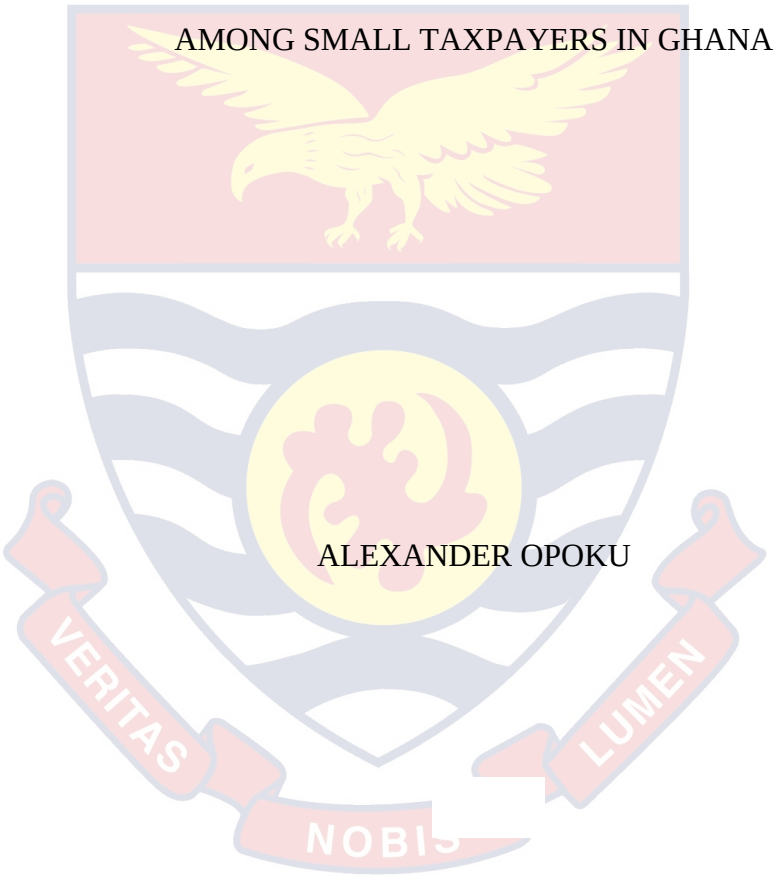
UNIVERSITY OF CAPE COAST

LEVEL OF TAX KNOWLEDGE AND TECHNOLOGY ADOPTION AMONG SMALL TAXPAYERS IN GHANA



ALEXANDER OPOKU

2020

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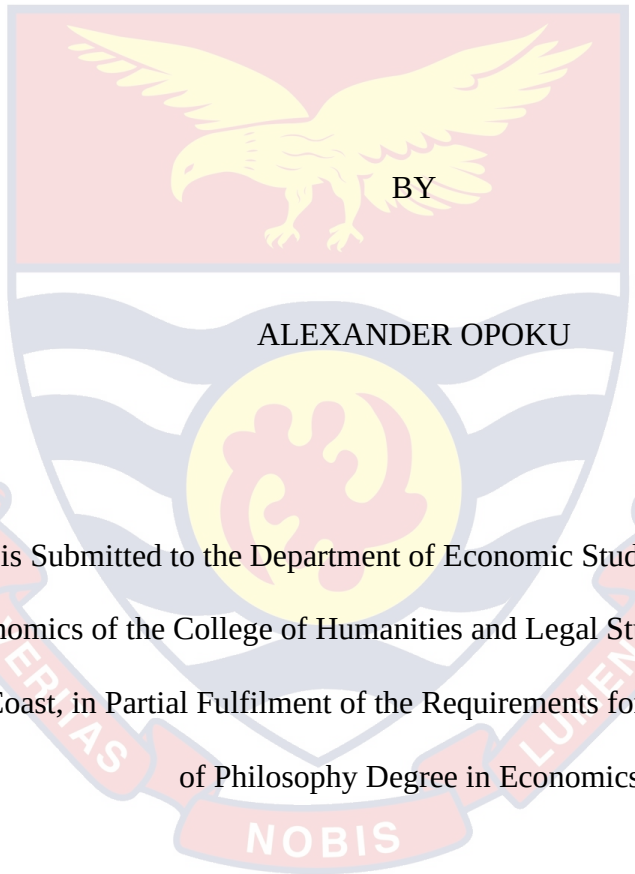

BY

ALEXANDER OPOKU

Thesis Submitted to the Department of Economic Studies of the School of Economics of the College of Humanities and Legal Studies, University of Cape Coast, in Partial Fulfilment of the Requirements for the Award of Master of Philosophy Degree in Economics.

DECEMBER 2020

DECLARATION

Candidate's Declaration

I hereby declare that this thesis is the result of my original research and that no part of it has been presented for another degree in this university or elsewhere.

Candidate's Signature…… Date ……..……

Name: Alexander Opoku

Supervisors' Declaration

We hereby declare that the preparation and presentation of the thesis were supervised in accordance with the guidelines on supervision of thesis laid down by the University of Cape Coast.

Supervisor's Signature……. Date ……..……

Name: Mr. Kwabena Nkansah Darfor

Co-Supervisor's Signature……. Date …….

Name: Dr. Benedict Afful Jnr.

ABSTRACT

This study examined the effect of the level of tax knowledge on technology adoption among small taxpayers in Ghana. To achieve the purpose of the study, the Generalised Ordered Logit, Multivariate Decomposition for nonlinear response models and the Probit Estimation Techniques were the main analytical tools used. The study used survey data collected by the Directorate of Research, Innovation and Consultancy (DRIC) where a sample of 490 small taxpayers was analysed. The explanatory sequential mixed-method design informed the orientation of the study. The study found that more than half of small taxpayers have an average level of tax knowledge. The results also showed that sex, educational level, firms' income, type of organisation, tax complexity, and tax education influence small taxpayers' tax knowledge level. The study further found that the mean predicted gap in tax knowledge between male and female firm managers is huge and statistically significant, and 60% of it can be explained by differences in educational level, tax complexity and tax education. It was also found that the level of tax knowledge significantly affects the adoption of technology for tax preparation and reporting. On the other hand, the qualitative analysis revealed that lack of education, internet connection, organisational barriers, technological resources and trust serves as major barriers to the adoption of iTAPS. Based on the results, the study recommends that the Domestic Tax Revenue Division should adopt strategies like zonal tax education workshops and training, provision of tax awareness programs and design simplified tax rules for firm managers especially among sole proprietorships, female managed firms, firms with less income and firms in the Northern region and rural areas to improve their tax knowledge level. Government through the GRA should intensify the awareness and training on the use of iTAPS; ensuring simplified platforms, improved internet coverage, trust and incentive for its usage.

KEYWORDS

Ghana

iTAPS

Small Taxpayers

Tax Knowledge

Technology Adoption

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DEDICATION

To my family and Ms. Efua Yaaba Yawson

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LIST OF ABBREVIATIONS

ANOVA	Analysis of Variance
CEPS	Customs, Excise and Preventive Service
DESA	Department for Economic and Social Affairs
EOU	Perceive Ease of Use
GDP	Gross Domestic Product
GRA	Ghana Revenue Authority
GSS	Ghana Statistical Service
IBES	Integrated Business Establishment Survey
ICT	Information and Communications Technology
IMF	International Monetary Fund
ISP	Internet Service Providers
iTAPS	Integrated Tax Application and Preparation System
ITC	International Trade Centre
KPP	Kantor Pelayanan Pajak
MLE	Maximum Likelihood Estimation
MoFEP	Ministry of Finance and Economic Planning
NBSSI	National Board for Small Scale Industries
OECD	Organisation for Economic Co-operation and Development
OLS	Ordinary Least Squares
POM	Proportional Odds Model
PU	Perceived Usefulness
SDGs	Sustainable Development Goal
SMEs	Small and Medium-Sized Enterprises
SPSS	Statistical Package for Social Sciences
STOs	Small Taxpayer Offices
TAM	Technology Acceptance Model
UCC	University of Cape Coast
UNCTAD	United Nations Conference on Trade and Development
USA	United States of America
UTAUT	Unified Theory of Acceptance and Use of Technology
VAT	Value Added Tax

CHAPTER ONE

INTRODUCTION

This chapter presents a general introduction to the themes addressed in this thesis. This chapter presents the background to the study, statement of the problem, research objectives, and research questions, hypotheses and significance of the study. It also presents delimitation, limitation of the study as well as the organisation of the various chapters.

Background of the Study

Taxes play a vital role in the development of a country. Revenue from tax constitute a significant share of government income in both advanced and emerging economies; it serves as the primary source of revenue for state building, funding public expenditures, social amenities and infrastructure development (Forstater, 2018). These revenues are usually generated from two main sources: internal and external. However, empirical studies have shown that externally generated revenue are usually accompanied by huge debt payments that take a long time to settle, hindering development and growth. Mobilising revenue domestically to a large extent helps to reduce the country's dependence on donors and as well narrow down the level of external control on the developmental agenda of government (IMF, 2018).

It can be inferred from the above that internally generated funds are of prime importance in terms of development and independence of every economy. However, to generate and increase domestic revenue, compliance of taxpayers is crucial, especially among small taxpayers. Evidence from the UN Department for Economic and Social Affairs (DESA) suggests that small taxpayers present a significant revenue potential, yet there is low compliance

level among them compared to medium and large taxpayers. They assert that these small taxpayers constitute about 85 percent of registered taxpayers compared to other taxpayer segments; however, their proportional contribution to tax revenue is 10 percent which is relatively low compared to 70 percent and 25 percent of the other taxpayer segment. DESA attributed the relatively low contribution of small taxpayers to their low compliance level. Empirical evidence has proven that the acquisition of knowledge in the tax system by taxpayers is a significant and positive determinant of their compliance level (Oladipupo & Obazee, 2016; Saad, 2014; Fjeldstad & Heggstad, 2012). To emphasise this, Asrinanda (2018) indicated that lack of tax knowledge might encourage tax non-compliance either intentionally or unintentionally. This even turns to be more severe when dealing with tax systems that are complex and hard to navigate.

Isbell (2017) observed that low knowledge level of taxpayers is found to be particularly severe in Africa, as a majority of Africans do not know what taxes or tax payments they owe to their government. Beyond compliance, a taxpayer with low knowledge of the tax system would have no confidence in how much they would pay, possibly being more vulnerable to corrupt officials or compelled to make unofficial payments. As such they might be more apt to see the tax system as unfair, which impedes the domestic tax revenue mobilisation goal. This indicates that knowledge of taxpayers is inherently essential, not only for taxpayers but also for citizens.

Among other factors, the demographic characteristics of the taxpayers are considered to play important role in their knowledge and compliance behaviour (Antwi et al., 2015; Kastlunger et al., 2010). Some empirical studies

revealed that gender as demographic factor affect the attitude and social norms of the individual (Bruner et al., 2017; Amponsah & Adu, 2017; and Lohse & Qari, 2014) since each gender has a different way of thinking and point of view affected by their surroundings, and diverse level of understanding so far as tax-related matters are a concern. According to Pratama (2018), females are more likely to comply than man which may be due to lack of tax knowledge on the side of men whiles studies like Kastlunger et al. (2010) revealed that men are more obedient to taxes than woman. This indicates that gender needs to be examined with caution as it affects socialization, education, tax knowledge and interest in variable tested that will lead to a mixed result.

Notwithstanding, the fact that knowledge in the tax system is key for compliance, literature also suggests that taxpayers are mostly motivated to comply easily when there exists an advanced tool or technology to aid them in the payment process (Wasao, 2014). Since time is a very useful resource especially in the aspect of business operations, any tool or technology that helps individuals to avoid its wastage is highly embraced in any business environment. Moreover, this is not a different case in the tax community and for that, both taxpayers and officials have made conscious efforts to make any of such tools available at their disposal. In recent times, taxpayers have adopted more innovative ways of keeping records to monitor the progress of their business, prepare their tax returns, and provide adequate information to the tax authority when filing and making payment (Lymer, Hansford & Pilkington, 2012). While most taxpayers opt for a manual record-keeping system, some taxpayers use a computerized record-keeping system that makes

it easier to gather information, generate reports and comply with tax and legal reporting requirements.

On the other hand, tax authorities are also challenged to maintain a modernised and alert tax administration system to enable faster tax collection which is user friendly and more cost-effective (Venter, 2014). According to Night and Bananuka (2019) for the tax authority to increase voluntary tax compliance, there is need to provide a system that is easy to use, user-friendly, secure, dependable, easier payment mode and variety of services for its customers. An electronic tax system is the surest modern way with which tax authority use in interacting with taxpayers on their filing and payment of their tax obligations. So, with this, the hassles of going on long-distance to collect taxes, to visit the tax office, and in making long queues are quite mitigated for both tax officials and taxpayers alike, since the returns are filed at their convenience.

One of the early adopters of internet-based filing was the USA in the early 1980s. Currently, the online tax system has been welcomed by several countries such as UK, Chile, Australia, France, Netherlands, Finland, Germany, Switzerland, Canada, Italy, India, China, Ireland, Norway, Malaysia, Mexico, Singapore, Thailand and only to mention a few (Muturi & Kiarie, 2015). In Africa, for example, countries like Rwanda, Ethiopia, Uganda, Kenya and Nigeria have embraced online filing and payment system (Muturi & Kiarie, 2015). Presently, the use of online tax system had been fully implemented in 84 countries in 2014, with 70 reforms in the last five years in 53 economies either by introducing or enhancing online filing and payment system (PwC, 2016).

Meanwhile, in Ghana, the incorporation of the erstwhile revenue agencies into the GRA in 2009 was undertaken with a clear objective to modernise and enhance revenue administration. Based on their revenue mobilisation strategies on reforming the GRA, the 3rd GRA Strategic Plan was launched in 2018. This Plan was informed by the "Ghana Beyond Aid" agenda and the first target of the sustainable development goal (SDG) of Goal 17, which seeks to reduce the country's heavy reliance on foreign aid by stepping up its domestic revenue, improve domestic tax and other revenue collection capacity. Among the initiatives under the programme was the automation and integration of ICT into the tax collection in a bid to modernise tax administration. It is in this regard that an electronic filing system was introduced known as the Integrated Tax Application and Preparation System (iTAPS) in 2019. The online system sought to allow taxpayers to file and pay their tax returns in an easier, faster, and cost-effective way and to reduce opportunities for corruption by reducing face-to-face relations between taxpayers and tax officials.

In achieving this policy paradigm, small taxpayers have a role to play, since they are key contributors to the development of an economy. They are a key component in the "ecology of firms" in a healthy economy due to their impact on GDP, job creation, employment, and poverty alleviation. For this, their knowledge level on the tax system and this technological initiative should be given a principal focus to foster easy generation of domestic revenue.

Statement of the Problem

Tax revenue collection continues to underperform in Ghana. Small taxpayers possess a significant revenue potential, yet there is low compliance level among them compared to other taxpayer segments in Ghana (GRA, 2012). Low compliance has become relatively high among small taxpayers. Nonetheless, tolerating low compliance may not be a suitable response to the fiscal challenges in the economy since it is inequitable, distorting and most critical; it inhibits the reconstruction of taxation bases and achieving domestic revenue mobilization goals, which makes it a daunting task to achieve the "Ghana Beyond Aid" agenda and 17 SDGs.

Empirical studies have shown that among other factors, small taxpayers' lack of tax knowledge is the core detention in honouring tax obligations (Susyanti, 2019; Inasius, 2018; Manual & Xin, 2016). Existing literature in Ghana fails to find small taxpayers knowledge level and factors that could contribute to their tax knowledge level (Wahabu, 2017; Danquah & Osei-Assibey, 2016). Moreover, small taxpayers possess different characteristics and diverse level of understanding tax-related matters. Empirical studies have analysed sex/gender as a demographic factor that plays a significant role in tax knowledge and tax compliance (Amponsah & Adu, 2017; Enggida & Baisa, 2014), however, this has received less attention in the literature.

Furthermore, the study also proposes whether the level of tax knowledge could be additional variable that may affect technology adoption among small taxpayers. Since the implementation of technology and innovation in tax return processing is vital in increasing tax compliance, it is

crucial to understand whether the level of tax knowledge could influence the use of technology in the preparation and reporting of tax requirements. The heavy investment outlay by the government on the introduction of iTAPS aims at makes payment and filing of taxes simpler, faster and more convenient and improve record keeping. However, its level of adoption of technology and the extent to which it enhances compliance among small taxpayers is yet to receive research attention.

This indicates that there is a need to adopt technology and innovation in the process of tax collection. However, such technology and innovation may be effective depending on the level of tax knowledge and the readiness of the taxpayers to adopt. The question is, what is the level of tax knowledge and technology adoption among small taxpayers in Ghana? The study, therefore, examines the level of tax knowledge and technology adoption.

Purpose of the Study

The purpose of the study is to examine the level of tax knowledge on technology adoption among small taxpayers.

Objectives of the Study

Specifically, the study seeks to;

1. Examine the correlates of tax knowledge of small taxpayers
2. Explore the tax knowledge gap between male and female small taxpayers
3. Examine the effect of level of tax knowledge on technology adoption.
4. Identify the context for the non-adoption of GRA iTAPS among small taxpayers.

Research Questions

The objective one, two and four have the following research questions respectively:

1. What are the correlates of tax knowledge among small taxpayers?
2. What is the tax knowledge gap among male and female small taxpayers?
3. What is the context for the non-adoption of GRA iTAPS among small taxpayers?

Research Hypothesis

Objective three will be answered by testing the hypothesis below.

H_A: level of tax knowledge has a significant influence on technology adoption among small taxpayers

Significance of the Study

This study is important in providing the empirical basis and valuable insights regarding the small taxpayers' knowledge level and its role in technology adoption. The study's findings can be used by the government, the tax authority as well as small taxpayers to boost domestic tax collection in Ghana and consequently propel economic growth. This study will assist tax authority to know the level of tax knowledge among small taxpayers. This will enable GRA and other policymakers to develop strategic and effective policies and education programmes that would enhance small taxpayers' knowledge of the tax system. The GRA and policymakers will be well-informed on the extent to which tax knowledge affect technology adoption. Thus, small taxpayers would also benefit from this initiative that would be developed, which would improve their attitudes towards honouring their tax obligation.

This study will enable tax authorities to know the level of awareness of iTAPS and context that explains its low adoption among small taxpayers. This would enable GRA and policymakers to design more effective and appropriate measures to improve its adoption not just among the small taxpayers, but amongst the entire taxpayers of the country. The study will, in essence, lay a basis for further studies on the adoption of an electronic tax system (iTAPS) in Ghana. It also hopes to assist students in appreciating the level of tax knowledge and the knowledge on technology adoption in developing nations, particularly in Ghana.

Delimitation

The study focused on examining the level of tax knowledge on technology adoption among small taxpayers in the Greater Accra, Ashanti and Northern Region in Ghana. The study focused on registered taxpayers with an annual turnover below GHC 90,000, who pay their tax to the small tax office. The study would unearth fresh evidence by measuring the knowledge level on the tax system and its drivers among small taxpayers, and their current knowledge and understanding of electronic tax filing system in Ghana since its introduction, as well as the challenges that confront small taxpayers in its adoption.

Limitations of the Study

The following are the limitations of the study. First, the study focuses on firm-level analysis rather than individual level. All taxpayers do not have the homogeneous characteristics and as such, there is the likelihood that the analyses would not reflect the state of all taxpayers. The survey was restricted

to Greater Accra, Ashanti and Northern Region. It may thus be inappropriate to generalize the findings of this study to other small taxpayers in the country. Further, the study is based on cross-sectional. In view of these changes in behaviour over time was not possible. Longitudinal data may provide significantly different results.

Organisation of the Study

This study is organised into six chapters. The first chapter dealt with the background story to the topic for the study, the statement of the problem, objectives of the study, research questions and hypotheses, significance of the study, delimitation and limitation of the study, and, finally, the organization of the study. Chapter Two captures the overview of small taxpayers in Ghana. The third chapter reviews the literature relevant to the study. The study reviewed both theoretical and empirical literature. Further, Chapter Four highlights the methods employed for the study. The chapter also gives a detailed description of the scope of the study, theories, variables used for the study, and the econometric model used for the estimation of the research objectives. Chapter Five covered the presentation of results and discussion of findings and Chapter Six summarised the entire work and stated the underlying conclusion based on the findings obtained in the study and finally made recommendation.

CHAPTER TWO

OVERVIEW OF SMALL TAXPAYERS IN GHANA

Introduction

This section presents an overview of small taxpayers in Ghana which include the description of small taxpayers, their roles, characteristics, tax policy reforms and taxes imposed on them.

Definition of Small Taxpayers

There is no generally agreed definition of small taxpayers since every country has its classification according to certain criteria. But usually, the categorisation of businesses based on the qualitative judgements such as the amount of paid-up capital, the number of employees, total assets owned and amount of total annual turnover. Wasao (2014) indicated that there has always been a challenge in having and implementing a multilateral or worldwide definition of small taxpayers. Therefore, its definition may not only differ between multilateral institutions such as the World Bank and the United Nations but also between countries, which largely depends on the size and scope of the economy.

In Ghana, the Ghana Statistical Service (GSS) classifies companies with employees less than ten (10) in their national accounts as small and micro-enterprises. Alternatively, the Ghana National Board for Small Scale Industries (NBSSI) uses both fixed assets and the number of employees in identifying micro and small taxpayers. The NBSSI describes small taxpayers as a business with not more than 9 employees with plants and machinery not exceeding 10 million Ghana Cedis except land, buildings, and vehicles, as employed by 29 or fewer workers. Also, the Ghana Revenue Authority (GRA)

defines small taxpayers as micro and small businesses with a turnover of less than ninety thousand Ghana cedis (GH 90,000.00). The study, therefore, employs the GRA definition small taxpayers since the study focuses on small taxpayers in Ghana.

Characteristics of Small Taxpayers

The number of employees, the number of sales, the specific product they produce and the capital are some of the main features of the small taxpayers. Small taxpayers are characterised by uncertainty and creativity (Atawodi & Ojeka, 2012). Nkuah et al. (2013) indicated that the idea of small businesses is subjective and complex. They add that small businesses are typically small business owners or companies selling basic products and services. Majority of these companies lack systems of administration and management in their operation. Few small companies are more coordinated and developed in metropolitan communities than those in rural areas (Atawodi & Ojeka, 2012). According to Osei et al. (1993), small business taxpayers' ownership style has led to simplistic management and operational structure, fewer employees and low education level for owners/managers.

Moreover, Hanefah, Arrif and Kasipillai (2001) indicate that the production processes of the majority of small businesses are usually labour-intensive. They also indicate that small businesses are usually suppliers of raw materials to manufacturing firms, since their operations depends largely on locally sourced raw materials and also require lower start-up capital than large companies. Also, the decisions of small business managers tend to be arbitrary in that they are handled and regulated by the same person (Atawodi & Ojeka, 2012).

Role of Small Taxpayers to the Economy

Several studies have illustrated the significant contribution of small taxpayers to the gross domestic product, growth and development of most economies, especially developed countries. According to Ayyagari et al. (2007), small taxpayers on average account for about 55 percent of manufacturing jobs and makes up about 99 percent of all businesses and also account for 44 percent to 70 percent of employment. Small businesses will improve domestic economic cycles and inter-sectoral ties, which is a crucial prerequisite for effective industrialization strategies.

Small businesses, in Ghana, employ an integral part of the population, and job growth in the small business sector is around 5 percent higher than in medium and large small taxpayers, and the contributed about 6 percent to GDP in 1998 (Kayanula & Quartey, 2000). According to Abor and Quartey (2010) small business accounts for approximately 85 percent of manufacturing jobs and 70 percent of GDP in Ghana. They further indicate that small businesses account for about 92 percent of businesses in Ghana (Abor & Quartey, 2010).

Taxation of Small Taxpayers

Taxes are the obligatory money people of a nation pay to the government as a way of mobilizing revenue. Taxes differ based on the economic policies implemented by the government and are instruments to promote sustainable growth and economic development. Taxes are introduced to help fund the government's budget deficit, promote economic growth or combat other external factors. Small taxpayers tax rate for the year 2020 remain 21 percent. However, small taxpayers pay different tax rate based on

their entities. Generally, small taxpayers registered as sole proprietorships pay 13.3 percent tax rate, partnership firms pay 23.6 percent tax rate and small corporate businesses pay a 26.9 percent tax rate. Taxation may have significant effects on the economy's small taxpayers, including impacts on their production, performance and level of compliance. Taxes may increase the cost of producing products and services which ultimately lead to an increase of goods prices which affect the final consumers.

Furthermore, the development of a favourable environment for the growth of taxpayers while ensuring tax compliance is a challenge faced by most economies. Compliance of small taxpayers with the laws and rules governing the collection and implementation of tax assessments may be considered as the tax principles. These include fairness: taxes must be equal and consistent with the taxpayers' benefits; economic growth: taxes paid should be directed towards achieving the goals needed for a country's economic growth; equity: income and expenditure of taxpayers should balance their tax liabilities; convenient: frameworks on how taxes should be paid should be appropriate.

Classification of Taxes in Ghana

Taxation is defined as levying on mandatory donations by public bodies with the tax authority to defray the expenses of their operations without granting the donor any special benefit (Abdallah, 2014). It also refers to as any volume of money that a country's government obligatorily receives from its citizens without providing any benefit or returning any products indirectly for the amount obtained (Asante & Marfo-Yiadom, 2010).

In Ghana, taxes are grouped into direct and indirect taxes. The direct taxes supposed to be borne by persons or entity on whom it is directly charged, with the same individual or association having an influence and occurrence (Abdallah, 2014). According to GRA, a direct tax is also defined as; Pay As You Earn, which is a type of tax levied on employee's wages. This is a progressive tax where those with high income turns to pay more tax than those with lower income. In comparison, corporate tax is another form of direct tax imposed on the profits of companies. The tax rate charged by the Ghana Revenue Authority differs across business types. Capital gain tax is also a tax imposed on the increase in worth of the chargeable assets between purchase time and sale time (Abdallah, 2014). A gift tax is another form of tax imposed on the transfer of personal wealth from one person to another. However, there are some exemptions and the tax rate is charged on gifts that taxable and above fifty.

Indirect taxes, on the other hand, are levied on money spent on goods and services and are only paid when such goods and services are purchased (Asante & Marfo-Yiadom, 2010). These are tax collected by the GRA division of the Customs, Excise and Preventive Services (CEPS) and Value-Added Service (VAT). Export Duty, import duty and Value Added Tax are the main indirect taxes. VAT is a tax that is imposed on the purchased goods and service. It is been levied at the manufacturing and distribution chain at every point, which usually received by a licensed entity on behalf of the GRA.

Tax Policy and Reforms in Ghana

In creating a conducive and appropriate atmosphere for business success, the government's reform taxes are used to gear long-term economics.

Governments have introduced many tax policies to encourage and protect the growth of small taxpayers. However, probed into tax compliance by asking these questions: How can the government increase compliance level among small taxpayers? And how can tax knowledge increase technology adoption especially among small taxpayers? Regardless of these concerns, compliance with taxes should create a serene atmosphere in which small taxpayers can increase their operations to increase their tax knowledge level.

Tax policies and reforms have been implemented in Ghana to guarantee tax compliance. The GRA, for example, was created in 2009 by merging Internal Revenue Service (IRS) and the Custom Exercise and Preventive Service (CEPS) to enhance tax payments, increase tax system efficiency and minimize compliance costs. Also, the Ghana Government launched the e-government project in November 2011 to connect the GRA to the Registrar General's Department (RGD) to keep electrical bills on the payment of taxes from registered companies. The scheme for flat rate Value Added Tax (VAT) was adopted by Parliament Act 734 in 2007, which acted as an modification to the VAT Act, 1998, Act 546. For example, in Ghana, the Tax Stamp imposed a flat tax on different SMEs retailers.

CHAPTER THREE

LITERATURE REVIEW

Introduction

This chapter review relevant theories and empirical information from research works related to the research problem under study. The aim is to gain an understanding of the history, evolution and direction of tax knowledge and technology adoption which will provide justification in revealing the knowledge gap for which this study is intended.

Theoretical Review

This section presents the theoretical literature review, which is an evaluation report of related theories that forms the basis of this study. The review was organised into the following subsections: Theory of planned behaviour, Diffusion of Innovation Theory, Technology Acceptance Model and the Unified Theory of Acceptance and Use of Technology

The theory of Planned Behaviour

The behavioural theory suggests that people are not just autonomous, self-interested, maximizing utility, but behave according to specific behaviours, values, norms, and roles (Ajzen, 1991). The behavioural perspective combines psychological and sociological factors such as perception, ethics, knowledge, culture, tax morale and age as variables or factors that affect compliance behaviour of taxpayers. The model is important because it predicts that non-economic variables such as age, perception and knowledge influence taxpayers' behaviours indirectly by their impact on incentives and attitudes to non-compliance. The capability to exhibit an

activity depends on the truth that a person is responsible for that action (Behaviour intention). Behavioural intention is sequentially related to three factors: behavioural disposition, perceived behavioural power and social norms. These three variables are all under the influence of moral beliefs, control beliefs and normative beliefs.

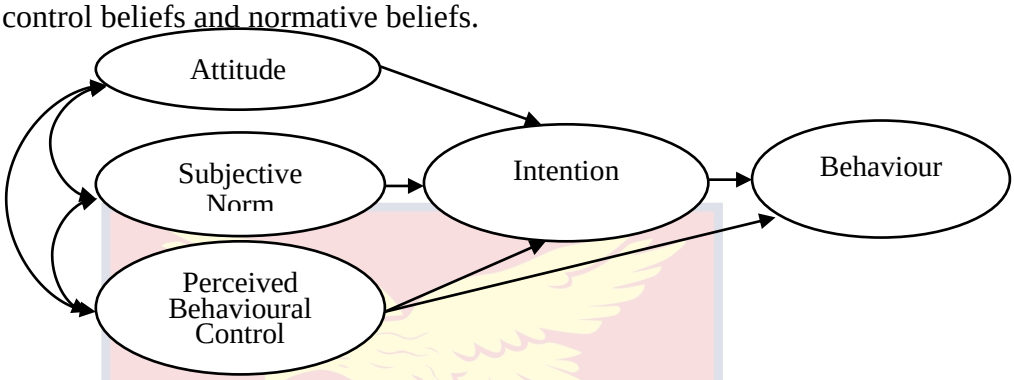

Figure 1: The theory of planned behaviour
Source: Ajzen, (1991)

Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) has been one of the most influential models of technology adoption. It is a theory of information systems that simulates how users adopt and use technology. TAM states that the adoption of technological innovation is affected by perceived usefulness and perceived ease of use of technology (Davis, 1989). The perceived usefulness refers to the extent to which an individual has confidence in a particular system to enhance job performance within an organisational context. Whereas the degree to which an individual believes that the use of a particular system would be effortless denotes the ease of use. The model indicates that the use of technology is implicitly influenced by both perceived utility and perceived ease of use, which are of key importance to innovation trends of adoption (Hong, Lin, & Hsieh, 2017).

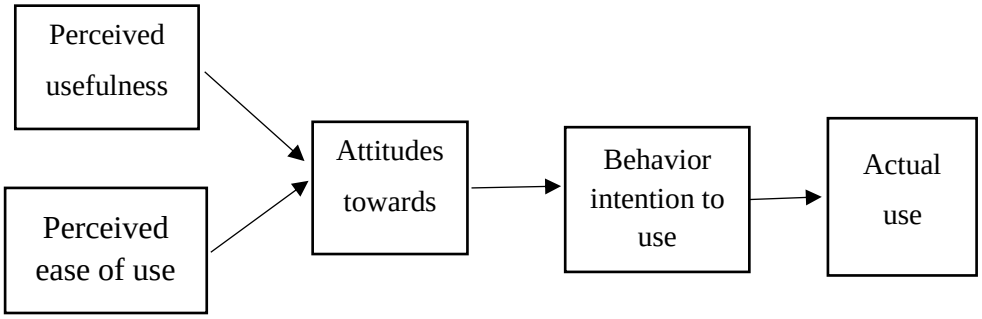

Figure 2: Technology Acceptance Model (TAM) Adapted from Davis (1989)

Diffusion of Innovation Theory

Innovation Diffusion Theory is one of the popular theories for studying IT adoption and understanding how IT innovations spread among and within communities. According to Rogers (2003), the Diffusion of Innovation Theory is a mechanism through which innovation is transmitted through certain networks over time amongst participants of the social system. Theoretically, invention is perceived as a concept, process or technology that is novel or unknown to individuals or organisations within a given field or social context. The medium of communication is a way of passing information from one person or unit to another. Finally, the social system is a group of units participating in the collective settlement of issues with a common mission.

According to Rogers (2003), the theory diffusion innovation aims to understand the nature of technology implementation, to explain the process of adoption and to forecast the pace of change in advance. The theory indicates that scientific progress is transmitted over time, across different networks, among the representatives of the Social Network. The theory relates to Ghana in that, the invention of a new electronic online system for filing and payment of tax known as iTAPS is conveyed via the different networks by the GRA and viewed through the internet to meet individual users or groups.

Moreover, Rogers (2003) asserted that the phrase at which technological progress involves five stages in a manner which is time-ordered accompany each other. The stages are knowledge: a person learns about the nature of innovation, understands how it operates and finds information on how to use it correctly. The second is the knowledge phase at which the innovation-decision process is evaluated. The third is the resolution stage where the user decides to adopt or reject the innovation. In Rogers' view, adoption is the full use of innovation as the most favourable course of action available, whereas rejection is not the use of innovation. The final stage is the confirmation stage, where the fortification is related to the positive results of the innovation and the user(s) are looking for support for their decision.

Unified Theory of Acceptance and Use of Technology (UTAUT)

The Unified Theory of Acceptance and Use of Technology model was conceived by Venkatesh and others and aims to clarify the intention of the consumer to use the information system and its subsequent usage behaviour. The UTAUT model consists of eight theoretical models, including TRA, TAM, Motivational Model, Planned Behaviour Theory (TPB), Technology Diffusion Theory, PC Usage Model and the TAM and TPB Combination Model. UTAUT aims to understand the purpose to use the information system (IS) and the definite use of the system (Venkatesh et al., 2003). Theoretically, four key constructs (performance expectations, effort expectations, social influence and facilitating conditions) are direct factors of intentional use and behaviour. According to Venkatesh et al. (2003) experience, gender, age and willingness to use are designed to mediate the impact of the four key constructs on the intent and behaviour of use.

Element of tax knowledge

Bornman and Ramutumbu (2019) contend that there is no uniform meaning of the concept of 'tax knowledge', and there is little reference to the different elements of tax knowledge despite its importance in influencing tax compliance. Bornman and Ramutumbu (2019) examined various studies on the effect of taxpayers knowledge on their compliance level, and found that authors recognise elements of tax knowledge as, for example, 'understanding laws', 'applying laws', 'reporting tax information' and 'submitting returns'. They further argue that different elements of tax knowledge are necessary to improve a taxpayer's ability to comply. They assert that tax knowledge can be viewed as having three elements, namely, legal, procedural and general. Their study proposes a theoretical framework for tax knowledge, as shown in Figure 3. The elements of tax knowledge are briefly discussed below.

General tax knowledge

General tax knowledge means tax awareness, including being informed on the goals of government fiscal policies (the "why" of paying taxes and the dimension of tax morality) and an individual understanding his one's financial status and the effects of taxation on them (the "who" and "how" to pay taxes).

Legal tax knowledge

Legal knowledge refers to an understanding of how one is taxed and has two dimensions; first, understanding the legal terms and legislation of the tax system (knowing that something is taxable) and secondly, the ability to apply the legal knowledge to specific situations to be able to calculate the tax effect (knowing how). Bornman and Ramutumbu (2019) specify that legal tax knowledge comprises of a 'broad understanding of legal jargons' and 'the

aptitude to apply explicit rules and regulations to accurately determine one's tax liability'

Procedural/Technical tax knowledge

Procedural knowledge refers to the skills and resources to interact with tax authorities and has one's tax records in order. Bornman and Ramutumbu (2019) maintain that taxpayers need to be aware of tax processes and their responsibility to adhere to tax laws. They explained that procedural awareness is related to the need to understand the processes pertaining to tax enforcement which requires knowledge of tax forms, structures and contacts with tax authorities, as well as the need to know how to maintain documents that are tax compliant.

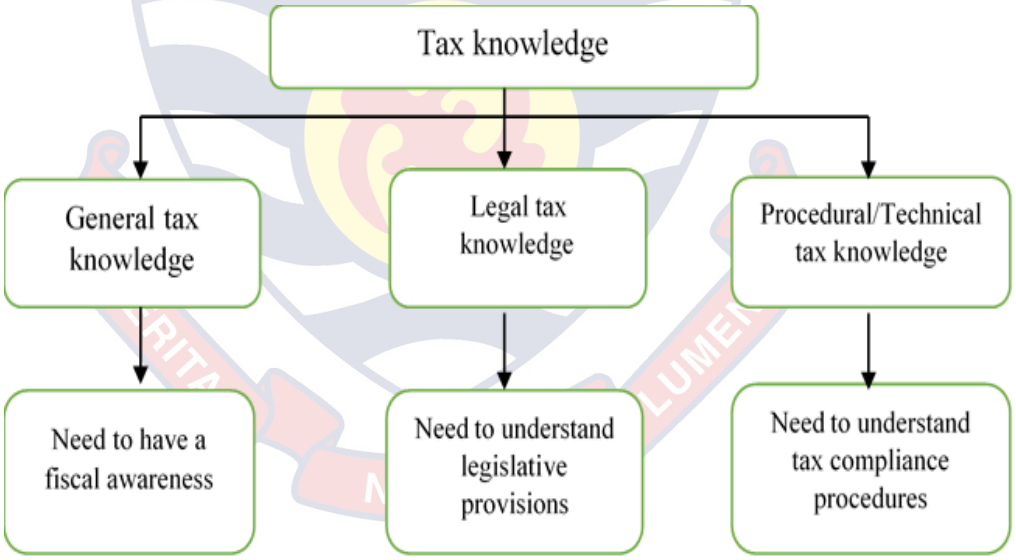

Figure 3: Element of tax knowledge framework
Source: Bornman and Ramutumbu (2019)

Empirical literature review

This section reviews empirical works in the context of their focus, methodology and, most importantly, their findings in relation to this work. Here, empirical literature about the conceptual framework of tax knowledge,

the significance of tax knowledge, factors that affect tax knowledge among small taxpayers. In addition, the role of tax knowledge in technology adoption and the context that explains the non-adoption of electronic filing system.

Tax Knowledge among small taxpayers

According to Harris (2013) tax knowledge among SMEs where small taxpayers from an integral are divided into two facets, namely, knowledge acquired through formal education in the form of taking a course and knowledge which is directed towards possible opportunities to evade tax. the findings of the study revealed that the majority of small businesses in the UK have tax knowledge, and are aware of the tax regulations. On the contrary, Saad (2014) using telephone interviews, analysed the views of taxpayers on their level of tax knowledge and perceived the complexity of Malaysia's income tax system. Moreover, the results suggest that taxpayers have insufficient technical knowledge and feel that the tax system is complex.

In Indonesia, Mukhlis, Soesetio and Utomo (2015) studied the role of tax education in tax awareness and its effect on tax fairness and tax compliance in the small and medium-sized enterprises sector. The result indicates that there is a positive and significant relationship between tax knowledge and fiscal fairness, and tax compliance. On the contrary, findings by Nurlis (2015) indicate that taxpayers' tax knowledge has a negative and significant taxpayer compliance relationship. In his article, he examines the results of taxpayer awareness, knowledge, tax penalties and service tax authorities on individual taxpayer compliance in Jabodetabek and Bandung in 2015 in Indonesia.

Fauziati et al. (2016) investigated the effect of tax knowledge on tax compliance in Indonesia using a survey research design. The result showed that there is no causal effect between tax knowledge and tax compliance. In contrast, Asrinanda (2018) argues that to improve taxpayer compliance, the government needs to raise tax and public knowledge awareness by socializing tax importance. This study was to investigate the impact of tax information, self-assessment program and tax awareness on taxpayer compliance in Indonesia's Banda Aceh Region. In a similar vein, research on taxpayer knowledge, taxpayer morale, tax sanctions, and taxpayer enforcement by Purnamasari and Sudaryo (2018) found that taxpayer knowledge has a positive impact on the taxpayer compliance of individuals at KPP Pratama Bandung Tegalega.

Maseko (2014) in Zimbabwe explored the effects of personal tax awareness on SME enforcement with the design of qualitative analysis. The finding indicated that all small and medium-sized enterprise operators were confronted with different business situations from large enterprises which caused them to bear high tax compliance burdens compared to SMEs. Also, the result revealed SME operators' perceptions of tax fairness; the quality of tax services and government spending priorities have a significant effect on their country's tax compliance decisions. In Ethiopia, Redae and Sekhon (2016) examined taxpayers' knowledge and tax compliance behaviour in case of Tigray state. Using a mixed approach, the result revealed that taxpayers' tax enforcement conduct is affected by tax awareness in the state of Tigray.

In Nigeria, Oladipupo and Obazee (2016) used a survey research method to study the impacts of the awareness and sanctions of taxpayers on

tax enforcement among small and medium-sized enterprises. The results found that tax awareness had a positive and significant effect on tax compliance when the tax penalty had a marginal positive impact. Thus, the study shows that tax awareness has a higher propensity than the tax penalty to encourage tax compliance. Furthermore, Newman and Nokhu (2018), using a sample of 35 SMEs and 40 tax officers in Zimbabwe, revealed that to have a positive effect on tax compliance, tax rates and corruption need to be addressed. Furthermore, Obongo, Memba, and Oluoch (2018) used cross-sectional survey research on the impact of tax knowledge and perception of tax compliance among investors in Kenya. Their studies have proven that tax knowledge and awareness have a direct impact on the willingness of taxpayers to recognize and comply with the laws and regulations on taxes.

In Ghana, Anane and Asamoah (2015) assessed the tax knowledge and perceptual experience of small trader tax obligation in the Obuasi Municipality. Their findings indicate that small traders have less knowledge on their tax obligation when dealing with the tax process, and their perception on how the government spends their tax influences their decision to comply with their tax obligation. On a comparable note, Amankwaah, et al (2019) in Sunyani Municipality revealed that tax knowledge significantly affects taxpayers' attitude and hence, affects their compliance level in Ghana. More so, Tetteh (2019) analysed the effect of tax knowledge and awareness on compliance among small and medium-sized businesses in Ghana. Using the Structural Equation Modelling, results indicated that the majority of the participants had no knowledge or attended any educational and sensitization programmes aimed at creating tax knowledge and awareness.

Factors That Influence Tax Knowledge among taxpayers

According to Cuccia (2013), taxpayers' level of formal education has an important effect on their knowledge about the tax system. This was in his study "*The economics of tax compliance: what do we know and where do we go?"* they opposed that taxpayers with a higher education level could easily understand the tax requirement. They further indicated that the complexity of some tax policies leads to many taxpayers to ignore tax-related matters. Besides, Armah-Attoh and Awal (2013) in Ghana, revealed that tax evasion is much higher among urban residents than their rural compatriots. The study added that probably, the high population density and tax knowledge in most urban centres in the country makes it difficult for tax officials to identify and bring all potential taxpayers into the tax net. A study by Okpeyoa, Musahb, and Gakpetor (2014) opined that the more frequent businesses are audited will significantly motivate small and medium taxpayers to comply with tax obligation, since they know tax-related matters, to avoid any fines and other sanctions.

Nyamwanza et al. (2014) investigated the effect of tax compliance of owners and managers on the operation of the legal system in Gweru, Zimbabwe. The findings revealed that the education level of firm owners does not influence their compliance level. In Ghana, a study by Appiah (2015) indicated that the distance from the business place to the tax office is too high in Kumasi metropolis. The study reviewed that the long-distance amid the tax office and place of business poses a challenge to taxpayers, which make the acquisition of obligatory information on tax matters difficult, leading to non-

compliance. He added that inadequate tax education contributes greatly to tax noncompliance

Adu and Amponsah (2016) in an interview study asserted that distance that taxpayers cover before they get to a tax office was found to be significant in determining the number of tax stamps purchased, even in times of obtaining information about tax obligation. Their finding indicated that the taxpayers are more likely to increase the number of tax stamp purchased if the distance between the revenue collection centre to the businesses is near. In Zambia, Pemstein, Seim, and Siwale (2018) added that travelling a far distance to pay taxes might be difficult for many taxpayers as well as dealing with tax-related matters. They further suggest that distance to the tax office is a critical problem for some, but not a pressing issue for most.

Moreover, Baru's (2016) research on the effect of tax knowledge on tax compliance showed that the extent of education of taxpayers does not inherently contribute to tax knowledge, but the beliefs they have. More so, Engida and Baisa (2014) research work on the determinants taxpayers' compliance level with the tax system in Mekelle City, Ethiopia indicated that there is a negative and significant correlation between gender and tax knowledge. The findings of this implies that males have lesser tax knowledge than females. They further indicated that concerning taxpayers' experiences, younger taxpayers have a higher tax knowledge level.

According to the findings of Mukhlis, Utomo and Soesetio (2015), indicated that among Handicraft SMEs Sectors, there exist a positive and significant relationship between tax education on tax knowledge and also on their compliance attitude in Indonesia. They added that well-equipped

taxpayer with the appropriate tax knowledge can easily access their file tax return forms on time and necessary tax liability correctly. Isbell (2017) reveals that the knowledge about tax obligation is high among taxpayers in the urban centre than those in the rural area. The study further indicated that regarding the knowledge, rural residents more commonly report difficulty than urbanites.

Moreover, Wadesango and Mwandambira (2018), argued that the absence of tax audit would affect tax knowledge and understanding of taxpayers, which affect their compliance behaviour among Small and Medium Enterprises in Zimbabwe. Pratama (2018) examined the effect of various individual characteristics, namely, age, gender, income level and education level have significant impact on their tax knowledge level. Using multiple regression, the findings revealed that gender does not influence tax knowledge, whereas age, income level and education level influence tax knowledge. Kumiawan (2020) also studied the effect of tax education on tax knowledge and how tax knowledge affects their personal tax compliance. The results of the survey showed that there exist a positive and significant effect of tax education on tax compliance. He further asserted that there is an indirect but significant effect of tax education on tax compliance and this is through tax knowledge in Indonesia.

Tax Knowledge and Technology Adoption

Tallaha, Shukor and Hassan (2014) in Malaysia, examined the factors that could affect taxpayers' intention to use e-filing through survey design using 288 individual taxpayers in the city of Kuala Lumpur. the study was based on the theoretical framework of technology acceptance model, the

concept of tax knowledge and the theory of planned behaviour. of which the findings showed that perceived ease of use, perceived usefulness, perceived subjective norms have a positive association. However, there was no significant association between tax knowledge, behavioural control and taxpayers' intention to use Electronic filing system. Mongwaketse's (2015) research on the influence of electronic filing on taxpayer's compliance behaviour found out that only 58 percent of taxpayers said they knew and understood how the use of electronic filing indication a lack of knowledge. It further showed that majority of taxpayers' tax knowledge is basic, although a significant portion still chose the use of tax advisor.

Agustiningsih and Isroah (2016) analysed the effects of the level of tax understanding, implementation of e-filing, and taxpayer's awareness on taxpayer's compliance in KPP Pratama Yogyakarta. The study focused on 70 electronic filing taxpayers and used incidental sampling. The results revealed that the e-filling implementation, level of tax understanding and there was positive and significant relationship between taxpayer's awareness and their compliance level. In India, Kumar and Sachan (2017) used a quantitative approach to explore the core factors that influence the adoption of e-filing of taxpayers in India. The study indicated taxpayers' attitude toward tax compliance will improve when the electronic filing system is upgraded.

In Tanzania, Kimea, Chimilila and Sichone (2019) use the TAM model to examine variables that affect the decision of taxpayers to use electronic tax filing system. The analysis showed that the majority of respondents had a positive intention of using the tax electronic filing system. In addition, it was observed that effort expectation, performance expectation, social influence,

and perceived usefulness had a positive relationship with the intention of using e-filing. Perceived risk was shown to have an adverse relationship with the intention of using e-filing. The significance of these variables was however, different for users and non-users. It was also observed that other factors such as market location, business size, availability and usage of ICT facilities, and expertise had major effects on the intention to use.

In an interview, Taylor and Owusu (2012) determined the factors influencing the acceptance of the Internet and e-commerce by small exporting handicraft firms. The results indicate that the internal factors that affected internet and e-commerce, as well as the adoption of businesses, were perceived gains of technology from the characteristics of the owner/manager, lack of trained personnel to build and operate the company's e-commerce website, and insufficient capital from expense and return on investment. The key external factors affecting the adoption were limited internet service providers (ISP), lack of electronic payment networks, price agreements, limited internet banking availability, power failure, and poor market competition.

The context that explains the non-adoption of a new technology

Hashim (2007) determines the extent to which information communication technology (ICT), expertise, usage and acceptance by owners of small and medium-sized businesses in Malaysia, using a survey sample of 383 small business owners. The study was based on the diffusion of creativity theory, the findings of which indicate that the degree of information communication technology expertise of small business owners is low. They

also suggested that the use of ICT is poor and that the implementation of ICTs is slow, and this is due to the fact that they find it difficult to adopt ICTs.

Jones et al. (2014) longitudinal study, revealed that sole-proprietor attitudes towards information communication technology are characterised by their perceptions of the value. The findings revealed that the inability of sole proprietors to develop the requisite attitudes has a positive strategic response, government-sponsored advisers needed to investigate and particularly in the context of the sustainability of businesses rather than their transformation to ICT usage.

In Nigeria, Apulu and Latham (2010) identify certain ICT drivers of small enterprises. The study showed that there is rising consensus for a positive association between ICT and its advantages. They suggested that the importance of small business owners–management and IT specialists–could inspire them to step up their efforts to deploy ICT in their respective organisations. It also reminds staff of the advantages involved with the adoption of ICT. Moreover, Jones, Beynon-Davies, Mpofu, and Watkins-Mathys (2011) examine the small hotel businesses adoption of ICT in Botswana, South Africa and Zimbabwe. The results show the person distinctive behavioral traits as well as the stage of ICT uptake reached in each case study. The study showed that research findings were undertaken in a stable business environment; with administrative readiness; financial and owner-manager assistance appeared to be readily engaged in ICT uptake.

Apulu, Latham and Moreton (2011) considered factors that had an impact on the effective use of ICT and the acceptance of a more sophisticated ICT solution for small businesses in Nigeria. The results show that the

effective use of sophisticated ICT solutions in small and medium-sized enterprises has a significant impact on the competitiveness of small and medium-sized enterprises. Anees and Kumar (2017) researched on individual taxpayers' perception of electronic filing. A cross-sectional descriptive research design was used to determine their perception, which results indicated that lack of experience, knowledge on filing their returns via online was a major problem. They added that most individual taxpayers were satisfied with the accuracy and easiness of e-filing.

Selase, et al. (2019) combined the construct of Innovation Diffusion Theory and Technology Acceptance Model to identify factors which influence Small and medium-sized businesses to adopt and use internet technology. The results indicated that perceived ease of use, perceived usefulness of internet technology, compatibility and cost-effectiveness are some of the factors that influence the adoption and utilization of internet technology, however, there is a positive association between internet technology usage and market performance.

Conclusion

This chapter reviewed relevant theories and empirical works in the context of their focus, methodology and, most importantly, their findings in relation to tax knowledge, compliance and technology adoption. Although the relevant of tax knowledge for tax-compliant conduct is important to many researchers (Purnamasari & Sudaryo, 2018; Asrinanda, 2018; Mukhlis, Utomo & Soesetio, 2015; Nurlis, 2015; Anane & Asamoah, 2015), others find a weak correlation or no between tax knowledge and attitudes towards tax compliance (Fauziati et al., 2016; Cvrlje, 2015). One of the challenges in interpreting

evidence on the role of tax knowledge in tax compliance is the fact that various studies use different measurements and interpretations of what tax knowledge entails. It is therefore argued that the literature discrepancy is that the definition of tax knowledge is not well defined in tax compliance study and is typically used in a limited context. Overlooking such nuances can lead to inappropriate policy recommendations. On this backdrop, the study adopts the tax knowledge framework proposed by Bornman and Ramutumbu (2019) to compute the level of tax knowledge of small taxpayers and factors that could influence their tax knowledge level.

Moreover, some researchers have analysed sex/gender as a demographic factor that plays a significant role in taxpayers tax knowledge and tax compliance (Amponsah & Adu, 2017; and Lohse & Qari, 2014; Engida, & Baisa, 2014) but fails to find the knowledge gap between male and female taxpayers. The study also estimates the tax knowledge gap between male and female small taxpayers, to assist policymakers to know the disparity and to develop necessary and effective initiatives to reduce the tax gap. Furthermore, the study proposes the possibility that the level of tax knowledge may be an additional factor that influences technology adoption among small taxpayers. Since the implementation of technology in tax return processing is mainly to upsurge tax compliance, it is crucial to understand whether the level of tax knowledge could influence the use of technology in the preparation and reporting of tax requirements, as well as the context that explains the non-adoption of GRA iTAPS for filing and payment of tax.

CHAPTER FOUR

RESEARCH METHODS

Introduction

This chapter describes the research design and methods used in the study. The chapter presents the research design, theoretical and empirical model specifications, data source, and description of the variables and finally how the post estimation techniques were conducted. The chapter ends with a summary from the discussion of the methods.

Research Design

The study employs pragmatist philosophy which combines the philosophy of positivism and interpretivism. The positivists hold the view that reality can be observed and is stable, described and measured objectively without being interfered by the phenomena being studied (Levin, 1991). However, positivist school rules out the fact that knowledge and theories could be developed from multiple sources, including personal experiences and beliefs. In response to this limitation, the interpretivism holds the view that reality exists, but it cannot be measured directly; it can be construed by the individual through the lens of his or her previous experience, knowledge and expectations (Rubin & Rubin, 2011).

Instead of relying on these philosophies, with pragmatism, researchers stress the analysis challenge and use all possible methods to explain the problem. (Taguchi, 2018). Pragmatists argue that diverse techniques should be used in studying a phenomenon instead of adhering to just one way (Moon & Blackman, 2014). The adopted philosophy will allow us to understand and ensure that the strength of one method can compensate for the weaknesses of

another, especially in interdisciplinary research such as taxation. It is the philosophy that underpins the study on mixed methods.

To achieve the objectives, this study adopts a mixed research approach. The integration of the findings of these two methods is also an opportunity to provide a complete picture of a research topic that can address a range of research questions. This may help to increase the validity and the reliability of the research in this area and provide new opportunities for observing the complex behaviour of taxpayers.

The study adopts a cross-sectional approach also known as one-shot or status studies. Upon careful consideration, the implementation of a sequential explanatory method was deemed acceptable to extract initial quantitative results from a survey with subsequent qualitative data to be collected from telephone interviews (Creswell & Creswell, 2017). According to the quantitative data from McKerchar (2010), researchers may analyse trends based on previous literature, such as links and causal effects among variables, in theoretical context. This is because the central idea of quantitative research is to compare groups and relationships between variables.

Data Type and Source

The study used both secondary and primary data. The secondary data was obtained from the Directorate of Research, Innovation and Consultancy (DRIC) of the University of Cape Coast. This survey was on the topic "Ghana Beyond Aid: Cost of Tax Compliance and Tax incentives on small taxpayers". The survey collects firm-level data from the Greater Accra, Ashanti and Northern region. The data contain the demographic characteristics, employment data, expenditure and asset of the firm, tax compliance level,

compliance cost, tax knowledge, firm perception on tax, technology adoption, investment decision, only to mention a few.

To obtain a deeper, more contextual understanding of small taxpayers' tax knowledge and technology adoption, a semi-structured interview was used to obtain a full understanding of the research problem. The primary qualitative data with a purposeful sample of 8 participants involving 5 small taxpayers and 3 GRA officials were interviewed to enhance the validity of fine-grained and in-depth inquiry for the quantitative data was analysed. This was due to lack of response and the unwilling on the part of some participants (small taxpayers) to undertake the interview.

Econometric Specification and Estimation Techniques

The estimation techniques that were used in this study are generalised ordered logit model, multivariate nonlinear decomposition model and probit model. The generalised ordered model captures the estimation of the correlate of the level of tax knowledge, which was an ordered category. The multivariate nonlinear decomposition model mainly captures the sex tax knowledge gap among male and female small taxpayers. Lastly, the probit model captures estimation of influence of level of tax knowledge on technology adoption, which was a binary dependent variable.

Generalised Ordered Logit Model

To achieve the first objective the generalised ordered logit model was conducted. Certain tests have been performed to select an appropriate methodology for this method. y is the choice variable which assumed that the ordered logit model to be the discrete realisations of an underlying,

unobserved continuous random variable $y*$. The latent variable y* has a logit distribution with a linear combination of some of the predictor variables, x, plus a disturbance term.

$$y^* = \beta x + \varepsilon \quad (1)$$

Where β is the vector coefficient, the observed choice variable y is considered to be calculated by the latent continuous variable y* as follows:

$$y_i = j \text{ if } \delta_{j-1} \leq y^* \leq \delta_j, \quad j = 1,2, \ldots \ldots J \quad (2)$$

Where δ is unknown thresholds or cutoff points in the distribution of $y*$ with $\delta_0 = -\infty$ and $\delta_0 = +\infty$. In this study, the level of tax knowledge (dependent variable) has three categories: (a) low tax knowledge($j = 1$), (b) average tax knowledge($j = 2$), and (c) high tax knowledge($j = 3$).

If the possibility of a small taxpayer is presumed i reports a level of tax knowledge of j given a vector of observed influence variables x is $P_i = P(y_i = \frac{j}{x_i})$, then

$$P\left(y_i = \frac{j}{x_i}\right) = P\left(\delta_{j-1} < y^* < \delta_j\right)$$
$$= P\left(\delta_{j-1} < \beta x_i + \varepsilon_i < \delta_j\right)$$
$$P\left(\delta_{j-1} - \beta x_i < \varepsilon_i < \delta_j - \beta x_i\right)$$
$$\varphi\left(\delta_j - \beta x_i\right) - \varphi(\delta_{j-1} - \beta x_i)$$

where $\varphi(\varepsilon)$ is the cumulative probability distribution of ε. The log-likelihood is simply to estimate this model by using maximum - likelihood estimation (MLE) $lnL = \sum_{i=1}^{N} \sum_{j-1}^{J} Q_{i,j} ln(Q_{i,j} - Q_{i,j-1})$

Where L=likelihood function

$Q_{i,j}$ = indicator variable that equals 1 if $y_i = j$ and 0 otherwise,

$$\varphi_{i,j} = \varphi\left(\delta_j - \beta x_i\right)$$
$$\varphi_{i,j-1} = \varphi\left(\delta_j - \beta x_i\right)$$

Based on the assumption of the logit distribution of ε, the so-called proportional odds model (POM) is

$\frac{P(Y\leq j/x)}{P(Y>j/x)}\exp(\delta_j - \beta x_i)$ j=1, 2,…. , 4 (3)

Where

$P(Y \leq j/x)$ = conditional probability of choosing at most $j-1$ average tax knowledge given vector of observed influence variables x,

$P(Y > j/x)$ = probability of having j − 1 tax knowledge, and

$\beta =$ column vector coefficients.

This model presumes that j is not contingent on β. The slope of the log adds ratio, in other words, is the same across the categories of the dependent variable. This means that the various equations for each category vary only in the intercepts.

While the proportional-odds model is simple to estimate and easy to understand, it is not inherently practical to assume a parallel slope. The viability of the proportional-odds assertion can be analyses using the Wald tests, which investigate the hypothesis that the coefficients of each explanatory variables are constant across groups of dependent variables. If this assumption does not hold, it is advisable to apply the generalised ordered logit model by allowing slope change in response to choose.

The generalised ordered logit model can be written as

$$P(y_i > j) = \frac{\exp(\delta_j + x_i\beta_j)}{1+\exp(\delta_j + x_i\beta_j)} \quad j = 1, 2, \ldots, J-1 \qquad (4)$$

From Equation 4, it can be shown that the probabilities that y will take on each of the values from 1 to J are given below:

$$P(y_i = 1) = 1 - \frac{\exp(\delta_j + x_i\beta_j)}{1+\exp(\delta_j + x_i\beta_j)}$$

$$P(y_i = j) = \frac{\exp(\delta_{j-1} + x_i\beta)}{1 + \exp(\delta_{j-1} + x_i\beta)} - \frac{\exp(\delta_j + x_i\beta_j)}{1 + \exp(\delta_j + x_i\beta_j)} \quad (5)$$

$$j = 2, \ldots, j-1$$

$$P(y_i = J) = \frac{\exp(\delta_{j-1} + x_i\beta)}{1 + \exp(\delta_{j-1} + x_i\beta)}$$

When $J = 2$, the generalised ordered logit model is the same as a binomial logit model. When $J > 2$, the generalised ordered logit model becomes "equivalent to a series of binary logistic regressions where categories of the dependent variable are combined". In the case examined here, for $j = 1$, the generalised ordered logit model is equivalent to contrast Choice 1 (low tax knowledge) with Choices 2, and 3 (average and high tax knowledge). For $j = 2$, the contrast is between the sum of Choices 1 and 2 (low and average tax knowledge) against Choices 3 (High tax knowledge).

Multivariate decomposition for nonlinear response models

To explore tax knowledge gap among male and female managers the study was investigated using multivariate decomposition approach (Powers, Yoshioka & Yun, 2011). The response function in decomposition analysis (F), which was estimated following the logit regression, is as follows:

$$Y = F(X\beta) = \frac{e^{X\beta}}{1+e^{X\beta}} \quad (6)$$

where Y signifies a vector of predicted probabilities of tax knowledge, X is a vector of the explanatory variables, and β is a vector of the logit regression coefficients. The decomposition approach helps one to decompose changes in tax knowledge into two components: endowment and coefficient effects. The former is attributable to changes in endowments or characteristics, popularly referred to as the male or female effects of the explained component or

characteristics, and the latter is due to differences in coefficients or effects, usually referred to as the unexplained component.

The decomposition analysis was conducted in overall and detailed forms. The overall decomposition was carried out to define the overall endowment and coefficient effects of the explanatory variables (E and C respectively) on variations in male and female tax knowledge, as follows:

$$\bar{Y}_M - \bar{Y}_F = F(\bar{X}_M\beta_M) - F(\bar{X}_F\beta_F) \quad (7)$$

$$\bar{Y}_M - \bar{Y}_F = \underbrace{\{F(\bar{X}_M\beta_M) - F(\bar{X}_F\beta_M)\}}_{E} + \underbrace{\{F(\bar{X}_F\beta_M) - F(\bar{X}_F\beta_F)\}}_{C} \quad (8)$$

In the equation above, M and F are the comparisons of male and female decomposition analysis. $\bar{Y}_M$ and $\bar{Y}_F$are means of the predicted probabilities of tax knowledge of male and female, $\bar{X}_M$and $\bar{X}_F$ are means of the explanatory variables, and β_M and β_F are the logit regression coefficients in male and female respectively.

In detailed decomposition, the endowment and coefficient effects of each explanatory variable (E_k and C_k, respectively) on the changes in the level of tax knowledge among male and female were assessed using the equation below:

$$\bar{Y}_M - \bar{Y}_F = E + C$$
$$= \sum_{k=1}^{K} W_{\Delta X_k} E + \sum_{k=1}^{K} W_{\Delta\beta_k} C$$
$$= \sum_{k=1}^{K} E_k + \sum_{k=1}^{K} C_k \quad (9)$$

where $W_{\Delta X_k}$ and $W_{\Delta\beta_k}$ are the contributions of the kth covariate to E and C, respectively, calculated using the 2 following formulas:

$$W_{\Delta X_k} = \frac{\beta_t^k(\bar{X}_t^k - \bar{X}_{t-n}^{\ k})}{\sum_{k=1}^{K}\beta_t^k(\bar{X}_t^k - \bar{X}_{t-n}^{\ k})} \quad (10)$$

$$W_{\Delta\beta_k} = \frac{\bar{X}_{t-n}^{\ k}(\beta_t^k - \beta_{t-n}^{\ k})}{\sum_{k=1}^{K}\bar{X}_{t-n}^{\ k}(\beta_t^k - \beta_{t-n}^{\ k})} \quad (11)$$

Where

$$\sum_k W_{\Delta X_k} = \sum_k W_{\Delta \beta_k} = 1.0 \quad (12)$$

Therefore, the weights of composition $W_{\Delta X_k}$ represent the contribution of the kth covariate to the linearization of E as determined by the magnitude of the group difference in means weighted by the effect of the reference group. Similarly, the $W_{\Delta \beta_k}$ coefficient weights represent the contribution of k to the linearization of ***C*** as calculated by the magnitude of the group difference in the effects weighted by the mean of the comparison group. The weights are then proportional to the contributions to the decomposition of the linear predictor, where the relative sizes of the contributions to the explained or unknown parts of the resultant differential are equal to the relative contributions to the decomposition of the linear predictor. To change in dimension, the weights of the covariates are invariant. Hence in terms of the overall components, the raw difference can be expressed as a sum of weighted sums of unique contributions.

Probit model

Since the dependent variables for the equation are dummy variables, this study estimated a Probit model to measure the effect of the level of tax knowledge on technology adoption. The advantage of using the Probit model (as against the LMP Model) is that it guarantees that the estimated probabilities fall between the logical limits 0 and 1 and also ensures the relationship between $P_i \; and \; X_i \; is \; non \; linear$ (Gujarati, 2006).

The Probit model is systematically specified below: We assume the probability of adopting a technology depends on an unobservable latent variable (y), that is determined by one or more explanatory variables as indicated in the equation below

$$y_i^* = x_i'\beta + \epsilon \quad \epsilon \sim N(0, \delta^2)$$

(13)

$$FA = \begin{cases} 1 \; if \; y_i^* > 0 \\ 0 \; if \; y_i^* \leq 0 \end{cases}$$

$$Pr(FA_I = 0|X) = Pr(x_i'\beta + \epsilon > 0|x)$$

(14)

$$Pr(x_i'\beta + \epsilon > 0|x)$$

(15)

$$Pr(\epsilon > -x_i'\beta)$$

Assuming that the error terms are independent and normally distributed with zero mean and unit variance. Equation changes to Probit model

$$Pr(FA_i = 1|x) = 1 - \phi\left(-\frac{x\beta}{\sigma}\right)\sigma \equiv 1$$

(16)

$$Pr(FA_i = 1|x) = \phi(x_i'\beta)$$

(17)

because of symmetry where $\phi(.)$ represents the standard normal distribution x_i' is a matrix that represents factors that influence $technology\ adoption$ among small taxpayers.

The widely used technique for estimating models with a binary dependent variable like Probit is an estimate of the minimum likelihood (MLE). The parameters in the Probit regression model were estimated using this technique. The maximum likelihood method is to estimate unknown parameters in such a way that the likelihood of observing the dependent variable is as high (max) as possible (Gujarati, 2006). It can be shown that there is a unique maximum available for the binary probit model. Pindyck and Rubinfield (1991) claim that calculating the maximum likelihood yields estimators with constant parameters. Thus, the MLE produced maximum

likelihood values to the parameters, given the sample data. The likelihood function can be expressed as $L(\beta|y) = \pi_i^n$

Empirical Model Specification

In achieving the set objectives, the study used some explanatory variables. Such firm-specific variables include the manager's education level, sex of manager, experience of the firm, type of organisation and firm's income, the institutional variables entail tax audit, tax complexity, and tax education. Distance to the GRA office, region, and firm residence covers the district variables.

To achieve the first objective which sought to examine the correlate of level of tax knowledge, the study begins the functional form as:

$$TK = f\left(\begin{matrix} man\_edu, man\_sex, F\_exper, F\_exper, F\_expersq, Fincome, TA, Compx, \\ Taxedu, DTO, Region, Location \end{matrix}\right) \quad (18)$$

From equation 10, the explicit estimable econometric model can be expressed as:

$$\begin{aligned} \mathrm{TK}_i = {} & \beta_0 + \beta_1 man\_edu_i + \beta_2 mansex_i + \beta_3 F\_exper_i + \beta_4 F\_expersq_i \\ & + \beta_5\, Fincome_i + \beta_6 Fstructure_i + \beta_7 Compx_i + \beta_8 Taxedu_i \\ & + \beta_9 TA_i + \beta_{10} DTO_i + \beta_{11} Region_i + \beta_{12} Location_i \\ & + \varepsilon_i \end{aligned} \quad (19)$$

β represent parameters to be estimated, ε represent the Gaussian white noise. TK denotes level Tax Knowledge, man_edu denotes Manager's educational level, man_sex denotes sex of the manager, F_exper denotes the experience of the firm since it registered with GRA, $F\_expersq$ denote experience square, $Fincome$ denotes firms' income, $Fstructure$ denotes type of organisation, TA denotes Tax audit, $Compx$ denotes the complexity of the tax

system, $Taxedu$ denotes Tax education, DTO denotes distance to GRA office, $Region$ denotes region, and $Location$ denotes firm's residence.

To analyse the effect of level tax knowledge on technology for preparing and reporting tax activities. The following functional form was specified;

$$Tec = f\begin{pmatrix} TK, Man\_sex, mansex, F\_exper, F\_expersq, Fstructure, Fincome, \\ Region, Location \end{pmatrix} \quad (20)$$

$$Tec_i = \gamma_2 TK_i + \gamma_3 mansex_i + \gamma_4 man\_edu_i + \gamma_5 F\_exper_i + \gamma_6 F\_expersq_i + \gamma_7 Fincome + \gamma_8 Fstructure_i + \gamma_9 Region_i + \gamma_{10} Location_i + \mu_i \quad (21)$$

γ represent parameters to be estimated, μ represent the Gaussian white noise. Tec denotes adoption of technology for preparing and reporting tax activities, TK denotes level Tax Knowledge, man_edu denotes Manager's educational level, $mansex$ denotes sex of the manager, F_$exper$ denotes the experience of the firm since it registered with GRA, $F\_expersq$ denote experience square, $Fincome$ denotes firms' income, $Fstructure$ denotes type of organisation, Reg denotes region, and $Location$ denotes firm's residence.

Variable Description and Expected Sign

The operational definition of variables and how they are measured in this study are presented. These are in two categories, the dependent variable and the independent variables. These are presented below;

Tax knowledge

To obtain a test score for the tax knowledge component, twenty-five true or false questions were used which was on general tax knowledge, legal tax knowledge and technical tax knowledge. General tax knowledge relates to

the need for tax awareness; procedural/technical tax knowledge applies to the understanding of tax compliance procedures; and legal tax knowledge relates to the need to understand regulations. The study sums the test score of general, legal and technical tax knowledge to compute the tax knowledge score. The study further categorised the tax knowledge score into Low tax knowledge (0-40), Average tax knowledge (41-60) and High tax knowledge (61-100).

Technology adoption

The dependent variable, technology adoption, in the study refers to a situation where a taxpayer uses any technological device such as a computer, phone, among others in preparing and reporting the required tax information. Technology adoption is a dummy variable which takes on a value of one (1) of the taxpayers uses a computer or any technological device in preparing and reporting the required tax information and zero otherwise.

Educational level

This variable is categorical in nature. It captures the level of education that small taxpayers (firm managers) have attained. The categories of educational attainment are; no formal education, primary, junior high school/middle, secondary, and tertiary. Here, small taxpayers with no education are used as the base category. Education is an important variable that could influence the tax knowledge. It has been documented that education enhances small taxpayer's ability to better understand the tax system which is in conformity with Fallan (1999), who claimed that a higher education taxpayer tends to understand tax issues better.

Sex

This captures the sex of the small taxpayer (firm manager). It is measured as a dummy with 1 if the firm manager is a female and 0 if the firm manager is a male. Empirical works examining the effect of sex on tax knowledge among taxpayers have produced mixed results. Whereas Tehulu and Dinberu (2014) found an insignificant relationship between sex and knowledge, some previous researches, like Gabriella (2012) and Kastlunger et al. (2010) suggested that females had higher tax knowledge than males. Meanwhile, other studies like Engida and Baisa (2014), and Fallan (1999) gender and tax knowledge research indicated that males know more about taxation.

Firms' experience

Experience is a measured continuous variable in years. In relation to tax knowledge, it is measured as the number of years the firm has registered with GRA. Intuitively, a firm that is registered with GRA could be more knowledgeable about tax issues (procedures, law, and regulations) than non-registered firms, and that might be misleading to use the number of years the business has been in existence.

Firms' income

This is a continuous variable which proxied by the firm's turnover, measured as the firm's sales in Ghana cedi. Previous research showed several different results, a work by Pratama (2018) revealed that the relationship between taxpayer's income and tax knowledge is positive, whiles studies like McGee and Yoon (2012) asserts that a negative relationship exists. However,

it is believed that higher-income firms are often more exposed to literature and tax-related information than those with lower incomes. This is because a firm with higher income pays more taxes compared to firms with lower income, which induces tax administration to put much priority on these firms.

Type of organisation

Type of organisation is a categorical variable with small taxpayers being either a sole proprietorship, partnership or private limited company. All things being equal since sole proprietorship are mostly one-man business, diffusion of knowledge in such businesses is limited to only the owner while companies have relatively more workers such that diffusion of knowledge is not limited to only the owner. Therefore, the researcher expects variation in the level of tax knowledge among sole proprietorship, partnership and companies.

Tax audit

Tax audit refers to an investigation conducted by the tax authority to check the authenticity of the tax returns and to track non-compliance by taxpayers and by the tax authorities. Many empirical studies have shown that tax audits could be a vital stimulus to increase tax knowledge and voluntary compliance by taxpayers, as well as an attitude towards the tax system. (Okpeyoa, Musah, & Gakpetor, 2019; Deyganto, 2018). In this study, respondents were asked to indicate whether or not they were audited by tax officials with a "Yes" or "No" response.

Complexity of the tax system

Tax complexity emerges when there is a growing sophistication in tax law and regulation as argued by Sawyer (2016). It inhibits the ability of the tax authorities to make a distinction between deliberate evasion, honest tax code misinterpretation and legitimate tax evasion. Gambo, Mas'ud, Nasidi, and Oyewole (2014) They claim that the ambiguity of some tax policies is leading many taxpayers to neglect tax-related issues since they find it difficult understanding them which affect their knowledge level.

Tax education

Tax education is described as an attempt to demonstrate how to pay taxes and explain why taxes should be charged and to motivate people to participate in discussions on the use of tax revenue (Gitaru, 2017). An Individual who is well-informed through having better tax education can navigate tax system, even when it is complex to understand and also avoid overpayment due to complicated reporting. Several empiric studies have shown that tax education is a significant aspect that can affect taxpayers' behavior. (Aondo, 2019; Devos, 2016; Appiah, 2015; Kołodziej, 2011). Tax education is a dummy variable with a "Yes" indicating that the respondent has attended any tax education seminar or workshop conducted by tax authorities and "No" if otherwise.

Distance to GRA office

The distance between the tax office and the place of business is seen as a crucial factor in the acquisition of knowledge and understanding of tax obligations and compliance behaviour in various studies. A long-distance

between the tax office and the place of business may pose a challenge to taxpayers, which could make it difficult to obtain mandatory information on tax matters. In this study, the respondent was asked to indicate the time (in minutes) spent in getting to the tax office to acquire tax-related information.

Location

Firm Location is a dummy variable where one (1) designates the firm is located in the urban centre whereas zero (0) represent rural situated firms. Firm location has an effect on their tax knowledge level and their adoption can make a difference between all taxpayers, but it is of particular importance to the small taxpayers since majority of them form part of the informal sector in Ghana.

Table 1: Summary of Variable Description and Expected Sign

Full Name	Type of variable	Expected sign
Level Tax Knowledge	**Categorical** Low level=0 (base) Average level =1 High level=2	Positive
Technology adoption	**Dichotomous** No=0 Yes=1	N/A
Managers Education Level	**Categorical** No formal education=0 (base) Primary=1 J.H.S/Middle=2 Secondary=3 Tertiary=4	Positive
Sex of Manager	**Dichotomous** Male =0 Female=1	Positive/Negative
Firm's Experience	Continuous	Positive/Negative
Firms experience square	Continuous	Positive/Negative
Type of organization	**Categorical** Sole proprietorship=0 (base) Partnership=1 Private limited company =2	Positive/Negative
Firm's Income	Continuous	Positive/Negative
Tax Audit	**Dichotomous** No=0 Yes=1	Positive

Table 1 Continued

Complex of Tax System	Index	Negative
Tax Education	**Dichotomous** No=0 Yes=1	Positive
Distance	Continuous	Negative
Region	**Categorical** Northern =0 Greater Accra=1 Ashanti=2	Positive/Negative
Location	**Dichotomous** Rural=0 (base) Urban=1	Positive/Negative

Source: Opoku (2020)

Post Diagnostic Test

For the estimates to be efficient and consistent, ε must be normally distributed. To test for this, goodness-of-fit test and link test for the probit model specification was performed. Besides, multicollinearity and correlation matrix are also conducted.

Chapter Summary

This study follows pragmatic paradigm and adopted the explanatory sequential mixed method design which best suits studies that aims at finding out the prevalence of a phenomenon, problem, attitude, situation by taking a cross-section of the population at the time of the study. The study uses secondary data from Directorate of Research, Innovation and consultancy. The study used a final sample size of 490 small taxpayers. The study used the Generalised Ordered Logit model, Multivariate decomposition for nonlinear response models, and Probit Model Estimation Technique to achieve the set objective. More so, an in-depth interview was conducted to achieve the fourth objective, as well as post estimation tests, was also discussed. The chapter ends with the measurement of variables and data description.

CHAPTER FIVE

RESULTS AND DISCUSSION

Introduction

This chapter of the study presents an analysis and discussion of the results. The results have been organised in the form of tables and figures for a better understanding of the values and direction of the relationship between variables. The chapter is organised into the following sections: Descriptive statistics of discrete and continuous variables, level of tax knowledge, correlate of tax knowledge, the tax knowledge gap between male and female small taxpayers; and the context that explains the non-adoption of ITAPS among small taxpayers.

Descriptive statistics of categorical variables

Being a male or female manager of an enterprise is relevant in understanding or analysis of the tax structure in the informal sector. Table 2 shows that a higher proportion of survey firms are managed by males (70%) than females (30%). This finding is in line with international business establishment survey-iBES (2015) which indicated there is more males (60.3%) firm establishment than females (39.7%).

The proportion of firm managers who have attained secondary school certificate is relatively higher (44.9%) compared with tertiary education (36.53%), JHS (14.08%), primary (2.04%) and those with no formal education (2.45%). Again, as presented in Table 5 majority (57.95%) of the sampled small taxpayers are sole proprietors, which conforms to finding of the international business establishment survey (2015), which indicated that sole

proprietorship represents almost half (48.2), followed by private limited company and partnership.

Table 2: Summary statistics of categorical variables

Variables	Categories	Frequency	Percent
Sex	Male	343	70.00
	Female	147	30.00
Manager's Level of Education	No Formal Education	12	2.45
	Primary	10	2.04
	JHS/Middle	69	14.08
	Secondary	220	44.90
	Tertiary	179	36.55
Type of organization	Sole Proprietorship	283	57.76
	Partnership	56	11.43
	Private Limited Company	151	30.82
Technology for tax preparation	No	411	83.88
	Yes	79	16.12
Sectors	Industry	78	15.92
	Service	408	83.27
	Agriculture	4	0.82
Tax Education	No	348	71.02
	Yes	142	28.98
Tax Audit	No	227	46.33
	Yes	263	53.67
Region	Northern	122	24.90
	Accra	142	28.98
	Ashanti	226	46.12
Location	Rural	32	6.53
	Urban	458	93.47

Source: Opoku (2020)

By classifying small taxpayers' activities into three main sectors of the economy, 83.3 percent sampled small taxpayers' main activities fall in the service sector, 16 percent in Industry and 0.8 percent in the Agric sector. This result is consistent with the international business establishment survey Phase II (2018), which indicated that sector constitutes highest proportion (75.1%) of

the sector establishments, followed by the industry (23.2%) and agriculture sector (1.8%).

More than half (53.67%) of the small taxpayers' activities are not audited, whereas only 46.33% of these firms are audited. Overall, the majority (46.12%) of the small taxpayers are located in the Ashanti region, 28.98 percent are located in the Greater Accra region and 24.90 percent are located in the northern region. This result is similar to the international business establishment survey Phase II (2018), which indicated that Greater Accra and Ashanti region constitute a greater proportion of small-sized establishments. They further showed that Northern region has the highest small-sized establishments so far as the three northern regions are concerned.

Furthermore, the results also indicate that slightly more than three-quarters (71.02%) of the small taxpayers have not attended tax briefing/seminars on the tax system organized by GRA or other professional bodies. Concerning the locality of residence, Table 2 shows that majority of the small taxpayers are situated in the urban area (98.5%), whiles about six percent (6.12%) are located in the rural areas.

Summary statistics of Tax Knowledge

Table 3 shows that tax knowledge has a mean score of 54.97 percent, with a standard deviation of 12.47, maximum score of 12 and a minimum of 88. Firms' income, which is proxied by their turnover, has an average value of Gh₵10816.04, with a standard deviation of Gh₵12500.88. A Gh₵400 sales are recorded as the lowest and Gh₵80000 is recorded as the highest. Firms experience measured as the number of years the firm has registered with GRA has an average value of 9.83, with a standard deviation of 6.61, a maximum

score of 48 and a minimum of 1. Moreover, the mean score of distance to GRA office, measured in minutes, is 22.78. This implies that it takes firms an average of 23 minutes to get to the GRA office. It has a standard deviation of 15.18, a maximum of 120 and a minimum of 2.

Table 3: Summary Statistics of continuous variables

Variable	Obs	Mean	Std. Dev.	Min	Max
Tax Knowledge	490	54.97	12.47	12	88
Firm Income	490	10849.29	12500.88	400	80000
Experience	490	9.83	6.61	0	48
Distance_GRA	490	22.78	15.18	2	120

Note: Obs represents observation and Std. Dev. represents Standard Deviation.
Source: Opoku (2020)

Element of Tax Knowledge Score

The results in Table 4 show the element of tax knowledge namely, general knowledge, legal knowledge and technical knowledge. General tax knowledge has a mean score of 64.66, a standard deviation of 17.52 and a minimum and maximum of 11 and 100 respectively. Legal knowledge has a mean score of 50.15, a standard deviation of 18.24 and a maximum score of 100 and a minimum of 0. In the same vein, technical tax knowledge has a mean score of 52.34, a standard deviation of 18.63, a minimum of 2 and a maximum of 10.

Table 4: Descriptive Statistics of Element of tax knowledge Score

Variable	Obs.	Mean	Std. Dev.	Minimum	Maximum
General Tax Knowledge	490	64.665	17.521	11	100
Legal Tax Knowledge	490	50.153	18.246	0	100
Technical Tax Knowledge	490	52.347	18.634	0	100

Note: Obs. represents observation and Std. Dev. represents Standard Deviation.
Source: Opoku (2020)

Element of Tax Knowledge Score by firm's characteristics

The element of the tax knowledge score is sub-divided into section by sex of the manager, firms' location, managers' education level, type of organisation and region

Element of tax knowledge score by sex

Table 5 shows the mean distribution of element of tax knowledge by sex. The findings indicated that there was a significant difference ($t = 2.535$, $p<0.05$) between male and female managers' general tax knowledge score. It shows that males' general tax knowledge score (mean=65.97, SD=16.735) was significantly better than females (mean = 61.63, SD = 18.92). The results also indicate that males were more knowledgeable about legal issues on tax (mean=51.681, t=2.838, $p<0.001$) and technical tax knowledge (mean=53.838, $t = 2.239$, $p<0.05$).

Table 5: Independent sample T-test for the mean of the element of tax knowledge score by sex

	Group	Obs	Mean	Diff	Std. Dev.	Pr(|T| > |t|)
General Tax Knowledge	Male	343	65.978	4.35	16.735	2.535
	Female	147	61.630		18.928	(0.012)
	Combined	490	64.665		17.521	
Legal Tax Knowledge	Male	343	51.681	5.06	17.571	2.838
	Female	147	46.622		19.321	(0.004)
	Combined	490	50.153		18.246	
Technical Tax Knowledge	Male	343	53.838	4.01	17.662	2.239
	Female	147	49.831		19.506	(0.026)
	Combined	490	52.628		18.311	

Note: Obs. represents observation, Diff represents Difference and Std. Dev. represents Standard Deviation.
Source: Opoku (2020)

Element of tax knowledge score by firm location

Table 6 shows the mean distribution of element of tax knowledge by firm location. The findings indicate that there is a significant difference (t = -4.154, p<0.001) between rural and urban located firm general tax knowledge score. It shows that general tax knowledge score of urban firms (mean=65.519, SD=18.120) is significantly better than the firm located in rural areas (mean = 52.425, SD =17.175). Moreover, firm located in the urban areas were also found to be more significantly knowledgeable in legal issues on tax (mean=50.546, t = -1.806, p<0.10) and technical tax knowledge (mean = 53.002, t = -2.968, p<0.001).

Table 6: Independent sample T-test for the mean of the element of tax knowledge score by location

	Group	Obs	Mean	Diff	Std. Dev.	Pr(|T| > |t|)
General Tax Knowledge	Rural	32	52.425	-13.09	18.120	-4.154 (0.000)
	Urban	458	65.519		17.175	
	Combined	490	64.665		17.521	
Legal Tax Knowledge	Rural	32	44.531	-6.02	18.766	-1.806 (0.071)
	Urban	458	50.546		18.165	
	Combined	490	50.153		18.246	
Technical Tax Knowledge	Rural	32	42.968	-10.03	17.943	-2.968 (0.003)
	Urban	458	53.002		18.523	
	Combined	490	52.346		18.634	

Note: Obs. represents observation, Diff represents Difference and Std. Dev. represents Standard Deviation.
Source: Opoku (2020)

Element of tax knowledge score by managers' education level

Table 7 shows a one-way ANOVA test amid the element of tax knowledge score and educational level. The results show that there is a statistically significant difference between the level of education and general tax knowledge score (F=5.39, p<0.01). A Scheffe post-hoc test reveals that taxpayers who have attained tertiary education and secondary certificate had

significantly more score in general tax knowledge than taxpayers with JHS/Middle, primary and those no formal education (see Appendix Ai).

Moreover, the ANOVA test indicates that there is a significant difference between the education level of taxpayers and their legal tax knowledge score with F=5.40, p<0.001. Post hoc tests show that taxpayers with tertiary education have significantly higher legal tax knowledge score than taxpayers with primary and secondary school education, which is in the Appendix (Aii). ANOVA test also reveals that there is a significant mean difference between educational level and technical tax knowledge score (F=3.34, p<0.01). In the Appendix (Aiii), the post hoc tests report that taxpayers with tertiary education were significantly more knowledgeable than those with primary education.

Table 7: One-Way ANOVA on the Element of Tax Knowledge Score by Managers' Education Level

Source	SS	df	MS	F-test	Prob > F
General Tax Knowledge					
Between groups	6392.662	4	1598.165	5.39	0.000
Within groups	143724.939	485	38.399		
Total	150117.602	489	306.988		
Legal Tax Knowledge					
Between groups	6940.393	4	1735.098	5.40	0.000
Within groups	155860.628	485	321.362		
Total	162801.02	489	332.926		
Technical Tax Knowledge					
Between groups	4674.909	4	1168.727	3.43	0.008
Within groups	165126.11	485	340.466		
Total	169801.02	489	347.241		

Bartlett's test for equal variances. SS denote sum of squares, df denote degrees of freedom, MS denote mean square
Source: Opoku (2020)

Element of tax knowledge score by type of organisation

Table 8 shows the element of tax knowledge by type of organisation. The one-way ANOVA test indicates that there is a significant difference between the type of organisation and general tax knowledge ($F=4.52$, $p<0.05$). The Scheffe post-hoc test reveals that a private limited company taxpayer has higher general tax knowledge score compared to the sole proprietor (presented in Appendix Bi).

Table 8: One-Way ANOVA on the Element of tax knowledge score by type of organization

Source	SS	df	MS	F-test	Prob > F
General Tax Knowledge					
Between groups	2735.71	2	1367.85	4.52	0.011
Within groups	147381.90	487	302.632		
Total	150117.60	489	306.99		
Legal Tax Knowledge					
Between groups	5164.11	2	2582.06	7.98	0.000
Within groups	157636.91	487	323.69		
Total	162801.02	489	332.93		
Technical Tax Knowledge					
Between groups	2696.144	2	1348.07	3.93	0.020
Within groups	167104.88	487	347.24		
Total	169801.02	489	347.24		

Bartlett's test for equal variances. SS denote sum of squares, df denote degrees of freedom, MS denote mean square
Source: Opoku (2020)

Moreover, ANOVA reveals that there is also a significant mean difference between the type of organisation and legal tax knowledge score ($F=3.34$, $p<0.01$). Likewise, the post-hoc test reveals that legal tax knowledge is statistically significantly higher in private limited company than a sole proprietorship (see Appendix Bii). The results indicate that there are significant mean differences between the type of organisation and technical tax knowledge score ($F=3.34$, $p<0.01$). The post hoc test (presented in

Appendix Biii) suggests that a taxpayer of a private limited company have a higher technical tax knowledge than taxpayer of a sole proprietor.

Element of tax knowledge score by Region

Table 9 shows the element of tax knowledge by regions. The one-way ANOVA test shows that there is a significant difference between groups ($F=13.52$, $p<0.001$). The scheffe post-hoc test (presented in Appendix Ci) reveals that general tax knowledge is significantly higher in Greater Accra and Ashanti region compared to Northern region. On the contrary, the results on legal tax knowledge score indicate that there is no significant difference between these regions.

Table 9: One-Way ANOVA on the Element of tax knowledge by Region

Source	SS	df	MS	F-test	Prob > F
General Tax Knowledge					
Between groups	7898.53	2	3949.26	13.52	0.000
Within groups	142219.08	487	292.03		
Total	19459.13	489	306.99		
Legal Tax Knowledge					
Between groups	1483.47	2	741.74	2.24	0.108
Within groups	161317.55	487	331.25		
Total	162801.02	489	332.93		
Technical Tax Knowledge					
Between groups	5760.610	2	2880.31	8.55	0.000
Within groups	164040.41	487	336.84		
Total	169801.02	489	347.24		

Bartlett's test for equal variances. SS denote sum of squares, df denote degrees of freedom, MS denote mean square
Source: Opoku (2020)

Furthermore, ANOVA test also reveals that there is also a significant mean difference between technical tax knowledge score and regions ($F=8.55$, $p<0.0001$). The post-hoc test indicates that technical tax knowledge was significantly higher for firms located in the Ashanti region compared to firms located in the Northern and Greater Accra region which is presented in Appendix (Cii).

Awareness and adoption of iTAPS

The study also sought to find out the respondents' awareness and usage of GRA iTAPS. The results indicate that more than two-thirds of sampled small taxpayers were not aware of GRA iTAPS. Out of those who are aware, more than half of the sampled small taxpayers are not using it. This is presented in Figure 4.

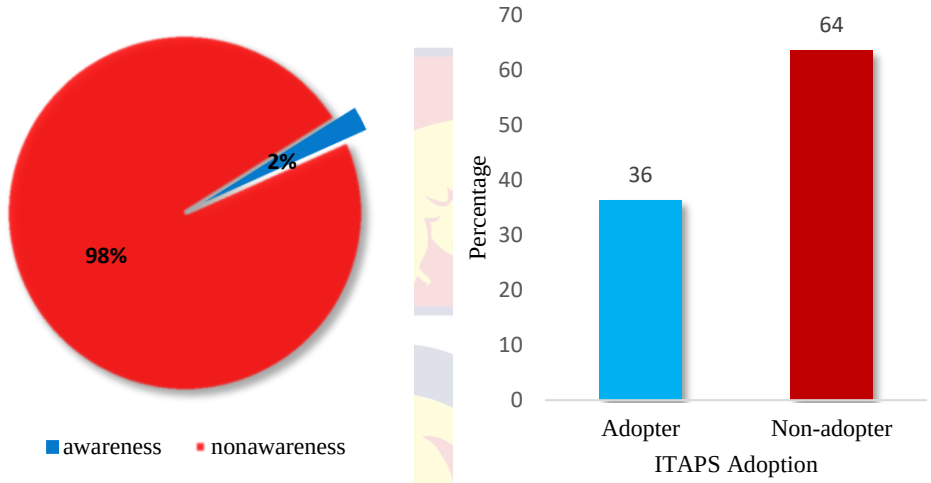

Figure 4: Awareness and Adoption of GRA iTAPS
Source: Opoku (2020)

Figure 5 presents the source of awareness of GRA iTAPS by small taxpayers. The results indicate that majority (36.4%) became aware through radio and TV, 27.3 percent through direct contact with a GRA staff, and 18.2 percent became aware through their employees. The majority of small taxpayer became aware through the waves.

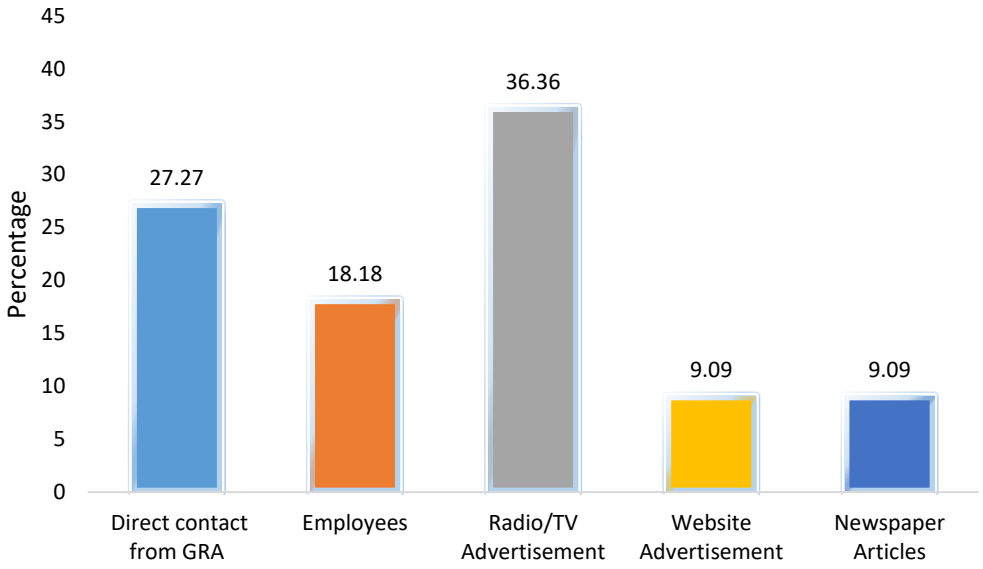

Figure 5: Respondent's Source of Awareness of GRA iTAPS
Source: Opoku (2020)

Level and Correlates of Tax Knowledge of Small Taxpayers

The first objective sought to know the level of and correlate of tax knowledge among small taxpayers. The summation of the score of the element of tax knowledge was done in order to achieve this objective and the results are presented in Figure 6. The results show that 58.16% of the small taxpayers sampled have an average level of tax knowledge. About one-third of the small taxpayers have tax knowledge above-average level of knowledge (29.39). This is not surprising since the majority of small taxpayers sampled have formal education which in accordance with other studies (Sritharan & Salawati, 2019; Cuccia, 2013; Mohani, 2001) who argue that taxpayers who have attained higher education are more likely to have a higher level of moral development, which affect their understanding and knowledge of the tax system. These findings are consistent with works (Mohd-Rizal, 2010; Pratama, 2018) who in

their study found that taxpayer has an average/medium (60%) level of tax knowledge.

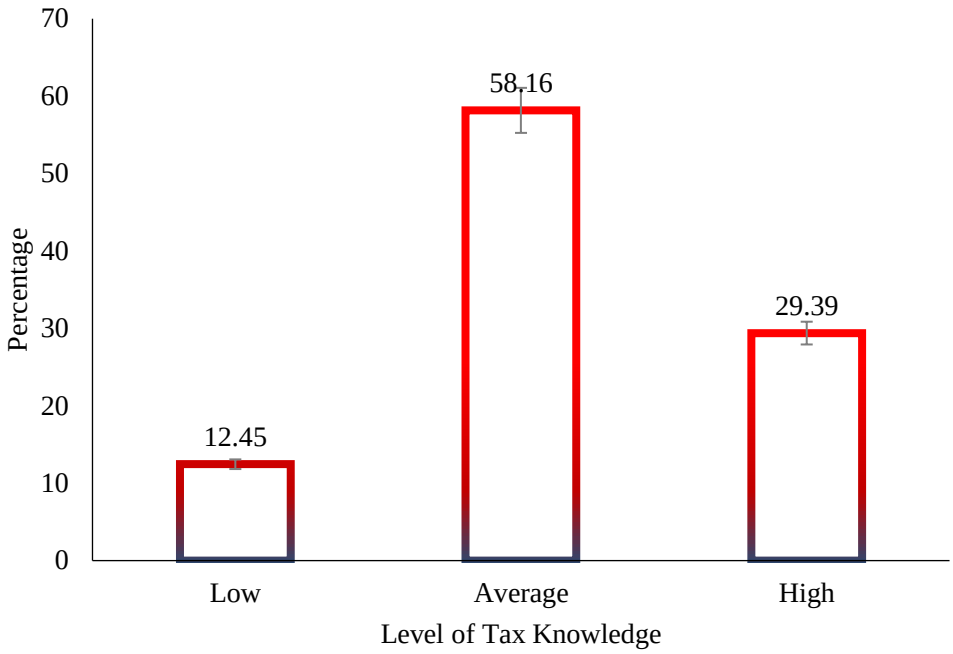

Figure 6: Level of tax knowledge among small taxpayers
Source: Opoku (2020)

Correlates of tax knowledge of small taxpayers

Table 10 presents the results of the correlates of tax knowledge level among small taxpayers using the Generalised Ordered Logit Technique. The chi-square statistics is significant ($p<0.001$), which makes us reject the null hypothesis that all the parameters are zero. To address the potential problems arising from unbalanced sample makeup the robust variance is used. The predictive power of the variables as reflected by Pseudo R square was 0.1450, which indicates that about 15 percent of the variations in the level of tax knowledge among small taxpayers is explained by the explanatory variables. Since the estimations of the parameters of the Generalized Ordered Logit model presented only the direction of the effect of the explanatory variables on the dependent variable (levels of knowledge) but did not provide the exact

magnitude of the change, the marginal effects that measure the predicted change in the probability of a particular level of tax knowledge are shown in Table 10.

Table 10: Marginal effects of the independent variables on levels of tax knowledge

Level of Knowledge	dy/dx (Low)	dy/dx (Average)	dy/dx (High)
M. Education Level (Base=No Education)			
Primary	-0.042	0.001	0.041
	(0.109)	(0.019)	(0.104)
JHS/Middle	-0.081	-0.012	0.093
	(0.096)	(0.024)	(0.090)
Secondary	-0.078	-0.011	0.089
	(0.093)	(0.017)	(0.080)
Tertiary	-0.135	-0.075***	0.209**
	(0.093)	(0.028)	(0.085)
Sex (Base=Male)			
Female	0.116***	-0.093**	-0.023
	(0.033)	(0.047)	(0.042)
Experience	0.045	0.035	-0.080
	(0.035)	(0.028)	(0.062)
ExperienceSquare	-0.015	-0.012	0.027
	(0.012)	(0.009)	(0.021)
lnFirm Income	-0.024**	-0.018**	0.042**
	(0.010)	(0.008)	(0.018)
Tax_Audit (Base=No)			
Yes	-0.026	-0.020	0.046
	(0.020)	(0.016)	(0.036)
Complexity	0.012***	0.009**	-0.021***
	(0.004)	(0.004)	(0.008)
Type of organisation (Base=Sole proprietorship)			
Partnership	0.007	0.004	-0.011
	(0.034)	(0.018)	(0.052)
Private Limited Company	-0.044**	-0.047*	0.091**
	(0.018)	(0.024)	(0.041)
Tax Education (Base=No)			
Yes	-0.113***	-0.088***	0.200***
	(0.024)	(0.020)	(0.037)
Distance	0.001	0.001	-0.001
	(0.001)	(0.001)	(0.001)
Region (Base=Northern)			
Greater Accra	-0.048*	-0.040*	0.087*
	(0.029)	(0.024)	(0.051)
Ashanti	-0.016	-0.009	0.025
	(0.028)	(0.015)	(0.042)
Location			
Urban	-0.120	-0.024	0.144
	(0.075)	(0.019)	(0.061) **
Wald chi2(18)	112.32		
No. of Obs.	490		
Prob > chi2	0.0000		
Pseudo R2	0.145		

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1
Source: Opoku (2020)

Beginning with the effect of educational level, it is found that managers who have attained tertiary education are more likely to have high level tax knowledge compared with the other levels of education. The coefficients of tertiary education are statistically significant at the level of at least 0.05. The results indicate that a manager who has attained tertiary education is 7.5 percent less likely to have average knowledge and 20.9 percent more likely to have a high tax knowledge compared to those with no formal education (base category). These results are consistent with the descriptive statistics and the findings of Mamun et al. (2014) who in their work conclude that higher level of education increases one's cognitive ability, which helps them to easily understand issues, and their higher level of moral development improves their tax knowledge.

The variable sex shows that female managers stand a higher chance to have low tax knowledge compared to males, with a significance level of 5 percent. The coefficients indicate that a female manager is 11.6 percent more likely to have low tax knowledge and 9.3 percent less likely to have average knowledge compared to males. This could be due to the fact males have an interest in tax law than female. The findings confirm our earlier findings from the descriptive statistics and other studies (Enggida & Baisa, 2014; Fallan, 1999). Specifically, Fallan's (1999) research indicated that based on testing the tax knowledge of several taxpayers, it was revealed that men appear to rank higher in the "masculine" category; one of the topics is tax law. But contradict other works (Gabriella, 2012; Kastlunger et.al., 2010) who argue that females have greater tax knowledge than males.

Firm income is also seen to have a negative and significant effect on the level of tax knowledge. The coefficients are significant at the level of 0.05. The results indicate that a percentage increase in the annual sales of firms on average decreases the probability of having a low-level tax knowledge and an average tax knowledge by 2.4 percent and 1.8 percent respectively, with a probability of having a high tax knowledge (4.2%). This may be explained by the fact that small taxpayers with higher incomes level can have more access to information, and can afford the cost involved when acquiring knowledge regarding tax-related matters, which make them stand a higher chance of getting a higher tax knowledge compared to those with lower incomes. The results are consistent with those of Chau and Leung (2009) who suggest that a firm with a high turnover/income ratio requires greater understanding and precision in reporting its tax estimates.

The coefficients of tax complexity are all statistically significant at the level of 0.01. The results indicate that as the tax system gets more complex, there is a higher probability of having a low tax knowledge of 1.2 percent and average tax knowledge of 0.9 percent. Conversely, there is a reduction in the probability of recording high tax knowledge (2.1%). This could be due to the fact that as the tax system becomes more complex, taxpayers find it difficult to understand the rules and regulations of the tax system, which make them ignore tax related-matters, leading to a fall in their knowledge about the tax system. This finding is consistent with Saad (2014) who indicates that the complex nature of some tax policies causes many taxpayers to ignore tax-related issues, resulting in a lack of knowledge.

Concerning the type of organisation, the coefficients of private limited company are statistically significant at the level of at least 1 percent. The results indicate that compared to a sole proprietorship, a private limited company has a higher probability of having high tax knowledge of 9.1 percent, with less probability of having a low and an average tax knowledge of 4.4 percent and 4.7 percent respectively. This may be due to the fact that private limited companies have a more formalized structure with well-educated people in charge of their operations and tax-related matters, which influence the tax knowledge level of the enterprise compared to sole proprietorships. These results are consistent with the descriptive statistics.

From Table 10 the results indicate that the coefficients are negative and positive with a significant level of 0.001, which means that tax education plays a key role when it comes to the knowledge level of small taxpayers. Small taxpayers who have attended tax seminar/ briefing stand a lower chance of having low tax knowledge of 11.3 percent and an average tax knowledge of 8.8 percent and with a higher chance of having a high tax knowledge of 20 percent. A possible explanation could be that small taxpayer who attends seminars organised by a tax authority will have the advantage to be more informed and get the opportunity to call for clarification on some tax issues that baffles them compared to those who have not attended any tax education. This enables them to become aware and understand tax related-matters, hence increasing their tax knowledge level. This result is in line with other studies (Tetteh, 2019; Bornman & Wasserman, 2018; Palil, 2010). For example, Bornman and Wasserman's (2018) findings reveal that taxpayer education is a

factor influencing tax knowledge since it creates more awareness and a better understanding of the tax system and hence increases tax compliance.

Among the three regional dummies, Greater Accra is statistically significant at the level of at least 0.1. The results show that compared to firms in Northern Region, there is a higher probability of having a high tax knowledge if the firm is located in Greater Accra region. This result is plausible since Greater Accra is the capital of Ghana, so any tax-related policy and initiative that have to be enrolled mostly commence from the national capital (in Greater-Accra). As a result, they become more informed and aware of tax-related matters compared to small taxpayers in the other regions.

With respect to firms' location, the results show that there is a positive and significant ($p > 0.05$) effect of firms' location on high tax knowledge. The findings indicate that there is a 14.4% chance that firm located in the urban centre to have a high tax knowledge. This could be because most tax offices are situated in urban centres and so sourcing information on tax-related matters is relatively easy compared to rural situated firms. Also, the low regular supervision on these businesses in the rural area could be a probable reason for the locational variation in the result. This is consistent with the finding by Isbell (2017) who revealed that the knowledge about tax obligation is high among taxpayers in the urban centre than those in the rural area.

Decomposition of the tax knowledge gap between male and female managers

Table 11 presents the non-linear multivariate decomposition of the tax knowledge gap between male and female small taxpayers. The mean predicts tax knowledge of male and female managers and also shows how much of the difference is attributable to differences observable (explained portion) and

unobservable characteristics (unexplained portion). The results show a significant sex gap in small taxpayers' tax knowledge level (0.0972, $p < 0.05$). About 60 percent of the sex knowledge gap was explained by the differences in distributions of characteristics (explained portion) between male and female. The sex tax knowledge gap would be eliminated if males and females had similar levels of tertiary education, tax education and see the tax system to be complex at the same level.

Table 11: Decomposition of the sex tax knowledge gap among small taxpayers

Predicted Mean	Coefficient	
Male Knowledge	0.4625	
Female Knowledge	0.5597	
Sex Knowledge Gap	0.0972**	
Predicted Mean	Coefficient	% of Gap
Explained	0.0580***	59.7
	(0.0188)	
Unexplained	0.0391	40.2
	(0.0465)	
Total	0.0972**	100.0
	(0.0419)	

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1
Source: Opoku (2020)

Table 12 presents the results of the detailed decomposition analysis of sex knowledge gap using the same set of independent variables used to predict the correlate of tax knowledge. The specific method of decomposition suggests that the difference in result can be reduced by closing the gap in positive contribution characteristics while expanding the gap in negative contribution characteristics.

Formal education variable makes a considerable contribution to explaining the sex gap in tax knowledge. A manager with tertiary education has a positive significant (p>0.10) impact on the sex gap favouring males. The

results indicate that if male and female managers had the same level of tertiary education level, the tax knowledge gap would be reduced by 18.3 percent.

Table 12: Detailed decomposition of the sex tax knowledge gap among small taxpayers

Variables	Explained	% of Gap	Unexplained	% of Gap
Primary	-0.0273	-28.1	0.0892	91.8
	(-0.0190)		(-0.0652)	
JHS/Middle	-0.0115	-11.8	0.0421	43.3
	(-0.0095)		(-0.0644)	
Secondary	0.0287	29.5	0.1050	108.0
	(-0.0192)		(-0.1510)	
Tertiary	0.0178**	18.3	0.0673	69.3
	(-0.0085)		(-0.1330)	
Experience	-0.0017	-1.7	0.1180	121.4
	(-0.0149)		(-0.2680)	
Experiencesq	0.0018	1.9	-0.0146	-15.0
	(-0.0096)		(-0.1290)	
Tax Audit	-0.0029	-3.0	-0.0544	-56.0
	(-0.0045)		(-0.0734)	
lnTurnover	0.0000	0.0	-0.3840	-395.1
	(-0.0004)		(-0.5610)	
Tax Complexity	0.0176***	18.1	0.0121	12.5
	(-0.0085)		(-0.2760)	
Partnership	0.0000	0.0	0.0239	24.6
	(-0.0002)		(-0.0256)	
Private Limited Company	0.0074	7.6	-0.0319	-32.8
	(-0.0120)		(-0.0373)	
Tax Education	0.0327***	33.6	-0.0332	-34.2
	(-0.0091)		(-0.0394)	
Distance	0.0042	4.3	-0.1020	-105.0
	(-0.0053)		(-0.1100)	
Greater Accra	-0.0089	-9.2	0.0217	22.3
	(-0.0064)		(-0.0745)	
Ashanti	-0.0012	-1.3	0.0835	85.9
	(-0.0069)		(-0.1060)	
Urban	0.0015***	1.5	0.0991	102.0
	(-0.0005)		(-0.2850)	
Constant			-0.0014	-1.5
			(-0.7610)	
Observations	490		490	

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1
Source: Opoku (2020)

These results reveal that male managers have a higher education level, which in turn affect their understanding of tax procedures and regulations of the tax system compared to females. This is consistent with our earlier findings from the descriptive statistics and the general expectation that higher education may suggest a better cognitive ability when dealing with matters including tax-related issues.

The positive coefficient of tax complexity is significant ($p< 0.01$), which indicates that males are less likely to see the tax system to be more complex than females. We do find that disparity between how male and female managers perceive the tax system to be complexity accounts for about 18.1 percent of the explained gap in tax knowledge. This finding is not surprising since education plays a significant role in understanding the tax-related matters and since research indicates that females are less educated and have less interest about the tax system, they stand a higher chance to perceive tax system to be more complex than their male counterpart.

We find that tax education explains a significant component of the sex knowledge gap ($p<0.01$). The results show that male managers attend tax education programs (seminar/briefing) than female, which accounts for 32.7 percent of the sex knowledge gap. The finding reveals that female managers feel redundant to attained tax education programs organized by GRA because of less importance attached to tax-related issues, which affect their opportunity to get information and understanding of tax-related matters. Moreover, firm location characteristics (rural/urban) induces a difference in score of tax knowledge between male and female managers. We found out that location

contributes about 2 percent of the sex tax knowledge gap among small taxpayers.

Effect level of tax knowledge on technology adoption

Table 13 shows the results of the multivariate probit regression estimates used to determine how the level of tax knowledge influence small taxpayers' technology adoption. The link test with _hat (P>|z|=0.014) and _hatsq (P>|z|=0.557) indicate that the null hypotheses of correct specification of the model have not been rejected. To address the potential problems arising from unbalanced sample makeup the robust variance is used. The explanatory power of the variables as reflected by Pseudo R square was 0.197, indicating that the hypothesised variables are responsible for about 19.7% of the level of tax knowledge on technology adoption of small taxpayers. Once these robust checks have been cleared, we continue with our presentation of results.

The level of tax knowledge of a firm manager has a positive and significant ($p<0.05$) relationship with technology adoption. It can be seen that a manager with a high tax knowledge is 12.1 percent more likely to adopt technology in preparing and reporting the required tax information compared to managers with low tax knowledge. This can be attributed to the fact that a taxpayer who has a high level of tax knowledge is better informed about the relevance and proper use of tax will be willing to pay tax. The use of a more effective and efficient method of preparing and reporting require tax information so that the right amount can be reported for filing and payment as compared to a taxpayer with a low knowledge level. More so, a taxpayer with higher tax knowledge is better aware of the consequence of not paying tax. So, to avoid this penalty and fines, the taxpayers with high tax knowledge will

prefer to adopt an innovative way that will enable him in preparing and reporting tax information so that filing and payment of tax can be done on time. The findings are at variance with that of Tallaha et al. (2014) who concluded that tax knowledge is important in many prior studies regarding tax filing activities, however, it does not influence the use of a computerized system.

For the qualitative side, participants shared similar views on the notion that the level of tax knowledge has a major influence on adopting technology in preparing and reporting their tax obligation.

"It [tax knowledge] plays a part because if I know the kind of system, I'm dealing with it will help me find a more efficient and less costly way of complying with their rules" (Participant 6, male, accountant).

"no matter the technology that you want to use without a proper idea of the system [tax knowledge], the purpose of this innovation cannot be fulfilled" (Participant 8, Male, Owner).

Sex of the manager has a negative and significant effect on adopting technology for tax preparation. At a 10 percent significance level, a female manager of a firm is 5.6 percent less likely to adopt technology for tax activity preparation. The results indicate that males have positive attitudes towards adopting computerized systems in preparing and reporting require tax information compared to female managers. This could be due to the fact that men have been described to have more positive perceptions and interest in technology and less anxious about adopting new technology. These results are consistent with other studies (Sekabira & Qaim, 2016; Simon & Peppas, 2005). Specifically, Sekabira and Qaim (2016) argued that men show more

positive perceptions, attitudes and interest towards technology than women do, as well as less anxious towards technology applications.

Table 13: Effect of level tax knowledge on technology adoption

Technology adoption	Marginal effect	Standard error
Level of tax knowledge		
Base= low		
Average	0.072	0.046
High	0.121**	0.053
Sex		
Base=male		
Female	-0.056*	0.031
Managers' education level		
(JHS and below)		
Secondary	0.066*	0.035
Tertiary	0.150***	0.044
Firm Experience	-0.065	0.053
Firm Experiencesq	0.023	0.015
Business income	0.009	0.015
Type of Organisation		
Base=sole proprietorship		
Partnership	0.066	0.049
Limited Company	0.139***	0.039
Region Base= northern		
Greater Accra	0.150***	0.036
Ashanti	0.136***	0.032
Location		
Base=Rural		
Urban	0.052	0.064
No. of observation	490	
R^2	0.197	
LR chi2 (13)	73.45	
Prob > chi2	0.000	
_hat	0.014	
_hatsq	0.557	

*** p<0.01, ** p<0.05, * p<0.1

Source: Opoku (2020)

Results on the education level of a firm manager have a significant (p<0.01) relationship with technology adoption. It can be observed that a manager with secondary and tertiary education has a probability of 6.6 percent

and 15 percent likelihood of adopting technology in preparing and filing tax returns compared to managers with JHS/Middle certificate and below respectively. This implies that firm manager with higher level of education are related with higher probabilities of adopting technology. Education plays a vital role in the adoption of new technologies and it is believed to improve the willingness of the firm managers to embrace new ideas and innovations.

With the type of organisation, the results indicate that compared to a sole proprietorship, a private limited company is 13.9 percent more likely to adopt technology in preparing and filing their tax activities. This is an indication of the evidence that private limited company has a more formalised organisational structure and bigger business size which plays a major role in their adoption of the technology compared to a sole proprietorship. It can be seen that a firm in the Greater Accra and Ashanti region are more likely to adopt technology in dealing with tax preparing and filing activities. Especially, firm located in Greater Accra is 16.5 percent more likely and that of Ashanti region is 15.9 percent more likely to adopt technology compared to firms in the northern region.

Context that explains the non-adoption of iTAPS among small taxpayers

This objective sought to identify the reasons that explain the non-adoption of iTAPS after the heavy investment outlay by the government in its implementation in 2019. Despite the short time of its existence, its usage among small taxpayers has been very little. Evidence from the study (see Figure 4) shows that majority of the small taxpayers who were aware of iTAPS were not using it. So, what are the context within which the non-adoption of iTAPS can be explained? The interest is in the non-adoption

because as the level of awareness increase, those concerns can be addressed which will improve the usefulness and efficiency of its usage to improve its adoption level. Some of the key context outlined by participants were education and training, organisational barriers, internet connections, technological resources and trust as well as possible recommendation to aid their adoption.

Education and Training

Education and training play a crucial role in adopting innovation. The purpose of a newly introduced technology cannot be achieved when there is no requisite education including formal education, public education and training. Some participants indicated that they refrain from the idea of adopting GRA iTAPS in honouring their tax obligation because there are little education and no training on its usage. The following are some of their quotes:

"*Nothing has motivated me to use it since there hasn't been enough education on how to use it [iTAPS]"* (Participant 3, Female, Sale Manager)

"*For me, education is a major problem. They just implement it without enough education but expect us to use them*?" (Participant 6, Male, Manager).

"…I know of it but don't know how to use it, there hasn't been any form of training by the GRA on how to use it…" (Participant 5, Female, Owner)

The responses from these participants indicate that the necessary education and training on the use of GRA iTAPS are lacking and that prevent them from adopting it. Some participant indicate that low awareness and education was a reason for not adopting the iTAPS. Other participants also reveal that lack of

training and the requisite skills on how the iTAPS operate has to lead to them not using it. This shows that education and training are very important in adopting GRA iTAPS. This is because training which is supposed to give the small taxpayers the skills to know the processes involved in using the iTAPS is missing. This is in line with the findings of Mapeshoane and Pather (2016), who argue that education and training are critical in addressing the lack of readiness of SMEs in adopting new technology.

Organisational barriers

Most organisations have barriers to innovation, ideas and creativity. Some limitations emerge from the attitudes and perceptions of organisational leadership, while others arise from the organisational structure or even from the employees themselves. Some participants indicate that their organisation stringent rules and hierarchical structure have affected their decision to adopt the GRA iTAPS. Below are some of the responses by participants:

"My organisation would not accept it especially the owner. Because she is illiterate, she prefers manual work to ensure accuracy in terms of receipt and all that than to use online filing system" (Participant 3, Female, Sales Manager)

"But one thing you have to know is that for instance this company there are certain things it cannot be accepted if not in line with company policies".

(Participant 4, Male, Manager)

These comments seem to provide evidence that fear of a new idea and rigid organisational structure and tradition serve as an impediment to GRA iTAPS usage. Some participants indicated that the firm owner's impression about online system inhabited their firm adoption of GRA iTAPS. Other participants

also reveal that their organisations frown on accepting an innovation which is not in line with their policies. This indicates that despite the introduction of iTAPS, organisational leadership and policies can serve as a hindrance to its adoption. This is consistent with the finding by Atkin et al. (2017) who assert that lack of organisational support hinders the adoption of new technology.

Internet Connection

Problems in internet access affect the use of a diverse range of technologies. Some participant indicates that poor internet connection and high internet costs are a major barrier to technology adoption. Below are some of their responses:

"*Getting reliable internet access is a problem, especially when it rains or living in a small town, so this makes it difficult to even think of filing and paying you tax online*" (Participant 2, Male, Accountant).

"*…network problem and high internet cost is a major barrier…because to file online internet bundle is required, of which its price has become quite expensive of late and poor network deters me from filing and paying tax online*". (Participant 3, Female, Sale Manager)

Speaking on the same issue a GRA officer added:

"Internet problem is a major issue on filing online it being TRIPS or iTAPS. The poor internet network has made online filing a very difficult task. You have to spend more hours before using it all because of poor network. I hope this iTAPS will not have network problem as the TRIPS". (Tax Officer, Male)

As the findings show, the poor internet connection and high cost of internet bundle affect participant decision to adopt to online filing and payment. Some participants' narratives indicate that they admit the relevance of filing online but the issue of poor internet connection and internet cost serves as a dissuade them from using iTAPS. As stated earlier, the tax officer also added internet problem was also a major problem for the tax authority when dealing with online activities. This implies that the purpose of online tax filing can be delayed when there is the poor and high cost of internet connection. In a similar vein, Mapeshoane and Pather (2016) claim that poor internet access and high internet connection costs impede the adoption of e-commerce in Lesotho.

Technological Resources

Technological resources comprise computer apparatus such as the software and hardware required for electronic reporting and tax payments. The role of computer software and hardware is a fundamental requirement for adopting online practices. Some participants raise the issue of technological resource requirements as a barrier to their adoption of GRA iTAPS. The following are some of the comments made by the participants:

"*… with this, the firm has to incur an extra cost of buying a computer, and other equipment to work with, which is not the case when using the manual system".* (Participant 6, Male, Manager)

*"I don't know how to use a computer, that's why am not using it. Because to use it I have to get a computer and someone who will help operate it for me, which will be an extra cost" (*Participant 5, Female, Owner)

These comments indicate that even if all the challenges listed (education and training, organisational barriers and internet connection) are resolved adoption rate is likely going to below. This is because the comments of these participants imply that small taxpayers have to spend an extra cost to buy a computer and hire the service of a computer literate to use the iTAPS. This is consistent with Venkatesh et. al. (2003) who explain that the lack of necessary technological resource is a hindrance to technology usage. Several studies have argued that inadequate technological resources (Infrastructure and necessary hardware and software) could serves as major barrier that prevents small businesses from adopting and implementing new technologies (Chan et al., 2012; Schniederjans & Yadav, 2013).

Trust

According to Ha and Stoel (2009), trust is the extent to which a person trusts that there would be no security or privacy risks to modern technology use. Some participants shared fear that greater vulnerability and uncertainty in the online world is a significant explanation for the reluctance to follow iTAPS. Below are some of their responses:

"*we cannot trust the system with my details, I have the fear that can be hacked…so for me am concern about the security and privacy of the information submitted online"* (Participant 1, Male, owner).

"we do not have confidence in online dealing because anytime something goes wrong, it is very difficult to hold someone responsible. So, nothing will convince me to use this iTAPS if the manual system is still in use". (Participant 6, Male, Manager)

These comments show how to trust influence the participants' decision to affect the organisation in adopting the online filing and payment of tax. Some participants indicated that they do not entrust the system with our firm details because of the fear that the system could be hacked. It implies that until these small taxpayers are guaranteed that their info provided will not be shared with any third party, they will resort to the manual system. Similar to what these participants have said, Santii (2011) indicates that the issue of trust is an crucial predetermining factor when assessing the acceptance of a particular technology in an electronic assessment system. In all this, it shows that lapses in the security when vital info is shared so far as adopting an online tax system concern serves as a possible threat which deter small taxpayers from accepting this iTAPS.

Major Concerns

In order to improve the adoption of GRA iTAPS, the concerns of small taxpayers as to what can be done to motivate them to use the iTAPS are presented. Some of the participants suggest some possible solutions that; ease of use, incentives for usage and use of revenue will motivate them to use it.

Ease to Use

Efforts aimed at encouraging taxpayers to adopt iTAPS need to take cognisance of the important role that ease of use plays in such decisions. Some suggest the following views:

> *"the ITAPS platform should be user friendly so that it will be easy to use…in such a way that a layman can even use without any difficulties or consulting any expert". (Participant 5, Female, Owner)*

"I think the system [iTAPS] should be made simple which does not demand any complex procedure in filing and paying tax through it. So that it will be easy to understand and use it compared to the paper system which sometimes is complicated to deal with".

(Participant 6, Male, Manager)

Some of the participants indicate that the system should be user-friendly, simplified interfaces, and time-saving which will ensure wide adoption of the system. They also indicated that it is advisable to ensure that the iTAPS is set up in such a way that one does not need to have specialist computer skills to use it. This implies that making iTAPS system easy to use could improve the adoption level. The notion is in line with the assertion in the TAM (Davis, 1989) who argues that ease of use serves as an influencing factor to new technology adoption. They note that future users prefer to avoid practices that seem difficult to understand.

Incentive for Usage

Another possible solution raised by participants in the provision of incentives in the form of discount to people who pay through the use of iTAPS. Below are some narratives from participants:

"giving incentive in the form of a special cash rebate or speedy tax refund will motivate taxpayers to use iTAPS. Since they believe their other benefit for using it [iTAPS]". (Participant 1, Male, Owner)

"They should give out incentives such as an *extension of the tax the filing deadline and discount to all taxpayers who file and make payment through iTAPS by so doing it would motivate us to always*

use it". (Participant 3, Female, Sales Manager).

The evidence shows that incentives could propel small taxpayers to use iTAPS. Some participants indicate that there should be a reward if a taxpayer files and pay their tax using iTAPS. This implies that recognizing and showing appreciation to iTAPS adopters could improve the rate of adoption. This is because the incentive in the form of discount, special cash rebate and extension of filing deadline will attractive other non-users because of the incentive that comes with the use of iTAPS.

Use of Tax Revenue

Tax is a levy that tax authorities impose on persons or property for public purposes. However, when these taxes are not used for its rightful purpose it turns to affect the attitude of taxpayers. The evidence indicates that the proper use of tax revenue affects taxpayers' adoption to a new system. Some participants indicate that proper use of tax revenue serves a great motivation to their attitude towards adopting a new system for paying tax. These are some of their suggestion:

"The government should also make good use of the taxes paid by taxpayers. When there are good roads, hospitals filled with the necessary equipment, schools and good facilities it would motivate taxpayers to comply with any initiative or to pay their tax".

(Participant 3, Female, Sales Manager)

"*Technology in paying tax is good but does not mean taxpayers will pay tax when there is technology. I think our roads are still bad, poor healthcare after these years of paying tax. They should*

make good use of the tax revenue since that is what motivate us to pay tax, not the technology or any other thing". (Participant 5, Female, Owner).

The evidence shows that taxpayers' perception of the use of tax has a major role to play in technology adoption and even in tax payment. Some of the participants indicate that despite the taxes paid over the years, state of their road, healthcare, and school facilities remains woeful. They add that, to increase iTAPS adoption, the revenue generated should be used for its rightful purpose by investing in proper infrastructure such as school, good healthcare, good roads only to mention a few. This implies that increasing education, training, internet connection and incentive will not improve taxpayers' adoption of iTAPS if the revenue generated is not used to benefit the taxpayers.

Chapter Summary

This chapter sought to implement the statistical technique and analyse the empirical models set out in the previous chapter and to achieve objectives outlined in this study, first, to compute the level of tax knowledge and its correlates among small taxpayers using the generalised ordered logit model. Second, to explore the tax knowledge gap between male and female managers of firms using non-linear multivariate decomposition model. Third, to examine the effect of the level of tax knowledge on technology adoption among small taxpayers using probit model and lastly, to identify the context that explains the non-adoption of iTAPS among small taxpayers. However, before considering the analysis of the stated objectives, the chapter first presented descriptive and summary statistics of the variables used in this study.

Based on the finding of the study it was revealed that more than half of sampled small taxpayers have an average level of knowledge. There is also a huge tax knowledge gap between male and female firm managers, which can be bridged by increasing the education level, tax knowledge and making the tax system simpler. Moreover, the level of tax knowledge has a positive and significant effect on technology used in preparing and reporting the required tax obligation. Lastly, it is shown that lack of education and training, internet connection, organisational barriers, technological resource and trust serve as major barriers to iTAPS adoption. They further suggested that proper use of tax revenue, an incentive for iTAPS adoption and ease of use, will improve iTAPS adoption.

CHAPTER SIX

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

First of all, this chapter, summarizes the entire study; from statement of problem to results and discussions. This is to encapsulate the research work on fewer pages, it is then followed by conclusion drawn on the findings of the study, finally, make policy recommendation based on the research findings.

Summary

Tax knowledge is a vital factor that influences taxpayers' attitude and willingness to comply and the role of technology in aiding tax compliance is widely acknowledged by several empirical works. However, the important features of the technology in tax preparation, filing and payment do not guarantee that taxpayers will determine its rightful use and benefit if they do not have sufficient tax knowledge. Nevertheless, empirical studies in Ghana fail to examine the level of tax knowledge and technology adoption among small taxpayers. The purpose of this study was to examine the effect of level of tax knowledge on technology adoption in Ghana. The study specifically sought to:

- Compute the level and correlates of tax knowledge among small taxpayers
- Explore the sex knowledge gap among small taxpayers
- Examine the effect of level tax knowledge on technology adoption
- Identify the context that explains the non-adoption of iTAPS among small taxpayers

In the review of relevant literature and theories related to planned behaviour theory, Technology Acceptance Model, and Diffusion of innovation theory, as well as empirical works in the context of their focus, methodology and findings on tax knowledge and technology adoption, are studied. The mixed-method design which follows the Pragmatists philosophy is adopted. The study used a firm-level survey data from the Directorate of Research, Innovation and Consultancy entitled "Ghana Beyond Aid: Cost of Tax compliance and Tax incentives on small taxpayers". Based on this data the researcher computes the level of tax knowledge and their correlates using the generalised ordered model. Also, the multivariate decomposition estimation technique is used to explore the sex knowledge gap among male and female managers. The probit estimation technique is used to examine the effect of the level of tax knowledge on technology adoption while the in-depth interview is conducted to identify the context that explains the non-adoption of iTAPS among small taxpayers.

Key Findings

This study established that majority of small business taxpayers have an average level of tax knowledge. The findings revealed that independent variables like level of education, firms' income, type of organisation, complexity about the tax system and the tax education influence small taxpayers' tax knowledge level.

From the study, it was revealed that there is a statistically significant tax knowledge gap between male and female firm managers. From the detail decomposition, managers level of education, how taxpayer perceive the tax

system to be complex and tax education constitute the explained component of the tax knowledge gap.

Again, it is established that the level of tax knowledge has a significant effect on adopting technology for preparing and reporting the required tax obligation. Other variables like formal education level, type of organisation and region are found have a significant effect on adopting technology for preparing and reporting tax information.

It was established that small taxpayers lack of education and training iTAPS, poor internet connection, organisational barriers, lack of technological resource and issues with trust and security serve as major barriers to iTAPS adoption. Some participants also recommended that ease of use, incentives for usage and proper use of tax revenue generated will improve the adoption of iTAPS.

Conclusions

The study concludes that more than half of small taxpayers have an average level of tax knowledge. We also conclude that sex, level of education, firms' income, type of organisation, complexity about the tax system and the tax education influence small taxpayers' tax knowledge level.

Also, the study concludes that the mean predicted gap in tax knowledge between male and female firm managers is huge, statistically significant and 60% of it can be explained by variances in formal education level, tax complexity and tax education.

We conclude that level of tax knowledge affects small business taxpayer's decision to use technology in preparation and reporting their tax activities. Moreover, other variables like formal education level, type of

organisation and region are found have a positive effect on adopting technology for preparing and reporting tax information.

We also conclude that lack of education and training, internet connection, organisational barriers, technological resource and trust serve as major barriers to iTAPS adoption. They further suggested that proper use of tax revenue, an incentive for adopting and ease of use will improve iTAPS adoption.

Recommendations

the following recommendations are proffered having considered the findings and conclusions of this study:

The Domestic Tax Revenue Division (DTRD) should adopt strategies like zonal tax education workshops and training for managers especially among sole proprietorships, firms with less income and firms in the Northern region and rural areas to improve their tax knowledge. It is believed that the GRA could come up with an improved level education and training which could increase the level of awareness and understanding of the tax system in improving their tax knowledge level by focusing on these groups.

DTRD should frequently provide tax awareness programs and design simplified tax rules for small taxpayers, especially among female firm managers. Also, Ghana Education Service may consider providing taxation scholarship for females to study taxation related course at high education institutions. Furthermore, DTRD should increase the awareness and educate small taxpayers on the relevance and benefit of having an innovative way of keeping records since it aids in reporting an accurate taxable amount and fastness compliance process.

Government through the GRA should intensify the awareness and training on the use of iTAPS; ensuring a simplified platform, improved internet coverage, trust, incentive for its usage (such as giving tax rebate, discount and extension of tax return submission deadline). Small taxpayers should also embrace the use of innovation (iTAPS) to fast-track their compliance process and complying with their tax obligations.

Suggestion for future Study

Further research is proposed to cover the following areas on the basis of the results, conclusions, recommendations and limitations of the work in order to corroborate the findings of this study and to expand knowledge in this area. In order to achieve a holistic conclusion on the effect of the level of tax knowledge on technology adoption in Ghana, further studies should be carried out on small taxpayers in other regions. Similarly, other studies should focus on large, medium taxpayers as well as individual taxpayers. In addition, there is a need for research on the association between the online tax system and tax compliance among small taxpayers in Ghana.

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APPENDICES

A: Scheffe Post-hoc test for Table 7

Appendix Ai: Comparison of GK by Manager's level of education (Scheffe)

Appendix Ai: Comparison of GK by Manager's level of education (Scheffe)				
Row Mean=Column Mean	None	Primary	JHS/Middle	Secondary
Primary	-3.84577 0.989			
JHS/Middle	-4.89236 0.927	-1.04659 1.000		
Secondary	-2.39995 0.927	1.44582 0.999	2.49242 0.894	
Tertiary	4.3455 0.942	8.19127 0.637	9.23786 0.007	6.74545 0.005

Appendix Aii: Comparison of LK by Manager's level of education (Scheffe)				
Row Mean=Column Mean	None	Primary	: JHS/Middle	Secondary
Primary	-5.84936 0.956			
JHS/Middle	5.33724 0.914	11.1866 0.41		
Secondary	6.49368 0.807	12.343 0.251	1.15644 0.994	
Tertiary	12.0002 0.248	17.8496 0.026	6.66298 0.145	5.50654 0.057

Appendix Aiii: Comparison of TK by Manager's level of education (Scheffe)				
Row Mean=Column Mean	None	Primary	JHS/Middle	Secondary
Primary	-9.29487 0.803			
JHS/Middle	1.93701 0.998	11.2319 0.42		
Secondary	-0.10537 1.000	9.1895 0.574	-2.04239 0.956	
Tertiary	4.61756 0.941	13.9124 0.162	2.68055 0.897	4.72293 0.16

B: Scheffe Post-hoc test for Table 8

Appendix Bi: Comparison of GK by Type of firm organisation/structure (Scheffe)		
Row Mean-Col Mean	Sole Proprietorship	Partnership
Partnership	0.001402 1	
Private Limited Company	5.11757 0.015	5.11617 0.172

Appendix Bii: Comparison of LK by Type of firm organisation/structure (Scheffe)		
Row Mean-Col Mean	Sole Proprietorship	Partnership
Partnership	4.08017 0.301	
Private Company limited	7.15343 0	3.07326 0.551

Appendix Biii: Comparison of TK by Type of firm organisation/structure (Scheffe)		
Row Mean-Col Mean	Sole Proprietorship	Partnership
Partnership	2.50899 0.642	
Private Company limited	4.8727 0.03	2.36371 0.709

C: Scheffe Post-hoc test for Table 9

Appendix Ci: Comparison of GK by Region (Scheffe)		
Row Mean-Col Mean	Northern	Greater Accra
Greater Accra	-8.438320	
	0	
Ashanti	-9.685990	-1.24768
	0	0.793

Appendix Cii: Comparison of TK by Region (Scheffe)		
Row Mean-Col Mean	Northern	Greater Accra
Greater Accra	-2.22812	
	0.605	
Ashanti	-8.23118	-6.00305
	0	0.008

D: Generalised Ordered Logit regression for Table 10

VARIABLES	Low	Average
Primary	0.319	0.319
	(0.814)	(0.814)
JHS/Middle	0.661	0.661
	(0.705)	(0.705)
Secondary	0.636	0.636
	(0.663)	(0.663)
Tertiary	1.303*	1.303*
	(0.670)	(0.670)
Female	-1.105***	-0.137
	(0.296)	(0.251)
Experience	-0.474	-0.474
	(0.367)	(0.367)
Experience2	0.162	0.162
	(0.124)	(0.124)
Tax Audit	0.274	0.274
	(0.216)	(0.216)
Business income	0.251**	0.251**
	(0.108)	(0.108)
Tax Complexity	-0.126***	-0.126***
	(0.0453)	(0.0453)
Partnership	-0.0705	-0.0705
	(0.326)	(0.326)
Private limited company	0.515**	0.515**
	(0.224)	(0.224)
Tax education	1.192***	1.192***
	(0.246)	(0.246)
Distance	-0.00736	-0.00736
	(0.00839)	(0.00839)
Greater Accra	0.516*	0.516*
	(0.305)	(0.305)
Ashanti	0.157	0.157
	(0.268)	(0.268)
Urban	1.001*	1.001*
	(0.513)	(0.513)
Constant	-0.712	-4.533***
	(1.168)	(1.185)
Observations	490	490

E: Wald test of parallel lines assumption for Table 10

Wald test of parallel lines assumption for the final model
chi2(16) = 14.68
Prob > chi2 = 0.5481

F: Multicollinearity test (VIF) for the Table 10

	VIF	1/VIF
Experience	6.847	.146
Experience 2	6.822	.147
Region	1.285	.778
Tax Audit	1.276	.784
Tax Education	1.268	.789
Type of organisation	1.248	.801
M. level of education	1.179	.848
distance	1.169	.855
sex	1.099	.91
Complexity	1.091	.916
Business income	1.082	.924
Location	1.065	.939
Mean VIF	2.119	.

G: Probit regression for Table 13

Technology adoption	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Level of tax knowledge							
Average	0.459	0.355	1.29	0.196	-0.237	1.155	
High	0.690	0.369	1.87	0.062	-0.033	1.414	*
Sex							
Female	-0.299	0.174	-1.72	0.085	-0.640	0.041	*
M. education level							
Secondary	0.442	0.274	1.61	0.107	-0.096	0.980	
Tertiary	0.824	0.290	2.84	0.004	0.256	1.392	***
Experience	-0.334	0.270	-1.24	0.215	-0.863	0.194	
Experience2	0.117	0.078	1.50	0.133	-0.036	0.271	
Business income	0.048	0.079	0.61	0.544	-0.107	0.202	
Type of organisation							
Partnership	0.355	0.240	1.48	0.139	-0.115	0.825	
Private limited company	0.658	0.175	3.76	0.000	0.315	1.000	***
Region							
Greater Accra	0.930	0.252	3.69	0.000	0.436	1.424	***
Ashanti	0.866	0.241	3.59	0.000	0.394	1.339	***
Location							
Urban	0.298	0.412	0.72	0.470	-0.509	1.105	
Constant	-3.577	0.863	-4.15	0.000	-5.267	-1.886	***

Mean dependent var	0.161	SD dependent var	0.368
Pseudo r-squared	0.197	Number of obs	490.000
Chi-square	73.451	Prob > chi2	0.000
Akaike crit. (AIC)	375.548	Bayesian crit. (BIC)	434.270

H: Linktest for the probit region table Table 13

Iteration 0: log likelihood = -216.43045
Iteration 1: log likelihood = -176.35915
Iteration 2: log likelihood = -173.72173
Iteration 3: log likelihood = -173.59594
Iteration 4: log likelihood = -173.59585
Iteration 5: log likelihood = -173.59585
Probit regression Number of obs = 490
LR chi2(2) = 85.67
Prob > chi2 = 0.0000
Log likelihood = -173.59585 Pseudo R2 = 0.1979

adop11	Coef.	Std.Err.	z	P>z	[95%Conf.	Interval]
_hat	0.817	0.331	2.470	0.014	0.169	1.466
_hatsq	-0.099	0.169	-0.590	0.557	-0.431	0.233
_cons	-0.047	0.151	-0.310	0.755	-0.342	0.248

I: heteroskedasticity Test Multicollinearity test for Table 13

Hettest
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of adoption

chi2(1) = 3.18
Prob > chi2 = 0.0747

Multicollinearity test (VIF)

	VIF	1/VIF
Experience	6.661	.15
Experience2	6.637	.151
Type of organisation	1.206	.829
M. education level	1.205	.83
Level Tax education	1.167	.857
sex	1.089	.918
Business income	1.082	.924
Region	1.065	.939
Location	1.056	.947
Mean VIF	2.352	.

J: Pairwise correlations Matrix

	Variables	1	2	3	4	5	6	7	8	9	10	11	12	13
1	Level of tax knowledge	1.000												
2	M. education level	0.260*	1.000											
3	Sex	-0.157*	-0.037	1.000										
4	Experience	0.052	0.130*	-0.089*	1.000									
5	Experience2	0.067	0.116*	-0.055	0.920*	1.000								
6	Tax Audit	-0.017	-0.085	0.064	-0.064	0.001	1.000							
7	Business income	0.162*	0.175*	0.013	-0.009	-0.031	0.040	1.000						
8	Tax Complexity	-0.211*	-0.069	0.150*	-0.003	-0.021	-0.073	-0.019	1.000					
9	Type of organisation	0.251*	0.291*	-0.173*	0.118*	0.100*	-0.211*	0.174*	-0.044	1.000				
10	Tax education	0.309*	0.217*	-0.136*	0.093*	0.079	-0.307*	0.045	-0.161*	0.306*	1.000			
11	Distance	-0.073	0.006	0.087	-0.041	-0.063	-0.182*	0.002	0.076	-0.007	-0.048	1.000		
12	Region	-0.014	0.015	0.158*	0.005	0.007	-0.251*	0.092*	0.177*	0.022	0.062	0.332*	1.000	
13	Location	0.151*	0.163*	-0.006	-0.021	-0.031	-0.035	0.081	0.012	0.040	0.041	-0.032	0.149*	1.000

* shows significance at the 0.05 level