghobakhloo et al., 2011; Ahmad et al., 2014; Rahayu & Day, 2015; Awa et al., 2015). However, e-commerce can only be practised by a company if it has access to the internet. Le Guel et al. (2005) used a probit model with Heckman selection bias correction, but applied it to household data in France.

The objective of our study is to go beyond the empirical work identified in the literature. In light of the above, our study aims to :

- ✓ *examine the effect of firm size on the adoption of e-commerce by firms;*
- ✓ *analyse the effect of mobile money use on the adoption of e-commerce by businesses;*
- ✓ *explore the effect of proximity on the adoption of e-commerce by businesses;*
- ✓ *study the influence of education level on the adoption of e-commerce by businesses.*

The rest of the article is organised as follows: Section 2 provides an overview of e-commerce in Cameroon, Section 3 is devoted to a review of the literature, Section 4 presents the study methodology, Section 4 is dedicated to the presentation of descriptive statistics, Section 5 highlights the econometric results, and Section 6 examines the sensitivity and robustness of the results.

1. Overview of e-commerce in Cameroon

As in many countries, the Cameroonian government has recognised the importance of e-commerce and has responded by adopting measures to stimulate e-commerce, including the development of an E-Commerce Development Strategy in 2018 and a Priority Action Plan for the Development of the Digital Economy in 2016. This strategy is based on five pillars: (i) regulation in favour of e-commerce, (ii) logistics and delivery, (iii) infrastructure and accessibility, (iv) consumer readiness, and (v) business readiness. The government is currently developing a matrix of action plans to implement this strategy.

E-commerce practices

Information from the ISSEA (2020) and INS (2018, 2022) surveys, shown in Table 2, can also shed light on the e-commerce ecosystem in Cameroon. The ISSEA survey (2020) was conducted among a sample of 3,214 people living in the city of Yaoundé and aged 15 years or older. This sample consisted of 54.50% women, 42.60% unemployed people, (iii) 33.10% married, (iv) 30.70% with higher education and 54.5% with secondary education, and (v) 75% belonging to the Catholic or Protestant religion. It should also be noted that (i) 67.30% of people have a mobile money account, (ii) 25.60% of people have a bank account, and (iii) 67.45% have an average monthly income of less than 75,000 CFA francs (US\$136.36).

The e-commerce adoption rate among businesses in Cameroon is 3.97% (INS, 2018). This statistic masks certain disparities. In terms of size, the INS (2018) reports that the e-commerce adoption rate is very low among very small enterprises (VSEs), at 3.14%. However, among small enterprises (SEs), medium-sized enterprises (MSEs) and large enterprises (LEs), it is 33.43%, 50.46% and 62.35% respectively (INS, 2018). It should be noted that nearly half of all businesses are VSEs. In terms of sector of activity, 89.42% of businesses that have adopted e-commerce belong to the tertiary sector (INS, 2018).

The INS (2022) reveals that 27.02% of companies in the formal sector in Cameroon have carried out purchases and/or sales of products via e-commerce platforms¹. More specifically, 19.72% of companies have carried out sales transactions, compared with 18% for purchases. However, around 23% of

¹ The difference in e-commerce adoption rates between the INS (2018) and INS (2022) data is due to the fact that the INS (2022) has a very small sample of 248 companies in the formal sector. In contrast, the INS (2018) sample size is very large, comprising 209,482 companies in the formal and informal sectors.

households have already made purchases via e-commerce in the city of Yaoundé (ISSEA, 2020). In terms of frequency, according to ISSEA (2020), these household purchases via e-commerce platforms are made every quarter (55.24%), monthly (28.10%), weekly (4.78%) and daily (11.88%) basis.

In addition, according to the INS (2022), approximately 46.66% of businesses in the formal sector report that e-commerce sales account for at least 5% of their total turnover. Furthermore, it should be noted that these businesses generated a total turnover of 13,347 billion CFA francs, representing an average turnover of 66 million CFA francs. Concerning households, the ISSEA (2020) provides information on their e-commerce spending: (i) 61.49% of households spent less than 50,000 CFA francs, (ii) 16.78% of households spent between 50,000 CFA francs and 99,999 CFA francs, (iii) 16.19% of households spent between 100,000 CFA francs and 499,999 CFA francs, and (iv) 5.54% of households spent at least 500,000 CFA francs.

E-commerce platforms and products sold

The two main mechanisms through which companies engage in e-commerce in Cameroon are B2C and B2B. B2B is not very widespread, as many companies, both in the formal and informal sectors, do not have a functional and regularly updated website. They also do not often have commercial websites, with the notable exceptions of: (i) CIMENCAM¹, one of the largest companies specialising in cement production, (ii) Vision Confort, an SME in the furniture sector, and (iii) Mandeo, an SME in the fashion sector.

In terms of B2C, some companies collaborate with private B2C e-commerce platforms such as WandaShop, Koulou Market, Ledetailant.biz, Limarket, Ekoolo, Welly Market, Sassayez.com, Solderis.com, Iziway, Glotelho, Durell Market, Sellam Quick, and Regalsansegal. In a study conducted in Cameroon between December 2018 and February 2019, the research firm Dina Surveys, using web analytics tools, showed that only seven companies surveyed had more than 20,000 unique visitors per month. These include Jumia², Jumia Deals, Kerawa, Afrimarket, Camerspace, Sellam and Jedolo. The e-commerce platforms most familiar to households in the city of Yaoundé are as follows (ISSEA, 2020): Jumia (47.07%), sales pages on social networks such as Facebook and WhatsApp (17.21%), Afrimarket (9.95%), Amazon (9.49%), Alibaba (5.74%), Wandashop (3.38%) and Sellam Quick VIP (3%).

INS (2022) reveals that 35.19% of companies have an account or user licence (Facebook, WhatsApp, LinkedIn, Xing, Viadeo, Yameer or Google+). They use social media to (i) develop their company image or market their products (73.19%), (ii) collect and respond to customer feedback (65.35%), (iii) involve their customers in the development or improvement of their products (63.37%) and (iv) collaborate with

1 In April 2021, CIMENCAM launched an online sales application for its products called "My Cimencam".

2 In 2019, the company Jumia ceased its activities in the e-commerce sector in Cameroon.

their suppliers or public administrations (50%)¹ . Some companies use their website for e-commerce. They use their website to offer: (i) descriptions of goods or services available, including prices (72.02%), (ii) online ordering or reservation services (36.14%), (iii) online order tracking for customers (32.74%) and (iv) the possibility for visitors to customise or design goods or services online (22.89%)² .

There is also an e-commerce platform called Small Deals where payments are made in CFA francs, foreign currencies (euros, US dollars) and cryptocurrencies (Limocoin swap, Simbcoin swap, bitcoin). However, it should be noted that Article 46 of Law No. 2015/018 of 21 December 2015 governing commercial activity in Cameroon prohibits the use of currencies other than the CFA franc in the purchase or sale of goods on the domestic market.

In addition, there are a few local e-commerce platforms that sell products from very small businesses (particularly those in the informal sector), such as AGRIBIZ and KLAPEERS. However, most businesses in the informal sector sell their products via social media (Facebook, WhatsApp, Instagram, Twitter). They also often market their products on classified ad websites, such as Jumia Deals, Kerawa, banabaana.com, locanto TM, Cameroun Annonces and Camerbiz.

Some of these commercial platforms attach importance to promoting products made in Cameroon, notably TIWYN, LiMarket and Prem'Market. Local and imported products can be purchased on these e-commerce platforms. These include fashion products, electronic devices, kitchen utensils, agri-food products and tourism services. According to ISSEA (2020), the proportion of households that have purchased electronic products via e-commerce is 23.39%, compared to 21.20% for fashion products, 13.85% for phones and tablets, 12.40% for health and beauty products, 9.81% for home and office furniture, 0.93% for online training, 0.85% for video games, 0.64% for airline tickets, 0.57% for hotel reservations and 0.01% for bus/train tickets.

Challenges of e-commerce in Cameroon

Households that make purchases via e-commerce report high levels of satisfaction. According to ISSEA (2020), the proportion of satisfied households is (i) 81.88% in terms of product quality, (ii) 81.38% in terms of transaction security, (iii) 79.20% in terms of transaction costs or fees, and (iv) 77.69% in terms of delivery times. In terms of costs, the proportion of households considering the prices of products purchased via e-commerce platforms compared to traditional market prices: (i) as higher is 26.65%, (ii)

¹ INS (2022)

² INS (2022)

as lower is 22.50% and (iii) as the same is 4.27%¹ . In addition, around 46.63% of them think that it depends on the products² .

The development of e-commerce faces many challenges, including those related to (i) access to new information and communication technologies (NICTs), in particular internet connection, computer ownership and the security of mobile money transactions, (ii) logistics and transport, (iii) banking services, (iv) urban addressing, and (v) the legal and regulatory framework that influences business and consumer confidence.

There are various delivery methods available after a purchase is made via an e-commerce platform. After a purchase via an e-commerce platform, the proportion of households wishing to receive their products: (i) via home delivery is 57.36%, (ii) at transport agencies is 35.78%, (iii) at postal services is 7.55% and (iv) at decentralised e-commerce company services is 7.25%³ . The places where products are sold via e-commerce also differ. For example, 63.41% of companies carry out at least 5% of their sales via e-commerce on the national market, while 51.35% of companies carry out at least 5% of their sales via e-commerce on the international market (INS, 2022). In addition, 38.77% of companies carry out at least 5% of their e-commerce purchases on the domestic market, while 51.35% of companies carry out at least 5% of their e-commerce purchases on the international market (INS, 2022).

In terms of ICT, it should be noted that 5.60% of businesses in Cameroon have access to the internet (INS, 2018). However, this statistic masks certain disparities. In terms of company size, 56.66% of small, medium and large enterprises (PEMEGE) have access to the internet, compared to 4.24% of micro-enterprises (INS, 2018). However, the INS (2022) shows that the proportion of companies with internet access is 94.62%. In terms of households, ISSEA (2020) reveals that 72% connect to the internet via MTN, 71.90% via Orange, 18.20% via NEXXTEL, 4.20% via CAMTEL and 1.20% via YOOME⁴ . The internet network has often experienced disruptions, such as the discriminatory internet connection cut in the North-West and South-West regions, implemented to curb the security crisis in those regions.⁵ . Furthermore, some rural areas are not covered by the internet. The government has put in place certain infrastructure to improve quality access to the internet and other digital services, including (i) four landing points, (ii) nearly 20,000 km of fibre optic cable, and (iii) several data centres (Fogang, 2021).

In addition, 13.07% of businesses in Cameroon have at least one computer (INS, 2018). This figure masks certain contrasts, notably the fact that (i) 74.90% of businesses in the formal sector have a

¹ ISSEA (2020)

² ISSEA (2020)

³ Orange, MTN, CAMTEL, YOOME and NEXXTEL are among the internet service providers (ISPs)

⁴ Orange, MTN, CAMTEL, YOOME and NEXXTEL are among the internet service providers (ISPs) in Cameroon.

⁵ Internet connectivity was disrupted in these two regions between 19 January 2017 and 20 April 2020, for a total of approximately 93 days.

computer, compared with 9.33% of businesses in the informal sector, and (ii) 78.44% of PEMEGEs compared to 11.31% of VSEs (INS, 2018). However, INS data (2022) reveal that 96.40% of businesses in Cameroon use a computer. The ISSEA survey (2020) shows that 8.10% of households use computers to make purchases via e-commerce platforms. The other digital devices they use for these transactions are phones (88.43%) and tablets (3.47%).

In addition, approximately 22.89% of businesses conduct commercial transactions via mobile money (INS, 2018). This statistic also masks certain disparities, notably the fact that (i) 47.24% of businesses in the formal sector compared to 22.08% of businesses in the informal sector and (ii) 44.13% of PEMEGEs compared to 22.42% of VSEs (INS, 2018). However, the INS (2022) indicates that businesses use mobile money solutions: MTN mobile money (25.89%) and Orange money (16.75%). They also use mobile banking solutions: Expression Union (5.08%) and Afrikpay (0.51%). It should be noted that 12.99% of businesses used mobile money to purchase products on behalf of the business, and 15.43% used mobile money to pay service bills. As for households, ISSEA (2020) shows that 67.3% of households use mobile money solutions, while 74.30% of them have a bank account.

Table2 : E-commerce ecosystem in Cameroon

Household adoption of e-commerce (ISSEA, 2020) ¹⁸ : n = 3,168 households	E-commerce adoption by businesses (INS, 2022) ¹⁹ : n = 248 businesses in the formal sector	E-commerce adoption by businesses (INS, 2018): n = 209,482 businesses in the formal and informal sectors
<p>Adoption of e-commerce (purchasing or selling)</p>	<p>Approximately 23% of them have already made purchases via e-commerce platforms.</p> <p>Household purchases via e-commerce platforms are made quarterly (55.24%), monthly (28.10%), weekly (4.78%) and daily (11.88%).</p>	<p>Approximately 19.72% of businesses have made sales.</p> <p>Approximately 52.94% of businesses engage in B2C, selling their products to individuals, while 53.48% engage in B2B or B2G, selling their products to legal entities, including public administrations, businesses and non-governmental organisations.</p> <p>Approximately 18% of companies made purchases via e-commerce.</p>
<p>Products most purchased and/or sold via e-commerce platforms</p>	<p>Approximately 3.97% of companies in Cameroon have made purchases or sales via the internet.</p>	<p>9.30% of transactions are carried out by small businesses, 18.60% by medium-sized businesses and 72.10% by large businesses. These businesses sell food products, refrigeration equipment, insurance products, health services, housing goods or services, inputs, telecommunications equipment, wood products and clothing.</p>
<p>Most used e-commerce platforms</p>	<p>The proportion of households that purchased the following products: electronic products (23.39%), fashion products (21.20%), phones and tablets (13.85%), health and beauty products (12.40%), home and office furniture (9.81%), bus/train tickets (0%), hotel reservations (0.57%), airline tickets (0.64%), video games (0.85%) and online training (0.93%).</p>	<p>35.19% of businesses have an account or user licence (Facebook, WhatsApp, LinkedIn, Xing, Viadeo, Yameer or Google+). They use social media to (i) develop their business image or market their products, particularly through advertising and product launches (73.19%), (ii) collect and respond to customer feedback (65.35%), (iii) involve their customers in the development or improvement of their products (63.37%) and (iv) collaborate with their suppliers or public administrations (50%).</p>
<p>Household expenditure/business turnover via e-commerce platforms</p>	<p>The proportion of households familiar with the following e-commerce platforms: Jumia (47.07%), sales pages on social networks such as Facebook and WhatsApp (17.21%), Afrimarket (9.95%), Amazon (9.49%), Alibaba (5.74%), Wandashop (3.38%) and Sellam Quick VIP (3%).</p>	<p>46.66% of businesses say that e-commerce sales account for at least 5% of their total turnover. It should be noted that (i) 18.60% of companies sold products worth at least 500,000 CFA</p>
	<p>It should be noted that (i) 61.49% of households spent less than 50,000 CFA francs, (ii) 16.78% of households spent</p>	<p>In economic terms, the total turnover of companies in the sector is 13,347 billion CFA francs. The aver²² al turnover is 66 million CFA francs.</p>

¹⁸ The data collection methodology is presented in Annex 2

¹⁹ The data collection methodology is presented in Annex 3

²⁰ NA: Not available. The INS (2018) does not provide information on goods and services purchased via e-commerce platforms

²¹ NA: Not available. The INS (2018) does not provide information on e-commerce platforms used by businesses

²² INS (2018) does not provide information on turnover generated through e-commerce operations

	between 50,000 and 99,999 CFA francs, (iii) 16.19% of households spent between 100,000 CFA francs and 499,999 CFA francs, and (iv) 5.54% of households spent at least 500,000 CFA francs.	francs through e-commerce and (ii) 41.86% of companies generated turnover of less than 500,000 CFA francs through e-commerce.	
Use of mobile money and other means of payment	The proportion of households using mobile money solutions is 67.3%, while 74.3% have a bank account.	Proportion of businesses using mobile money or mobile banking solutions: (i) MTN mobile money (25.89%), (ii) Orange money (16.75%), (iii) Expression Union (5.08%) and (iv) Afrikpay (0.51%). It should be noted that 12.99% of businesses used mobile money to purchase products on behalf of the business and 15.43% used mobile money to pay service bills.	The proportion of companies using mobile money is 22.5%.
Most commonly used technological infrastructure or equipment for making purchases via e-commerce platforms	The proportion of households using digital devices when shopping via e-commerce platforms: (i) telephone (88.43%), (ii) computer (8.10%) and (iii) tablet (3.47%)	96.40% of businesses ²³ use a computer.	13.70% of businesses ²⁴ use a computer. In the specific case of the formal sector, this rate is 50.90%.
Internet access	72% of households connect to the internet via MTN, 71.90% via Orange, 18.20% via NEXXTEL, 4.20% via CAMTEL and 1.20% via YOOME	94.62% of businesses have access to the internet.	5.60% of businesses have access to the internet. This rate is 16.90% in the formal sector.

Source: ISSEA (2020) and INS (2018, 2022)

²³ This only includes businesses in the formal sector

²⁴ This includes businesses in the formal and informal sectors

Many companies face difficulties related to logistics and transport. Here too, certain differences can be noted, in particular the fact that (i) 14.57% of companies in the formal sector encounter problems related to transport and logistics, compared with 18.73% of companies in the informal sector, and (ii) 12.32% of PEMEGEs experience difficulties related to transport and logistics, compared to 13.62% of VSEs (INS, 2018). In some cases, road infrastructure is of poor quality. In addition, the transport of goods is often subject to corruption by law enforcement agencies on the roads (Mpabe & Fondo, 2017). Added to this is the obstacle of urban addressing. Several companies (approximately 96.29%) do not have an easily identifiable address. Some contrasts can be noted, notably the fact that (i) 15.28% of companies in the formal sector have addresses, compared to 3.38% of companies in the informal sector, and (ii) 16.02% of PEMEGEs have addresses, compared to 3.49% of VSEs (INS, 2018).

The incomplete legal and regulatory framework is another obstacle to the growth of e-commerce in Cameroon. This incompleteness often leads to mistrust, fear of data theft and cybercrime (Forson, 2018). According to the International Telecommunication Union (ITU) (2021), Cameroon, with a score of 45.63 points, has a cyberattack protection system that is below the global average. However, there is no specific legislation on online personal data protection in Cameroon.

Cameroon has been at the forefront of the fight against cybercrime since 2010, well before the advent of the African Convention on Cybersecurity in 2014, when a law against this scourge was adopted, namely Law No. 2010/012 of 21 December 2010 on cybersecurity and cybercrime in Cameroon. The scope of this law can even be applied when the offence is committed outside the country, especially if certain elements of evidence are found in Cameroon. Thanks to the close cooperation with Interpol²⁵, there is mutual legal assistance between Cameroon and its partner states, particularly in the areas of evidence sharing, granting legal value to foreign evidence, preserving evidence and mechanisms to mitigate cybercrime. Furthermore, there appears to be a certain degree of diligence in gathering and preserving evidence without undermining the right to a fair trial in Cameroon. This is achieved through the intervention of expert commissions on reading and encryption set up by the Cameroonian Ministry of Justice.

Law No. 2010/012 of 21 December 2010 on cybersecurity and cybercrime in Cameroon is currently being amended to take into account new cyber offences. Certain offences, such as cyberbullying and malicious communications, have been identified and taken into account in Cameroonian legislation. This demonstrates, to a certain extent, the desire to align with the requirements of the African Union Convention, which aims, concerning substantive criminal law, to modernise the instruments for combating cybercrime by developing a policy for the adoption of new offences specific to ICT. By way of illustration, Article 267 of the Cameroonian Criminal Code punishes with imprisonment of 1 to 25

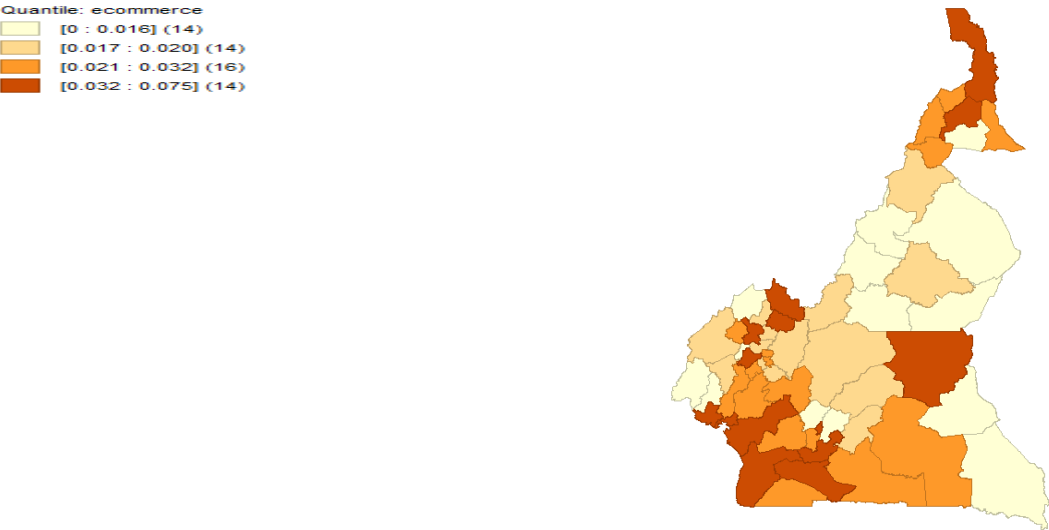
²⁵ Interpol: International Criminal Police Organisation

years and a fine of 10,000 to 20,000,000 CFA francs any person who publicly advocates crimes of murder, looting, arson, destruction, theft, or crimes or offences against state security. However, online public communication networks continue to be flooded with content promoting hatred, crime or terrorism, with apparent impunity. In fact, there is a whole range of related offences surrounding the acts referred to in Article 267 of the aforementioned Penal Code, such as simple threats, conditional threats, defamation and insults. In addition, the institutional framework for e-commerce in Cameroon has a regulatory mechanism governing electronic transactions (Law No. 2015/006 of 20 April 2015 amending and supplementing certain provisions of Law No. 2010/013 of 21 December 2010 regulating electronic communications in Cameroon).

In addition to this string of obstacles, we must not forget the difficulties of access to electricity and the numerous disruptions to the national power grid. In fact, approximately 77.51% of businesses have access to electricity. Specifically, it should be noted that 89.58% of businesses in the formal sector have access to electricity, compared with 80.31% of businesses in the informal sector, and that 85.63% of PEMEGEs have access to electricity, compared with 77.44%.

In terms of location, the companies that have adopted e-commerce the most are in the Divisions (or departments) of Wouri (Douala) and Mfoundi (Yaoundé). Looking at the e-commerce adoption rate, the top 10 division (or departments) in the ranking are: Fako (7.51%), Ocean (7.34%), Sanaga Maritime (5.68%), Mezam (5.46%), Mfoundi (5.10%), Bui (4.76%), Diamaré (+4.22%), Wouri (4.15%), Mvila (3.55%) and Menoua (3.55%). Furthermore, Figure 1 shows that departments with a high rate of e-commerce adoption by businesses are located near other departments with a high rate of e-commerce adoption by businesses.

Figure 1 : Map of the proportion of e-commerce adoption by businesses in each department of Cameroon



NB: estimates based on INS data (2018)

2. Literature review and theoretical framework

2.1. Critical review of empirical literature

Effect of company size

Numerous empirical studies have examined the development of e-commerce in developed and emerging countries (Hsu et al., 2006). In African countries, most studies, which are microeconomic in nature, have focused on the adoption and use of the internet based on data collected from field surveys (Penard et al., 2015; Bakehe et al., 2017). Those that have focused on the adoption of e-commerce remain relatively limited and seem to ignore the informal sector, despite its weight in the economy. However, the expansion of e-commerce may occur through the informal economy, via classified ad sites and social networks. Most businesses in the informal sector are small. The debate on the effect of business size on innovation is still ongoing.

Indeed, some empirical studies (Hall & Khan, 2002; Bocquet et al., 2007) show that large companies are more bureaucratic and less flexible; they are unable to change and adapt quickly and display greater structural inertia. As a result, they are less inclined to adopt innovations in the field of ICT, including e-commerce. Furthermore, large companies may be less willing to adopt new technology in view of the high costs of renewing their technological equipment, particularly the expenditure associated with acquiring software, the learning process required to use new technology and organisational change (Geroski, 2000). Finally, some empirical studies show that there is a non-linear relationship between company size and the adoption of ICT. For example, Hollenstein (2004) shows that company size only

stimulates the adoption of ICT up to a threshold of around 200 employees. Subsequently, Oliveira & Martins (2009) showed that company size does not significantly influence the adoption of e-commerce in Portugal.

However, other studies (Fichman & Kemerer, 1997; McGowan & Madey, 1998; Kossai et al, 2010; Gallego et al, 2015) find that there is a positive relationship between company size and the adoption of innovations. Similarly, Hsu et al. (2006) found that in the United States, the adoption of e-commerce increases with company size. Company size is often considered a proxy for financial resources, in other words, a company's ability to pay installation costs, integration costs, employee training costs and maintenance costs. Large companies have relatively more financial resources available for acquiring technological equipment or resources and adopting innovations, given the high risks and costs associated with early adoption of new technologies. They are better equipped with the skills and other resources needed to introduce and use new technology and quickly capture economies of scale in production through the learning curve. Size strengthens companies' resilience to external or environmental shocks (Awa et al., 2015).

Effect of mobile money

The number of e-commerce users increases when payments can be made securely and easily, thanks to effective solutions involving banking and non-banking operators. By adopting reliable payment systems, developing countries can offer new opportunities to consumers and businesses. Using parametric and non-parametric approaches, Jacolin et al. (2019) find that increased use of mobile financial services contributes to a reduction in the size of the informal sector in a sample of 101 emerging and developing countries.

Mobile technology is a key driver of e-commerce services in developing countries, particularly in Africa (GSMA & CEA, 2021). In addition to being the main platform used to access the Internet (given the lack of fixed broadband infrastructure), mobile technology also facilitates online payments through mobile money, which addresses the challenge of low bank card penetration and the risks associated with cash payments. The mobile money system offers a level of flexibility that tends to integrate the poorest social classes, who are unable to obtain bank accounts due to their unaffordable costs and management terms. Unlike banks, mobile money offers several advantages (Ahuja & Khazanchi, 2016; Massanga & Miere, 2020; CEA, 2020; GSMA & CEA, 2021): (i) free account opening for subscribers who have reached the age of majority, (ii) free savings transactions with relatively low and affordable fees, (iii) free financial transactions between subscribers of the same mobile operator or even subscribers of different operators, and (iv) online purchases or sales, as possible with e-banking systems.

The widespread adoption of digital payments in China has fostered the expansion of the broader digital ecosystem, with the emergence of a number of hyper-scale e-commerce players that dominate their

domestic markets and are increasingly seeking to expand internationally (GSMA & CEA, 2021). WeChat Pay and Alipay have approximately 1 billion and 1.2 billion active users worldwide, respectively, compared to approximately 0.5 billion for Apple Pay (GSMA & CEA, 2021).

However, the method of payment for commercial transactions via e-commerce platforms is up to customers, who can choose between mobile money, cash payments (recommended for low-cost transactions) and bank debits (considered more secure but unaffordable for the poor). In developing countries, there is a predominant cash payment culture, which does not facilitate the use of new payment methods (mobile money, credit cards and debit cards). For e-commerce transactions, cash on delivery is a very popular payment method. In some cases, this type of payment allows customers to return the products they have ordered without making any payment, which increases losses and the risk of theft for service providers. This manual payment process also introduces procedural inefficiencies, such as delays in settling payments to suppliers. In addition, many consumers are unaware of the advantages of new payment methods, including enhanced security compared to cash transactions. Bidiassé & Mvogo (2019) identified certain factors that inhibit the adoption of mobile money by individuals in Cameroon: lack of information about how the product works (65.43%), fear of system failure when using mobile money (44.44%), the risk of loss (36.42%), and security and lack of trust (28.40%).

Securing a new means of payment promotes e-commerce by strengthening consumer confidence, who feel protected against cybercriminals and confident that they will not lose their income even if they lose their bank card (Bounie & Bourreau, 2004). The flexibility of mobile money has some well-known drawbacks, which can put the assets and information of mobile payment system subscribers at risk. The rise in cybercrime in developing countries is a threat that makes mobile subscribers feel unsafe. This contributes to a lack of trust that prevents consumers from choosing new payment methods for e-commerce transactions (Lawrence & Tar, 2010; Olatokun & Bankole, 2011). Olatokun & Bankole, 2011). GSMA & CEA (2021) indicate that in the US, mobile phones account for 85% of customer visits. However, only a quarter of total e-commerce sales in the US were completed via mobile phones in 2019.

Smartphones and tablets, with their new operating systems, pose new threats to the security and safety of business information and customer data, particularly for SMEs that lack the financial resources and security infrastructure that larger companies may have. Some companies, particularly SMEs, may use mobile phones to conduct business operations, but they often lack the IT and technology security personnel to properly secure these devices (Harris & Patten, 2014).

Proximity effect or epidemic effect

Proximity effects can influence the adoption of technologies: the presence of companies that have adopted a technology in the vicinity of a company can increase the likelihood that it will adopt that technology or a similar one itself. This suggests that the agglomeration of firms promotes the diffusion of new technologies.

Some studies have reaffirmed this result, particularly in terms of the adoption of ICTs and mobile money. To our knowledge, no study has tested the proximity effect or epidemic effect on the adoption of e-commerce. Concerning other technologies, empirical studies have shown that epidemic effects play a very important role in the inter-firm diffusion of NICTs in both developed and developing countries (Karshenas & Stoneman, 1993; Ben Youssef et al., 2010; Gallego et al., 2015; Fambeu, 2017). Bartoloni & Baussola (2001) demonstrate that the epidemic effect had positive effects on the adoption of ICT in manufacturing industries in Italy. Similarly, Battisti et al. (2004), using data from a sample of 438 metalworking factories established in Italy between 1970 and 1996, show that there is a contagion effect linked to the adoption of computer-aided design software among the growing number of users of these technologies. However, these authors point out that this effect does not work when it comes to the diffusion of an organisational practice (the establishment of design teams between customers and suppliers) rather than a technology. At the same time, Hollenstein (2004), using an ordered probit model to estimate ICT adoption equations on a sample of Swiss companies, finds a significant and positive impact of the epidemic effect. Subsequently, Bocquet & Brossard (2008) show that the proximity effect promotes the adoption of information and communication technologies in France. Ben Khalifa (2016) shows that when the number of companies adopting ICTs increases, their diffusion spreads rapidly among firms located in the same region. The tacit transmission of information and knowledge about a new technology or innovation in the information system between companies in a locality encourages their adoption by firms that do not yet use it.

The proximity effect or epidemic effect is often measured simply by the number of companies that have adopted a technology or the rate of adoption of a technology by companies in a given neighbourhood (Bartoloni & Baussola, 2001). However, the use of these epidemic effect indicators suffers from several shortcomings (Bocquet & Brossard, 2008):

- ✓ it is often the case that relatively distant companies are treated as neighbouring companies;
- ✓ the equipment rate is a relatively imperfect proxy variable for the epidemic effect, as it does not take into account the (negative) impact of non-adopting neighbours;
- ✓ the use of administrative areas to define neighbourhoods often leads to edge effects because observations located on either side of administrative boundaries are considered distant when they are in fact close. This is not the case when distance matrices are used.

To remedy this, Bocquet & Brossard (2008) constructed a technological proximity variable defined as follows: the number of companies located within 15 minutes of a given company and having made the same technological choice is counted. The figure obtained is then divided by the number of companies located within a 15-minute radius of the company under observation. This variable, therefore, represents the effects of localised knowledge diffusion but does not provide information on the channels of diffusion.

Effects of education

When the level of education of company managers is high, the company is more likely to adopt e-commerce (Sanna et al., 2007; Chuang et al., 2009; Federici, 2009; Tan & Ludwig, 2016; GSMA, 2019). Education can enable managers to overcome certain barriers to the adoption of e-commerce: insufficient computer skills (Zaied et al., 2007), difficulties in changing existing work procedures (Olatokun & Bankole, 2011), lack of technical know-how (Ramsey et al., 2003), and lack of information about e-commerce (Kartiwi & MacGregor, 2011). Bankole, 2011), lack of technical know-how (Ramsey et al., 2003), lack of information about e-commerce (Kartiwi & MacGregor, 2007) and language barriers (Lawrence & Tar, 2010).

In developing countries, the level of education is often relatively low. The least educated people generally have limited access to information on the internet, as they have difficulty reading and understanding the languages used. Education affects proactive and/or reactive approaches to rapid technological change. To a large extent, the level of education shapes an individual's value systems, cognitive preferences, learning ability, dexterity and capacity for innovation. To take advantage of e-commerce, modern education or capacity-building programmes need to be expanded to include skills development and entrepreneurship for digital markets. In addition to basic skills (reading, writing and arithmetic), e-commerce actors must be proficient in digital tools and business development, and be able to adapt their cognitive, social and technical skills to the digital economic environment (World Bank, 2017).

2.2. Theoretical framework

In theoretical literature, e-commerce is considered a technology. Numerous theories have been developed in economic literature to examine the adoption of e-commerce. The most commonly used of these are the theory of reasoned action (TRA), the theory of planned behaviour (TPB), the technology acceptance model (TAM), the innovation diffusion theory (IDT) and 's technological, organisational and environmental framework model (TOE), Hofstede's cultural dimension theory and the model proposed by Hsu et al (2006). However, it has been shown that some of these theoretical models (namely TRA, TAM, TPB and Hofstede's cultural dimension) are only appropriate for analysing the adoption of a technology at the individual level and not at the company level (Alrousan & Jones, 2016).

Three of the four factors likely to influence the adoption of e-commerce and highlighted in the previous section, namely company size, mobile money use and the proximity effect, are taken into account by the TOE model. The TOE model, developed by Tornatzky & Fleischer (1990), is considered a solid theoretical basis for identifying the factors influencing the adoption of e-commerce by companies, particularly SMEs (Oliveira & Martins, 2011). This model groups the explanatory factors for e-commerce adoption into three categories: technological context, organisational context and environmental context. This model predicts interactions between certain factors in the technological, organisational and environmental contexts.

With regard to the technological context, it takes into account the use of internal and external technologies relevant to the organisation to explain the adoption of e-commerce. These technologies include computers, the internet, intranets, mobile phones and related services such as mobile money. An empirical assessment of the effect of mobile money use on the adoption of e-commerce has not yet been conducted.

In terms of organisational context, company size is considered one of the factors explaining the adoption of e-commerce. Other factors identified include the scope, preparation and awareness of ICT among employees, the complexity of the management structure and financial resources.

The environmental context takes into account external factors or factors related to the environment in which the company operates. These factors include government support, relationships with suppliers and customers, and competition. Although not yet tested empirically, the proximity effect can be added to this list. The proximity effect, or epidemic or contagion effect, highlights the fact that when one company adopts a technology, it is highly likely that companies located in its vicinity will follow suit. The general idea behind this geographical proximity is that a company's neighbourhood can influence its propensity to adopt new technologies (Galliano & Roux, 2006).

Epidemic or contagion diffusion models, developed in geographical economics, consider that information about a technology is decisive for its adoption and that it is costly. Each company that adopts

a technology can generate a positive externality by transferring information to other companies located in its neighbourhood. While recognising their validity in certain empirical studies, epidemic or contagion diffusion models have often been criticised, in particular because of their uniform treatment of firms, which are assumed to have an identical probability of being infected. These models focus primarily on the aggregate behaviour of companies, virtually ignoring the decision-making process at the individual level (Grolleau, 2001). However, not all companies have the same information, in the same quantity, at the same time.

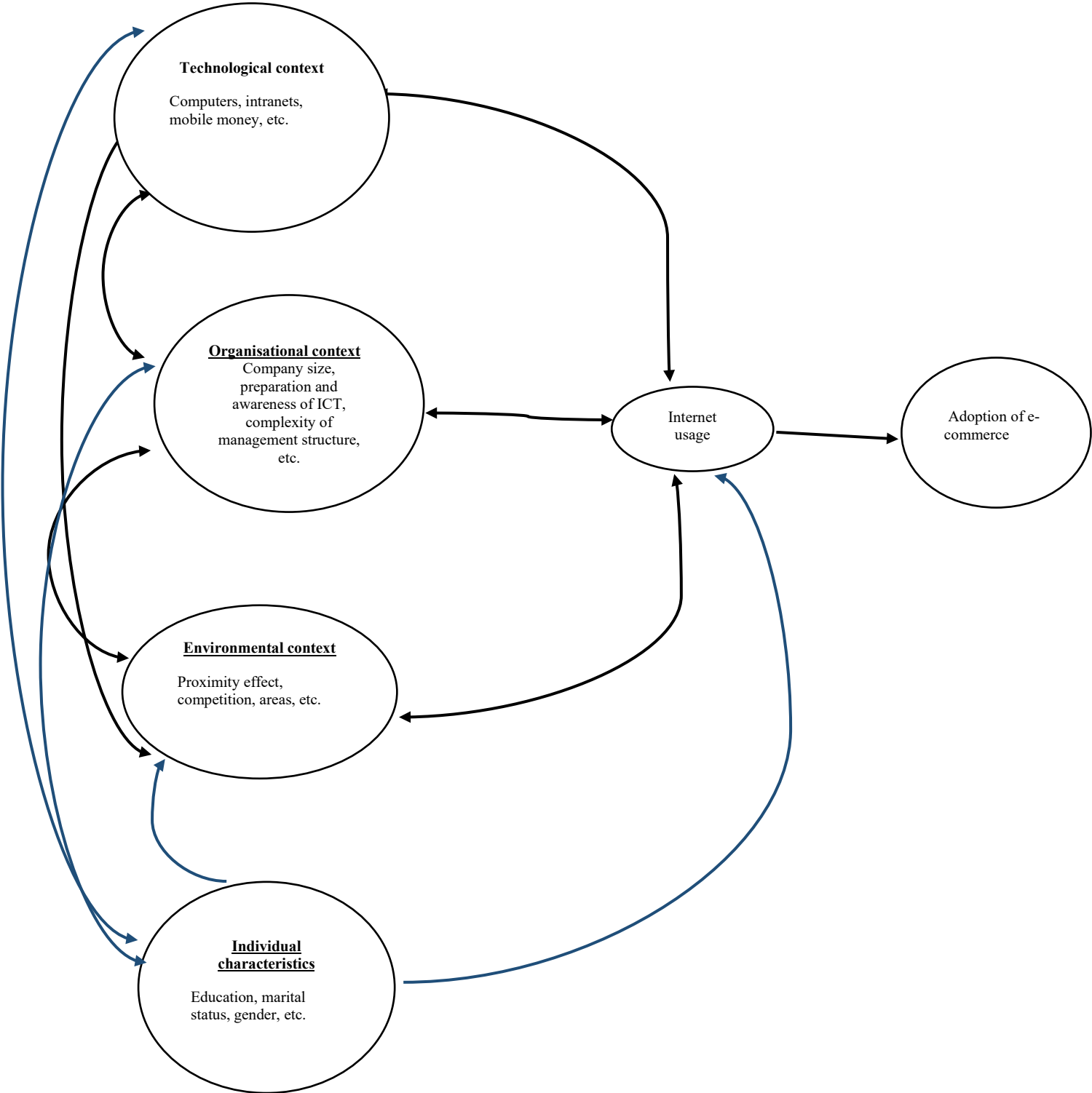
Extension of the TOE model: taking into account the individual characteristics of company managers

Ontologically, the TOE model does not take into account the individual characteristics of company managers to explain technology adoption (Hashim, 2007; Ghobakhloo & Tang, 2013). Many researchers have therefore argued in favour of extending the TOE model by adding a fourth context that incorporates the individual and managerial characteristics of company managers (Bao & Sun, 2010).

The TAM model considers the ease of use of technologies (internet, computers) as one of the key factors in the adoption of an innovation or technology such as e-commerce (Van der Heijden et al., 2003). The individual characteristics of managers (particularly their level of education) are also considered to be determining factors in the adoption of e-commerce by small businesses in developing countries. For example, in most small businesses, strategic decisions are mainly made by the manager/owner. Cloete et al. (2002) found that the adoption of e-commerce by small businesses largely depends on the acceptance of e-commerce technology by the business owner. If the manager of the business has a high level of education, there is a strong likelihood that the business will engage in purchasing and/or sales via e-commerce.

The TOE model is based on discrete choice theory, as it describes the choice behaviour of a company (individual) when faced with mutually exclusive alternatives (the cardinal number of the set of choices is finite). In the standard microeconomic approach, it is assumed that each individual has a complete and transitive preference relationship so that all alternatives can be compared and ranked. Furthermore, each individual is assumed to always choose the alternative they prefer over all others. Le Guel et al. (2005) indicate that the analysis of e-commerce adoption can be carried out using discrete choice models. These models, which are commonly used in economics, make it possible to identify the determinants of individual choices (McFadden, 2001).

Figure2 : Framework of factors affecting the adoption of e-commerce



3. Method

In this section, we will justify the choice of the econometric model and describe it. We will then focus on presenting the data source, followed by a discussion of the choice of variables for this model.

3.1. Choice of econometric model

Several statistical and econometric methods have been used in the empirical literature to analyse the determinants of trade adoption. These include the Heckman selection bias correction probit model (Le Guel et al., 2005), the bivariate probit model (Suire, 2007), qualitative analysis (Agwu, 2015), and the multiple regression model (Ghobakhloo et al., 2011; Ahmad et al., 2014; Rahayu & Day, 2015), partial least squares regression (Liu & Wei, 2003; Pavlou & Fygenson, 2006), logistic regression (Wanyoike et al., 2012; Solaymani et al., 2012; Van Huy et al., 2012; Lv et al., 2018), the ordered multinomial logit model (Lip-Sam & Hock-Eam, 2011) and comparative qualitative analysis (Chaparro-Pelaez et al., 2016). These studies mostly used cross-sectional data.

The main weakness of many of these methods is that they do not take into account the possibility of selection bias in the relationship between internet access and e-commerce adoption. The decision to access the internet and the decision to adopt e-commerce are closely linked, since the adoption of e-commerce is conditioned by internet use. Only companies that use the internet can adopt e-commerce²⁶. From this point of view, the e-commerce adoption model (online purchasing and/or sales) that only concerns internet-using companies may be subject to selection bias. To correct this selection bias, Le Guel et al. (2005) used Heckman's method (1979) in a study conducted in the Brittany region of France on a sample of 2,000 households.

Furthermore, no empirical study has examined the effect of mobile money use on e-commerce adoption. It is possible that mobile money use promotes e-commerce adoption. However, this relationship may be subject to endogeneity bias, as it is assumed that people who adopt e-commerce may choose to use mobile money services.

To simultaneously correct for the selection bias and endogeneity bias mentioned above, we will use a probit model with endogeneity bias treatment and selection bias correction²⁷. This is a discrete choice model.

²⁶ As indicated by the definition of e-commerce used by the INS (2018)

²⁷ See Articles 4, 5 and 6 of Law No. 2010/001 of 13 April 2010 on

The theoretical framework outlined in the previous section clearly shows that the adoption of e-commerce can be analysed using discrete choice models (Le Guel et al., 2005). Discrete choice models enable the determinants of individual choices to be identified and examined (McFadden, 2001). The probit model with endogeneity bias treatment and selection bias correction has not yet been used to analyse the adoption of e-commerce, but it has been developed by some authors (Roodman, 2011; Bartus & Roodman, 2014).

This model is structured as follows:

$$ECOM_i = \begin{cases} 0 & \text{if } INT = 0 \\ 1(X_i\beta + MOMO_{b1i}\beta_{b11} + \varepsilon_i) & \text{if } INT = 1 \end{cases} \quad (1)$$

$$MOMO_i = \begin{cases} 0 \\ 1(Z_{bi}\alpha_b + \varepsilon_{bi}) \end{cases} \quad (2)$$

$$INT_i = \begin{cases} 0 \\ 1(Z_{si}\alpha_s + \varepsilon_{si}) \end{cases} \quad (3)$$

Equation 3, which is the selection equation, identifies the factors that explain access to the internet. The variable *INT*, "company access to the internet", is also a dichotomous variable that takes the value 1 if the company has access to the internet (either directly within the company or through an external source, such as an internet café) and 0 if it does not. Equation 2 estimates the explanatory factors for mobile money use. The variable *MOMO* is a dichotomous variable that takes the value 1 if the company uses mobile money and 0 otherwise. Equation 1 identifies the explanatory factors for the adoption of e-commerce. The variable *ECOM* "adoption of e-commerce" is a binary variable that takes the value 1 if the company adopts e-commerce and 0 otherwise. In addition, we assume that *ECOM* is observable only if $INT_i = 1$ and not observable if $INT_i = 0$.

E-commerce can mean several things. In some studies, e-commerce adoption is measured by having a website, an email address, an intranet, a virtual private network, an internet connection, electronic funds transfer, or electronic data interchange (Al-Qirim, 2007; Tan et al., 2007; Ghobakhloo et al., 2011). To measure the adoption of e-commerce, Shah Alam et al (2008) considered the following operations carried out via the internet: the use of web pages, the sale of products, the purchase of supplies, the replenishment of suppliers, the entire procurement function, and purchases from suppliers and commercial transactions. Pearson & Grandon (2005) constructed a composite index based on 38 explanatory factors for e-commerce adoption using discriminant analysis. Lefebvre et al (2005) constructed a composite index of e-commerce adoption by averaging 36 uses of e-commerce. Daniel et al. (2002) used an e-commerce adoption variable based on 16 variables. Lip-Sam & Hock-Eam (2011) used a 5-point variable to measure the level of e-commerce adoption.

These composite e-commerce indices often contain certain biases because they do not measure only the fact of buying and/or selling via e-commerce platforms. For example, having an internet connection does not necessarily mean that one conducts transactions via e-commerce platforms. In our study, following Van Huy et al (2012), we consider e-commerce to be the act of conducting sales and/or purchases via the internet.

X_i , represents the vector of exogenous explanatory variables that influence the adoption of e-commerce. Z_s , represents the vector of explanatory variables of the selection equation or the internet access equation. Z_b , represents the vector of explanatory variables of the mobile money usage equation. α_s , is a vector of coefficients of the selection equation, α_b is a vector of coefficients of equation 2, and β is a vector of coefficients of the e-commerce adoption equation. ε , represents the error term vectors in the different equations. This model is estimated using the maximum likelihood technique. The unobserved errors ε_i ; ε_{bi} , and ε_{si} follow a multivariate normal distribution with mean 0 and covariance:

$$COV = \begin{bmatrix} 1 & \rho_{1s} & \rho'_{1b} \\ \rho_{1s} & 1 & \rho'_{sb} \\ \rho_{1b} & \rho_{sb} & 1 \end{bmatrix}$$

3.2. Data source

In the literature, most empirical studies in the field of e-commerce have been conducted using survey data. Most of these surveys are conducted online, and non-response rates are often quite high. As a result, it has often been difficult to obtain samples of more than 1,000 companies.

To analyse the adoption behaviour of e-commerce among businesses, we will use data from the RGE-2 survey conducted by the INS (2018). One of the specific objectives of the RGE-2 is to calculate structural indicators for the productive sector, which cannot be monitored through a sample survey.

The geographical scope of this operation is the entire national territory. The sampling plan is stratified into two levels. At the end of this RGE-2, the total number of businesses and establishments surveyed was 209,482, all of which were geographically locatable and operating from fixed business premises or a developed site. Certain categories of businesses, including street vendors, open-air stalls, taxis, motorcycle taxis and call boxes, were therefore excluded from the scope of the operation.

In our study, the sample was selected based on the following criteria: businesses providing information on internet use, e-commerce adoption and mobile money adoption. This ultimately resulted in a sample of 145,439 businesses. RGE-2 data have not yet been used to examine the adoption of e-commerce in Cameroon.

This database provides information on factors identified in the literature that are likely to influence the adoption of e-commerce by businesses: the regulatory framework, internet use, intranet use, computer use, postal addressing, transport and logistics difficulties, mobile money use, tax-related difficulties, difficulties in accessing finance, difficulties in accessing electricity, difficulties related to market access or outlets, sector of activity and branches of activity, lease status, difficulties in accessing raw materials and inputs, difficulties related to labour market malfunctions, the lifespan of businesses, the marital status of the promoter and the level of education of entrepreneurs.

To measure the adoption of e-commerce, businesses were asked whether they "operate purchasing and/or sales operations via e-commerce platforms". This database has three main limitations: (i) it does not distinguish between companies' sales and purchases via e-commerce, (ii) it does not provide information on the products traded (quantities and transaction values), and (iii) it does not provide information on the frequency of companies' online purchases or sales.

3.3. Model variables

Technological factors

INT is the dichotomous variable that measures a company's access to the internet. It takes the value 1 if the company has access to the internet and 0 if it does not.

ORDI is a qualitative variable that measures access to computers. It takes the value 1 if the company has at least one computer and 0 otherwise.

MOMO is a dichotomous variable that takes the value 1 if the company uses mobile money and 0 otherwise.

Environmental and geographical factors

EPI is the quantitative variable that captures the epidemic effect or proximity effect. It measures the proportion of companies using e-commerce within the department²⁸ of the company surveyed. This variable is based on the one used by Bartoloni & Baussola (2001) and Fambeu (2017). We were unable to use the approach suggested by Bocquet & Brossard (2008) due to insufficient information, such as the distance between companies.

CON is a quantitative variable that captures the spatial concentration of companies. It is similar to the concentration ratio and is measured as follows:

²⁸ Cameroon has 58 divisions or departments

$$CON = \ln\left(\frac{\text{number of companies located in a Division } i}{\text{total number of companies located in Cameroon}} * 100\right)$$

ZON is the qualitative variable that provides information on the location of the company. It has six possible values: 0 = other region, 1 = Douala, 2 = Yaoundé, 3 = North-West Region, 4 = West Region, 5 = South-West Region.

Organisational factors

Two variables are used to measure company size: **TAIL** and **LNTAIL**. **TAIL** is a polytomous variable that takes the value of 0 if it is a very small enterprise (between 1 and 5 employees), 1 if it is a small enterprise (between 6 and 20 employees), 2 if it is a medium-sized enterprise (between 21 and 100 employees) and 3 if it is a large enterprise (more than 100 employees). This classification was made in accordance with the law on the promotion of small and medium-sized enterprises in Cameroon²⁹. This variable is provided by the INS database (2018). **LNTAIL** is a quantitative variable that measures the logarithm of the number of employees in the company.

FORMAL is a qualitative variable that captures the formal nature of the company. It takes the value 1 if the company operates in the formal sector and 0 if it belongs to the informal sector. The choice of this variable is linked to the fact that the vast majority of companies in the informal sector are small in size.

DUR is the qualitative variable used to assess the experience of the company. It has three possible values: 0 if the company has been in business for more than 10 years, 1 if it has been in business for between 5 and 10 years, and 2 if it has been in business for between 0 and 4 years. Awa et al. (2015) also use a variable with three categories to measure company experience: (i) at least five years in business, (ii) less than five years in business, and (iii) between five and ten years in business. This definition violates the principle of independence of the modalities of a random variable, since the modalities "at least 5 years in business" and "between 5 and 10 years in business" are linked.

SSA is the qualitative variable used to capture the company's sub-sector of activity. This variable has 7 modalities: 0 sub-sector "Agriculture, livestock farming, forestry, fishing, fish farming", 1 sub-sector "Food industry, mining and hydrocarbons, electricity, natural gas, water and sanitation", 2 sub-sectors "Other manufacturing industries", 3 sub-sectors "Trade and transport", 4 sub-sectors "Accommodation and catering", 5 sub-sectors "Banking, insurance, telecommunications and other business services" and 6 sub-sectors "Construction and other tertiary activities".

²⁹ See Articles 4, 5 and 6 of Law No. 2010/001 of 13 April 2010 on the promotion of small and medium-sized enterprises in Cameroon

LOC is a dummy variable that provides information on the occupancy status of the premises housing the company. It takes the value 1 if the company is a tenant and 0 if it is not.

Individual characteristics of the business promoter

EDU measures the level of education of the business promoter. This qualitative variable has two categories: 0 if the promoter has at most a primary school diploma, 1 if the promoter has a secondary school diploma, and 2 if the promoter has a higher education diploma. This variable is provided by the INS (2018) and INS (2022) databases. Awa et al. (2015) captured education through a variable with two categories.

SEX is the qualitative variable capturing the gender of the business promoter. It has two categories: 0 if female and 1 if male.

SM is the qualitative variable that measures the marital status of the business promoter. It takes the value 1 if they are married and 0 otherwise.

Institutional and other factors

DCJTA is the qualitative variable that captures companies' complaints about corruption, labour legislation and administrative formalities, insufficient dialogue between the public and private sectors, red tape, low confidence in the judiciary, and unfair competition. It takes the value 1 if the firm does not consider its problems related to institutional failures as an obstacle to the development of its activities and 0 otherwise.

ENEO is the dummy variable that provides information on the company's access to electricity. It takes the value 1 if the company has access to electricity and 0 otherwise.

4. Descriptive statistics results

Table 3 shows that the observation rate of the model variables varies between 88% and 100%. It can be seen that 4% of companies have adopted e-commerce. Cameroonian companies appear to have poor ICT connectivity. While 11.90% of companies use a computer, only 6.40% are connected to the internet, and 22.90% carry out financial transactions by mobile phone.

Table3 : descriptive statistics from the analysis of e-commerce adoption by companies

Variables	Observation	Observation rate in %	Mean	S.D.	Minimum	Maximum
ECOM						
Does not use e-commerce	145,439	10	0.960	0	0	1
Adopts e-commerce	145,439	1	0	0	0	1
SEX						
Female	137,529	94,561	0.372	0.483	0	1

	Male	137,529	94.561	0.628	0.483	0	1
SM							
	Not married	134,047	92,167	0.350	0.477	0	1
	Married	134,047	92,167	0.650	0.477	0	1
EDU							
	<i>The manager has at least a primary school diploma</i>	127,475	87,648	0.512	0	0	1
	<i>The manager has a secondary school diploma</i>	127,475	87	0	0	0	1
	<i>The manager has a higher education qualification</i>	127,475	87,648	0	0	0	1
TAIL			0				
	Micro-enterprises	145,430	99.993	0	0	0	1
	Small businesses	145,430	99.993	0.016	0	0	1
	Medium-sized companies	145,430	99.993	0.004	0.067	0	1
	Large companies	145,430	99.993	0.002	0.048	0	1
LNTAIL		145,430	99.993	0.742	0.405	0	9,829
FORMAL							
	Informal sector enterprise	140,628	96.69	0.968	0	0	1
	Formal sector enterprise	140,628	96.69	0	0	0	1
SSA							
	Agriculture, livestock farming, forestry, fishing, fish farming	145,439	1	0.001	0.031	0	1
	Food industry, mining and hydrocarbons, electricity, natural gas, water and sanitation	145,439	1	0	0	0	1
	Other manufacturing industries	145,439	100	0.149	0	0	1
	Trade and transport	145,439	100	0.532	0.499	0	1
	Accommodation and food services	145,439	10	0.109	0.312	0	1
	Banking, insurance, telecommunications and other business services	145,439	1	0	0	0	1
	Construction and other tertiary activities	145,439	10	0	0	0	1
ZON							
	Other regions	145,439	100	0.230	0.421	0	1
	Douala	145,439	100	0.326	0.469	0	1
	Yaoundé	145,439	100	0.194	0.395	0	1
	North-West Region	145,439	1	0	0	0	1
	Western region	145,439	1	0	0	0	1
	South-West region	145,439	1	0.076	0	0	1
DUR							
	The company has been in business for over 10 years	137,762	94,721	0.167	0	0	1
	The company has been in business for between 5 and 10 years	137,762	94,721	0	0	0	1
	The company has been in business for between 0 and 4 years	137,762	94,721	0	0	0	1
DCJTA			0				
	The company considers its problems related to institutional failures to be an obstacle to the development of its activities.	145,259	99.87	0	0	0	1
	The company does not consider its problems related to institutional failures to be an obstacle to the development of its activities.	145,259	99	0	0	0	1
MOMO							
	Does not use mobile money	144,960	99,670	0.771	0	0	1
	Mobile money usage	144,960	99.67	0	0	0	1
LOC							
	Not a tenant	142,833	98,208	0.152	0	0	1
	Tenant	142,833	98.208	0.848	0.359	0	1
ENEO							
	The company does not have access to electricity	133,800	91,997	0.195	0	0	1
	The company has access to electricity	133,800	91,997	0.805	0	0	1

INT		0				
The company does not have internet access	145,439	1	0.936	0	0	1
The company has access to the internet	145,439	1	0.064	0	0	1
COMPUTER		0				
The company does not use computers	145,004	99.7	0	0	0	1
The company uses at least one computer	145,004	99	0	0	0	1

Table 4 provides information on the joint frequencies and conditional frequencies of e-commerce adoption. It should be noted that the conditional frequency of e-commerce adoption is the proportion of companies that adopt e-commerce given that they have modality j of a given explanatory variable. It also makes it possible to measure the e-commerce adoption rate for each modality j of a given explanatory variable.

It should be noted that 3.97% of companies have access to the internet and have adopted e-commerce. The e-commerce adoption rate is 60.98% among companies with internet access. On the other hand, we note that no companies with internet access have adopted e-commerce. These results suggest that internet access is a prerequisite for the adoption of e-commerce. There is also a presumption of selection bias.

We observe that 2.73% of companies use mobile money and have adopted e-commerce. The e-commerce adoption rate is 11.93% among companies that use mobile phone money services. In addition, it was found that 3.30% of companies that use a computer have adopted e-commerce. The e-commerce adoption rate is 27.63% among companies that own a computer.

It should be noted that the e-commerce adoption rate is 3.14% among very small businesses, 32.51% among small businesses, 50% among medium-sized businesses and 65.21% among large businesses. This suggests that the adoption of e-commerce increases with the size of the business. Similarly, it is also noted that approximately 39.43% of businesses in the formal sector have adopted e-commerce, compared to 2.48% of businesses in the informal sector. There is therefore a significant disparity in terms of e-commerce adoption between the formal and informal sectors.

The e-commerce adoption rate is:

- ✓ 4.14% among companies located in Douala, 4.54% among companies located in the North-West region, 5.11% among companies located in Yaoundé, 5% among those located in the South-West region, compared to 2.69% among companies located in other regions;
- ✓ 39.02% in the "Banking, insurance, telecommunications and other business services" sub-sector, 10% in the "Agriculture, livestock, forestry, fishing and fish farming" sub-sector. However, it does not even reach 10% in other sub-sectors;
- ✓ 4.20% among companies whose promoter is male, compared to 2.07% among companies whose promoter is female;

- ✓ 0.93% in companies where the promoter has at most primary education, compared with 17.43% in companies where the promoter has higher education.

Table4 : joint frequencies and conditional frequencies (in %)

Variables	Modalities	Joint frequencies		Conditional frequencies of e-commerce adoption or e-commerce adoption rates
		No adoption of e-commerce	Adoption of e-commerce	
		ECOM		
INT	No internet access	93	0	0
	Internet access	2.4	3.97	57.47
MOMO	The company does not use mobile money	76.0	1	1
	The company uses mobile money	2	2.7	1
COMPUTE R	The company does not own a computer	87	0	0
	The company has at least one computer	8.6	3.3	2
FORMAL	Informal sector company	94.4	2.41	2
	Formal sector enterprise	1.9	1.2	39.
TAIL	Very small enterprise	94.62	3.07	3.14
	Small business	1.10	0.53	32.51
	Medium-sized business	0.22	0.22	50
	Large company	0.09	0.15	65.21
SSA	Agriculture, livestock farming, forestry, fishing, fish farming	0.08	0	10
	Food industry, mining and hydrocarbons, electricity, natural gas, water and sanitation	1	0	3
	Other manufacturing industries	14	0.	1.94
	Trade and transport	51.74	1.49	2.79
	Accommodation and food services	10.7	0.19	1.7
	Banking, insurance, telecommunications and other business services	1	0.64	39.02
	Construction and other tertiary activities	1	1.29	7.21
ZON	Other regions	22.38	0.62	2.69
	Douala	31.22	1.35	4.14
	Yaoundé	18.38	0.99	5.11
	North-West Region	7.7	0.37	4.5
	Western Region	9.0	0.26	2.7
	South-West Region	7.2	0.3	5
DCJTA	The company does not consider problems related to institutional failures (corruption, labour legislation and administrative constraints, insufficient dialogue between the public and private sectors, red tape, low confidence in the judiciary, and unfair competition) to be an obstacle to the development of its activities.	37.8	1	4
	The company considers its problems related to institutional failures (corruption, labour legislation and administrative formalities, insufficient dialogue between the public and private sectors, red tape, low confidence in the judiciary, and unfair competition) to be an obstacle to the development of its activities.	5	2	3.3
ENEO	The company does not have access to electricity.	19	0.4	2
	The company has access to electricity	77	3	4
LOC	The company is not a tenant	14.56	0.64	4.2
	The company is a tenant	81.67	3.14	3.7
SEX	Female	36.38	0.77	2.07
	Male	6	2.64	4.2
SM	Not married	3	1.06	3.03
	Married	62.7	2.29	3.52
EDU	Primary education at most	50.7	0.48	0
	Secondary education	39.	1.19	2
	Higher education	6.4	1.36	17.34
DUR	Over 10 years	15.30	1.44	8
	Between 5 and 10 years	19.48	0.74	3.65
	Between 0 and 5 years	61.41	1.63	2.58

5. Econometric results and discussion

Looking at Table 5, the correlation coefficient between the errors affecting internet use and those affecting the adoption of e-commerce is positive and significant. There is, therefore, a selection bias. We can conclude that unobservable factors that increase the chances of having access to the internet also tend to increase the chances of adopting e-commerce. On the other hand, the correlation coefficient between errors affecting mobile money use and errors affecting the adoption of e-commerce is not significant. There would therefore appear to be no endogeneity bias in the relationship between mobile money use and e-commerce adoption. In light of the above, we can estimate our results using only a probit model with Heckman selection bias correction. The procedure for estimating the probit model with Heckman selection bias correction is presented in Appendix 1.

Table5 : econometric results of the probit model with endogeneity bias, treatment and selection bias correction

	Model 1					
	Equation for the adoption of e-commerce		Equation of determinants of internet access		Equation of mobile money usage	
	Coef.	S.D.	Coef.	S.D.	Coef.	S.D.
SEX (ref: female)	0.04	0.04	0.038	0.018	0.005	0.009
SM (ref: no)	-0.039	0	-0.069	0	0	0
EDU (ref: primary education at most)						
Secondary education	0.104	0.05	0.16	0	0	0.009
Higher education	0.371	0.113	0.605	0.026	0.341	0.016
TAIL (ref: Very small enterprise)						
Small business	0.231	0.085	0.344	0.048	0.209	0.039
Medium-sized enterprise	0.166	0.125	0.484***	0.091	0.240	0.080
Large company	0.580	0.184	1.040***	0.187	0	0.139
FORMAL (ref: informal sector)	0.495	0	0.755	0	0.355***	0.02
SSA (ref: Agriculture, livestock farming, forestry, fishing, fish farming)						
Food industry, mining and hydrocarbons, electricity, natural gas, water and sanitation	-0.986	0	-2.469	0	-0.770	0.043
Other manufacturing industries	-0.678**	0	-2.205***	0	-0.639***	0
Trade and transport	-0.661**	0	-2.290***	0.041	-0.685	0
Accommodation and food services	-1.087***	0	-2.549***	0	-0.703	0
Banking, insurance, telecommunications and other business services	-0.495	0	-1.826	0	-0.108	0
Construction and other tertiary activities	-0.709**	0	-2.120	0	-0.649	0
ZON (ref: Other region)						
Douala	2.472***	0.717	-0.065	0.02	0.158***	0.011
Yaoundé	1.848***	0.505	-0.010	0.026	0.017	0.013
North-West Region	-0.194**	0	-0.083	0	0	0
Western region	-0.268***	0	-	0	-	0
South-West region	0.031	0	-0	0	-	0
DUR (ref: More than 10 years in business)						
Between 5 and 10 years in business	0.04	0.103	-0.087	0	-0.254	0.013
Between 0 and 5 years of activity	-0.01	0	-0.191	0	-0.465	0.011
DCJTA (ref: not an obstacle)	-0	0				
EPI	3.090	1.389				
CON	-8.042***	2,299				
MOMO (ref: No)	0.569	0.871				
LOC (ref: No)			0.046	0.024	0.074	0.012
COMPUTER (ref: No)			1.559	0.02		
ENE0 (ref: No)			0.042	0.	0.086	0.01
corr(e,INT1,e,ECOM)					0.268**	0.111
corr(e,MOMO,e,ECOM)					0.218	0.506
corr(e,MOMO,e,INT1)					0.359	0.01

NB: ***, ** and * represent significance at 1%, 5% and 10% respectively

Looking at Table 6³⁰, we see that the coefficient of the inverse of the Mills ratio is significant at the 1% threshold. This confirms the hypothesis of the existence of selection bias.

Companies managed by men are more inclined to adopt e-commerce. However, this result is not significant. As such, it differs from that obtained by Awa et al. (2015) in Nigeria, while it is similar to that obtained by Lip-Sam & Hock-Eam (2011) in Malaysia. Some authors have shown that innovation is adopted more quickly by men than by women (Jimmie & Mukhopadhyay, 2010). In technology-driven markets, the first to adopt new innovations are mainly young men (Lu et al., 2003). According to GSMA (2019), there are significant gender inequalities in the use of NICTs in sub-Saharan Africa: (i) 29% of women use the internet compared to 70% of men, and (ii) 69% of women own a mobile phone compared to 84% of men.

Married people are less likely to adopt the internet and e-commerce. However, although marital status significantly influences internet use, it does not have a significant impact on the adoption of e-commerce. This insignificant result may be linked to the fact that the e-commerce adoption rate among "married" and "unmarried" business leaders is not very different, as shown in Table 4.

It should be noted that all the coefficients for the "*SSA*" variable are insignificant. This result is similar to that obtained by Hong & Zhu (2006). The insignificance of our result may be attributable to the fact that some actors fear information asymmetries in almost the same way in all sub-sectors of activity. Some of these information asymmetries may be linked to the existence of goods whose characteristics can only be truly assessed through physical contact. This includes not only tangible goods, but also services that require interpersonal contact. Information asymmetries are also the result of opportunistic behaviour on the part of sellers. In particular, information disseminated on an open network such as the internet, especially regarding the identity and reliability of sellers (compliance with delivery times), is not guaranteed (Rallet, 2001).

The coefficient of the "*DCJTA*" variable is positive but not significant. The lack of significance may be due to the fact that the *DCJTA* variable is not specific to e-commerce regulations. This result contradicts that obtained by some studies. Zaied (2012) proves that the absence of a legal and regulatory framework is a barrier to the adoption of e-commerce by businesses in Egypt. Similarly, Amornkitvikai & Lee (2020) show that the institutional environment is important for the development of e-commerce in Thailand. Confidentiality and personal data protection are essential in e-commerce operations. Some authors (Swan et al., 1999) have shown that there is a negative relationship between lack of trust in online transactions and customer attitudes, purchase intentions, and purchasing behaviour. Most

³⁰ See Annex 4

economies have enacted regulatory frameworks to protect the privacy of online shoppers, and many have exploited long-standing laws on cross-border data flows to regulate and/or deny access to strategically important personal, non-personal and economic data and information. Cameroon has a law governing e-commerce but does not yet have a law dedicated to the protection of personal data.

The coefficients of the variable "**EDU**" are positive and significant. This shows that the adoption of e-commerce increases with the level of education. Having secondary education and higher education increases the probability of adopting e-commerce by 3.60 points and 13 points, respectively. Education strengthens individuals' technical skills in using certain technologies or adopting innovative web technologies. Furthermore, it is the most highly qualified entrepreneurs who are best able to ensure the introduction and adoption of new technologies, given the uncertainty associated with the introduction of new products and processes. Our result is similar to that obtained by some studies (Lip-Sam & Hock-Eam, 2011), but contrary to that of Amornkitvikai & Lee (2000) and Awa et al (2015).

Increasing company size contributes positively and significantly to the adoption of e-commerce. Small, medium, and large companies are more inclined to adopt e-commerce than very small companies. Being a small, medium, or large enterprise increases the probability of adopting e-commerce by 10.30 points, 9.20 points and 19.30 points, respectively. These results are in line with the predictions of the TOE model and are similar to those obtained by some authors (Hsu et al., 2006; Hong & Zhu, 2006; Kossai et al., 2010; Ghobakhloo et al., 2011; Gallego et al., 2015). As they grow, companies have more financial capital, which can enable them to adopt innovation and acquire equipment. However, our result is contrary to that obtained in other studies (Rahayu & Day, 2015; Amornkitvikai & Lee, 2000).

The sign of the "**MOMO**" variable is positive and significant at the 1% threshold. Mobile money stimulates the adoption of e-commerce. This is because mobile money promotes financial inclusion in a country. Mobile money services enable businesses to carry out financial transactions at any time and in complete security. A company's use of mobile money services increases its likelihood of adopting e-commerce by 29.20 points. The BEAC³¹ (2021) reveals that in 2020, Cameroon alone held 19.50 million electronic money payment accounts, representing 64.80% of the total number in the CEMAC. Cameroon's leadership in electronic money payments is confirmed by the total amount of financial transactions carried out using this tool, which represents 80% of transactions in the CEMAC in 2020. In Cameroon, the total amount of transactions carried out using mobile money in 2020 was 14 times higher than in 2016.

The coefficient of the variable "**EPI**" is positive and significant. The probability of adopting e-commerce increases by 102.10 points for a company located in the vicinity of companies that use e-commerce. This confirms the role of epidemic effects or proximity effects in the adoption of e-commerce. Some of

³¹ BEAC: Bank of Central African States

the behaviors associated with the adoption of e-commerce, therefore, follow a logic of diffusion from one company to another, through a contagion effect. Hong & Zhu (2006) demonstrate that when a company has a business relationship with another company that uses e-commerce, it is more likely to adopt e-commerce itself. In addition, when the behaviour of customers and suppliers is favourable to the use of e-commerce, companies may be encouraged to adopt e-commerce (Van Huy et al., 2011). Some empirical studies have shown that external pressure (from customers, suppliers, or competing companies) promotes the adoption of e-commerce (Oliveira & Martins, 2009; Ghobakhloo et al., 2011; Van Huy et al., 2012; Walker et al., 2016). Companies have often been encouraged to adopt e-commerce as a means of improving their competitiveness (Daniel & Myers, 2000).

The coefficient of the variable "CON" is negative and significant. The probability of adopting e-commerce decreases by 262 points for a company located in a department with a high concentration of companies. The spatial dispersion of companies appears to be important in stimulating the adoption of e-commerce. This result confirms that e-commerce is an important tool for companies wishing to sell or purchase goods and/or services remotely. E-commerce can enable companies to access geographically dispersed or remote markets at reduced cost at the national, regional, and even global level. Askenazy et al. (2010) showed that the share of retail trade accounted for by distance selling (VAD) in France is continuing to grow under the influence of e-commerce.

Compared to those located in "other regions", companies based in the North-West and West regions are significantly less inclined to adopt e-commerce. The probability of adopting e-commerce decreases by 5.10 points and 6.30 points, respectively, for a company located in the North-West region and the West region. In contrast, in the cities of Douala and Yaoundé, the coefficients are positive and significant. The probability of adopting e-commerce increases by 50.10 points and 39.80 points for a company located in Douala and Yaoundé, respectively. Douala (economic capital) and Yaoundé (political capital) are the two largest cities in Cameroon. These two cities are home to the headquarters of the main internet service providers in Cameroon, including CAMTEL, ORANGE, MTN, and NEXTTEL. However, the coefficient is positive but not significant in the south-west region. Yet the city of Buea, which belongs to this region, is experiencing a technological boom. Silicon Mountain is the name chosen to describe this technological ecosystem. Favoured by the presence of higher education institutions³², Silicon Mountain is home to a growing community of developers, designers, and business professionals. Like the famous Silicon Valley in the United States, Cameroon's Silicon Mountain is now renowned for its exponential number of start-ups and its facilitation of the growth and implementation of modern technologies. Overall, our results differ from those of the study conducted by Le Guel et al. (2005),

32 The University of Buea, the Catholic University of Buea, Saint Monica University and many other leading institutions

which found that individuals' place of residence has no significant impact on their online purchasing behaviour in France.

Company experience significantly influences the adoption of e-commerce. Younger companies are more likely to adopt e-commerce. The probability of adopting e-commerce increases by 4.70 points for a company with between 5 and 10 years of experience in the field. Our result contradicts that of Amornkitvikai & Lee (2000), who show that the most experienced companies in Thailand are less inclined to adopt e-commerce. Experience is an asset for companies and the best teacher: when acquired consistently, experience has an impact on operations, cost structure, employee morale and productivity, learning curves, and adjustments to market demands (Awa et al., 2015).

6. Sensitivity and robustness analysis of econometric results

The sensitivity analysis of the results will be carried out by conducting an analysis by sub-sector of activity. Barriers to e-commerce on the Internet vary according to sector and company size (OECD, 2004). In the specific case of the food industry, certain factors can hinder the adoption of e-commerce (Salançon, 2006), in particular (i) changes in consumer relations (no tasting, no human contact), which even constitute a threat or a break with tradition, and (ii) the relationship between information and the quality of the products sold is mentioned as a constraint.

We have selected six sub-sectors of activity for this study: **SSA 1** "Food industry, mining and hydrocarbons, electricity, natural gas, water and sanitation", **SSA 2** "Other manufacturing industries", **SSA 3** "Trade and transport", **SSA 4** "Accommodation and catering", **SSA 5** "Banking, insurance, telecommunications and other business services" and **SSA 6** "Construction and other tertiary activities". The **SSA 0** sub-sector "Agriculture, livestock, forestry, fishing and fish farming" was not selected due to its weight in the total sample.

Looking at Tables 7 and 8, we can see that the inverse Mills ratio coefficient is only significant in the case of three groups of activity sub-sectors: **SSA 1**, **SSA 2**, **SSA 3**, and **SSA 6**. If we consider only these four cases, we see that the level of education of the company manager has a positive and significant influence on the adoption of e-commerce in the **SSA1**, **SSA3**, and **SSA6** sub-sectors. Having a secondary education and a higher education increases the probability of adopting e-commerce by 37.9 points, 16.20 points and 6.80 points, respectively, in the **SSA1**, **SSA3**, and **SSA6** sub-sectors.

In addition, company size significantly promotes the adoption of e-commerce in the **SSA1**, **SSA 3** and **SSA4** sub-sectors. Increasing company size increases the likelihood of adopting e-commerce by 11.10 points, 3 points, and 16.40 points in the **SSA1**, **SSA 3** and **SSA4** sub-sectors, respectively.

Furthermore, mobile money can significantly stimulate the adoption of e-commerce in the **SSA1**, **SSA2**, **SSA3**, **SSA4**, **SSA5**, and **SSA6** sub-sectors. The use of mobile money by a company increases the probability of adopting e-commerce by 47 points and 25.40 points, respectively, in the **SSA 1** and **SSA 3** sub-sectors.

In addition, the coefficient of the "**EPI**" variable is positive and significant in the **SSA2** and **SSA 6** subsectors. The probability of adopting e-commerce increases by 360.10 points and 422.80 points for a company located in the vicinity of companies using e-commerce in activity sub-sectors **SSA2** and **SSA6**, respectively.

Table6 : Probit results with Heckman selection bias correction: sector analysis (part 1)

	Model 4						Model 5						Model 6					
	SSA1						SSA2						SSA3					
	INT		ECOM		Marginal effects		INT		ECOM		Marginal effects		INT		ECOM		Marginal effects	
	Coef.	S.D.	Coef.	S.D.	dy/dx	S.D.	Coef.	S.D.	Coef.	S.D.	dy/dx	S.D.	Coef.	S.D.	Coef.	S.D.	dy/dx	S.D.
SEX (ref: female)	0.176	0.317	0.085	1.262	0.02	0.329	0.070	0.05	0.087	0.148	0.030	0.051	0.024	0.027	0.064	0.070	0.021	
SM (ref: no)	-0.477	0.249	0	0	0	0.145	-0.139***	0.049	-0.222*	0.134	-0.077	0.046	-0.070	0.026	-0.060	0.064	-0.02	
EDU (ref: primary education at most)																		
Secondary education	-0.012	0	1.14	0	0	0.207	0.093	0.051	0.202	0.151	0.071	0.054	0.181***	0.028	0.163**	0.078	0.057	
Higher education	1.170	0.291	1.454	0.908	0.379**	0.194	0.455	0.096	0.332	0.215	0.116	0.074	0.569***	0.037	0.484	0.096	0.162	
LNTAIL	0.215	0.139	0.425	0.157	0.111	0.037	0.329	0.082	0.084	0.115	0.029	0.040	0.277***	0.031	0.088	0.044	0.030**	
FORMAL (ref: informal sector)	1.394	0.332	0	0.74	0	0.194	0.777***	0.139	0.559**	0.226	0.194	0.077	0.684	0.051	0.614	0.091	0.208	
ZON (ref: Other region)																		
Douala	-0.387	0.326	-2.174	15.55	-0.436	2.051	0.105	0.067	4.654	2.736	0.572	0.037	-0.072**	0.034	2.240	1.177	0.500***	
Yaoundé	0.045	0.300	-1.084	10.738	-0.194	1.456	0.061	0.074	3.382*	1.876	0.390	0.064	0.001	0.037	1.772**	0.819	0.414	
North-West region	0.190	0.414	0.001	0.02			-0.071	0.096	0.156	0.255	0.027	0.043	-0.049	0.049	0.159	0.124	0.038	
Western region	-0.948	0.548	-1.396	1.111	-0.261	0.912	0.024	0.088	-0.204	0.233	-0.036	0.041	-0.068	0.047	-0.221	0.113	-0.051	
South-West region	-0.287	0.502	-0.045	1.018	-0.007	0.146	0.112	0.099	-0.316	0.292	-0.056	0.052	-0.004	0.049	0.024	0.126	0.006	
DUR (ref: More than 10 years in business)																		
Between 5 and 10 years in business	-0.224	0	0	0	0	0.170	-0.115	0.071	0.231	0.174	0.080	0.061	-0.103***	0.037	0.071	0.086	0.024	
Between 0 and 5 years of activity	0.222	0	0	0.611	0	0.160	-0.220***	0.060	0.139	0.160	0.049	0.056	-0.247***	0.030	0.065	0.075	0.022	
LOC (ref: No)	0.084	0					0.143	0.079					-0.038	0.035				
COMPUTER (ref: No)	1.907	0.275					1.721***	0.06					1.556	0.028				
ENEO (ref: No)	0.261	0.434					0.212	0.080					0.060	0.033				
DCJTA (ref: not an obstacle)			-0.469	0.569	-0.122	0			-0.070	0.128	-0.024	0.044			-0.068	0.060	-0.023	
EPI			-1.316	22.754	-0.343	5.934			10.380	6.271	3.601	2.154			0.283	1.810	0.096	
CON			4.709	48.858	1.227	12.733			-15.018	8.711	-5.210	2.994			-7.197	3.685	-2.431**	
MOMO (ref: No)			1.802	0.902	0.470	0.199			0.726***	0.130	0.252	0.040			0.751	0.061	0.254	
inv mills			1.398**	0.647	0.364**	0.151			0.187	0.103	0.065	0.035			0.341	0.054	0.115	
CONS	-3.124***	0.647	-4.044***	2.277			-2.704***	0.145	-0.878***	0.389			-2.360	0.063	-0.966***	0.198		

NB: *, ** and *** represent significance at 10%, 5% and 1% respectively

Table7 : Probit results with Heckman selection bias correction: sector analysis (part 2)

	Model 7						Model 8						Model 9					
	SSA4						SSA5						SSA6					
	INT		ECOM		Marginal effects		INT		ECOM		Marginal effects		INT		ECOM		Marginal effects	
	Coef.	S.D.	Coef.	S.D.	dy/dx	S.D.	Coef.	S.D.	Coef.	S.D.	dy/dx	S.D.	Coef.	S.D.	Coef.	S.D.	dy/dx	S.D.
SEX (ref: female)	-0.05	0.065	0.013	0	0	0.056	0.240	0.085	0.172	0.133	0.054	0.042	0.085**	0.037	-0.028	0.071	-0.009	0.024
SM (ref: no)	-0.071	0	-0.313	0	-0.102	0.058	0.013	0.082	0.065	0.114	0.020	0.036	-0.033	0.034	0.031	0.062	0.010	0.021
EDU (ref: primary education at most)																		
Secondary education	0.145	0.07	0.181	0	0	0.069	0.346**	0.143	-0.235	0.279	-0.073	0.083	0.193***	0.044	0.003	0.106	0.001	0.036
Higher education	0.345***	0.094	0.463	0.244	0.155	0.083	0.701	0.149	-0.100	0.312	-0.030	0.093	0.687	0.052	0.203	0.118	0.068	0.040
LNTAIL	0.535	0.071	0.499	0.139	0.164***	0.044	0.455	0.101	0.136	0.085	0.043	0.026	0.072**	0.032	-0.040	0.041	-0.013	0.014
FORMAL (ref: informal sector)	0.978	0	0	0	0	0.082	0.857***	0.130	0.112	0.186	0.035	0.058	0.592***	0.064	0.409	0.092	0.137	0.030
ZON (ref: Other region)																		
Douala	0.009	0	-1.389	3.41	-0.381	0.630	-0.208	0.117	2.638	2.425	0.541***	0.156	-0.149	0.047	3.285	1.218	0.528	0.038
Yaoundé	-0.152	0.101	-0.949	2.34	-0.265	0.453	-0.138	0.124	2.099	1.661	0.454***	0.073	0.081	0.053	2.261	0.835	0.376	0.018
North-West region	0.015	0	-0.126	0.301	-0.03	0.082	-0.108	0.162	-0.152	0.219	-0.032	0.052	-0.182***	0.061	-0.645***	0.115	0.118***	0.026
Western region	-0.323**	0	-0.117	0	-0.031	0.102	-0.302	0.159	-0.430*	0.229	-0.089	0.069	0.000	0.065	-0.298***	0.114	-0.056**	0.024
South-West region	-0.245*	0	0	0	0	0.134	-0.154	0.148	0.438	0.258	0.096	0.075	-0.112	0.073	-0.066	0.143	-0.012	0
DUR (ref: More than 10 years in business)																		
Between 5 and 10 years in business	0	0	0	0	0	0.084	0.017	0.120	0.031	0.153	0.010	0.049	-0.028	0.053	0.060	0.093	0.02	0
Between 0 and 5 years of activity	0	0	0	0	0	0.076	-0.029	0.098	0.088	0.139	0.028	0.044	-0.049	0.045	-0.033	0.081	-0.011	0.027
LOC (ref: No)	-0.132	0					0.15	0.124					0.292***	0.048				
COMPUTER (ref: No)	1.243	0.071					1.691***	0.171					1.918	0.039				
ENE0 (ref: No)	-0.001	0.099					-0.124	0.139					0.143**	0.059				
DCJTA (ref: not an obstacle)			0.038	0.161	0.012	0.05			-0.06	0.110	-0.019	0.035			0.068	0.059	0.023	0.020
EPI			-6.002	8.275	-1.967	2.702			-8.015	5.588	-2.517	1.746			12.338***	3.040	4.118***	1.002
CON			4.644	10.794	1.522	3.532			-8.042	7.664	-2.526	2.404			-11.202***	3.849	3.739***	1.278
MOMO (ref: No)			0.706	0.163	0.232	0.049			0.821	0.113	0.258	0.031			1.036***	0.061	0.346	0.016
inv mills			0.063	0.176	0.020	0.058			-0.312	0.338	-0.098	0.106			0.161**	0.071	0.054**	0.024
CONS	-2.769***	0.157	-1.329**	0.660			-2.547***	0.276	0.282	0.574			-2.802***	0.100	-0.743	0.211		

NB: *, ** and *** represent significance at 10%, 5% and 1% respectively

The robustness of the results will be analysed using not the Heckman probit model with selection bias correction, but rather the recursive bivariate probit model, which allows for the correction of endogeneity bias. Several sources of endogeneity bias have been identified in the economic literature: omitted variables, measurement errors, simultaneous variables, and non-random sample selection. Heckman modelling is widely used to remedy sample selection bias. After using the probit model with Heckman selection bias correction, some authors have used recursive bivariate probit to analyse the robustness of their results (Xu et al., 2017; Li et al., 2021).

Table 9 shows that the rho coefficient is significant. This confirms the existence of endogeneity bias.

Concerning the variables of interest, we note that the results mostly show similarities in the sign of the variables compared to those in Table 6. The coefficients of the modalities of the "*TAIL*" variable are all positive and significant. This confirms that an increase in company size significantly promotes the adoption of e-commerce. Being a small, medium, or large company increases the probability of adopting e-commerce by 6.40 points, 9.20 points, and 18.70 points, respectively (see model 10).

The coefficients of the variables in the "*EDU*" category remained positive and significant. The fact that a company is managed by someone with secondary or higher education increases the probability of adopting e-commerce by 1.20 points and 7.00 points, respectively.

Mobile money can significantly stimulate the adoption of e-commerce. The fact that a company uses mobile money increases the probability of adopting e-commerce by 1.30 points. In addition, the coefficient of the variable "*EPI*" is negative and significant.

Table 8 : Results of the recursive bivariate probit

	Model 10						Model 11					
	Coef.	S.D.	Coef.	S.D.	dydx	S.D.	Coef.	S.D.	Coef.	S.D.	dydx	S.D.
SEX (ref: female)	0.152	0.017	0.243	0.02	0.009	0.001	0.153***	0.017	0.243	0.020	0.009	0.001
SM (ref: no)	-0.029	0	-	0	0	0.001	-0.033**	0.017	-0.008	0.019	-0.001	0.001
EDU (ref: primary education at most)												
Secondary education	0.305	0.019	0.427	0.02	0.012	0.001	0.304	0.019	0.426	0.022	0.012***	0.001
Higher education	0.904	0.024	1.163	0.026	0.070	0.003	0.894	0.024	1.157	0.026	0.069	0.003
TAIL (ref: Very small enterprise)												
Small business	0.686	0.044	0.883	0.043	0.064***	0.005						
Medium-sized enterprise	0.899	0.086	1.055***	0.08	0.092***	0.012						
Large company	1.584	0.169	1.416	0.143	0.187	0.035						
LNTAIL							0.385***	0.017	0.430	0.017	0.017	0.001
FORMAL (ref: informal sector)	0.721	0.034	0.457	0	0.156***	0.018	0.705	0.034	0.448	0.054	0.152***	0.018
SSA (ref: Agriculture, livestock farming, forestry, fishing, fish farming)												
Food industry, mining and hydrocarbons, electricity, natural gas, water and sanitation	-0.482	0	-	0	-0.025	0.015	-0.500	0.256	-0.586**	0.258	-0.026	0.016
Other manufacturing industries	-0.309	0.242	-0.475**	0.240	-0.022	0.015	-0.318	0.242	-0.484**	0.242	-0.022	0.015
Trade and transport	-0.342	0.241	-0.462	0	-0.022	0.015	-0.351	0.242	-0.474**	0.240	-0.022	0.015
Accommodation and food services	-0.543**	0.243	-0.778	0.242	-0.029	0.015	-0.554**	0.243	-0.781	0.243	-0.030*	0.015
Banking, insurance, telecommunications and other business services	0.407	0	0	0.242	0	0.016	0.406	0.245	0.590**	0.243	0.054***	0.016
Construction and other tertiary activities	-0.073	0.	-0.046	0.239	-	0.015	-0.077	0.242	-0.048	0.241	-0.004	0.015
ZON (ref: Other region)												
Douala	-0.069***	0.02	0.73	0	0.016***	0.005	-0.070	0.022	0.740**	0.294	0.016	0.005
Yaoundé	0.025	0.024	0.691***	0.205	0.018	0.003	0.024	0.024	0.693	0.205	0.018***	0.003
North-West region	0.003	0	0.075**	0.036	0	0.001	0.004	0.030	0.074**	0.036	0.002	0.001
Western region	-0.042	0	-0.084	0	-	0.001	-0.039	0.030	-0.078**	0.037	-0.002	0.001
South-West region	0.006	0	0.126***	0.039	0	0.001	0.009	0.033	0.132***	0.039	0.003	0.001
DUR (ref: More than 10 years in business)												
Between 5 and 10 years in business	-	0.	0	0	0	0.001	-0.035	0.024	0.067**	0.027	0.002	0
Between 0 and 5 years of activity	-0.187	0	-0.067	0	-	0	-0.185	0.020	-0.065	0.023	-0.004***	0.001
LOC (ref: No)	0.049	0			0.001	0	0.053	0.019			0.001	0.000
COMPUTER (ref: No)	1.090	0			0.013	0	1.080	0.020			0.012***	0.000
ENEO (ref: No)	0.02	0.018			0	0.00	0.017	0.018			0.000	0

DCJTA (ref: not an obstacle)			0.015	0.015	0	0			0.01	0.015	0.000	0
EPI			-2.531***	0.917	-0.074***	0.027			-2.544***	0.918	-0.074***	0.027
CON			0.693	0.445	0.020	0.013			0.652	0.446	0.019	0.013
MOMO (ref: No)			0.441	0.019	0.013	0.00			0.441	0.019	0.013	0.000
CONS	-1.983***	0.243	-2.356***	0.242			-2.241	0.244	-2.642***	0.244		
/athrho	2.042	0.044					2.039	0.044				
rho	0.967	0.003					0.967	0.003				
Wald test of rho=0:	chi2(1) = 2149.330***						chi2(1) = 2159.910***					

NB: *, ** and *** represent significance at 10%, 5% and 1% respectively

7. Conclusion

This study examined the factors explaining the adoption of e-commerce by businesses in Cameroon. As a methodology, certain econometric techniques were used (the probit model with endogeneity bias treatment and selection bias correction, as well as the probit model with Heckman selection bias correction) and applied to a sample of 145,439 companies from the second general business census (RGE-2) conducted by the INS (2018).

The econometric results obtained show that the adoption of e-commerce increases significantly with company size, the use of mobile money, the level of education, and the proximity effect or epidemic effect.

Based on our empirical observations, several measures could be taken in Cameroon to stimulate e-commerce. It seems useful for public authorities and business leaders to adopt measures that can contribute to increasing the size of businesses. With this in mind, businesses can carry out activities to promote innovation, increase the use of ICT, strengthen employee training and improve work organisation. For their part, public authorities can make the economic environment more open, transparent, and predictable. In the same vein, it seems wise for public authorities to encourage and raise awareness among small, medium, and large enterprises to use e-commerce. These public awareness programmes can help to disseminate initial information on e-commerce to businesses. They should be accompanied by presentations of success stories in the adoption of e-commerce and a guide to e-commerce practices (which is a comprehensive online source of information for business leaders seeking quick and easy information on e-commerce). They should help SMEs, SMIs, and large enterprises to assess for themselves the costs, risks, and opportunities associated with e-commerce.

Concerning mobile money, it seems appropriate for business leaders to adopt mobile phone money services. Public authorities can also promote and encourage businesses to use mobile money services. To do so, it seems necessary to reduce the discrimination suffered by small businesses, particularly those in the informal sector, in terms of access to mobile financial services, linked in particular to registration for mobile money accounts, registration of SIM cards used by the business and the authorised daily transaction limit. In Cameroon, registration is a prerequisite for using mobile money services, which limits the adoption of these services, among very small businesses, particularly those in the informal sector. They must gather the necessary documents and take the time to visit a mobile network operator's office, where they must fill out a registration form (a formality that can be intimidating for businesses in the informal sector). The registration of SIM cards used by businesses or individuals is often required as part of the fight against crime. This can slow down the adoption of mobile money by very small businesses in the informal sector, especially if they fear that their data will be misused by certain public bodies to track them down and force them to migrate to the formal sector. The authorised limits on

financial transactions via mobile money may also restrict the operations of businesses in the informal sector. The current financial transaction thresholds in terms of value and volume are rather restrictive and not conducive to commercial activity. The daily limits on authorised money transfers should therefore be revised upwards. In addition, the provisions of the 2022 Finance Act relating to the introduction of a 0.2% tax on mobile money transfers and withdrawals should be revised. This tax measure is akin to double taxation, which may be detrimental to the use of mobile money in e-commerce transactions. Business promoters must also diversify the sources of payment for the purchase or sale of products on the market. Consideration should also be given to cooperation between mobile money service providers, particularly in terms of interoperability.

Concerning the proximity effect, decentralised local authorities (particularly district councils) should take action to promote the adoption of e-commerce at the local level. For example, decentralised local authorities should equip various areas within their territory with free public Wi-Fi. Internet coverage is provided by the installation of Wi-Fi hotspots. These Wi-Fi infrastructures can also be used by entrepreneurs in the informal sector.

With regard to education, it seems necessary to strengthen the knowledge and skills of local businesses in the field of e-commerce. To this end, substantial support should be provided to businesses to strengthen their digital culture, including the establishment of a mechanism dedicated to building the e-commerce capacity of business leaders and staff. Finally, e-learning sessions can bring together all e-commerce stakeholders (businesses, consumers, and national authorities) to strengthen cooperation and accelerate the development of e-commerce. These training courses should enable businesses to (i) develop e-commerce strategies, (ii) evaluate different tools and platforms in this field, and (iii) learn about digital marketing.

Although the results of our study provide an overview of some of the very important factors influencing the adoption of e-commerce by businesses in Cameroon, there are some limitations related to the absence of certain explanatory variables, including purchasing behaviour and expenditure via e-commerce, sales and turnover via e-commerce, products traded via e-commerce, the importance of e-commerce, the quality of the internet network and the use of mobile banking. The INS database (2022) provides some of this information, but the small sample size (248 companies) and its lack of representativeness meant that it could not be used. Some authors recommend not using probit with Heckman selection bias correction when the sample size is small (Ami & Desaignes, 2000; Lollivier, 2001). It would be desirable for the INS to take this information into account when preparing the third general census of enterprises in Cameroon.

8. Appendices

Appendix 1: Heckman's two-stage selection model

Box:

We will estimate a binary model in which a specific part of the sample is observed. Our model is based on the analytical framework proposed by Heckman (1979) and refined by Van de Ven & Van Praag (1981), in which the equation of interest is binary.

The model is presented as follows:

INT and $ECOM$ are two binary variables such that $ECOM$ is observable only if $INT = 1$. Assuming that $INT^* = Z'\gamma + \eta$, is an unobservable latent variable of utility in the face of binary choices (having access to the internet or not), then we assume that $INT = 1$ (the choice is observed) only if $INT^* > 0$ and $INT = 0$ otherwise.

In the case where $INT = 1$, the business promoter is faced with a second binary choice $ECOM$ and $ECOM^* = X'\beta + \varepsilon$, can be perceived as an unobservable latent variable of utility when faced with the second binary choice (adopt e-commerce or not). In this case, $ECOM = 1$ if $ECOM^* > 0$ and $ECOM = 0$ if $ECOM^* < 0$.

By introducing β and γ to explain the latent propensities of the binary choices INT and $ECOM$, we can define a system of two equations.

The first equation (**selection equation**):

$$probit (INT = 1 | \gamma) = Z'\gamma$$

INT^* can be represented by a probit model in which the utility associated with internet access ($INT = 1$) is explained by a set of factors such as level of education (EDU), company size (TAIL1, TAIL2, TAIL3 or FORMAL), use of mobile money (MOMO) and the proximity effect (EPI).

$$INT_i = \gamma_0 + \gamma_1 TAIL_i + \gamma_2 EDU_i + \gamma_3 MOMO_i + \gamma_4 EPI_i + \delta Y + \eta_i$$

Since internet access is not directly observable, the dependent variable (INT_i) is a dichotomous variable taking the value 1 if the company has internet access and 0 otherwise. The explanatory variables are similar to those presented in the simple probit model (model 1). This selection equation is similar to an intermediate step necessary for studying the determinants of internet access. Indeed, only companies with internet access can have internet access.

The second equation (**equation of interest**) is defined only if $INT = 1$:

$$probit (ECOM = 1 | \beta) = X'\beta$$

$ECOM^*$ can be represented by a probit model in which the utility associated with the adoption of e-commerce ($ECOM = 1$) is explained by a set of factors such as company size, level of education, use of mobile money and the proximity effect.

$$ECOM_i = \beta_0 + \beta_1 TAIL_i + \beta_2 EDU_i + \beta_3 MOMO_i + \beta_4 EPI_i + \beta_5 Millinverse_i + \theta X + \varepsilon_i$$

As the utility associated with the adoption of e-commerce is not directly observable, the explained variable $ECOM_i$, is a dichotomous variable taking the value 1 if the company has adopted e-commerce and 0 otherwise.

The estimation is performed in two stages using the maximum likelihood estimator. Heckman's Mills ratio is introduced into the second equation to correct for selection bias. However, the correction is only made after performing a Chi2 test on the correlation coefficient of the error terms of the two Rho equations to identify the proven existence of selection bias.

The Chi2 test checks whether $\rho_{\varepsilon\eta}$ is significantly different from 0 ($H_0: \rho = 0$). Rejection of the null hypothesis means that the equation of interest is not independent of the selection equation; the two decisions are not made independently of each other, so correction for selection bias is justified.

Appendix 2: Methodology for collecting data from the ISSEA survey (2020)

The study covers only the city of Yaoundé, subdivided into seven districts, located approximately 200 km from the Atlantic coast. The survey is conducted among all ordinary households (as opposed to collective households: boarding schools, barracks, hospitals, convents, etc.) residing in the city of Yaoundé, with the exception of members of the diplomatic corps and their households. The observation unit is an individual member of the household aged 15 or over.

For face-to-face surveys, two basic sampling frames are recommended: lists and area frames. Given the unavailability of a comprehensive list of residents in the city of Yaoundé, the sampling frame used for this study is the area-based frame from the fourth General Population and Housing Census (RGPH 4), which was scheduled for 2018.

This sampling frame, available at BUCREP, is a file of enumeration areas (ZD) that was created for the 2018 census. The results of the enumeration work carried out as part of the 2018 MIGRATION survey made it possible to update the number of households in certain ZDs. Each ZD has a map showing its location and boundaries for identification in the field, as well as its characteristics in terms of the number of households.

The sample size is calculated using a scientific method that determines the minimum size required to achieve a given level of accuracy. The accuracy is calculated using several control indicators in terms of proportion or average (*proportion of the population aware of the existence of electronic money transfer services, proportion of the population aware of the existence of distance selling, proportion of the population that has already sent/withdrawn money via electronic money transfer, proportion of the population that has already engaged in distance selling*).

The sample selected is a random, stratified sample drawn at three levels. The primary sampling unit is the enumeration area (EA), the secondary unit is the household, and the tertiary unit is the individual observation unit drawn from the household.

In order to improve the representativeness of the sample, a priori stratification of the population of the city of Yaoundé was carried out. Thus, seven strata representing the seven districts of the city were selected. The rationale for this choice is that the districts are considered homogeneous in terms of the fairly similar ethnic, socio-demographic and economic characteristics of households.

The primary sampling unit is the ZD, i.e. the smallest geographical unit created for the purposes of the 4th General Population Census (RGPH 4). In each stratum, at the first level, the ZDs are drawn with a probability proportional to their size, which is the number of households in the ZD. The sample of ZDs is drawn independently in each stratum with an allocation proportional to their size. Each ZD has a non-zero probability of being drawn.

Of the **1,845 ZDs** available in the RGPH 4 area database for the city of Yaoundé, a total of **55 ZDs** were selected for this survey, based on a first-stage sampling rate of approximately **3%** within the limits of available financial and human resources. The ZDs were selected by stratum.

Assuming that the primary units had already been selected, the enumeration lists of the selected ZDs were used. The aim was to obtain an exhaustive list of households in each selected ZD, which would serve as the sampling frame for the second stage of the household survey. After counting the households in each ZD, based on the size of each ZD and the size of the overall sample, a systematic probability-equal draw of households was made from the various household enumeration lists.

The tertiary units are the individuals to be interviewed during the survey, i.e. the observation units. In each second-stage sample household, one resident member aged 15 or over was selected by simple random sampling. A questionnaire was administered to each household by a respondent aged 15 or older who was selected using the Kish table. The questionnaire consisted of five sections:

- Section 0, entitled "Data collection team", identifies the survey data collection teams;
- Section 1, entitled "Identification of the respondent", records the general and specific socio-demographic characteristics of the individual surveyed;
- Section 2, entitled "Electronic money transfers", captures the level of knowledge, practice and perception of the survey in relation to electronic money transfers;
- Section 3, entitled "online or distance commerce", captures the level of knowledge, practice and perception of the survey in relation to distance commerce;
- Section 4, entitled "Results and assessment of data collection", captures the results of the data collection and the assessment of the quality of the interview.

Data collection in the field was carried out directly, using a tablet or smartphone with the data collection application designed on CSPro 6.3 installed.

Appendix 3: Methodology for collecting data from the INS survey (2022)

To measure the adoption of e-commerce, companies were asked whether they carried out purchasing and/or sales transactions via e-commerce platforms. This database has three main limitations: (i) it does not distinguish between

This is a survey conducted by the INS in 2017 among 248 companies in the formal sector in eight Cameroonian localities, including Douala and Yaoundé. However, its results were not made public

until 2022. This database provides separate information on purchases and sales via e-commerce, the proportion of e-commerce sales in turnover, the products sold, internet access and the use of mobile money.

The sampling methodology used to conduct this survey is based on the truncated exhaustiveness method. This methodology does not require the calculation of weights, as the largest companies in each sector were selected. The sample is therefore not representative.

This methodology was used due to budgetary constraints faced by the INS. The companies selected for this survey are among those included in the RGE2. However, in accordance with the provisions of the 2020 Law on Statistical Activity in Cameroon, the INS did not provide us with the identification names of the "companies" in the RGE-2. This did not allow for the merging of the RGE-2 database and the INS survey database (2022). The INS survey database (2022) does not provide information on the individual characteristics of the entrepreneur.

Appendix 4: Other econometric results

Table9 : Probit results with Heckman selection bias correction

	Model 2						Model 3					
	INT		ECOM		Marginal effects		INT		ECOM		Marginal effects	
	Coef.	S.D.	Coef.	S.D.	dy/dx	S.D.	Coef.	S.D.	Coef.	S.D.	dy/dx	S.D.
SEX (ref: female)	0.06	0.018	0	0.042	0.017	0.014	0.062***	0.018	0.048	0.042	0.016	0.014
SM (ref: no)	-0.055***	0	-0.038	0	-0.013	0.013	-0.057***	0.018	-0.040	0.038	-0.013	0.013
EDU (ref: primary education at most)												
Secondary education	0.172	0.02	0.112	0.05	0.039	0.019	0.172	0.020	0.103	0.054	0.036	0.019
Higher education	0.593	0.026	0.342	0.063	0.117	0.021	0.590	0.026	0.330	0.062	0.113	0.021
TAIL (ref: Very small enterprise)												
Small business	0.328	0.048	0.211	0.07	0.071	0.023						
Medium-sized enterprise	0.472	0.091	0.141	0.112	0.048	0.037						
Large company	0.985	0.183	0.557	0.201	0.175	0.055						
LNTAIL							0.204***	0.019	0.087	0.025	0.029***	0.009
FORMAL (ref: informal sector)	0.721	0.034	0.457	0	0.156***	0.018	0.705	0.034	0.448	0.054	0.152***	0.018
SSA (ref: Agriculture, livestock farming, forestry, fishing, fish farming)												
Food industry, mining and hydrocarbons, electricity, natural gas, water and sanitation	-0.549	0	-	0	-0.099	0.159	-0.552**	0.267	-0.276	0.463	-0.096	0.159
Other manufacturing industries	-0.314	0	0	0	0	0.146	-0.314	0.252	0.022	0.428	0.007	0.146
Trade and transport	-0.385	0.250	0.039	0.424	0.013	0.145	-0.385	0.251	0.047	0.424	0.016	0.145
Accommodation and food services	-0.655***	0.252	-0.397	0.430	-0.139	0.147	-0.659***	0.253	-0.381	0.430	-0.133	0.147
Banking, insurance, telecommunications and other business services	0.012	0	0	0	0	0.145	0.015	0.254	0.132	0.426	0.044	0.146
Construction and other tertiary activities	-0.244	0.250	-0.023	0.424	-0.008	0.145	-0.242	0.251	-0.019	0.424	-0.006	0.145
ZON (ref: Other region)												
Douala	-0.069***	0.023	2.542***	0.764	0.517	0.046	-0.070	0.023	2.526	0.764	0.516***	0.047
Yaoundé	0.012	0.026	1.914***	0.525	0.407	0.022	0.012	0.026	1.901***	0.524	0.407	0.023
North-West region	-0.060	0	-	0	-0.045**	0.018	-0.060	0	-0.211***	0.070	-0.045**	0
Western region	-0.063	0	-0.270	0	-0.057***	0.018	-0.062	0.033	-0.271	0.069	-0.058	0.018
South-West region	-0.042	0	0	0	0	0.017	-0.040	0.035	0.037	0.081	0.008	0.017
DUR (ref: More than 10 years in business)												
Between 5 and 10 years of activity	-0.063	0	0	0	0	0.018	-0.066**	0.026	0.086	0.053	0.029	0.018
Between 0 and 5 years of activity	-0.163	0	0	0	0	0.016	-0.162***	0.022	0.051	0.047	0.017	0.016
LOC (ref: No)	0.08	0					0.082***	0.024				
COMPUTER (ref: No)	1.657	0					1.651	0.02				
ENEO (ref: No)	0.067***	0.025					0.065***	0.025				
DCJTA (ref: not an obstacle)			-0.004	0.	-	0.			-	0.036	-0.002	0.012
EPI			3.324	1.736	1.130	0.590			3.289	1.739	1,119	0.591
CON			-8,314***	2,419	-2.826***	0.820			-8.261***	2.420	2.812***	0.821
MOMO (ref: No)			0.855	0	0.291	0.01			0.854	0.036	0.291	0.010
invills			0.226	0.037	0.077	0.012			0.213	0.037	0.073	0.012
CONS	-2.009***	0.253	-0.790	0.439			-2.149***	0.254	-0.825	0.441		

NB: ***, ** and * represent significance at 1%, 5% and 10% respectively

9. References

- Agwu, E., M., (2015)**, “Empirical Study of Barriers to Electronic Commerce Adoption by Small and Medium Scale Businesses in Nigeria”, *International Journal of Innovation in the Digital Economy*, vol 6, No. 2, pp. 1-19
- Ahmad, S., Z., Abu Bakar, A., R., Faziharudean, T., M., & Mohamad Zaki, K., A., (2014)**, “An Empirical Study of Factors Affecting e-Commerce Adoption among Small- and Medium-Sized Enterprises in a Developing Country: Evidence from Malaysia”, *Information Technology for Development*, DOI: 10.1080/02681102.2014.899961
- Ahuja, V., & Khazanchi, D., (2016)**, "Creation of a conceptual model for Adoption of Mobile Apps for shopping from E-Commerce sites-An Indian context", *Procedia Computer Science*, No. 91, pp. 609–616
- Al-Qirim, N., (2007)**, “The adoption of e-commerce communications and applications technologies in small businesses in New Zealand”, *Electronic Commerce Research and Applications*, vol. 6, pp. 462–473
- Ami, D., & Desaignes, B., (2000)**, “The treatment of responses equal to zero in contingent valuation”, *Économie & prévision*, no. 143-144, pp. 227-236, doi: 10.3406/ecop.2000.6105
- Amornkitvikai, Y., & Lee, C., (2020)**, “Determinants of E-Commerce Adoption and Utilisation by SMEs in Thailand”, ISEAS Yusuf Ishak Institute, Economics Working Paper, No. 2020-01, 42p
- Askenazy, P., Célérier, C., & Irac, D., (2010)**, "Distance selling, the internet and price dynamics", *Économie & prévision*, vol. 194, no. 3, pp. 2-13
- Awa, H., O., Baridam, D., M., & Nwibere, B., M., (2015)**, "Demographic determinants of electronic commerce (EC) adoption by SMEs: A twist by location factors", *Journal of Enterprise Information Management*, Vol 28 No 3, pp 326-345. <https://doi.org/10.1108/JEIM-10-2013-0073>
- Bakehe, N., P., Fambeu, A., H., & Tamokwe P., G., B., (2017)**, "Are digital divides narrowing in Cameroon?", *Réseaux*, vol 201, No 1, pp 147-174
- World Bank (2017)**, "Chapter 6: Improving the e-commerce environment", edited by OECD & WTO (2017), *Aid for Trade 2017: Promoting Trade, Inclusion and Connectivity for Sustainable Development*, pp. 195-212
- Bao, J., & Sun, X., (2010)**, “A conceptual model of factors affecting e-commerce adoption by SMEs in China”, Fourth International Conference on Management of E-Commerce and E-Government, pp.172–175, IEEE
- Barbesol, Y., & Briant, A., (2008)**, “Économies d’agglomération et productivité des entreprises: estimation sur données individuelles françaises” (Agglomeration economies and business productivity: estimates based on individual French data), *économie et statistique*, No. 419–420, pp. 31-54
- Bartus, T., & Roodman (2014)**, “Estimation of multiprocess survival models with cmp”, *Stata Journal*, No. 14, pp. 756-777
- BEAC (2021)**, “Electronic money payment services in the CEMAC in 2020”, BEAC working paper, 26p
- Ben Khalifa, A., (2016)**, "Determinants of information and communication technologies adoption by Tunisian firms", *Journal of Innovation Economics & Management*, vol. 20, No. 2, pp. 151-177
- Ben Youssef, A., Hadhri, W., & M’henni, H. (2010)**, “Intrafirm Diffusion of Innovation: Evidence from Tunisian SMEs in Matters of Information and Communication Technologies”, *Working Paper 532*.

- Bidiassé, H., & Mvogo, G., P., (2019)**, "The determinants of mobile money adoption: the importance of factors specific to Cameroon", *Revue d'économie industrielle*, vol. 165, no. 1, 2019, pp. 85-115.
- Bocquet, R., Brossard, O., & Sabatier, M., (2007)**, "Complementarities in Organizational Design and the Diffusion of Information Technologies, an Empirical Analysis", *Research Policy*, vol 36, No. 3, pp 409-437.
- Bocquet, R., & Brossard, O., (2008)**, "Adoption of ICTs, proximity and localised dissemination of knowledge", *Revue d'Économie Régionale & Urbaine*, vol. 3, pp. 411-446
- Bounie, D., & Bourreau, M., (2004)**, "Payment security and the development of e-commerce", *Revue économique*, Vol 55, No 4, pp 689-714
- CEA (2020)**, "African countries called upon to shake off their e-commerce lethargy", briefing note of 12 December 2020, <https://www.uneca.org/fr/storys/les-pays-africains-appelés-à-sortir-de-la-léthargie-du-commerce-électronique>
- Chaparro-Pelaez, J., Agudo-Peregrina, A., F., & Pascual-Miguel, F., (2016)**, "Conjoint analysis of drivers and inhibitors of e-commerce adoption", *Journal of Business Research*, vol 69, Issue 4, pp 1277-1282
- Chuang, T., Nakatani, K., & Zhou, D., (2009)**, "An exploratory study of the extent of information technology adoption in SMEs: an application of upper echelon theory", *Journal of Enterprise Information Management*, Vol 22, No 1/2, pp 183-196
- Cloete, E., Courtney, S., & Fintz, J., (2002)**, "Small Businesses' Acceptance and Adoption of e-Commerce in the Western-Cape Province of South Africa", *The Electronic Journal on Information Systems in Developing Countries*, vol 10, No 4, pp 1-13
- UNCTAD (2021)**, *The UNCTAD B2C e-commerce index 2020: Spotlight on Latin America and the Caribbean*, UNCTAD Technical Notes on ICT for Development, No. 17, 22p
- Daniel, E., & Myers, A. (2000)**, "Levelling the playing field: Electronic commerce in small and medium enterprises", Bedford, UK: Cranfield School of Management. Available from: www.cranfield.ac.uk/som/ecom
- Daniel, E., Wilson, H., & Myers, A., (2002)**, "Adoption of E-Commerce by SMEs in the UK: Towards a Stage Model", *International Small Business Journal*, vol 20, No. 3, pp. 253-270
- Fambeu, A., H., (2017)**, "The adoption of ICT in a developing country", *Revue d'économie industrielle*, vol 157, pp 61-101
- Federici, T., (2009)**, "Factors influencing ERP outcomes in SMEs: a post-introduction assessment", *Journal of Enterprise Information Management*, Vol 22, No 1/2, pp 81-98
- Fichman, R., G., & Kemerer, C., (1997)**, "The assimilation of software process innovation: An organisational learning perspective", *Management Science*, vol. 43, No. 10, pp. 1345–1363
- Fogang, M., (2021)**, "Websites, submarine cables and data centres: the State secures infrastructure", *Cameroon Tribune*, 3 June 2021 edition, p19
- Forson, V., (2018)**, "E-commerce: Africa between performance and challenges", *Le Point Economie*, 16 December 2018 edition, https://www.lepoint.fr/economie/e-commerce-l-afrique-entre-performances-et-defis-16-12-2018-2279638_28.php
- Gallego, J.M., Gutiérrez, L.H., & Lee, S., H., (2015)**, "A firm-level analysis of ICT adoption in an emerging economy: Evidence from the Colombian manufacturing industries", *Industrial and Corporate Change*, vol. 24, No. 1
- Galliano, D., & Roux, P., (2006)**, "Spatial inequalities in ICT adoption: the case of French industrial firms", *Revue Économique*, No. 57, pp. 1449-1475
- Geroski, P., A., (2000)**, "Models of Technology Diffusion", *Research Policy*, vol. 29, No. 4-5, pp. 603-625.
- Ghobakhloo, M., Arias-Aranda, D., & Benitez-Amado, J., (2011)**, "Adoption of e-commerce applications in SMEs", *Industrial Management & Data Systems*, vol 111 No 8, pp 1238-1269

Ghobakhloo, M., & Tang, S., H., (2013), “The role of owner/manager in adoption of electronic commerce in small businesses: The case of developing countries”, *Journal of Small Business and Enterprise Development*, vol 20, No. 4, pp. 754-787

Grandon, E., & Pearson, J., M., (2004), “Electronic commerce adoption: An empirical study of small and medium US businesses”, *Information & Management*, vol 42, No. 1, pp 197–216

Grolleau, G., (2001), “Adoption and dissemination of environmental management systems in agriculture”, INRA Paris, 20-21 September

GSMA (2019), “Connected Women: 2019 report on gender inequality in mobile phones”, GSMA working paper, 64p

GSMA & CEA (2021), "Facilitating e-commerce in Central Africa: The role of mobile services and policy implications", Working paper, 60p

Hadjimanolis, A., (1999), “Barriers to innovation for SMEs in a small less developed country (Cyprus)”, *Technovation*, Vol 19, Issue 9, pp 561-570

Hall, B., H., & Khan, B., (2002), "Adoption of New Technology," *NBER Working Papers 9730*, National Bureau of Economic Research, 21p

Harris, A., M., & Patten, P., K., (2014), "Mobile device security considerations for small- and medium-sized enterprise business mobility", *Information Management & Computer Security*, Vol 22 No. 1, pp. 97-114, <https://doi.org/10.1108/IMCS-03-2013-0019>

Hashim, J., (2007), “Information and communication technology (ICT) adoption among SME owners in Malaysia”, *International Journal of Business and Information*, Vol. 2, No. 2, pp. 221–240

Heckman, J., (1979), Sample selection bias as a specification error, *Econometrica*, No. 47, pp. 153–161

Hollenstein, H., (2004), “Determinants of the Adoption of Information and Communication Technologies (ICT): An Empirical Analysis Based on Firm-level Data for the Swiss Business Sector”, *Structural Change and Economic Dynamics*, vol 15, No 3, pp 315-342

Hong, W., & Zhu, K., (2006), “Migrating to internet-based e-commerce: Factors affecting e-commerce adoption and migration at the firm level”, *Information & Management*, No. 43, pp. 204–221

Lawrence J., & Tar U., (2011), “Barriers to e-commerce in developing countries”, *Information, Society and Justice*, vol. 3, No. 1, pp. 23-35

Hsu, P., F., Kraemer, K., L., & Dunkle, D., (2006), "Determinants of E-Business Use in U.S. Firms", *International Journal of Electronic Commerce*, vol 10, No. 4, pp. 9-45

INS (2018), General Business Census 2016 (RGE-2): main report, Working paper, 179p

INS (2022), Annual Business Survey Database (EAE 2017), Competition and e-commerce in businesses

International Telecommunication Union (2021), “Global security index 2020: Measuring commitment to cybersecurity”, *International Telecommunication Union Working paper*, **172p**

ISSEA (2020), Electronic money transfers and distance commerce: knowledge, use and perception among residents of the city of Yaounde, Database

Jacolin, L., Keneck, M., J., & Noah, A., (2019), “Informal Sector and Mobile Financial Services in Developing Countries: Does Financial Innovation Matter?”, Banque de France, Working Paper No. 721, 29p

Jimmie, J., & Mukhopadhyay, S., (2010), “A bi-national examination of gender and ICT adoption”, *International Journal of Society Systems Science*, Vol 2, No 3, pp 255-268

Karshenas, M., & Stoneman, P., (1993), "Rank, Stock, Order and Epidemic Effects in the Diffusion of New Process Technology", *Rand Journal of Economics*, 24(4), 503527.

Kartiwi, M., & MacGregor, R., (2007), "Electronic commerce adoption barriers in small to medium-sized enterprises (SMEs) in developed and developing countries: A cross-country comparison", *Journal of Electronic Commerce in Organisations*, vol. 5, No. 3, pp. 35-51

- Kossai, M., Lapa de Souza, M., L., & Roussel, J., (2010)**, "Adoption of information technologies and human capital: the case of Tunisian SMEs", *Management & Avenir*, vol. 1, No. 31, pp. 137-159
- Lawrence, J., & Tar, U., (2010)**, "Barriers to e-commerce in developing countries", *Information, Society and Justice*, 2010, vol. 3, no. 1, pp. 23-35
- Le Guel, F., Pénard, T., & Suire, R., (2005)**, "Adoption and commercial use of the Internet: an econometric study based on data from Brittany", *Économie & Prévision*, vol. 167, No. 1, pp. 67-84
- Lefebvre, L., A., Lefebvre, E., Elia, E., & Boeck, H., (2005)**, "Exploring B-to-B e-commerce adoption trajectories in manufacturing SMEs", *Technovation*, Vol 25, pp 1443–1456
- Li, J., Ding, H., Hu, Y., & Wan, G., (2021)**, "Dealing with dynamic endogeneity in international business research", *Journal of international business studies*, vol 52, 339–362, doi:10.1057/s41267-020-00398-8
- Lip-Sam, T., & Hock-Eam, L., (2011)**, "Estimating the determinants of B2B e-commerce adoption among small & medium enterprises", *International Journal of Business and Society*, Vol 12 No 1, pp 15 – 30
- Liu, X., & Wei, K., (2003)**, "An empirical study of product differences in consumers' E-commerce adoption behaviour", *Electronic Commerce Research and Applications*, vol 2, pp 229–239
- Lollivier, S., (2001)**, "Endogeneity of a dichotomous explanatory variable in a bivariate probit model: An application to the link between fertility and female activity", *Annales d'Économie et de Statistique*, No 62, pp 251-269
- Lu, J., Yu, C., & Yao, J., (2003)**, "TAM for wireless internet", *Internet Research: Electronic Networking Applications and Policy*, Vol 13, No 3, pp 206-222
- Lv, Z., Jin, Y., & Huang, J., (2018)**, "How do sellers use live chat to influence consumer purchase decision in China?", *Electronic Commerce Research and Applications*, vol 28, pp 102–113
- Massanga, P., T., & Miere, T., (2020)**, "From mobile phone operators to financial operators: the use of mobile money in Congo-Brazzaville", *Revue française des sciences de l'information et de la communication*, No. 20, doi: <https://doi.org/10.4000/rfsic.9767>
- Mauger, J., (2021)**, "Commerce: le coup de fouet du digital" [Commerce: the digital boost], *Cameroon Tribune*, 3 June 2021 edition, p15
- Mc Fadden, D., (2001)**, "Economic choices", *American Economic Review*, vol 91, issue 3, pp 351-378
- McGowan, M., & Madey, G., (1998)**, "The influence of organisation structure and organisational learning factors on the extent of EDI implementation in U.S. firms", *Information Resources Management Journal*, vol. 11, No. 3, pp. 17–27
- Migiro, S., O., (2007)**, "Diffusion of ICTs and E-commerce adoption in manufacturing SMEs in Kenya", *The South African Journal of Library and Information Science*, vol. 72, No. 1, pp. 35-44
- Molla, A., & Licker, P., S., (2005)**, "Perceived E-Readiness Factors in E-Commerce Adoption: An Empirical Investigation in a Developing Country", *International Journal of Electronic Commerce*, vol. 10, No. 1, pp. 83-110
- Mpabe, B., M., J., & Fondo, S., (2017)**, "Access to urban markets and income variation among rural farmers in the informal sector in Cameroon", *Revue d'Économie Régionale & Urbaine*, vol 2, pp 357-378
- OECD (2004)**, "ICT, e-business and SMEs", Working document presented at the 2nd OECD Conference of Ministers Responsible for Small and Medium-Sized Enterprises (SMEs) on the theme "Promoting Entrepreneurship and Innovative SMEs in a Global Economy: Towards a More Responsible and Better Shared Globalisation", 53p

- OECD (2020a)**, OECD Competition Policy Responses to COVID-19, https://read.oecd-ilibrary.org/view/?ref=130_130807-eqxgniyo7u&title=OECD-competition-policy-responses-to-COVID-19
- OECD (2020b)**, "E-commerce in the time of COVID-19", OECD Working Paper, 15p
- Okadapau, M., O., Omwenga, E., I., & Robert O. Oboko, R., O., (2016)**, "State and Extent of Electronic Commerce Adoption among SMEs in Kenya", *Journal of Emerging Trends in Computing and Information Sciences*, Vol 7, No 5, pp 256-262
- Olatokun, W., & Bankole, B., (2011)**, "Factors Influencing Electronic Business Technologies Adoption and Use by Small and Medium Scale Enterprises (SMES) in a Nigerian Municipality", *Journal of Internet Banking and Commerce*, vol 16, No. 3, pp. 1-26
- Oliveira, T., & Martins M., O., (2009)**, "Determinants of information technology adoption in Portugal", In Proceedings of the International Conference on e-Business, pp 264-270, doi: 10.5220/0002261502640270
- Oliveira, T., & Martins, M., F., (2010)**, "Understanding e-business adoption across industries in European countries", *Industrial Management & Data Systems*, Vol 110 No 9, pp 1337-1354
- Oliveira, T., & Martins, M., (2011)**, "Literature review of information technology adoption models at firm level", *The Electronic Journal Information Systems Evaluation*, Vol 14, No 1, pp 110–121
- Pavlou, P., & Fygenson, M., (2006)**, "Understanding and Predicting Electronic Commerce Adoption: An Extension of the Theory of Planned Behaviour", *MIS Quarterly*, Vol. 30, No. 1, pp 115-143
- Pearson, J., M., & Grandon, E., E., (2005)**, "An Empirical Study of Factors That Influence E-Commerce Adoption/Non-Adoption in Small and Medium Sized Businesses", *Journal of Internet Commerce*, vol 4, No. 4, pp1-21
- Penard, T., Poussing, N., Mukoko, B., & Tamokwe P., G., B., (2015)**, "Internet adoption and usage patterns in Africa: Evidence from Cameroon", *Technology in Society*, No. 42, pp. 71–80
- Rahayu, R., & Day, J., (2015)**, "Determinant Factors of E-commerce Adoption by SMEs in Developing Country: Evidence from Indonesia", *Procedia - Social and Behavioral Sciences*, vol 195, pp 142–150
- Rallet, A., (2001)**, "E-commerce and urban location of commercial activities", *Revue économique*, vol. 52, no. 7, pp 267-288
- Ramsey, E., Ibbotson, P., Bell, J., & Gray, D., (2003)**, "E-opportunities of service sector SMEs: an Irish cross-border study", *Journal of Small Business and Enterprise Development*, vol. 10, no. 3, pp. 250–264
- Roodman, D., (2011)**, "Fitting fully observed recursive mixed-process models with cmp," *Stata Journal*, No. 11, pp. 159-206
- Salançon, A., (2006)**, "Le commerce agroalimentaire via Internet, encore une utopie ?" (Agri-food trade via the Internet: still a pipe dream?), *Les Enjeux de l'information et de la communication*, vol. 2006, no. 1, pp. 73-82
- Sanna, L., Sami, S., & Petri, H., (2007)**, "Enterprise size matters: objectives and constraints of ERP adoption", *Journal of Enterprise Information Management*, Vol 20, No 3, pp 319-334.
- Shah Alam, S., Khatibi, A., Ahmad, M., I., S., & Bin Ismail, H., (2008)**, "Factors affecting e-commerce adoption in the electronic manufacturing companies in Malaysia", *International Journal of Commerce and Management*, Vol. 17, issue 1-2, pp 125 – 139
- Solaymani, S., Sohaili, K., & Yazdinejad, E., A., (2012)**, "Adoption and use of e-commerce in SMEs: A case study", *Electronic Commerce Research*, vol 12, pp 249–263
- Suire, R., (2007)**, "Social embeddedness and internet usage: a joint analysis of e-commerce and e-government", *Economie & prévision*, vol. 180-181, No. 4, pp. 161-174

- Swan, J., E., Bowers, M., R., & Richardson, L., D., (1999)**, "Customer trust in the salesperson: an integrative review and meta-analysis of the empirical literature", *Journal of Business Research*, vol. 44, No. 2, pp. 93-107.
- Tan, J., Tyler, K., & Manica, A., (2007)**, "Business-to-business adoption of ecommerce in China", *Information & Management*, vol 44, pp 332–351
- Tan, J., & Ludwig, S., (2016)**, "Regional Adoption of Business-to-Business Electronic Commerce in China", *International Journal of Electronic Commerce*, vol 20, No. 3, pp 408-439
- Tornatzky, L., & Fleischer, M., (1990)**, *The process of technology innovation*, Lexington, MA. Lexington Books, 298p
- Turban, E., King, D., Lee, J., Liang, T.-P., & Turban, D. (2010)**, *Electronic commerce: A managerial perspective 2010*, Upper Saddle River, NJ: Pearson Prentice Hall
- UNCTAD (2020)**, Covid-19 and e-commerce: impact on business and policy responses, UNCTAD Working paper, 47 p
- Uwamariya, M., Cremer, S., & Loebbecke, C., (2015)**, "ICT for Economic Development in Rwanda: Fostering E-Commerce Adoption in Tourism SMEs", *GlobDev 2015. 1.*, 22p, <https://aisel.aisnet.org/globdev2015/1>
- Van de Ven, W., P., M., M., & Van Praag, B., M., S., (1981)**, "The demand for deductibles in private health insurance: A probit model with sample selection", *Journal of Econometrics*, vol 17, pp 229–252.
- Van Huy, L., Rowe, F., Truex, D., & Robinson, J., M., (2012)**, "An Empirical Study of Determinants of E-Commerce Adoption in SMEs in Vietnam: An Economy in Transition", *Journal of Global Information Management*, vol 20, No. 3, pp 23-54
- Van der Heijden, H., Verhagen, T., & Creemers, M., (2003)**, "Understanding online purchase intentions: contributions from technology and trust perspectives", *European Journal of Information Systems*, vol 12, pp 41–48
- Walker, J., H., Saffu, K., & Mazurek, M., (2016)**, "An Empirical Study of Factors Influencing E-Commerce Adoption/Non-Adoption in Slovakian SMEs", *Journal of Internet Commerce*, vol. 15, no. 3, pp. 189-213, DOI: 10.1080/15332861.2016.1191049
- Wanyoike, D., M., Mukulu, E., & Waititu, A., G., (2012)**, "ICT Attributes as Determinants of E-commerce Adoption by Formal Small Enterprises in Urban Kenya", *International Journal of Business and Social Science*, vol 3, No 23, pp 65-74
- Xu, X., Wong, S., C., Zhu, F., Pei, X., Huang, H., & Liu, Y., (2017)**, "A Heckman selection model for the safety analysis of signalized intersections", *Plos One*, vol 12, No. 7, <https://doi.org/10.1371/journal.pone.0181544>
- Zaied, A., N., H., (2012)**, "Barriers to E-Commerce Adoption in Egyptian SMEs", *I.J. Information Engineering and Electronic Business*, vol 3, pp 9-18, doi: 10.5815/ijieeb.2012.03.02
- Zaied, A., Al-Khairalla F. & Al-Rashed W., (2007)**, "Assessing e-Readiness in the Arab Countries: Perceptions towards ICT Environment in Public Organizations in the State of Kuwait", *Electronic Journal of e-Government*, vol 5, No. 1, pp 77 – 86



Mission

To strengthen local capacity for conducting independent, rigorous inquiry into the problems facing the management of economies in sub-Saharan Africa.

The mission rests on two basic premises: that development is more likely to occur where there is sustained sound management of the economy, and that such management is more likely to happen where there is an active, well-informed group of locally based professional economists to conduct policy-relevant research.

Bringing Rigour and Evidence to Economic Policy Making in Africa

- Improve quality.
- Ensure Sustainability.
- Expand influence.

www.aercafrica.org

Learn More



www.facebook.com/aercafrica



www.instagram.com/aercafrica_official/



twitter.com/aercafrica



www.linkedin.com/school/aercafrica/

Contact Us

African Economic Research Consortium
Consortium pour la Recherche Economique en Afrique
Middle East Bank Towers,
3rd Floor, Jakaya Kikwete Road
Nairobi 00200, Kenya
Tel: +254 (0) 20 273 4150
communications@ercafrica.org