UNIVERSITY OF GHANA

VIRTUALIZATION OF GOVERNMENT-TO-CITIZEN ENGAGEMENT PROCESSES: EVIDENCE FROM GHANA DRIVER AND VEHICLE LICENSING AUTHORITY

BY

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DECLARATION

I do hereby declare that this work is the result of my own research and has not been presented by anyone for any academic award in this or any other university. All references used in the work have been fully acknowledged.

I bear sole responsibility for any shortcomings.

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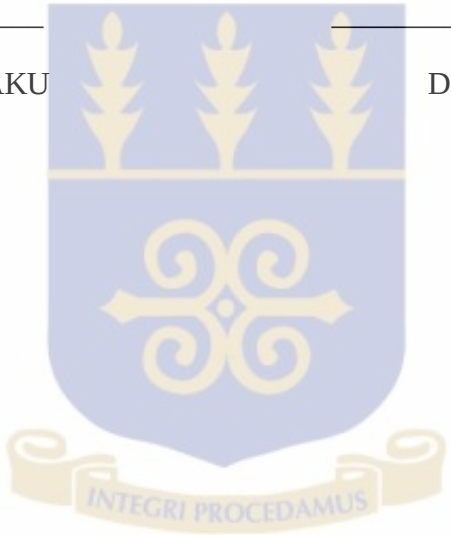

CERTIFICATION

I hereby certify that this thesis was supervised in accordance with procedures laid down by the University.

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Dr. Richard Boateng Date

(Supervisor)

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Dr. John Effah Date

(Co-supervisor)

DEDICATION

This work is first of all dedicated to the glory of God who has given me victory in the midst of my trials. Secondly, I dedicate this work to my lovely parents; Apostle & Mrs. Henry Ofoeda. I thank God for having you as parents. You are the best. Love you always.

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LIST OF ACRONYMS AND ABBREVIATION

DVLA	-	Drivers' and Vehicular Licensing Authority
ICT	-	Information and Communication Technology
IS	-	Information Systems
PVT	-	Process Virtualization Theory
TAM	-	Technology Acceptance Model
TPB	-	Theory of Planned Behaviour
TRA	-	Theory of Reasoned Action

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ABSTRACT

With the world becoming a more virtual society, most of our physical processes are now being migrated to the online environment. The rationale behind these migration processes is to ensure efficiency and effective service delivery. In spite of these developments, some processes are still not amenable to the online environment and as such are conducted manually; hence understanding different processes and their amenability was needed. Based on a critical realist paradigm, this study used a mixed-methods (both quantitative and qualitative) approach to examine the various activities involved in acquiring a new driver's license. The purpose of this study was to explore the factors that enable or constrain virtualization processes in government-to-citizen electronic services using evidence from the Ghana Driver and Vehicle Licensing Authority. Pursuant to this, this study used the Process Virtualization Theory as the theoretical framework.

Quantitative data analysis was done using descriptive and regression analysis while qualitative data were analyzed based on Miles and Huberman data analysis techniques. Survey data came from 317 citizens, interviews conducted with management of DVLA and a focus group discussion with some DVLA customers.

Quantitative results from the study showed that characteristics of the processes such as the Sensory Requirement of the registration activity, Sensory Requirement of written test activity were amenable to virtualization. The analysis further proved that the Relationship Requirement of the registration activity was not amenable to virtualization whereas Relationship Requirement of the written test activity was amenable to virtualization. Similarly, the Synchronism Requirement of the registration activity has proven to be amenable to virtualization while Synchronism Requirement of the written test activity was not amenable to virtualization.

Evidence from the qualitative analysis also proved that the nature of virtualization at the DVLA was carried out after a need was established in 2012 (i.e. Fraud, impersonation and corruption). The virtualization however took place in phases; thus from one region to the other in order to fade out the traditional means of acquiring a drivers' license. The virtualization of the DVLA processes, are in four major strands and these are: minimizing corruption in the system, improve work efficiency, promote good record keeping and enhance transparency. The study also showed that not all the processes could be virtualized because of the laws that regulate the acquisition process, hence the need for reconsideration of the legislative instrument that regulates the way and manner in which a license should be acquired. While financial constraints hinder the virtualization of some of the activities, it was revealed that government regulation is a major hindrance to the full virtualization of the activities.

CHAPTER 1

INTRODUCTION

1.1 Background

The concept of Electronic Government (e-government) has been in existence since the late 1990´s primarily as a context within which experience is shared among practitioners (Grönlund & Horan, 2005). In spite of its existence, it is comparably gaining more ground in developed countries as compared to developing countries (Boateng, 2013). In reality e-government has been in existence for some time now even though its design is seen as an imported one (Heeks, 2002). This is to say that the designs for implementing e-government are mostly imported and modified to suite a particular context.

In implementing e-government, Information and Communication Technologies (ICTs) are regarded as transformers of government structures (Carter & Weerakkody, 2008). Due to this, decision makers and stakeholders in government sectors are exploiting all the benefits that these technologies bring. These technologies have made governments become more open by putting their services online and subsequently providing services that are citizen-centric since e-government affords convenience and transparency (Heeks, 2002). Making services available to citizens' needs channels by which they can access the services that government provides. In this regard, web 2.0s and social media are good tools for engaging citizens in the decision making process and further enhances efficiency, accountability, user convenience and transparency (Chun, Shulman, Sandoval, & Hovy, 2010; cited in Nam, 2012).

Many governments all over the world are striving for citizen-centric e-Government services (Velsen, Geest, Hedde, & Derks, 2009). Examples of citizens-centric e-government services abound (Hung, Chang, & Yu, 2006; Bridge, 2012). E-government can offer a variety of

services and offer information such as public voting information, tax filing, license registration, and renewal, obtaining passports, payment of fines etc. The primary objective of governments doing this is to provide a one-stop-shop and online access to information and services to citizens. Soufi and Maguire (2007) opined that even though governments are determined to provide services and information to their citizens, the actual services that are provided in the past years have fallen short of being citizen-centric due to the lack of representative user involvement in the design process (Følstad, Jørgensen, & Krogstie, 2004; as cited in Velsen *et al*., 2009). When governments provide their information, services, products, and transactions electronically, there is the potential benefit of accessibility for a wider audience, political and administrative transparency, and improved service delivery (Velsen *et al*., 2009). In Ghana the Driver and Vehicle Licensing Authority (DVLA), as a government institution exists to provide a variety of services to citizens. Examples of services include driver license acquisition, license renewal, vehicle registration (DVLA, 2013). These services are provided to bring efficiency in service delivery and reduce the numerous human interferences that have characterized the license acquisition process. Research into the virtualization of the operations of the DVLA with a focus on user involvement is very important.

Over the last decade, ICT has enhanced the migration of processes that relied heavily on traditional methods to virtual environments in which physical interactions are not present (Balci & Rosenkranz, 2014) and government processes are no exception to these developments. In view of this, the shift towards virtualization of government services continues at an increasing pace. Virtual processes as used here refer to processes in which physical interactions have been removed (Overby, 2008). Most processes that previously seemed to be difficult to virtualize are now being fully virtualized (Overby, 2008). For

instance, traditional voting which involved joining long queues has been replaced by electronic voting (e-voting) in some countries like the US (Carter & Bélanger, 2012). Interestingly even though there is a general perception that virtualization is good, it is not every process that qualifies to be virtualized (Overby, 2008). Distance learning for example is better suited for some courses and degree programs than others (Overby, 2011). As a result of these developments, it has become inconceivable to envisage life without processes that have been moved from the physical to virtual environments (Balci, 2014).

While putting government processes online is generally perceived as a step in the right direction; practitioners tell us it is very expensive. The trend of government spending has increased over the years. During the early 2000's, it was estimated that governments over the world would spend about US$3 trillion on IT provision and expansion (Gubbins, 2004 as cited in Heeks & Stanforth, 2007). Recent statistics however show that by the end of 2015, governments worldwide would spend up to a total of $3.8 trillion in ICT expansion, as against some $3.7 trillion in 2014 (Gartner, 2015). These heavy investments are however estimated to be wasted since between 60-80% of all e-government projects fail (Gubbins, 2004 as cited in Heeks & Stanforth, 2007). Some of these e-government projects are considered either a total failure (35%), partial failure (50%) or successful (15%) (Heeks, 2003). Studies show that one underlying factor for this failure is the unwillingness of citizens to use the online services (Chan *et al.*, 2010).

In general, it seems that the importance of virtualizing government processes has been comprehended. Furthermore, on the premise of virtualizing processes, it is understood that not all processes are amenable to virtualization. This study attempts to address these questions by empirically examining which factors enable or constrain virtualization of processes in government-to-citizen electronic services.

1.2 Research Problem

A substantial amount of research has been conducted in the field of e-government and its sub applications. For instance studies have been conducted on e-government adoption (Carter & Weerakkody, 2008; Zheng, Chen, Huang, & Zhang, 2013); assessment of e-government projects (Esteves & Joseph, 2008), The use of web 2.0s in e-government (Chun *et al*., 2010; Cromer, 2010; Alton, Dion, & Ang, 2011; Bonsón, Torres, Royo, & Flores, 2012); e-government synthesis of literature (Yildiz, 2007; Zahir, Peter, Montazemi, & Love, 2007; Boateng, 2011); and e-government challenges and opportunities (Zambrano & Seward, 2008/2010; Matavire, Chigona, Roode, Sewchurran, Davids, Mukundu, 2010). Some studies also focused on e-government services (Belanger & Carter, 2005; Papadomichelaki & Mentzas, 2012; Wang & Chen, 2012); with some specifically on e-government services that are centered on citizens (Saxena, 2005; Forman, 2007; Axelsson & Melin, 2008; Osimo, 2008; Van-Dijk, Peters, & Ebbers, 2008; Vesnic-Alujevic, 2012; Alawneh, Al-Refai, & Batiha, 2013). In their study, Van-Dijk, *et al*. (2008) posited that, in order for citizens to have faith in governnment online services and continue to use them, governments must focus on measuring the demand side of their services and not only measuring the supply side. Alawneh *et al*. (2013) further argue that governments must provide useful information to citizens which will satisfy their needs, desires and expectations. Generally, most of these studies were conducted in developed countries even though there were a few that were conducted in developing countries (Bwalya, 2009; Awowi & Owusu, 2010; Matavire *et al*., 2010). In the case of the e-government services that governments use, literature is silent on how amenable they are to the online environment using tested theories.

Past research has revealed that most online and offline processes have had a persistent difficulty with any government-to-citizen sponsored engagement initiative (Bruns & Swift,

2011). Alshawi and Alalwany (2009) argued that poor exploitation of e-government initiatives is prevalent in most developing countries. Some of these difficulties range from problems associated with implementation, and unwillingness of citizens to use the online system etc. In the case of the online government services for instance, unwillingness of citizens to use the services has been identified as a crucial factor that caused most online government services to fail (Chan *et al.*, 2010). While e-government research has received a lot of attention, they continue to fail. Further research is therefore required to understand this phenomenon in order to enhance the likelihood of success of e-government services.

In addition, although there is evidence to show that governments are migrating several of their services online (Schaupp, Carter, & McBride, 2010), theories used for examining virtualization are yet to gain maturity; one such theory is PVT. There are calls for testing the theory in other IT applications and in other contexts. Its use will therefore enhance understanding of the constructs. Since it is an emergent theory and empirical testing of the process virtualization theory is still nascent (Barth & Veit, 2011). In the same line, Overby (2008) opined that the virtualizability of a process is relevant from the user's perspective. This is because online systems that governments introduce will arguably be used by citizens, a phenomenon which when ignored will lead to the failure of the online systems. It is important to argue here that governments must know the preferences of the users of their online systems. This will inform their decisions on designing successful online systems. This presupposes that for online services to succeed, the users must determine what they want the government to transfer online. Presumably, any attempt by government to transfer services online could be resisted if the users do not establish what they want to migrated online.

Even though various studies (Alton *et al.*, 2011; Grein, 2011; Chun & Chob, 2012) and reports (Smith, 2009) have been presented by scholars and practitioners on the use of IT to

promote e-government, there still remains a void in the normative literature investigating which aspects of government-to-citizen engagement processes can be virtualized and which cannot be virtualized. In a step to garner support for this, Snead & Wright (2014) argued that it is important to consider the individual processes in government instead of looking at the process as a whole. There is therefore, the need to establish which aspects of current engagement processes between government and citizens can be sent online and which cannot be sent online. From these gaps, this research redefines which aspects of physical government engagement processes exist and which of them can be virtualized, and those that have been virtualized. It is therefore expedient to understand different processes and their level of amenability.

1.3 Research Purpose

Drawing motivation from the established gaps in research, the purpose of this study is to identify factors that enable or constrain virtualization processes in government-to-citizen electronic services using evidence from the Ghana Driver and Vehicle Licensing Authority.

1.4 Research Objectives

Based on the purpose of this study, the related objectives are:

1. To explore the nature of virtualization of processes in government-to-citizen services.
2. To understand what factors enable or constrain virtualization of processes in government-to-citizen electronic services.

1.5 Research Questions

To address the issues stated in the objectives, this research seeks to answer the following questions:

RQ1: What is the nature of virtualization of processes in government-to-citizen services?

RQ2: Which factors enable or constrain the virtualization of processes in government-to-citizen services?

1.6 Synopsis of Chapters

This study has eight chapters. Chapter One introduces and provides a background to the study, and an overview of the discrepancies in existing literature. Chapter Two outlined the review of relevant literature. The literature review placed this research work within its larger context with emphasis on the development of e-government and IS research and process virtualization by doing a detailed review of existing literature. Chapter Three focused on the context of the Study. This chapter of the research focused on government engagement processes with citizens in a Ghanaian context using DVLA as a case. The chapter introduced the case organization and further modeled the processes of interest. Chapter Four entailed the theoretical framework. This chapter performed a review of the framework which guided the research. Chapter Five entailed the research methodology. This section described the research paradigm, methods and procedures used to collect information and used to analyze the collected data. Chapter Six focused on the analysis and discussion of the quantitative data. Chapter Seven focused on analysis and discussion of the qualitative data. Chapter Eight discussed the conclusions, summary and recommendations. References and appendix followed this chapter.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Having established the background and need for this study, this chapter presents a review of past literature on the migration of physical processes to the online environment. The chapter begins by explaining the concept of virtualization and putting it in an appropriate context for this study. The chapter further looked at virtualization of processes in e-commerce, e-learning and some e-government services such as e-voting and e-filing. The chapter also highlights relevant gaps for future research and ends with a summary of the critical issues discussed.

2.2 Process Virtualization Explained

Following the advent of the Internet, most processes (not limited to business processes) are gradually being migrated from the traditional methods to virtual or online platforms. The Internet has become indispensable in our modern society with people using it for various activities (Farag, Schwanen, Dijst, & Faber, 2007). In view of this, processes such as education, commerce, governance etc. are now gradually being migrated to the virtual environment (Overby, 2008).

In order to appreciate the subject matter, it is important to define some pertinent themes as used extensively in the study, two of which are "process" and "virtualization." Overby (2008) defines a process as a set of steps to achieve a goal or an objective. There exist both physical processes and virtual processes. In the case of physical processes, they involve human interaction between people and objects (Overby, 2008). Virtual processes on the other hand are processes in which the physical interactions between people and objects are removed (Overby, 2008). When virtualizing a process, the responsibility of the human actor is shifted to an information system (Overby *et al.*, 2010). According to Overby (2012), the transition of

a process from the physical to the virtual environment is termed as process virtualization. Information Technology is regarded as an enabler of most virtual processes even though not all processes are virtualized using IT (Overby, 2008). Equivalently, the means of virtualization of a process can either be IT based or non-IT based (Overby, 2008). Similarly it is not out of place to state that IT is not a necessary ingredient for process virtualization. Mail-order catalogs for instance allow people to take part in virtual shopping processes without the use of IT (Overby & Konsynski, 2010).

Virtual or virtualization as used in this study is different from virtualization of machines in the cloud (Zhang, Li, & Zheng 2013); network virtualization (Berl, Race, Ishmael, & Meer 2010); and storage virtualization (Shu, Li, & Zheng, 2005). Fiol and O'Connor (2005) posited that distinctions are very important since they help to entangle the various contradictions that arise; and further help distinguish face-to-face processes, hybrid and purely virtual processes.

There is a gradual migration of processes from the traditional platforms to the online or virtual platforms, for instance: online education (Saltz, Hiltz, Turoff, & Passerini, 2007; Fong, Kwan, Wang, Huang, Ma, & Zhang, 2008); online shopping (Ba & Pavlou, 2002; Kim, Galliers, Shin, Ryoo, & Kim, 2012); online tax filling (Carter & Schaupp 2009; Chen, 2010; Schaupp & Carter 2010; Schaupp, Carter, & McBride, 2010; Azmi, Kamarulzaman, & Hamid, 2012; Hung, Chang, & Kuo, 2013). All these online applications and more are discussed in subsequent sections. The purpose of doing this is to establish the contemporary issues in the virtualization of various processes. The researcher reviews pertinent issues not only in e-government but also in e-commerce, and e-learning.

2.2.1 Virtualization of Commerce

Electronic commerce has developed roots throughout business organizations and is having a profound effect on the business strategy of organizations (Fruhling & Digm, 2000). With the advent of the Internet, businesses are putting in efforts and measures to exploit the benefits that the Internet brings with it. One of such example is the selling of goods and services online. As such, businesses have aligned their strategies to information systems in order to fully exploit the benefits (Fruhling & Digm, 2000).

The definitions of e-commerce are numerous and diverse as a result of the confusion that surrounds the term (Thulani *et al.*, 2010). In its broad sense however, e-commerce is defined as performing any business process electronically (Stanfield & Grant, 2003). Authors such such as Jusoh and Ling (2012); Mokhtarian (2004) used e-shopping as a form of e-commerce, hence the two terms are used interchangeably. E-commerce has been studied extensively in the literature. For instance, there are studies on e-commerce adoption (El Said and Galal-Edeen, 2009; Al rawabdeh, Zeglat, and Alzawahreh, 2012); literature on e-commerce assessment and impact (Lin, 2007; Hasan and Abuelrub, 2011); and numerous other studies on the various sub-domains of e-commerce.

Table 2.1 Distribution of Research in e-shopping / e-commerce

Research Study	Research Focus	Underpinning Theory and Framework	Research Method and Country	Relevant gaps for future research
Studies on online shopping / e-Commerce				
Monsuwe, Dellaert, and Ruyter (2004)	The study reveals that ease of use, usefulness, and enjoyment, and other exogenous factors like previous online shopping experiences, and trust in online shopping affect consumer intentions to shop online	Technology Acceptance Model	Qualitative The Netherlands	Future research should examine which factors significantly have effect on the behavioral intention of users to use the Internet to shop
Bosnjak, Galesic, and Tuten (2007)	The study concludes that personality characteristics of different levels of generality affect decisions about future online purchases	Hierarchical approach to personality developed	Quantitative Croatia	An inductive approach to understanding consumption-related needs useful in determining consumer intentions in shopping online
Soopramanien and Robertson (2007)	This study focuses on how attitudes and beliefs towards Internet shopping affect both the adoption decision and usage of the online shopping channel	TRA framework	Quantitative UK	There is the need for research to explore the main motivations for shopping online or offline and how this affects adoption and usage of online shopping
Verhagen and Dolen (2009)	The study shows that both online and offline store perceptions influence online purchasing intentions. Further users believe that offline store impressions were used as references for their online store counterparts	TAM	Quantitative The Netherlands	Need for research on the impact of offline store images on purchasing via purely online store
Kim *et al*. (2012)	This study focused on the factors that influence Internet shopping value and customer repurchase intention	DeLone and McLean model	Quantitative South Korea	Need for research to examine other factors that influence Internet shopping qualities

Research Study	Research Focus	Underpinning Theory and Framework	Research Method and Country	Relevant gaps for future research
Ha and Stoel (2009)	The study focused on factors that influence online shopping	Technology Acceptance Model (TAM)	Quantitative US	Need for studies into browsers' e-shopping quality perceptions
Lu, Cao, Wang, and Yang (2011)	This research focuses on users' intention to transfer usage between offline and online channels that offer similar services	Technology Acceptance Model	Quantitative China	Need for further research into service provision sectors aside the banking sector that was researched
Lee, Kim, and Ahn (2011)	The research explored how positive messages in online discussion forums may affect consumers' decisions to shop online	Social Influence Theory and Technology Acceptance Model	Quantitative China	Future studies should focus on the impact of negative word of mouth on consumers decision to shop online
Uzoka, Shemi, and Seleka (2007)	The study examines the behavioral factors that influence the adoption of e-commerce in developing countries	Theory of Planned Behaviour (TPB)	Quantitative Botswana	Need for more e-commerce research in developing countries.
Grandón, Nasco, and Mykytyn (2011)	The study compared two theories thus the TBP and TRA to determine which of them best explain e-commerce adoption	theory of planned behavior (TPB) and the theory of reasoned action (TRA)	Quantitative Chile.	Further studies should use the TRA to study e-commerce adoption issues in developing countries
Yang, Lu, and Chau (2013)	The study focused on what affect consumers decision to move from an offline channel to an online channel	Brand extension theory and expectation–confirmation theory	Quantitative China	Need for longitudinal studies on the transfer process from the offline channel to the online channel

Source: Author's Construction, 2015

Table 2.1 above presents studies focusing on Internet or online shopping (e-commerce). Prior to the advent of the Internet, most economic activities were undertaken manually. In the case of commerce, buyers and sellers previously transacted business on a face-to-face term. The advent of the Internet has however improved commerce and made it increasingly competitive (Kwon & Lennon, 2009). Most businesses are gradually moving from the old traditional brick and mortar methods of operations to the new brick and click method (Yang *et al*., 2013). Examples of the well-known companies that have incorporated Internet in the transition process in the selling of their goods include Best Buy, Wal-Mart, and Barnes & Noble (Bernstein, Song, & Zheng, 2008).

The attractiveness of Internet shopping has gained more attention due to the proliferation of the internet. ICTs have provided retailers the means to reach the end market. In lieu of this most consumers today have found e-commerce more attractive as compared to traditional commerce (Bernstein *et al*., 2008). While most traditional retailers are encouraged to embrace the virtual approach in order to transform their businesses, there is a fear that when all retailers adopt the traditional method, the end result is going to be an increase in competition (Bernstein *et al*., 2008).

The peak of research points out the intentions of users to move from the traditional shopping to the online plateforms through different online channels (Lu *et al*., 2011). Studies showed that user experience in using the Internet moderated the consumer benefit and intention to use services from offline to online. Kim *et al*. (2012), similarly investigated the factors that influence Internet shopping value and customer repurchase intention. Consequently, system, information and services qualities were identified as factors closely associated with Internet shopping values

and purchase intentions of consumers. While some studies found that consumers will choose an online commerce over the traditional commerce (Monsuwe *et al*., 2004); other studies found otherwise (Kacen, Hess, and Chiang, 2013). Issues such as competitive disadvantages in shipping charges as well as refund policies are among the reasons why people choose traditional commerce over the virtual or online method of shopping.

The study further highlights the underpinning framework or theory that these studies are based on, and the methodology and gaps relevant for future research. From the review of literature, there is a distribution of theoretical frameworks used to study e-commerce. Some of these include the Technology Acceptance Model (TAM), the Theory of Reasoned Action (TRA), and the Theory of Planned Behaviour (TPB) among others. However, the dominant theory used is the TAM. The attitudes and beliefs of shoppers that effects their adoption and usage of online shopping channels were studied by Soopramanien and Robertson (2007).

The review further showed a number of gaps that are relevant for future research. One such gap is the lack of e-commerce research in African countries (Uzoka *et al*., 2007; El Said & Galal-Edeen, 2009). Also there is the need for research into the impact that negative word-of-mouth has on the decision of consumers to shop online (Lee *et al*., 2011). Further, there is the need to investigate browsers' e-shopping quality perceptions, and how different they might be from those of online purchasers (Ha & Stoel 2009). These and many other gaps are there to further enhance our understanding of offline to online commerce in general. More pressing among these gaps is an investigation of the transfer process from the offline environment to the online environment (Yang *et al*., 2013). In this vein, processes are arguably not examined critically before

transferring online hence the need for research on how processes can be examined before they are transferred to the online environment.

2.2.2 Virtualizing Learning

There has been a growing interest in e-learning over the past years as a result of the growth of ICT and the Internet. ICTs have been widely used as a hub for most online education although the same ICTs are also used in face-to- face lectures to augment and support classroom learning (Balaji & Chakrabarti, 2010). The term e-learning, distance education, and distance learning are used interchangeably in most literature. Moore and Kearsley (2011) define the term distance education as the "teaching and planned learning in which teaching normally occurs in a different place from learning, requiring communication through technologies as well as special institutional organization". There is also the blended form of distance education which requires the physical on-site presence of course takers (Tabor, 2007).

Using online instructional tools can remove a number of hindrances associated with the face-to-face lectures providing a forum to address issues through argumentative and collaborative discourse (Karacapilidis & Papadias, 2001; cited in Balaji & Chakrabarti, 2010). Due to the removal of these hindrances, we have virtual schools and universities springing forth across the globe with the mandate of providing education based on a full curriculum (Phipps & Merisotis, 1999).

Many a priori research on distance education have done comparisons of the face-to-face education and that of the online education. Most of these studies however have different stands regarding the two methods (Singh, 2003). Some studies show that there is no significant

difference in the two methods (Ramage, 2001). However in the case of efficiency, students that take online course are believed to be more effective than their offline counterparts (Singh, 2003). Apart from the formal education that takes place in classrooms and lecture halls, organizations can also create a condusive learning environment for their employees to learn (Hsia, Chang, & Tseng, 2014).

Table 2.2 Distribution of Studies in e-Learning

Research Study	Research Focus	Underpinning Theory and Framework	Research Method and Country	Relevant gaps for future research
Studies on e-Learning				
Hsia *et al*. (2014)	The study examines/explains employee acceptance of e-learning systems	Technology Acceptance Model (TAM)	Quantitative Taiwan	Need for research on the factors that could predict future e-learning systems
Masrom (2007)	This study examined TAM using student acceptance of e-learning technology	Technology Acceptance Model (TAM)	Quantitative Malaysia	Future research should include user experiences, and user characteristics to the TAM model
Park (2009)	This research focuses on the verification of the process of how university students adopt and use e-learning	Technology Acceptance Model (TAM)	Quantitative South Korea	Need for future research on blended learning or synchronous e-learning
Lim *et al*. (2008)	The study investigated the satisfaction levels of students in online instruction, traditional face-to-face instruction, and a combination of online and traditional instruction	No defined theory or framework	Quantitative USA	Need for research on the factors that influence the achievement and satisfaction of students in online learning
Raaij and Schepers (2008)	This research focuses on how students accept and use virtual leaning environments	Technology Acceptance Model (TAM), TAM2 and (UTAUT)	Quantitative China	Future research on the impact of culture on virtual learning environment acceptance
Haron, Abbas, and Rahmanb (2012)	The study provided insights on the attitude towards the adoption of blended learning	TAM and Mezirow's Transformational Learning Theory	Quantitative Malaysia	Need for a more elaborate study to test all the constructs in the framework on the adoption of blended education by academicians

Source: Author's Construction, 2015

Table 2.2 above details studies on electronic learning (distance education). The review pin points studies that focus on migration of education from the traditional environment to the online environment and how users come to accept it (Raaij & Schepers 2008). Some studies also focused on the satisfaction level of students in the traditional, online and blended education environments (Lim *et al*., 2008).

For online education to be a success it needs to be accepted and used by the consumers. Extant literature suggests factors that account for the acceptance of online education by students (Raaij & Schepers 2008; Lee, 2008); and factors affecting student satisfaction in online course delivery (Beqiri, Chase, & Bishka, 2010). In their study, Beqiri *et al*. (2010) pontificated that the appropriateness of the course offered online and the extent of its familiarity will influence student satisfaction.

Studies also showed that academicians for instance, will prefer the blended learning, and that its perceived usefulness influences them to adopt a blended form (Haron *et al*., 2012). By this academicians are inclined to the usefulness of technology and hence influence the adaptation to the blended form of education (Haron *et al*., 2012). Prior evidence supports the fact that blended learning is more advantageous, offers more benefits and is more effective compared to the traditional learning (Singh, 2003; cited in Haron et al., 2012).

These studies on e-learning give us more insight into the e-learning domain and its sub-applications; and no doubt these studies have contributed to current research. More importantly

however is what can be done now to improve on these studies specifically addressing the pressing need for research on the factors that could predict future e-learning systems.

2.3 E-Government Services

Information and Communication Technologies (ICTs) are regarded as transformers of governments across the globe (Carter & Weerakkody, 2008). Due to this, decision makers as well as stakeholders in the government sector are exploiting all the benefits that these technologies bring. These technologies have made governments to become more open by putting their services online and subsequently providing services that are citizen-centric. Generally, e-government affords convenience and transparency (Heeks, 2002).

By exploiting these technologies governments are able to disseminate information to their citizens. Literature suggests that e-government is largely observed in stages. Reddick (2005) opined that there are two stages in e-government: the information dissemination stage and the transaction based e-government. The former stage involves cataloging government information to be used by citizens whereas the latter involves transaction procedures such as tax filing. There are a great number of studies focusing on services that governments provide, for instance: Lim and Tang (2008); Van Dijk et al (2008); Velsen, Geest, Hedde, and Derks, (2009); Lean, Zailani, Ramayah, and Fernando, (2009); Hirwade (2010); Kvasny and Lee (2011); Ramtohul and Soyjaudah (2013); Nygren, Axelsson, and Melin, (2013); Taipale (2013); Janssen & Estevez (2013); Lindgren & Jansson (2013); Alawneh, Al-Refai, and Batiha, (2013); and Hsieh et al., (2013). The trend of the studies largely concentrates on e-government services in general. There are however some studies that pinpoints specific e-government services. Examples of service specific e-government studies include e-voting (Powell, Williams, Bock, Doellman, & Allen, 2012); e-Filling or e-taxation (Azmi and Bee, 2010); e-petitioning (Panagiotopoulos, Al-Debei,

Fitzgerald, & Elliman, 2012). Studying e-government services holistically arguably does not allow for a detail scrutiny of the service to exhume its shortfalls. In this light, Islam and Scupola (2011) advocated for future research to consider individual e-service application research instead of studying e-government services holistically.

This study falls under the e-government domain; the discussions henceforth deal with specific services that fall under the e-government field; for example, e-voting and e-filing. Untill recently, these e-government services were renderd physically. Citizens had to join long queues in order to vote. While some countries like the US have virtualized this service, developing countries like Ghana still have their citizens join queues to vote. The story is not the same for the process of filing tax returns. Recently the President of Ghana had to travel to the office of the internal revenue service to file his tax return (Myjoyonline.com, 2013; GNA, 2014). Another important aspect of e-government that this study looked at was the driver license acquisition by citizens. This form of service is provided by government to citizens hence it falls under the government-to-citizen catagory of e-government.

2.3.1 E-voting

Voting involves exercising voting rights in a democratic system. By this, the principle of fairness and legitimacy is displayed (Boateng, 2011). ICT has had an impact on election processes all over the world. Electronic voting therefore is the use of electronic systems in casting votes. According to Zissis and Lekkas (2011), there are two forms of e-voting. These are voting supervised physically by representatives and electoral officials at particular centers; and remote voting where voting is not supervised physically. This can be chieved with the use of a computer, or mobile phone via the Internet.

Table 2.3: Studies on e-Voting

Research Study	Research Focus	Underpinning Theory and Framework	Research Method and Country	Relevant gaps for future research
Studies on e-Voting				
Bélanger and Carter (2010)	The study focused on factors that influence citizens intention to use Internet voting systems	Technology Acceptance Model	Quantitative USA	Need for future research to determine the characteristics that differentiate potential Internet voters from non-Internet voters
Carter and Bélanger (2012)	The study focused on the impact of political and technological factors that influence the intention to use voting system	Technology Acceptance Model	Quantitative USA	The need for future research to assess the practical ways in which Internet voting is more advantageous than current options
Powell et al. (2012)	This study revealed that performance expectancy, effort expectancy, social influence, trust in the Internet, and computer anxiety were significantly related to intent to use online voting	Unified Theory of Acceptance and Use of Technology (UTAUT)	Quantitative USA	The need for further research to duplicate this study in other countries that are practicing e-government initiatives
Chiang (2009)	The research focused on the effects of trust and security on adoption of e-voting systems	Technology Acceptance Model	Quantitative Taiwan	No defined gap
Schaupp and Carter (2005)	The study reveals that user perceptions of compatibility, usefulness, and trust significantly impact their intention to use an electronic-voting system	Technology Acceptance Model (TAM), Diffusion of Innovation (DOI) and Web Trust Models	Quantitative USA	Need for research to study the perceptions users have after they have used an e-voting system
Achieng and Ruhode (2013)	This study however gives insight into the factors that could influence the adoption of electronic voting technology	Diffusion of Innovation (DOI)	Quantitative South Africa	Need for research on the e-voting adoption pattern using samples of Internet and non-Internet users

Source: Author's Construction, 2015

Electronic voting (Internet voting) in today's technology driven world is regarded as one of the most security-sensitive application (Pieters, 2006), and many questions have been asked on Internet voting. One such question is "If I can bank or shop online, why can't I vote online?" (Simons & Jones, 2012). This is possibly because online bankers and shoppers have faith in that their transaction processes are secure, although there are issues of fraud recorded in some cases. Many citizens over the world today are advocating for Internet voting and one argument for such demand is that Internet voting encourages voter participation as compared to the traditional way of voting (Olsen & Nordhaug, 2012). This is because traditional voter turnout has declined in many countries (Olsen & Nordhaug, 2012). In the US for instance, average voter turnout is at 48%. With e-voting, it is believed that people can vote through e-mail, telephone, and also by SMS. This phenomenon is believed to supplant the traditional form of voting and subsequently lead to an increase in voter turnout (Sebastian, 2012).

The review of the few articles on e-voting shows a trend of issues. On one hand are the issues that were discussed above and on the other hand, are the gaps identified for future research. Adoption and intention of citizens to use online voting systems is paramount among the issues. As a result, adoption frameworks such as the TAM and UTAUT have been used extensively in studying such phenomena. Powell et al. (2012) for instance reveal that performance expectancy, effort expectancy, social influence, trust in the Internet, and computer anxiety was significantly related to intent to use online voting.

From the many issues discussed, one that is crucial among them is the migration of voting from the brick and mortar method to the click and brick platforms. As a result of this, there is a call for

more studies to explore the practical ways electronic voting is more advantageous than the traditional voting method (Carter & Bélanger 2012). In doing this comparison, it is important to test the amenability of current e-voting to the online environment using theories (e.g. Process Virtualization Theory)

2.3.2 E-Filing or E-Taxation

Tax filing is one of the avenues that governments use to generate their funds. Wang (2002) defines electronic tax-filing systems as "non-manual tax-filing systems," which include both Internet and two dimensional (2D) bar-code filing systems. Several countries have implemented e-tax filing systems to collect revenue. The US, Canada, and Taiwan are among countries that have implemented e-tax filing systems (Wang, 2002). Research shows that online taxation is one of the most successful e-government applications. This is in terms of savings to the taxpayers and citizen take-up (Connolly, Bannister, & Kear, 2010). In Taiwan, for instance, individuals could choose from any of these three methods of filing their tax returns to government which are manual, Internet and two-dimensional (2D) bar code (Chen, 2010). While most developed countries such as the US and Canada are using the Internet filing systems (Wang, 2002); some developing countries like Ghana are using the manual tax returns method.

Table 2.4: Studies on e-Filing or e-Taxation

Research Study	Research Focus	Underpinning Theory and Framework	Research Method and Country	Relevant gaps for future research
Studies on e-Filling / e-Taxation				
Hung, Chang, and Yu (2006)	Factors that determine citizens' acceptance and use of online tax filing and payment system.	Theory of Planned Behavior (TPB)	Quantitative Taiwan	Need for longitudinal studies to determine the users continuous or discontinues use of e-government services
Azmi and Bee (2010)	The study focuses on the factors that lead to the acceptance of e-filing among citizen taxpayers	Technology Acceptance Model (TAM)	Quantitative Malaysia	The need for further exploratory research on the perceived antecedents of risks on the adoption of e-government services.
Anuar and Othman (2010)	Factors that influence citizens' use of online tax filing system to file their taxes	Technology Acceptance Model (TAM)	Quantitative Malaysia	The need for other variables such as system design and users' experience to determine the acceptance of e-tax filing system by citizens
Azmi, Kamarulzaman, and Hamid (2012)	This research investigates how perceived risk and its facets influence the adoption of tax e-filing adoption behavior of consumers	Technology Acceptance Model (TAM)	Quantitative Malaysia	Need for future research on citizens and businesses who are paid tax preparers
Schaupp, Carter, and McBride (2010)	The study focuses on intentions towards the adoption of e-filing systems	UTAUT	Quantitative USA	Future studies could include trust and self efficacy in studying adoption of e-filing.
Fu, Farn, and Chao (2006)	This study examines the factors that affect the taxpayers' intention to adopt a particular tax-filing method- manual or Internet	TAM and TPB	Quantitative Taiwan	Call for research on the applicability of the TAM and TPB in other e-government services
Chang, Li, Hung, and Hwang (2005)	The research examines taxpayers' acceptance of the Internet tax-filing system	Technology Acceptance Model (TAM)	Quantitative Taiwan	Need to future research to extend and examine the linkage between perceived ease of use and perceived credibility in an e-government service context

Source: Author's Construction, 2015

From Table 2.4 above, various studies on e-tax filling points to the adoption and acceptance of the electronic tax filing systems (Chang et al., 2005; Azmi and Bee, 2010),and the intention to use online tax-filing systems (Fu et al., 2006). Variables such as perceived risk and its facets influenced the adoption of tax e-filing adoption behavior of consumers. The majority of studies on electronic filing heavily relied on the TAM and TPB as the underpinning framework.

Despite the efforts put in by governments in making online tax filing systems efficient and effective to its citizens, the system remained unnoticed by its users (Wang, 2002). In this light, although the systems are available, they are not being used and therefore the benefits are not appreciated. The other forms of filing methods that have been identified are there to meet the needs of different tax payers, for instance, experienced and non-experienced tax payers (Hwang, 2000). In their study, Fu et al. (2006), examined the factors that affect the taxpayers' intention to adopt a particular tax-filing method - manual or Internet. Results of the study showed that tax payers will focus on the usefulness of a particular taxpaying method and may develop attitudes in using that method. The study further concluded that perceived behavioral controls (PBC) were consistent across taxpayers.

The various studies primarily seek to enhance our understanding of the ways governments provide payment platforms to collect revenues from their citizens. It also outlines recommendations for stakeholders on the kinds of methods to adopt in collecting taxes. Some studies show that the manual methods of filing are characterized by inefficiencies, financial malfeasance and many other issues (Fu et al., 2006).

Majority of the issues discussed focused on factors that influence the acceptance of online tax filing (Azmi and Bee, 2010), and the factors that influence citizens' use of online tax filing

systems (Anuar & Othman, 2010). Prominent among the issues is the case that can be made on the migration of offline tax returns to the online environment. Arguably research has been silent on the migration process and whether or not tax returns are amenable to the online environment. A relevant question that could be asked is whether or not collection of taxes is amenable to the online environment knowing well from past research that e-tax payment systems remain unnoticed by citizens (Wang, 2002).

2.3.3 Driver Licensing

Driver licensing is a form of service provided by governments to their citizens. Primarily driver licenses are official documents that are given to an individual by a state to operate vehicles ranging from motorcycles, cars, trucks etc. on a public road. Driver licensing first began when Karl Benz (inventor of modern automobile) had to acquire written permission before using public roads in 1888. This was because of the noise and smell of his motor. The United States in 1899 adopted this concept with Chicago and New York becoming the first states to require testing before operating vehicles (NYT, 1913). Several countries today have adopted instituted driver licensing through legal backings. Apart from being a legal requirement to drive on public roads, independence had also necessitated the acquisition of a driver license (Begg , Langley, Brookland, McDowell, Ameratunga, & Broughton, 2009).

Table 2.5: Research Focusing on Driver Licensing

Research Study	Research Focus	Underpinning Theory and Framework	Research Method and Country	Relevant gaps for future research
Studies on Driver Licensing				
Williams, Tefft, and Grabowski, (2012)	The study performed a review of literature between 2010 and 2012 on graduated driver licensing	No defined framework or theory	Qualitative US	Need for research in exploring the licensing trends of the youth and its effects on Graduated Driver Licensing (GDL)
Begg , Langley, Brookland, and Ameratunga, (2014)	The study showed that generally, pre-licensed driving experience had relatively little influence on crash involvement at the learner or restricted license stage	No defined framework or theory	Mixed Method New Zealand	Need for more in-depth exploratory research on pre-licensing
Bohensky, Charlton, Odell, and Keeffe, (2008)	The study shows that the projecting values of vision test used in issuing driver license in selected countries are generally not conclusive	No defined framework or theory	Qualitative Australia	Need for further research to assess the adequacy of existing visual assessment programs for effective road safety outcomes
Hirsch, Maag, and Laberge-Nadeau (2006)	The study explored the role that driver education has on the licensing process	Licensing Process Framework	Quantitative Canada	Need for research on the development of drivers' permit evaluation that have predictive validity for future driving safety

Source: Author's Construction, 2015

The issuance of driver licenses began during the advent of motor vehicles in the 20th century. It originally started as a means of generating revenue and also to be able to hold vehicle drivers responsible for damages on other people and property (Christie, 2000). Guaranteeing safety on roads remains the objective of authorities that issue licenses and test vehicles (Mayhew, Simpson, & Singhal, 2005). Evidently, the shared perspective of various jurisdictions is to maintain safety on all roads; further ensuring that collisions and damages caused on roads are avoided (Mayhew et al., 2005). It is believed that the first driver license was issued in 1899 in the city of Chicago, Illinois (Mayhew et al., 2005).

Literature on driver licensing focuses much on graduated driver licensing (GDL) (Zhua, Chub, and Li, 2009; Mastena, Fossb, and Marshall, 2013; Brooklanda, Begga, Langleya, and Ameratunga, 2014; Begga, Langley, Brookland, and Ameratunga, 2014). These studies became necessary largely because of the increasing number of fatal road accidents reported involving teenagers and young adults between the ages of 15 and 24 in New Zealand, United States, Canada, and United Kingdom (Begg & Stephenson, 2003).

Nonetheless, some studies deal with individual aspects of the license acquisition process. Hirsch et al. (2006), posited that the licensing process is made up of factors that influence the issuance of licenses. A number of studies focus on the health and medical issues regarding driver licensing (Owsley, Stalvey, Wells, Sloane, and McGwin, 2001; Racette & Casson, 2005; DeLaey and Colenbrander, 2006). For instance, Bohensky et al. (2008) studied the implications of eye testing on the licensing of the aged. The results of the study showed that most of the vision tests used as a basis for driver licensing are inconclusive. Similarly, Bates et al. (2010) compared the

number of hours allocated for practical driving lessons amongst Australian jurisdictions. Conclusions from the study indicated that, while practical driving is a requirement, the number of hours might discourage people doing additional driving practice. From the review, academic research that covers all the activities and processes in acquiring a new driver license is arguably non-existent although academic search proves the presence of the use of words like processes, activities and license in some of the literature (Layne & Lee, 2001; Williams et al., 2012). For instance, Layne and Lee (2001) gave instances of the ability of citizens to use online systems in renewing their drivers' license and making payment online. Begg et al. (2014), in their study, outlined the three stages in acquiring a driver license using the graduated driver licensing system in New Zealand. The stages include theory and eyesight test, and a practical driving test which leads to the issuance of a provisional license. The last stage is another practical driving test which leads to full license issuance. Prior studies have not been able to establish whether or not the process of acquiring a driver's license is done physically or electronically. Past studies did not provide reasons why a particular process involved in acquiring a drivers' license is performed physically or electronically. Some processes such as the eyesight test however require face-to-face interactions (Begg et al., 2014). In view of this, this current study seeks to identify the license acquisition process and their sub-activities to be able to establish their level of amenability or otherwise to the online platform by using a tested theory called the Process Virtualization Theory (PVT).

2.4 Summary

This chapter reviewed literature on some selected services that have been migrated from the traditional to online environment and users' acceptance or resistance of such processes. The review also highlights some relevant gaps for future research. The review outlined some critical issues pertaining to online processes which will help us to understand the strategies in adopting and using online services that were previously conducted physically. Most importantly, the trend of research calls for research on the testing of physical processes to see whether or not they are amenable to the online environment. There is arguably little or no research on theories that could test the amenability of the various services that are put online which include ranging e-commerce, e-voting, e-filling, etc. The salient feature of the literature review which showed the lack of theoretical support for the amenability of the new license acquisition process positions the study for the discussion on the context of study in the next Chapter.

CHAPTER 3

CONTEXT OF STUDY

3.1 Introduction

This chapter presents descriptions of the Driver and Vehicle Licensing Authority (DVLA) Ghana having already discussed pertinent and contemporary literature in relation to the virtualization of processes within several domains in the previous chapter. This section starts with the a brief description of the DVLA, their vision and mission, the scope of the services offered by the DVLA, the breakdown of the driver license acquisition process into core activities and the detail flow of activities and tasks.

3.2 Driver and Vehicle Licensing Authority - Ghana

The Driver & Vehicle Licensing Authority (DVLA) - Ghana is a semi-autonomous public sector organization. This is because it operates under the Ministry of Transportation. The organization was established by **Act 569 of 1999** to be responsible for ensuring safety on Ghanaian roads. The authority evolved from the Vehicle Examination & Licensing Division (VELD). It serves as a regulatory body and a service provision body. Some core functions of the DVLA as spelt out in **Act 569 of 1999** include the following: issue driver licenses, establish standards and methods for training and testing of driver instructors and drivers of motor cycles, register and license driving schools, issue vehicle registration certificates, license and regulate private garages to undertake testing, provide syllabi for driving training instructors etc.

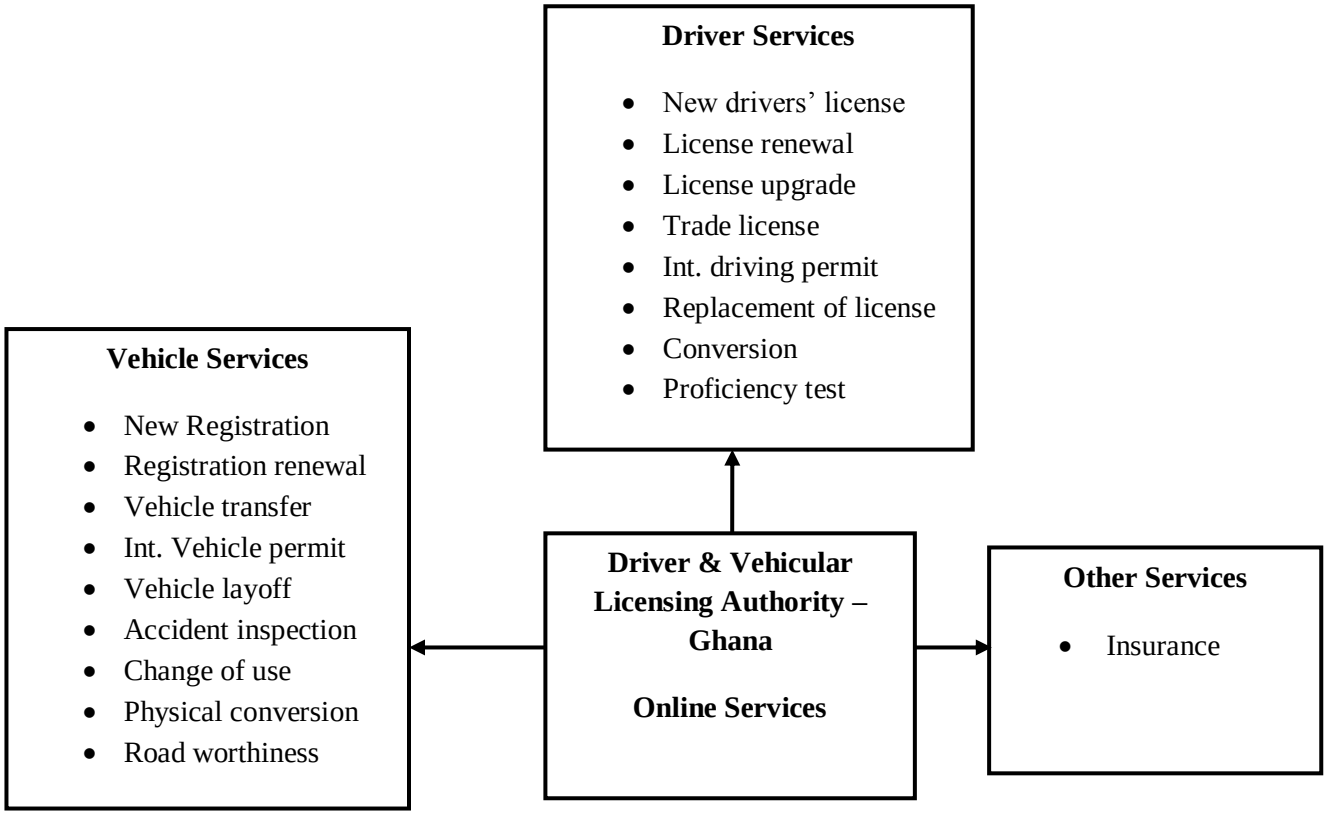
3.2.1 Mission and Vision of DVLA

DVLA exists to ensure best practices for licensing drivers and vehicles to promote road safety and environmental sustainability, while pursuing integrity, excellence, professionalism, and reliability in service delivery. The vision of DVLA is to be a reputable organization with internationally accepted standards for driver and vehicle licensing.

3.3 Scope of DVLA Services

The DVLA Ghana provides a range of services to their respective stakeholders. The core services they provide include driver licensing, vehicle licensing and other services. Figure 3.1 below describes the core services provided by the DVLA. The core processes are driver services and vehicle services. Under each of these services are lists of other sub-services. All these services are provided primarily to provide efficiency to the general public.

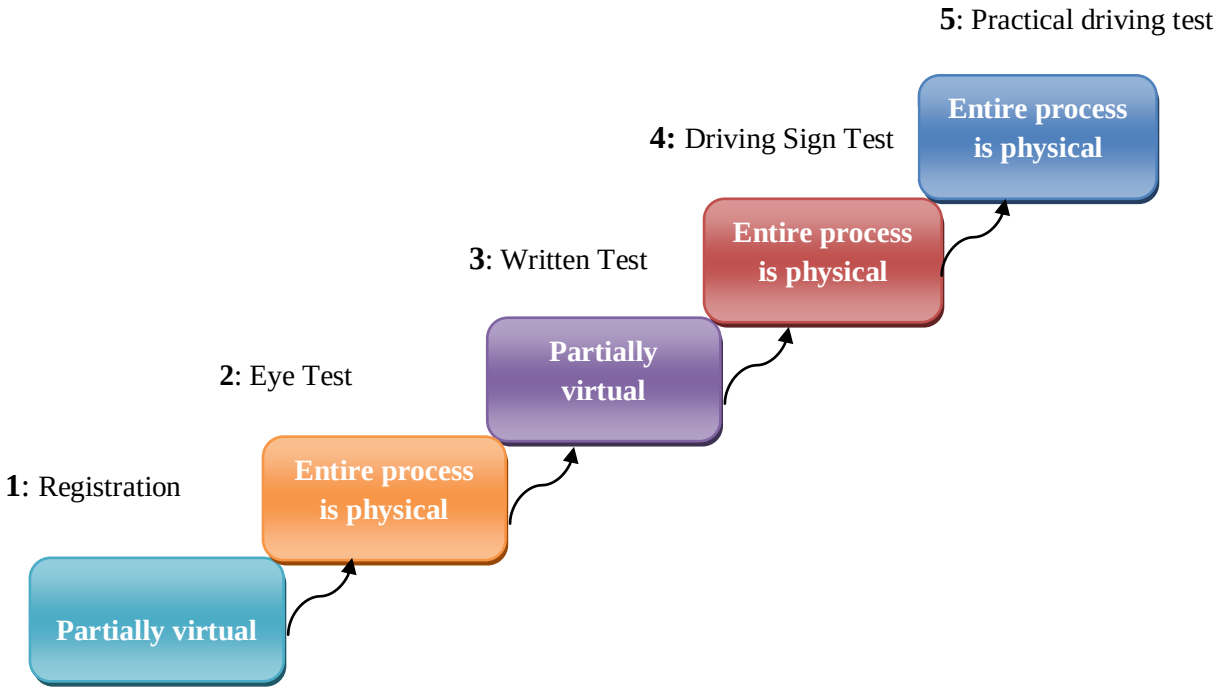
Figure 3.1: Model of Services Offered by the DVLA



Source: Author's Construction, 2015

Figure 3.1 demonstrates a range of services that the DVLA provides. The scope of this study is not to consider all the services and in this regard, two services were chosen: vehicle registration and new driver licensing. However only one of these two services (new driver licensing) was considered. The reason is that data was not readily available for new vehicle registration. After settling on the new driver licensing as a service provided by the DVLA, the researcher narrowed down the activities involved in acquiring a new drivers' license. Figure 3.2 shows the breakdown of the new driver license acquisition process into core activities.

Figure 3.2: Core Activities Involved in Acquiring a New Driver License



Source: Author's Construction, 2015

From Figure 3.2 above, each of the core activities are identified by their current nature; thus whether they are virtual, manual or having a blend of both. The core processes involved in acquiring a new drivers' license are: registration, eye test, written test, driving sign test and

practical driving test; although there are other minor activities, these five are considered the core ones.

3.3.1 Registration

As can be seen from Figure 3.2 above, the registration process involves other sub-activities. To start with, the prospective candidate has to register online. This involves providing relevant information that will be needed to complete the registration process which includes bio data of an applicant. When an applicant successfully registers and requests for a service, an invoice is printed out. This invoice is subsequently submitted to the bank and payment is made in the name of the DVLA. After payment is made the documents are returned to the office of the DVLA. In this case, the registration process is termed partially virtual. This is because at the end, the candidate has to interact with human beings or objects. This is evidence that the physical interaction between people and objects has not been fully eliminated.

3.3.2 Eye Test

The eye test as a second activity involves the prospective license owner making him or herself available at the office of the DVLA for an eye test. Eye specialists will ascertain whether or not the prospective license owner has adequate vision or sight to safely drive a vehicle on a public road. All the tasks that take place here are physical in nature. The eye test can only be done at the recommended DVLA offices. In this case the eye test activity is fully manual or physical in nature.

3.3.3 Written Test

The next activity is for the candidate to write an automated written test. This activity is classified under partially virtual because candidates cannot take the test in the comfort of their homes. This

is because officials needed to make sure that the exams were supervised. Hence the exams take place at the designated premises of the DVLA. In any case, the exams cannot be taken outside the premises of the DVLA because the exam is available on the DVLA's intranet.

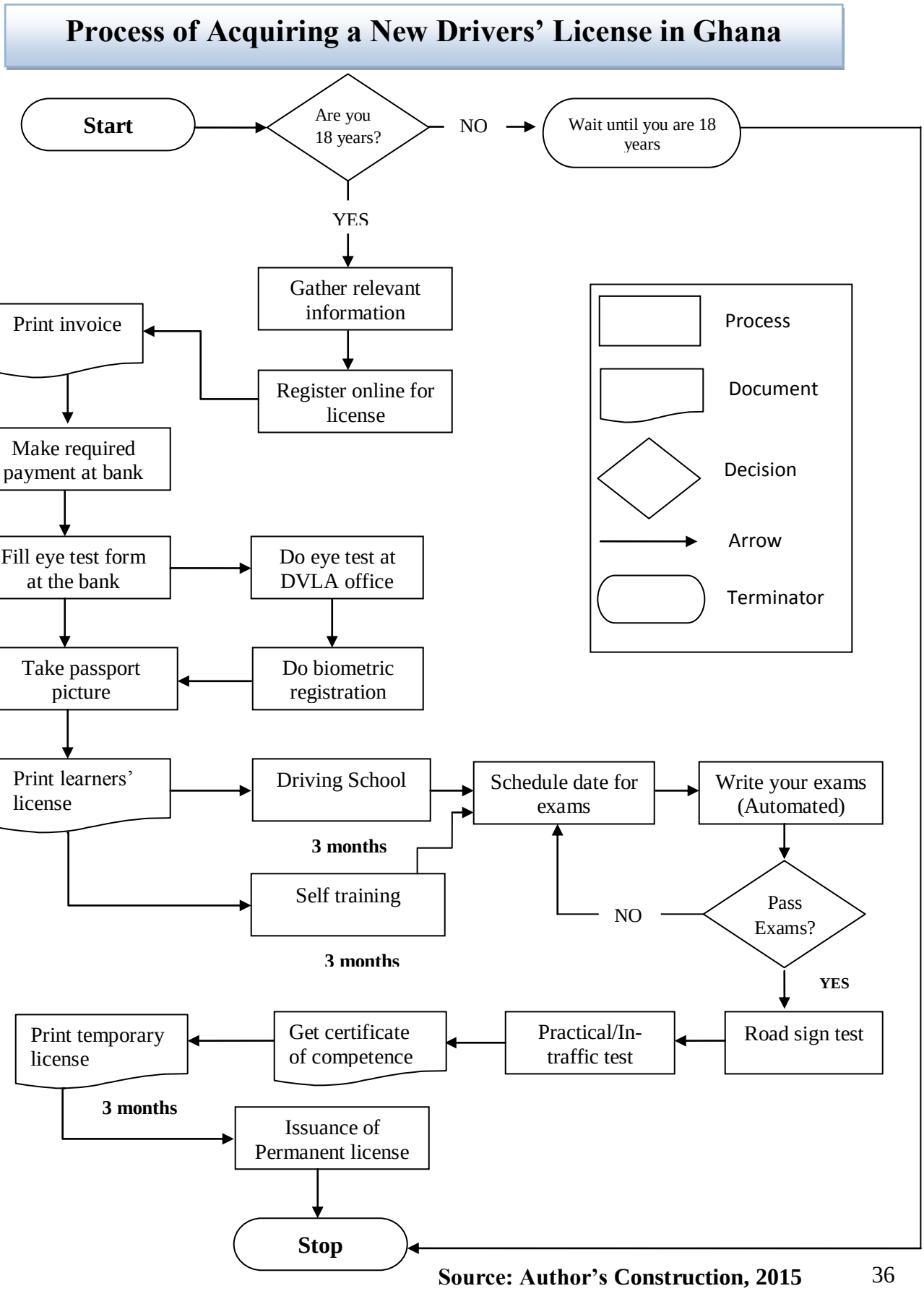
3.3.4 Driving Sign Test

The driving sign test follows after the written test. This stage of the process involves the candidate going through identification and interpretation of some driving signs. This is done to ensure that the candidate understands the various road signs when driving. With its mission of ensuring best practices for driver licensing and promoting safe driving, prospective driver license owners had to go through the rudiments of understanding the road signs. These road signs according to the DVLA are in line with international best practices.

3.3.5 Practical Test or In-traffic Test

The final stage is the practical driving test or in-traffic test. This activity ensures that the candidate can drive in a practical sense. Supervisors are made available to ensure that the results from this test are also fair and could be trusted. Figure 3.2 describes a detailed process flow of the various activities and tasks involved in acquiring a new drivers' license.

Figure 3.3: Flow of Activities in Acquiring a New Drivers' License



Source: Author's Construction, 2015

Figure 3.3 above shows the flow of the various activities that needs to be performed before licenses are issued. The recommended age for acquiring a driver license is 18. This is not different from what is being done in other jurisdictions. In the UK for instance the minimum age to obtain a provisional license is 17.

A prospective driver with a learners' license will have to drive under the supervision of a fully licensed driver. Obtaining a learner license leads to acquiring a full driver license. The learner driver is given an **L sign** number plate to display behind and in front of the vehicle (Bates et al., 2010). This is done to indicate to other road users that the person is a learner and is under supervision. Subsequent activities include undertaking a writing test. In the case of Ghana, like other countries the test has been automated. A candidate that passes this test is scheduled for a road sign test and in-traffic test respectively. A temporary license is issued and this is expected to expire in three months after which a permanent license is issued.

3.4 Rationale for Automating DVLA Processes

The DVLA introduced the manual written test in 2002. DVLA centers nationwide were required to conduct a written test to prospective license owners. Since its inception the manual system recorded a pass rate between 70-95%. However, given the fact that about 90% of road accidents are caused by human factors, it was surprising to see more people pass and further see an increase in road accidents. It became expedient to conduct a survey on the way the written test was administered and subsequently issuance of licenses. Basically, the rationale for automating the written test is due to internal and external factors. Internal factors include corruption among DVLA officials, elimination of middlemen "goro boys" and inefficiency. External factors include the DVLA meeting international best practice standards in the administration of the test.

3.5 Innovations for Automating DVLA Processes

A survey conducted by the authority in 2010 indicated that the manual written test had numerous problems associated with it. Some of these included fraud, impersonation, leakage of questions, human interferences and other credibility issues. In lieu of these challenges, the authority introduced innovative ways that would ensure transparency and credibility in the administration of tests, hence the introduction of the Computer-Based Theory (CBT) test in 2012. Primarily, the motive behind this innovative method was to meet the international best practices; introduce efficiency in the driver license administration; improve credibility in the driver license acquisition and to provide accurate data on driver license applicants.

The CBT was to replace the manual written test. The system automatically generated different questions to different applicants of the same class of license at the same time within the same exam center. The system also allows exam applicants to reschedule the test outside the DVLA office in the event of their absence from their first appointment. The online system is further able to display results immediately after finishing the test including performance feedback. Before its full integration there was a pilot study of three months in three offices. After this, the CBT was launched in April 2012. The project is currently at its last phase where the northern part of the country is being covered. Statistics reveal that the results from the CBT were more credible. The pass rate has dropped from an average of 70% to an average of 50%.

3.6 Why the New Drivers' License Process?

It is mandatory by law that one can only drive on public roads with a valid drivers' license. Figure 3.2 and 3.3 above explains the various core activities and detailed process flow of activities in acquiring a license. Aspects of these activities involved both physical and virtual methods. Selection of the new driver license acquisition process was informed by some reasons.

Firstly, the process is deemed as compulsory. This is because one will have to have a valid drivers' license before driving on public roads in Ghana. Secondly, the process involves both physical and virtual methods which make it interesting for investigation. The process characteristics can be investigated from these two strands (physical and virtual). Finally, the manual process has been in existence for years prior to the DVLA deciding to automate some of the processes due to challenges such as corruption among officials and inefficiencies in service delivery.

3.7 Setting the Process Virtualization Theory within the DVLA

Previous sections of this study describe the services offered by the DVLA. The core activities involved in the process of acquiring a new drivers' license was also conceptualized. Again, the activities involved were discussed in detail using diagrams. This section places the Process Virtualization Theory in the appropriate context of study - the Drivers' and Vehicle Licensing Authority, Ghana. With the process virtualization theory being the research framework for this study, we place the theory within the context of the DVLA. Each of the activities identified in acquiring a new drivers' license is modeled against the appropriate constructs in the framework. The process virtualization theory helped to determine the factors that influence each of the core activities to their level of amenability or otherwise. Increasing technology offers the potential of virtualizing more processes (Overby, 2008; Balci & Rosenkranz, 2014). In the context of the DVLA, the PVT is appropriate in explaining the reasons why some of the processes are virtualizable while others are not. The next chapter describes the PVT framework in great detail as well as its applicability to this study.

3.8 Summary

This chapter of the study started with the background of the organization where evidence was gathered. The selection of the process of acquiring a drivers' license was very crucial to this study. In this light the PVT helped us to examine why particular activities within the process of acquiring a new drivers' license are completely virtual, completely manual or have a blend of the two. The PVT also helped to determine whether the process participants (customers and management) will see a virtualized process as useful and usable. Having established the context of the study, the next chapter focuses on the research framework.

CHAPTER 4

THEORETICAL FRAMEWORK

4.1 Introduction

The previous chapter focused on the modeling of the process of acquiring a new drivers' license. Having established this, and in pursuit of finding answers to the research questions in Chapter One, and based on the research gaps, this chapter places the process of acquiring a new drivers' license within the Process Virtualization Theory (PVT). In view of this, the argument underpinning this research is contained in a framework of understanding how amenable a particular process is to virtualization. The following sections discuss the research framework that was adopted.

4.2 The Process Virtualization Theory

Overby (2008) argued that some processes are more amenable to virtualization than others. While some are successful in the virtual environment, others are still struggling to be amenable to virtualization. The book buying that is evident on eBay and Amazon is a critical example of a process that has been migrated successfully. Contrary to the successful migration of the book buying experience, grocery buying is still facing challenges of virtualization (Overby, 2012).

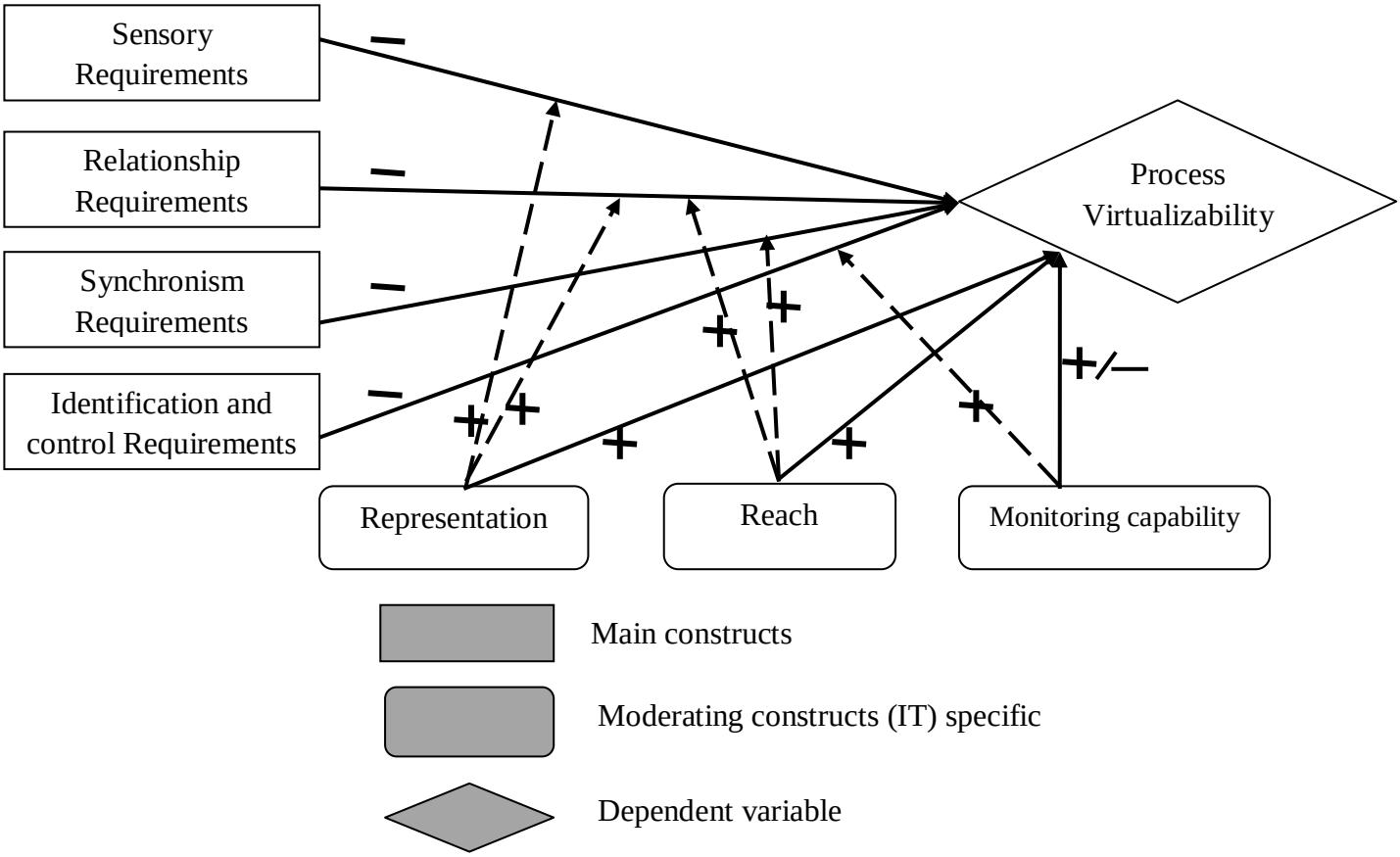
In the context of this study, the process involved in acquiring a new drivers' license is made of sub activities. While some of these activities have been virtualized to enhance service delivery and ensure reduction and corruption among government officials other activities are still being conducted physically (i.e. require physical interaction with entities involved in the process). In this light explaining the reasons for the disparity in physical and virtual processes is necessary in lieu of the increasing attention process virtualization is gaining (Overby, 2008).

4.3 Process Virtualization Theory: Constructs and Relationships

The process virtualization theory is based on a premise that, some physical processes are better suited to be conducted virtually than others (Overby, 2008). It therefore provides a theoretical starting point to exploring the factors that could affect how virtualizable a process is from the perspective of the end user (Balci & Rosenkranz, 2014). The theory however does not demonstrate whether a particular process is better than another or whether IT makes it better or worse (Overby, 2008). For example, the process of shopping for books has proven well-suited to virtualization while the process of shopping for groceries has proven less so to qualify for virtualization (Overby, 2011). So far studies that use the PVT to test for the amenability of processes are still limited (Barth & Veit, 2011; Balci, Grgecic, & Rosenkranz, 2013). As propounded originally, the process virtualization theory comprises four main constructs namely: sensory requirements; relationship requirements; synchronism requirements; and identification and control requirements. These are referred to as characteristics of the process (Overby, 2008; Overby, 2012). These constructs determine whether or not a process will be agreeable or resistant to virtualization. Drawing from literature, processes can be virtualized with or without information technology and there is also evident to prove that IT enables process virtualization (Overby, Slaughter, & Konsynski, 2010). Recognizing the importance of technology in virtualizing processes, the theory makes clear the significance of IT in the process virtualization theory by making use of the moderating effects that include representation, reach, and monitoring capabilities (Overby, 2008). These three moderating factors are considered to have a positive effect on process virtualizability (Overby, 2012; Balci & Rosenkranz, 2014). Each of the three constructs moderates the relationship between the process characteristics and process

virtualizability (Overby, 2012; Balci & Rosenkranz, 2014). In all, these seven constructs are referred to as the independent variables (Overby, 2008).

Figure 4.1: The Process Virtualization Theory



Source: Overby (2012)

4.4 Empirical Foundation of the PVT

Literature acknowledges the newness of the PVT and the lack of empirical testing of the theory (Barth & Veit, 2011), however few studies have tested the PVT. The scanty studies however demonstrate the solid theoretical stance of the PVT in various domains. Below are some of the empirical supports of the PVT. It also highlights the domain of the study, method/context of the study, and the types of data used with their respective authors. Indeed the studies demonstrate the use of quantitative methods. Arguably, this is as a result of the nature of measurement of the

PVT. This study however goes beyond the quantitative measurement as it has been used extensively. It also employs some qualitative measurement to further probe into the areas the quantitative measurement could not cover.

Table 4.1: Studies Based on PVT Framework

Research Domain	Analyzed Constructs	Methods	Data, and context	Author(s)
Airport check-in process	Sensory requirements, relationship requirements, synchronization requirements, identification and control requirements	Loglinear analysis	Interviews with 18 informants, Germany	Balci and Rosenkranz (2014)
Online banking process	Perceived Sensory Requirements Perceived Relationship Requirements Perceived Identification and Control Requirements Perceived Synchronism Requirements Perceived Process Virtualizability Virtual Process Use	Factor analysis Regression	190 questionnaire, Germany	Balci et al. (2013)
Wholesale automotive market.	Perceived Sensory Requirements, Perceived Relationship Requirements, Perceived Synchronism Requirements, Perceived Identification and Control Requirements, Perceived Representation, Perceived Reach, Perceived Monitoring Capability	Partial Least Squares Analysis, Regression, Structural Equation Modeling	130 survey instrument, US	Overby and Konsynski (2010)
E Government sub-domain E-Administration	Resistance (R) Relationship requirements (RR) Performance risk (PR) Process involvement (PI) Need for consultation (NC) Process complexity (PC)	Partial Least Squares (PLS)	501 Surveyed individuals, Germany	Barth and Veit (2011)

Source: Author's Construction, 2015

4.4.1 The Dependent Variable

The dependent variable in process virtualization is termed 'process virtualizability'. Overby (2008) conceived that process virtualizability is a continuous variable (further discussed by Overby, 2012) that illustrates how willing and agreeable a process is to being conducted without physical interaction between people or between people and objects. Process virtualizability is deemed to be measured effectively in two ways, namely: adoption of the virtual process or the results of the virtual process (Overby, 2008).

4.4.2 The Independent Variables

Each of the constructs of the independent variables of process virtualization which includes sensory, relationship, synchronization, and identification and control requirements all have a negative effect on process virtualization (Overby & Konsynski, 2010; Overby, 2012). In effect what this means is that as each of these requirements increases, the process becomes less amenable to virtualization. In other words, when a process has high independent variables then the process is less amenable to virtualization. It does not mean the process cannot be virtualized but rather it could have been more suitable for virtualization if the requirements are low (Overby, 2008).

Sensory Requirements are defined as "the need for process participants to be able to enjoy a full sensory experience of the process and the other process participants and objects. Sensory experience include seeing, hearing, smelling, touching, and tasting" (Overby, 2008 p:280). The intuition behind this is that the greater the sensory requirements of a process, the less suitable the process is to being conducted virtually and vice-versa. Based on this the following hypotheses were tested on the registration process and the written test process at DVLA.

H1a. The higher (lower) the sensory requirements (SR) of the registration process, the less (more) suitable it is to being conducted virtually

H1b. The higher (lower) the sensory requirements (SR) of the written test process, the less (more) suitable it is to being conducted virtually

Relationship Requirements: This variable is defined as "the need for process participants to interact with one another in a social or professional context" (Overby, 2008 p:281). Overby (2008) posited that social interactions often lead to knowledge acquisition, trust development, and friendship development. Ceteris paribus, a process with a higher relationship will be resistant to virtualization (Overby & Konsynski, 2008). This leads to the following hypothesis:

H2a. The higher (lower) the relationship requirements (RR) of the registration process, the less (more) suitable it is to being conducted virtually

H2b. The higher (lower) the relationship requirements (RR) of the written test process, the less (more) suitable it is to being conducted virtually

Synchronism requirements is defined as "the degree to which the activities in a process need to occur quickly with minimal delay". This means the greater (lower) the synchronism requirements of a process, the less (more) amenable the process is to being conducted virtually (Overby, 2008 p:281). Similarly, the following hypothesis has been derived:

H3a. The higher (lower) the synchronism requirements (SR) of the registration process, the less (more) suitable it is to being conducted virtually

H3b. The higher (lower) the synchronism requirements (SR) of the written test process, the less (more) suitable it is to being conducted virtually

Identification and control requirements: This requirement is defined as "the degree to which the process requires unique identification of process participants and the ability to exert control or influence over their behavior. Identification and control requirements are seen to have a negative relation to process virtualizability". The preposition is that the greater (lower) the identification and control requirements of a process, the less (more) amenable the process is to being conducted virtually (Overby, 2008 p:282). Accordingly:

> *H4a. The higher (lower) the identification and control requirements (IDC) of the registration process, the less (more) suitable it is to being conducted virtually*
>
> *H4. The higher (lower) the Identification and control requirements (IDC) of the written test process, the less (more) suitable it is to being conducted virtually*

4.4.3 Moderating Construct of PVT

From Figure 4.1, the moderating constructs can be explained in two forms. On one hand, they seemingly impact on process virtualizability directly while on the other hand, they moderate the relationship between process characteristics and process virtualizability. Overby (2008, 2012) refers to the moderating constructs as characteristics of the virtualization mechanism. These constructs (representation, reach, and monitoring capability) positively influence the relations between the main constructs and process virtualizability. From the bases that processes can be virtualized with or without IT, it is important to study whether or not IT plays a major role in process virtualization (Overby & Konsynski, 2008). Past literature argue that IT plays a significant role in process virtualization. For instance, haptic technologies are emerging technologies that permit forms of touch-enabled interaction with virtual objects (Thurfjell et al., 2002). Haptics give users a three-dimensional view of products and enables users to touch and

view objects in 3D scenes. This form of IT, for example, integrates sensory requirement (touch, taste, smell, see) in some virtual processes (Overby & Konsynski, 2008). Since the moderating constructs are IT based, what they do is to influence the independent constructs which are physical and negative in nature. The moderating constructs help in reducing the forms of negativity in the independent constructs. According to Overby (2012), the IT-related constructs are suggested to have a direct positive influence on process virtualizability.

Representation: As stated earlier, this is an IT construct and it is defined as the ability of IT to present information relevant to a process including simulations of actors and objects within the physical world, their properties and characteristics, and how individuals interact with them (Overby & Konsynski, 2008). This construct helps to incorporate sensory requirements into IT-based virtual processes (Overby, 2008). Good representation capabilities of IT have a positive main effect on process virtualizability (Balci & Rosenkranz, 2014). Accordingly the following hypotheses were derived.

> *H5a. There is a positive moderation effect of representation on the relationship between sensory requirements and the virtualizability process of registration*
>
> *H5b. There is a positive moderation effect of representation on the relationship between sensory requirements and the virtualizability process of the written test*

Reach: It is IT's capacity to allow process participation across both time and space. With respect to reach across time, IT allows many processes to be conducted throughout the day (Overby & Konsynski, 2008). Accordingly:

> *H6a. There is a positive moderation effect of reach on the relationship between relationship requirements and the virtualizability process of registration*

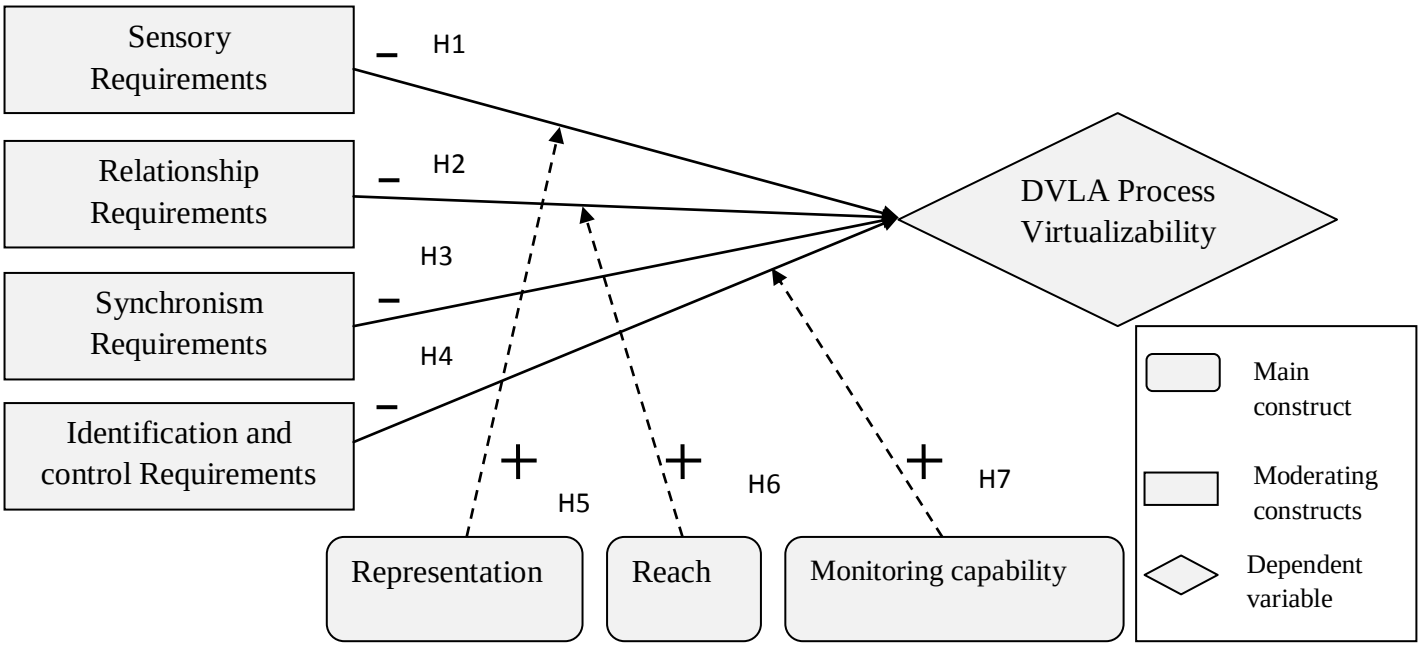
H6a. There is a positive moderation effect of reach on the relationship between relationship requirements and the virtualizability process of written test

Monitoring Capability: It defines IT's capacity to authenticate process participants and track activity. Monitoring capability facilitates the virtualization of processes with high identification and control requirements (Overby & Konsynski, 2008). From this explanation the following hypothesis were derived:

H7a. There is a positive moderation effect of monitoring and capability between identity & control requirements and the virtualizability process of registration

H7b. There is a positive moderation effect of monitoring and capability between identity & control requirements and the virtualizability process of the written test

Figure 4.2: Theoretical Model



Source: Adopted from Overby (2012)

4.5 Measurement

Overby (2008) argued that process virtualizability can be measured in two distinct ways: by adoption of the virtual process; or by the quality of the outcome of the virtual process. In this regard, this study used both forms of measurement. First, the physical process option was used and then the virtual process option (i.e. after the introduction of the IT constructs).

4.6 Implications of the PVT for This Study

4.6.1 Research Gap – Why the Need for Process Virtualization?

Previous sections discussed issues on the migration of processes from the traditional environment to the online platform. Focus was on the migration of online shopping which has given customers experience of the online environment, online education, electronic voting, etc. From the issues discussed and subsequent evidence gathered, this study seeks to use the process virtualization theory to analyze the process and activities of citizens acquiring a new drivers' license. Since research is quite silent on the amenability of the individual processes of acquiring a new drivers' license, this study seeks to do that by using the constructs of the PVT. Another motivational gap was to determine what factors enable or constrain process amenability at the DVLA.

The following decisions have informed studying the gaps in research.

i. The need to determine the amenability of the various activities in acquiring a new drivers' license; and
ii. The need for research using other process theories.

4.6.2 Theoretical Foundation – Why the Process Virtualization Theory?

Research on the use of process virtualization theory to investigate the engagement process that exists between government and its citizens is arguable nonexistent even though some research points to the use of the process virtualization theory in the e-government domain particularly procurement (Boughzala et al., 2011); and process virtualization in an e-government and e-commerce perspective (Barth & Veit, 2011).

Being an emergent theory, empirical testing of the process virtualization theory is still nascent. Having been able to find a major research issue in e-government and the contribution it has made, the process virtualization theory is very applicable to the issues identified. Why would no other information system theory be applicable to this study? Why not the Technology Acceptance Model (Davis, 1989; Venkatesh, Morris, Davis, & Davis, 2003) which analyzes the factors that influence users' acceptance of a new technology? Also the Task-Technology Fit theory (Overby & Konsynski, 2010) which also posits that "task characteristics" and "technology characteristics" influence fit. It is important to note that each of these theories and frameworks have their own constructs and relationships. They all have degrees and aspects of measurement that will lead to unique findings. For example there are studies that points to the use of the TTF theory to study the factors that influence government employee performance (Luarn & Huang, 2009).

All the aspects of e-government that has been studied are important endeavors since they explain various phenomena and also contribute to knowledge and research. However there are various aspects of e-government such as e-information, (Lambert, 2013), e-campaigning (Vesnic-Alujevic, 2012) hence the various theories could be used for satisfy the purpose of various

aspects of e-government research. So, why process virtualization theory? In terms of the richness of theories, the PVT is arguably richer than all the other theories. Barth & Veit (2011), point out that there are two reasons for this effect: first, the PVT does not only target communication tasks between people, but all kinds of processes, including those involving physical objects; and second, the PVT utilizes a more extensive range of process characteristics. The PVT therefore provides the finest starting point for investigation of the phenomenon of process virtualization in e-government. Lastly, the choice of using the process virtualization theory to investigate the engagement processes of government and citizen activities is in the right direction since it will enhance understanding of this theory in many IS domain. The IS discipline is said to be at its youthful stage and suffers from a 'trade imbalance' (Overby, 2012). This is in respect to the over reliance on imported theories rather than what is exported to other fields. Hence the preference of the process virtualization theory over any other theory is in a right direction for promoting the IS discipline and its self propounded theories.

4.7 Summary

This chapter focused on the process virtualization theory. It forms the theoretical background for this study. The constructs of the PVT were discussed in detail and how it is useful for this study. Further, following the measurement of the PVT, an appropriate context was selected; various variables to be analyzed were selected; and hypothesis developed and presented in a diagram accordingly. This leads to the next chapter that discusses the methodology used in this study.

CHAPTER 5

METHODOLOGY

5.1 Introduction

The previous chapter of this study presented the process virtualization theory as the theoretical framework for this study. Moving forward, this chapter presents a detailed discussion of the research methodology for investigating process virtualization within the chosen context. The chapter discusses the research paradigm, research method, data collection method and analysis methods.

5.2 Research Paradigm

Kuhn (1970) defines a paradigm as "a set of beliefs, values and techniques which is shared by members of a scientific community, and which acts as a guide or map**,** dictating the kinds of problems scientists should address and the types of explanations that are acceptable to them". Rossman and Rallis (2003) further narrows this definition down by arguing that a paradigm is a "shared understandings of reality". Generally, there are three dimensions to research paradigms, namely: ontology, epistemology, and methodology (Lincoln, Lynham, & Guba, 2011). The ontological aspect of a research paradigm looks at the nature of an event and determines if it is objective and distinct from the researcher or is created by the action of the researcher. The epistemology dimension on the other is concerned about the nature of knowledge and whether it is made and assessed by verifying empirically a theory or whether the knowledge is created by the interaction of the researcher with the social context (Ritchie & Lewis, 2003). Finally, the methodological dimension of a research paradigm is concerned with the methods involved in data collection and analysis for drawing a valid conclusion during a research project; for example, quantitative, qualitative or mixed-methods approaches (Lincoln et al., 2011).

Different paradigms to research exist; especially from the view point of specific disciplines. For instance, Rossman and Rallis (2003) opined that there are four paradigms that are used in research (critical humanism, critical realism, interpretivism and positivism). These forms of paradigms however are able to evolve over time. From the viewpoint of Fisher (2010), positivism, interpretism, realism and critical realism are the paradigms in research. In the information system domain however, there are three basic paradigms that are generally used. These are positivist, interpretive and critical realism paradigms (Mingers, 2004). All these paradigms carry their set of assumptions that they use to view the world and about the nature of society as well as guide social science (Rossman & Rallis, 2003). As to why a paradigm is important to a research work, Creswell (2003) mentions the nature of a problem, training and experience, the world view and audience of the study as some of the reasons why it is necessary to choose a particular paradigm for a study.

5.3 CR-based Research Methodology

This study was guided by the critical realist paradigm. Critical realism concerns multiple perceptions about a single, mind-independent reality (Healy & Perry, 2000; as cited in Krauss, 2005). Critical realists employ theories and hypothesis/questions to study social phenomena. The paradigm goes behind the natural phenomenon that everybody seems to believe and digs behind the layers of truth, explores mechanisms and puts them together. A further explanation of critical realism is that it recognizes certain plasticity about perceptions, and consequently there are differences between reality and people's perceptions of reality (Churchland, 1979; Bisman, 2002 as cited in Krauss, 2005). Based on the critical realism paradigm, this study gains the opportunity of obtaining in-depth detailed answers to the question of the reasons why some processes involved in acquiring a new drivers' license are amenable to virtualization and some are not.

Historically, Bhaskar (1978, 1998) is known as the most influential writer on critical realism (Carlsson, 2005). CR believes that there is an objective world and the perception of we understanding it can only be subjective and never objective or definitive (Fisher, 2010). On the basis of its philosophical credibility, CR is not regarded as a substantial social theory but a philosophy that focuses on analyzing the nature of reality in context (Easton, 2010; Bhaskar, 2011; as cited in Mutiganda, 2013). Having settled on using CR as the research paradigm it is important to see its applicability to this research. According to Bhaskar, reality is both *intransitive* (existing independently of humans) and *stratified.* The primary form of stratification is between mechanisms, the events that they generate, and the subset of events that are actually experienced. Bhaskar, refers to this as the domains of the *real*, the *actual*, and the *empirical* (Mingers, Mutch, & Willcocks, 2013).

Mingers (2004) explains the mechanisms as producers of reality, and the subset of events that are really experienced. There are three domains of reality i.e. *real*, the *actual*, and the *empirical* (Bhaskar, 1978). The *real* domain is made up of mechanisms, events, and experiences – i.e. the whole of reality; the *actual* domain on the other hand comprises of events that do (or do not) occur and includes the *empirical*, those events that are observed or experienced (Easton, 2010). From the discussion of the various stratifications and components of the critical realist paradigm, we can deduce their applicability to this study. By focusing on the three domains of reality the following deductions have been made.

The Empirical: According to Mingers (2004), empirical are events that are actually observed and experienced. In the case of the DVLA they are possibly referred to as the virtualization applications.

The Actual: They are the events and non-events that are generated by the mechanisms. In the case of the DVLA, the actual are the valid drivers' license as well as documents to support ownership of a car such as receipts.

The Real: They are the mechanisms and structures with lasting properties. In other words the real refers to the mechanisms and structures that are able to generate the actual events.

In the case of the DVLA Ghana, there are structures that are in place. The study was able to identify and understand the structures that make events possible. Arguably there are some hidden structures that seek to portray one dimension of issues. For instance, going through several processes in acquiring a drivers' license is deemed appropriate and mandatory in several jurisdictions. These structures can be identified through a more careful analysis. The study therefore uses practical and theoretical lenses to approach the phenomenon. The choice of the CR paradigm is also based on recommendations made in past research. Mingers (2004) and Carlsson (2005) have supported the use of the critical realism paradigm in IS research and further illustrate how it can rise above the challenges of the positivist and interpretive research. A recent confirmation of this study was undertaken by Wynn & Williams (2012). They argued that since critical realism is an emerging paradigm, and offers more alternatives than the positivism and interpretism, more studies should employ it. In view of the fact that this study seeks to study and understand an unclear phenomenon of the reasons for the amenability of some processes, using this paradigm will help in unearthing the truth about the natural impression people have. It further exhumed reasons why some particular process cannot be virtualized at this time and why some have been virtualized. Again, the purpose of CR research is to find out the underlying mechanisms behind the structures (Mingers, 2004); thus instead of attempting to generalize, the study rather focused on understanding the main parts that cause the observed phenomenon (i.e

mechanisms that enable or hinder virtualization at the DVLA). Hence the study does not just settling on the perceptions but going beyond perceptions to find out the underlying mechanisms

5.4 Research Method and Design

Research design is seen as the conceptual structure within which research would be conducted (Kothari, 2004). Following a research design allows for efficient and effective collection of data for unearthing the research findings (Johnson & Onwuegbuzie, 2004). In setting out the research design, it further allows for the researcher to collect relevant evidence with the least effort and expenditure. Similarly, research methods are all the methods/techniques that are used in the pursuant to conducting research (Kothari, 2004). The two types of research methods used in research are qualitative and quantitative methods (Johnson & Onwuegbuzie, 2004). The quantitative type of research is largely linked with the positivist paradigm of research whereas the qualitative types have been associated with the interpretive research. There is however the mixed-methods approach which has been connected with the critical realist paradigm (Mingers, 2004).

This study used a mixed-methods approach comprising quantitative and qualitative methods which helped bridge their differences in the service of addressing the research questions set in the introductory chapter of this study. Due to the nature of CR it is always appropriate to apply methods with continuous interactions between the researcher and actors in the fields in order to ascertain how processes work and to further dig deep into activities and exhume the truth (Sayer, 1992; as cited in Mutiganda, 2013). Yin, (2004) argued that case studies are preferred when "why" and "how" questions are asked. Yin, (2009) further defines a case study as "an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context,

especially when the boundaries between phenomenon and context are not clearly evident". Johansson (2003), narrows down the notions of case studies from earlier studies (Yin, 1993; Stake, 1998) and points out that case studies should have a 'case' which should act as the object of study.

This study therefore, used the critical realist paradigm because it employs both the qualitative and quantitative approach which is essential in achieving the objective of this study which is to identify the factors that constrain or enable virtualization of government-to-citizen electronic services. The first and second objective can be better achieved using a qualitative approach because of the provision of in-depth understanding of this methodology. The quantitative approach is better used where the quantitative approach was not able to cover the field. It probed the virtualizability of the process from both the citizen and government perspective by using in-depth interviews and focus group discussions.

5.4.1 Sampling Technique

This study adopted a purposive sampling technique in the administration of the questionnaire. The purposive sampling technique also known as judgment sampling is "the deliberate choice of an informant due to the qualities the informant possesses" (Tongco, 2007). With regards to the objective of the study which emphasizes why some processes are not amenable to virtualization, it is necessary to gather information from citizens who have gone through the process of owning a drivers' license.

5.4.2 Questionnaire Development

Developing the questionnaire to test the various variables was based on the work of Overby and Konsynski (2008). This is because of the newness of the process virtualization theory. Also, its constructs are not widely tested in literature hence we followed how they developed their survey instrument. Structuring of the questions was focused on individuals who own a drivers' license and have gone through the laid down processes by the DVLA. This was done to enable the respondents to read meaning into the questions.

The questionnaire was structured in sections - A through to E. A comprises the background information of the respondents such as gender and educational level. B provides questions on the services provided by the DVLA and the extent to which respondents were aware of such services. C presents information on the type (class) of license while part D presents questions on the registration process of acquiring a drivers' license. Some of the questions in this part include the method that citizens used in registering to acquire a drivers' license and how long it took them to register. Part E provides questions on the written test exams. Some questions asked in this part include their rating of the online and manual written test exams. There are several questions as well pertaining to the constructs that were used for the measurement. Table 5.1 shows the hypothesis, factors and number of questions for measuring the constructs in the questionnaire. The items were further measured on a five-point Likert-type scale with ranges from strongly disagree (1) to strongly agree (5). According to Hair et al., (2010), the five-point Likert-type scale is advantageous in providing correct reliable results. Table 5.1 demonstrates how the survey instruments were measured based on the constructs in the PVT

Table 5.1: Questionnaire Development Constructs

Factors	Number of Questions
Sensory requirements	14
Relationship requirements	9
Synchronism requirements	8
Identification and control	10
Representation	8
Reach	6
Monitoring capability	8

Source: Author's Construction, 2015

5.4.3 Pilot Test

Prior to the actual data collection, copies of the questionnaire were pilot tested on some twenty (20) graduate students of the University of Ghana Business School. This was done to gather first hand insight on the comprehensibility and lucidity of the questionnaire and further gain insight into some in-depth issues that the author could not bring to the fore. Various feedback was received which helped the author to restructure some specific questions. In some cases, questions (few reverse-coded questions) were taken out because the respondents found it difficult answering them. Past studies show that reverse-coded items may produce artifactual response factors consisting exclusively of negatively worded items (Harvey, Billings, & Nilan, 1985; (Podsakoff, MacKenzie, & Podsakoff, 2003). In view of this some of the questions were revised to enable respondents answer them easily. Having done this, the remaining questionnaires demonstrated a substantial degree of content validity, which was an indication that the questionnaire was ready to be used in data collection. This was after performing a pretest of the initial survey instrument. This was done with the intention to validate that content of the survey instrument (Hair et al., 2010). Content validity measures the extent to which the items on the survey instrument adequately captures different dimension of a construct.

5.4.4 Data Collection Procedure

Data was carefully collected in a systematic manner with the use of questionnaires. In doing this the researcher engaged the services of four assistants who were trained on the purpose of the study and how to deal with respondents whilst filling out the questionnaire. The assistants with the researcher collected the data in the frames that were identified as postulated by Lievens and (Anseel, 2004).

5.4.5 Response Rate

A total of 480 questionnaires were distributed in the course of the study; with 382 questionnaires returned. The researcher was not able to retrieve the remaining 98 questionnaires because respondents gave various forms of excuses. After analyzing the 382 questionnaires, 65 were deemed defective because they were either returned unanswered, or partially answered. In all, the researcher had a total of 317 valid questionnaires to work with. This remaining figure formed the basis for the quantitative analysis

5.4.6 Timeline for the Questionnaire

The data collection started from 10th February 2014 and ended on 11th June 2014. Four days was set aside to enable all questionnaires to be returned.

5.4.7 Data Analysis Instrument

The survey instrument used was the statistical package for the social sciences (SPSS). SPSS was able to detect the associations and relationships that existed between subjects and variables. The survey data was coded and entered in SPSS version 20.0, analyzed and the outcome presented in tables.

5.4.8 Analysis Technique

The first point of call for the analysis was to check for errors in the data, since mistakes can easily have a significant effect on results. Observing Pallant's (2003) procedural way of checking for errors and data cleaning; scores of variables that were out of range were checked and corrected in the data file. Also, missing data were cross-checked and appropriately dealt with. Secondly, the descriptive analysis was undertaken which involved the characteristics of the sample such as the mean, standard deviation, range of scores, skewness and kurtosis. Also any violation of assumptions underlying the chosen statistical technique was addressed.

This study also employed multivariate analysis techniques. These techniques included exploratory factor analysis which groups data into conceptual factors in order to evaluate the validity of factors that make up the various constructs. The use of exploratory factor analysis checks for internal consistencies among the variables since the relationship between variables may be affected by their underlying factors (Hair et al., 2010). Multiple regression was then done in order to validate the hypotheses that were established in the Chapter Four. In relation to this study, the independent variables are sensory, relationship, synchronism, identification and control requirements. The moderating variables are reach, representation and monitoring capability. The dependent variable in the model is process virtualizability. Hence this statistical technique can help understand how dependent variable is better predicted by the independent variables.

5.4.9 Quantitative Analysis

Responses from the retrieved questionnaires were coded into SPSS (version 20). This was done in order to perform analysis on the data. Prior to this, the data set was screened and cleaned. The purpose of doing this is to fix errors that might occur during the time of data entry. In order to

ascertain the mean of the variables a t-test and standard deviation was run. To determine whether factor analysis was appropriate for the study, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was used. To further measure the sampling adequacy a reliability test for all the factors used in the study was run to check their suitability based on their cronbach's alpha. To analyze the relationships between the various antecedents and process virtualizability, a hierarchical multiple regression was used. The variables predicted are the dependent variable (the outcome variable). The variable we are using to predict the other variable's value is the independent variable (the predictor variable). Because we have more independent variables, we used a multiple regression. The use of regression is justified by independent variables multiplied by (*) the interaction term and whether the interactions are modeled best using the multiple regression (Goodhue et al., 2007). In relation to the research objectives, the PVT was used to answer the question on the factors that constrain or enable virtualization. Due to volume and nature of the study, the researcher performed the quantitative anlysis before focusing on the qualitative analysis.

5.5 Qualitative Study

Qualitative data was collected through interviews and a focus group discussion. Interviews were conducted at the convenience of the interviewees. The researcher conducted the various interviews with an interview guide covering the relevant issues in this study. There was however some fluidity in the questioning to allow more insight to be gained on the subject matter and also to allow follow up questions. The need for qualitative analysis was to further explain quantitative findings (Nicholls, 2011). Permission was sought from interview respondents so that a voice recording device could be used to capture all responses whilst taking notes. Constructs within the PVT guided the analysis and discussion of the qualitative data. It helped in answering the

question on the nature of virtualization in DVLA as well as identifying factors that constrain and enable virtualization at the DVLA.

5.6 Selecting the Case Study

Selection of the case study was carried out in a careful manner. First, to identify an institution that acts on behalf of government and provides services that are citizen centric. The organization also provides multiple services to its customers. The diverse criteria of services allowed for the selection of the available service that reflects the performance of the organization. In view of this the Drivers, and Vehicle Licensing Authority (DVLA - Ghana) was selected. By using formal letters, emails, websites, phone calls and personal visits, the author contacted the responsible authorities to gain access to first hand information on why some processes have been virtualized and others have not. Initially, six workers confirmed their readiness to respond to the questions. However, at the time of data collection, only three showed interest in participating in the study.

5.6.1 Interviews

The very essence of undertaking a thorough interview is to understand the experiences of other people and how they have made meanings from such experiences (Seidman, 2006). In establishing the meaning of the processes provided by the DVLA and further unearth the hidden layers, an interview guide was prepared to find out the experiences and views of DVLA authorities pertaining to the services they render. The essence of the interview guide was to tease out some general information about the selected organization. The first interview took place on Monday 12th May, 2014 and lasted for 1hour 35 minutes. The second interview session took place on Wednesday, 14th May 2014 and lasted for about 2 hours. The last interview took place on Friday 16th May 2014. All the sets of interviews conducted took place in the interviewee's office at the DVLA. From the interview guide, some voices were captured as questions were

posed to the respondents, since not all interviewees allowed their voices to the captured. Questions on the guide ranged from previous (totally manual) process of acquiring a new drivers' license to current virtual or partially virtual methods employed. This helped in performing a comparative analysis of the processes. Validity test was performed on qualitative data based on the approach by Venkatesh et al (2013). One of the validities employed is the Descriptive validity which reveals the accuracy of what the researcher has reported (events, objects and settings) Credibility validity was also performed to establish that the results of qualitative research are credible from the perspective of the participants in the research (Venkatesh et al., 2013). Data collected from participants was based on the constructs of the PVT. The purpose of doing this was to explain the experiences of participants with a specific theoretical lens (ie PVT).

Apart from interwiwing officials of the DVLA, customers were also interviewed through focus group discussions. Having a fair distribution of respondents necessitated the use of focus group. This approach was chosen in order to capture information from the citizens' (license owners). In the case of the focus group discussion, multiple participants were involved and responses were built on one another. Kitzinger (1995) defines focus group as a "group interview that capitalizes on communication between research participants in order to generate data". A focus group is particularly useful in obtaining a variety of views or opinions about a topic or issue. The researcher used this method to gather relevant information from the citizens' perspective regarding the process of acquiring a drivers' license. This method also covered some portions that the quantitative analysis was not able to cover. In this study a cross section of drivers license holders (n = 8) were selected and allowed to give their experiences on the process of acquiring

their licenses. This discussion took place on 16th May, 2014 at the University of Ghana campus. Validity test based on the approach by Venkatesh et al (2013) was employed. The questions posed to participants were also based on the constructs within the PVT. Brikci & Green (2002) supported the use of between 6-10 in focus group discussions since below 6 participants will be difficult to sustain and above 10 participants will be difficult to be controlled.

5.6.2 Other Sources of Evidence

Other sources were consulted to gather evidence of the case organizations operations. This was carried out to enhance data triangulation. The case organization's website was one of the main sources that was analyzed. The case organization also provided brochures, handbills, road sign booklets, and other documents. Other forms of data sources included phone-based communication (using SMS and mobile applications like WhatsApp).

5.7 Questions Used and Data Collection

Semi structured interviews were used as the primary data collection method. Data was gathered from the offices of the DVLA. The case organization made available individuals who would be of help in answering the questions raised in the interview guide. Among the people interviewed during data collection were the senior systems administrator (MIS department) at the greater Accra Regional office of the DVLA (37 office), the online exams supervisor and the Director, Planning, Monitoring & Evaluation (DVLA Head Office-Cantoments).

Before going to interview the participants the interview guide was sent to them in their offices. This gave the participants ample time to brainstorm ideas and boast their confidence in responding. The interview was able to create an atmosphere of ease and comfort for the participants. It allowed for open interaction and stimulated the discussions.

5.7.1 Qualitative Analysis

The qualitative data collected was analyzed based on Miles and Huberman's (1984) analysis of qualitative data where they argued that there were three flows of analyzing qualitative data. These include data reduction (involves breaking down raw data into write-up notes), data display (demands display of data and drawing conclusions); and the verification or drawing conclusion phase. All these concurrent flows of activities are presented in the analysis. According to Miles and Huberman (1984), conclusions need to be verified and the meaning from the data must be confirmed. In this study interview and focus group data were transcribed according to the responses that were gathered. The data was verified by the researcher for errors and the transcribed data was also sent to the interviewees for their view of what they said during the interview. Corrections were made where it was due. According to the research objectives of the study, the researher selected some portions of the interview and this formed the bases for the qualititive analysis. After the analysis, a summary of the most important themes that the research focused on was produced. This was outlined in the form of lessons.

5.8 Summary

The aim of this chapter was to present the methodology used in this study. It can be summarized as follows: the selected paradigm was the critical realist paradigm. The researcher discussed a methodological review and posits that the current study is exploratory and the method used was both qualitative and quantitative, the data collection method is primary in nature. Careful attention has been given to create high reliability validity in the study. The qualitative front covers a range of questions on human experiences and realities. Following this methodology led to the analysis and discussions in the next chapter.

CHAPTER 6

ANALYSIS AND DISCUSSION OF FINDINGS

6.1 Introduction

Following from the previous chapter, which discussed the research methodology, this chapter presents the results of the study. This chapter analyzes and presents evidence vis-à-vis the research framework discussed in Chapter 4. Insights into the analysis of data included demographic profile of respondents, reliability of the various scale items and the descriptive statistics. Finally, a hierarchical multiple regression was performed to examine the various hypotheses proposed in the study. Prior to this, a preliminary data screening and cleaning was performed after data collection. This involved checking for errors on each of the variables for scores that were out of range. Correcting errors in the data file was very crucial in order to prevent any data incongruence. A total of four hundred and eighty (480) questionnaires were administered to respondents. Out of this number, 370 were returned. From this number, there were 30 that were not answered while 23 questionnaires were incomplete. In this regard, 317 questionnaires were analyzed. The qualitative front gathered data from interviews and focus group discussions. Interviews were conducted for 3 people whiles 8 others took part in the focus group discussion. Analysis of the qualitative data was based on Miles and Huberman's approach to qualitative data analysis.

6.2 Demographic Results

Demographics generally refer to the statistical characteristics for distinguishing a segment of a population from others (Preston et al., 2000). Demographics are usually represented using size, age, number of employees, revenue, geographic location, duration of operations and industry types (Zhu et al., 2003; Joo & Kim, 2004). Lee & Scheule (2010) posited that demographic

information provides data regarding research participants. It is also necessary for the determination of whether the individuals in a particular study are representative sample of the target population for generalization purposes. The demographic analysis presents the age, gender, education among Ghanaian drivers' license holders

Table 6.1: Profile of Respondents

Profile	Measurement	*f*	Percent
Gender	Male	20	65.6
	Female	109	34.4
	Total	**317**	**100**
Age	18-24	82	25.9
	25-30	164	51.7
	31-35	29	9.1
	36-40	22	6.9
	>40	20	6.3
	Total	**317**	**100**
Education	High School	35	11.0
	Bachelor's Degree	119	37.5
	Master's Degree	139	43.8
	PHD (Doctorate)	15	4.7
	Professional	9	2.8
	Total	**317**	**100**

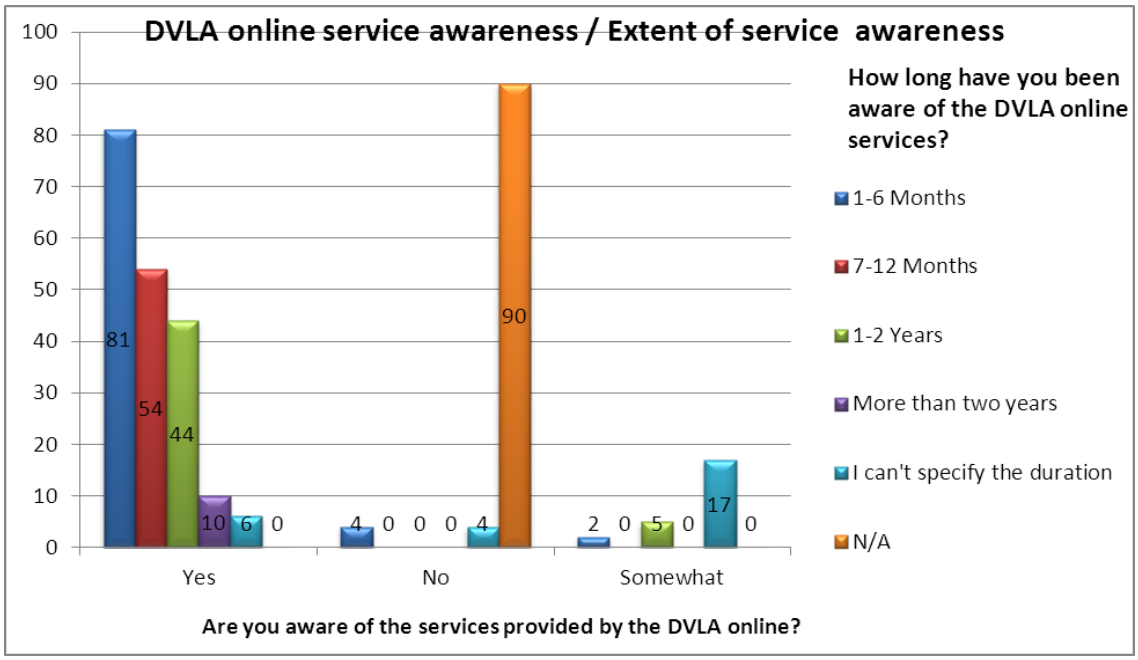
Source: Field Data, 2015

Table 6.1 above entails the demographic distribution of the responses. From the table, about 65.6% *(n = 208)* of the sample was male and 34.4% *(n = 109)* of the sample was female. A frequency analysis of age indicated that 25.9% (*n = 82)* of the respondents reported belonging to the 18-24 group, 51.7% (*n = 164)* to the 25-30 group, 9.1% *(n = 29)* to the 31-35 group, 6.9% *(n = 22)* to the 36-40 group, 6.3% (*n = 20)* belonged to the group greater than 40. This results proves that more males are likely to take part in surveys as compared to females

A further frequency analysis of the level of education of respondents showed that 11% *(n = 35)* of the participants highest educational attainment was Senior High School. 37.5% *(n = 119)* of the participants highest educational attainment was a Bachelor's Degree. 43.8% *(n = 139)*

testified earning a Master's Degree as their highest level in education whiles 4.7% *(n = 15)* of the participants testified to earning a PhD. In the case of a Professional Degree, approximately 2.8% *(n = 9)* of the participants confirmed having attained that level.

Figure 6.1: DVLA Service Awareness



Source: Field Data, 2015

Figure 6.1 above shows a cross tabulation of results of the DVLA online services and the extent to which respondents were aware of the services. For those respondents who indicated that they were aware of the services, 81 of them showed that they had been aware of the services for between 1-6 months. 54 respondents had been aware for between 7-12 months whereas 44 had been aware for between 1-2 years. 10 respondents on the other hand had been aware of the DVLA's online services for more than 2 years while 6 respondents cannot specify the extent of awareness. 90 respondents who were not aware of the DVLA's online services could not indicate the extent of awareness hence they chose Not available (N/A). 4 of the respondents however could not also specify the exact duration. To those respondents who were somewhat aware of the

DVLA online services, 17 of them could not specify the extent of awareness while 5 respondents thought they had been somewhat aware for between 1-2 years. 2 respondents had been somewhat aware for between 1-6 months.

6.3 Explorative Analysis of the Registration Process

Table 6.2 below entails the outcome for the descriptive statistics relating to all the variables in the Process Virtualization model. This was carried out to ascertain the mean and standard deviations of the various variables. This position is congruent to past research by Pallant (2011) who opined that data needs to be subjected to exploratory analysis before any other analysis should be done.

Table 6.2 displays the means, standard deviations and standard error means of the variable that measures process virtualizability in the registration process. The results as shown were based on a 5-likert scale questionnaire which participants responded to. The lowest point on the scale was "Strongly Disagree" coded as "1"while the strongest point on the scale was "Strongly Agree" coded as "5". The odd number on the scale was "3" which indicated a neutral position of the participants. The various mean results signify how each survey item performed from the 317 participants. In the case of the registration process the lowest mean recorded were 2.29 (Sens5: I need to touch and verify registration documents before filling them out) and 2.75 (Rep1: I can get information about the registration online). The highest means on the other hand were: 4.13 **(**Reach3: I can request for other services that I want**)**, and 3.99 **(**ID3: I would like to know who receives my forms). At a glance, the higher the mean the lower the standard deviation; this presupposes that the responses are not polarized. The standard deviation measures how concentrated the data are around the mean, hence, the more concentrated, the smaller the standard deviation.

Table 6.2: Descriptive Test of Means for the Registration Process

Variables	Mean	Std. Deviation	Std. Error Mean
Sens1: I prefer to pick up my registration documents from the DVLA office	3.33	1.32	.07
Sens2: I prefer to fill my form with pen and paper	3.18	1.28	.07
Sens3: I feel more comfortable when I hold and submit my registration forms	3.17	1.30	.07
Sens4: I prefer getting immediate feedback on my registration status	3.08	1.23	.07
Sens5: I need to touch and verify registration documents before filling them out	*2.29*	1.23	.07
Sens6: While I am doing my registration, I like to be able to see and touch registration documents	2.98	1.35	.08
Rel1: I enjoy socializing with other people at the premises of the DVLA	3.41	1.24	.07
Rel2: I enjoy having personal contact and informal interaction with the responsible employees	3.43	1.23	.07
Rel3: I would like to call for assistance and advice from the responsible personnel	3.17	1.32	.07
Rel4: I enjoy my physical presence at the offices so that I can ask the names and contacts of the responsible personnel	2.92	1.32	.08
Syn1: I like to submit my form immediately I complete it	3.08	1.35	.08
Syn2: I think that my registration will be faster using an online method	3.02	1.37	.08
Syn3: I like to pay my fees at the same time	3.56	1.23	.07
Syn4: It is important to me that my registration process is carried out as soon as possible	3.68	1.23	.07
ID1: I like to take note of other people who come to register	3.24	1.43	.08
ID2: I like the staff of DVLA to recognize me	3.83	1.37	.08
ID3: I would like to know who receives my forms	**3.99**	1.08	.06
ID4: The online system used for registration is not safe	2.96	1.30	.07
ID5: I don't have control over my personal information and data while registering online.	3.71	1.21	.07
Rep1: I can get information about the registration online	*2.75*	1.36	.08
Rep2: I can use the Internet to register for my license	3.83	1.16	.06
Rep3: I can use the Internet I can get all the requirements for registering	3.76	1.18	.07
Rep4: The Internet notifies me if I complete my registration process	3.59	.95	.05
Reach1: I can register for my license at anytime	3.57	1.02	.06
Reach2: I can register for my license at any place	3.82	.96	.05
Reach3: I can request for other services that I want	**4.13**	.84	.05
Mon1: I have to provide my bio data online	3.56	1.04	.06
Mon2: My national ID card has to be confirmed	3.67	.93	.05
Mon3: I have to enter a valid email address	3.74	.99	.05
Mon4: The Internet is able to track my progress when registering	3.85	.75	.042

Bold figures are the two variables with the highest means. Italized figures are the two figures with the least means

Source: Field Data, 2015

6.4 Explorative Factor Analysis

The thirty (30) variables used were rotated using the Varimax rotation as the extraction method. It was discovered that twenty six (26) items loaded perfectly onto seven factor components; thus there is an indication that four (4) of the initial survey items failed to meet the rotation criteria, and these are: (Rel1: I enjoy socializing with other people at the premises of the DVLA), (Syn4: It is important to me that my registration process is carried out as soon as possible), (ID4: The online system used for registration is not safe), (Rep3: I can use the Internet I can get all the requirements for registering). The four survey items had factor loading below the recommended threshold of 0.60 hence, were possible candidates for deletion from the measurement model.

From the results, the first component had eleven (11) items. Five (5) of the items loaded were related to Sensory Requirement. Three (3) of the remaining items loaded were related to Relationship Requirement while another three (3) items were related to Synchronism Requirement. The second component loaded three (3) items, all of which were related to Monitoring and Capability. The third component also loaded three (3) items of which one (1) was related to Representation Requirement and two (2) items were also related to Reach. The fourth component loaded 3 items which were all related to Identification and Control Requirement. The fifth component loaded two (2) items. Out of this, one (1) was related to Representation Requirement and the other one (1) was also related to Identification and Control Requirement. The sixth component also loaded two (2) items of which one (1) were related to Monitoring Capacity and the other one (1) related to Reach. The last component also loaded two (2) survey items; each item was related to Representation and Sensory Requirement respectively. The results of the Varimax rotation have been displayed in Table 6.4 below.

Table 6.3: Rotated Component Matrix

Rotated Component Matrix[a]

	Component						
	1	2	3	4	5	6	7
Rel3: I would like to call for assistance and advice from the responsible personnel	.888						
Sens4: I prefer getting immediate feedback on my registration status	.840						
Rel4: I enjoy my physical presence at the offices so that I can ask the names and contacts of the responsible personnel	.833						
Syn1: I like to submit my form immediately I complete it	.819						
Syn2: I think that my registration will be faster using an online method	.780						
Sens6: While I am doing my registration, I like to be able to see and touch registration documents	.753						
Sens2: I prefer to fill my form with pen and paper	.698						
Syn3: I like to pay my fees at the same time	.693						
Sens3: I feel more comfortable when I hold and submit my registration forms	.692						
Sens1: I prefer to pick up my registration documents from the DVLA office	.679						
Rel2: I enjoy having personal contact and informal interaction with the responsible employees	.614						
Mon3: I have to enter a valid email address		.900					
Mon1: I have to provide my bio data online		.740					
Mon2: My national ID card has to be confirmed		.730					
Reach1: I can register for my license at anytime			.893				
Rep4: The Internet notifies me if I complete my registration process			.880				
Reach2: I can register for my license at any place			.678				
ID2: I like the staff of DVLA to recognize me				.904			
ID3: I would like to know who receives my forms				.846			
ID1: I like to take note of other people who come to register				.715			
Rep2: I can use the Internet to register for my license					.870		
ID5: I don't have control over my personal information and data while registering online.					.717		
Mon4: The Internet is able to track my progress when registering						.803	
Reach3: I can request for other services that I want						.692	
Rep1: I can get information about the registration online							.790
Sens5: I need to touch and verify registration documents before filling them out							.727

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. a. Rotation converged in 6 iterations.

Source: Field Data, 2015

6.5 Reliability and Re-specification of Factors

In identifying the scales that were reliable, a reliability check was performed. In relation to this, Pallant (2003) argued that before analysis is done, the scales used for the analysis need to be checked for reliability. A reliability check ensures that the scales are consistent internally. The generally used indicator of checking internal consistency, Cronbach's Alpha coefficient was used to ascertain the reliability scales used in the survey. Researchers such as Hair, Black, Babin, & Anderson (2010) and Pallant (2011) admonish that ideally this value should be greater than 0.7 for managerial decisions although a threshold level of 0.6 could be used in exploratory research.

In view of this, the 26 variables were re-specified into seven factors based on the constructs in the Process Virtualization Theory. In the case of the first factor, six items associated with Sensory Requirement were loaded. The second factor loaded 3 items which were related to Relationship Requirement. The third factor loaded 3 items relating to Synchronism. Factor four loaded 4 items which were associated with Identification and Control Requirement. Factor five loaded 3 items which were related to Reach. Factor six loaded 3 items related to Representation while factor 7 loaded 4 items related to Monitoring and capability. From the reliabilities, only factors that have satisfied the minimum value of 0.6 as suggested by Hair et al., (2010) were accepted. The Cronbach alpha measurement of the loaded survey items were identified accordingly to check the reliability of the factors following the recommended threshold value of 0.7 by researchers like Hair et al., (2010) and Pallant (2011). The results appear in Table 6.4 below.

Table 6.4: Internal Consistency and Related Decisions

Factor Components	Loadings	No. of Items	Cronbach's Alpha
Factor 1		**6**	**.882**
Sens1: I prefer to pick up my registration documents from the DVLA office	**.679**		
Sens2: I prefer to fill my form with pen and paper	**.698**		
Sens3: I feel more comfortable when I hold and submit my registration forms	**.692**		
Sens4: I prefer getting immediate feedback on my registration status	**.840**		
Sens5: I need to touch and verify registration documents before filling them out	**.727**		
Sens6: While I am doing my registration, I like to be able to see and touch the registration documents	**.753**		
Factor 2		**3**	**.803**
Rel2: I enjoy having personal contact and informal interaction with the responsible employees	**.614**		
Rel3: I would like to call for assistance and advice from the responsible personnel	**.888**		
Rel4: I enjoy my physical presence at the offices so that I can ask the names and contacts of the responsible personnel	**.833**		
Factor 3		**3**	**.797**
Syn1: I like to submit my form immediately I complete it	**.819**		
Syn2: I think that my registration will be faster using an online method	**.780**		
Syn3: I like to pay my fees at the same time	**.693**		
Factor 4		**4**	**.711**
ID1: I like to take note of other people who come to register	**.715**		
ID2: I like the staff of DVLA to recognize me	**.904**		
ID3: I would like to know who receives my forms	**.846**		
ID5: I don't have control over my personal information and data while registering online.	**.717**		
Factor 5		**3**	**.708**
Reach1: I can register for my license at anytime	**.893**		
Reach2: I can register for my license at any place	**.678**		
Reach3: I can request for other services that I want	**.692**		
Factor 6		**3**	**.431**
Rep1: I can get information about the registration online	**.790**		
Rep2: I can use the Internet to register for my license	**.870**		
Rep4: The Internet notifies me if I complete my registration process	**.880**		
Factor 7			
Mon1: I have to provide my bio data online	**.740**	**4**	**.764**
Mon2: My national ID card has to be confirmed	**.730**		
Mon3: I have to enter a valid email address	**.900**		
Mon4: The Internet is able to track my progress when registering	**.803**		

Sens. is Sensory Requirement scale. **Rel.** is the Relationship Requirement. **Syn.** is the Synchronism Requirement scale. **ID.** is Identification and Control Requirement. **Rep** is Representation. Reach still remains the same. Mon. however is Monitoring and Capability. *N= 317.*

Source: Field Data, 2015

6.6 Reliability of the Dependent Variable

Table 6.5 below shows the reliability of the dependent variables. This table comprises survey items the measures the dependent variable (Process Virtualizability) From the analysis, it is evident that all the variables have high loadings and are loaded perfectly on the dependent variable with a good Cronbach's alpha of .720 indicating that the items used for the dependent variable provided a reliable scale for further analysis. Based on the Cronbach's alpha coefficient results, it is clear that all the scales for the dependent variable exceeded the conventional acceptable 0.6, and thus proved to be adequate for multiple regression analysis.

Table 6.5: Reliability of scales for Dependent Variables

Variables	Loadings	No. of Items	Cronbach's Alpha
Process Virtualizability		**4**	**.720**
Overall, online registration process supports my needs to manage my license acquisition process	.628		
The online exams has completely replaced traditional method	.720		
Overall, the online exams gives me control what I do.	.769		
I will rate the online process of acquiring a new drivers' license as satisfactory	.673		

Source: Field Data, 2015

6.7 Examination of Hypotheses

In identifying predictors that support the PVT, a hierarchical multiple regressions was performed to test the various hypotheses (see Chapter 3). Since the model has moderator variables, it was important to understand under which conditions the predictor variables influence the dependent variables (Baron & Kenny, 1986). It is also important to know whether or not the moderator variables influenced the direction of the relation between the predictor and dependent variables (Kim et al., 2001).

Because we have more independent variables, we used a multiple regression. The use of regression is justified by the fact that the independent variables * interaction term and whether the interaction are modeled best using the multiple regression (Goodhue et al., 2007). In determining the interaction effects of the various constructs, we multiplied each of the constructs by their respective moderating factors.

6.7.1 Analysis of Hypothesis 1_a and 5_a

Hypothesis 1_a predicts that the higher (lower) the sensory requirements (SR) of the registration process, the less (more) suitable it is to being conducted virtually. Similarly, hypothesis 5_a predictsthat there is a positive moderation effect of representation on the relationship between sensory requirements and the virtualizability process of registration. The rationel for testing this two hyporthesis was born out of the characteristics shared among them (sensory charactersitic). This phenomenon of analyzing two hypotheses together is repeated in subsequent sections. To test this, Karl Pearson's Product moment Correlation Coefficient and hierarchical regression analyses were employed. The results from Table 6.6 below revealed that sensory requirement was negatively related to process virtualizability ($r = -.141$, $p < .01$).

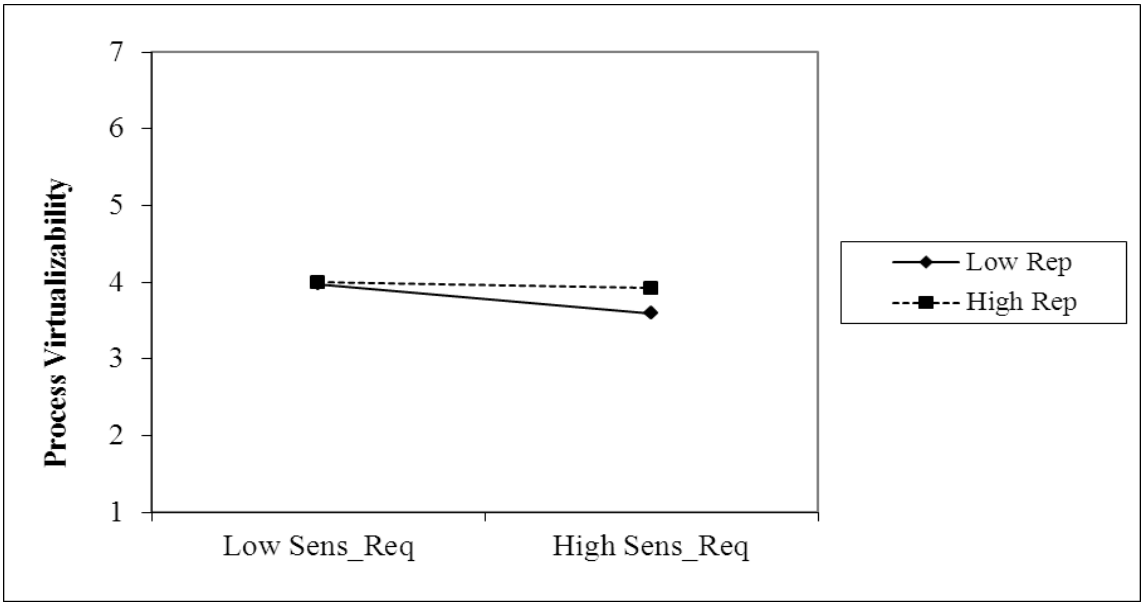
Table 6.6: Hierarchical Moderated Multiple Regression Analysis for Sensory Requirement and Process Virtualizability in the Registration Process

Variable	β	R^2	Δ R^2	F	Δ F
Step 1					
Sensory Requirement	-.141**	.020	.020**	6.54**	6.54*
Step 2					
Sensory Requirement (A)	-.141**	.020	. 000	3.26*	.000
Representation (B)	.000				
Step 3					
Sensory Requirement (A)	-.141**	.023	.002	2.43	.776
Representation (B)	.000				
Interaction (A) × (B)	.051				

Note: N= 317; * indicate * $p < .05$, ** $p < .01$, *** $p < .001$;
Source: Field Data, 2015

In support of Hypothesis 1a, which predicted that the higher (lower) the sensory requirements (SR) of the registration process, the less (more) suitable it is to being conducted virtually. Sensory requirements have a significant negative impact on the virtualizability of the registration process (β = -0.14**; $p < .01$). In testing this hypothesis using a three-step level moderated hierarchical regression, the first predictor variable, sensory requirement was entered into the model. At the second level of entry (i.e., step 2 of the moderated hierarchical regression model), the moderating variable, Representation was entered into the model as a predictor variable. Finally, the interaction term (i.e., the product of Sensory Requirement and Representation) was entered into the model. Baron and Kenny (1986), explains a moderator as a third variable which has the propensity of altering the direction of a bivariate relationship. As illustrated by Table 6.6, the results of the moderated hierarchical regression analysis revealed that the beta coefficients of the Sensory Requirement and Representation were -0.14 and .00 respectively. Finally, the interaction term had a beta coefficient of .051 and did explain a variance in process virtualizability (ΔR^2 = .002). There is evidence to prove that Representation had a positive correlation on the virtualizability of the registration process. The coefficient for representation is however insignificant. This suggests that a positive relationship exists but it adds no explanatory beyond that of the other independent variables, hence there is no support for hypothesis 5_a which is a corresponding moderator hypothesis to hypothesis 1_a. Figure 6.2 below shows the moderation effect of Representation on Sensory Requirement and Virtualizability of Registration Process.

Figure 6.2: Representation as a Moderator of Sensory Requirement and Virtualizability of Registration Process



Note: *Sen_Req* indicates Sensory Requirement, *Rep* denotes Representation

Source: Field Data, 2015

6.7.2 Analysis of Hypothesis 2_a and 6_a

Analyzing hypotheses 2_a and 6_a was necessitated by the fact that relationship requirement which was Hypothesis 2a was moderated by Reach which was hypothesis 6a.

Table 6.7: Hierarchical Moderated Multiple Regression Analysis for Relationship Requirement and Process Virtualizability in the Registration Process

Variable	β	R^2	Δ R^2	F	Δ F
Step 1					
Relationship Requirement	-.080	.007	.007	2.36	2.36
Step 2					
Relationship Requirement (A)	-.080	.008	. 001	1.32	.29
Reach (B)	-.041				
Step 3					
Relationship Requirement (A)	-.080	.011	.003	1.18	.89
Reach (B)	-.041				
Interaction (A) × (B)	.086	.011			

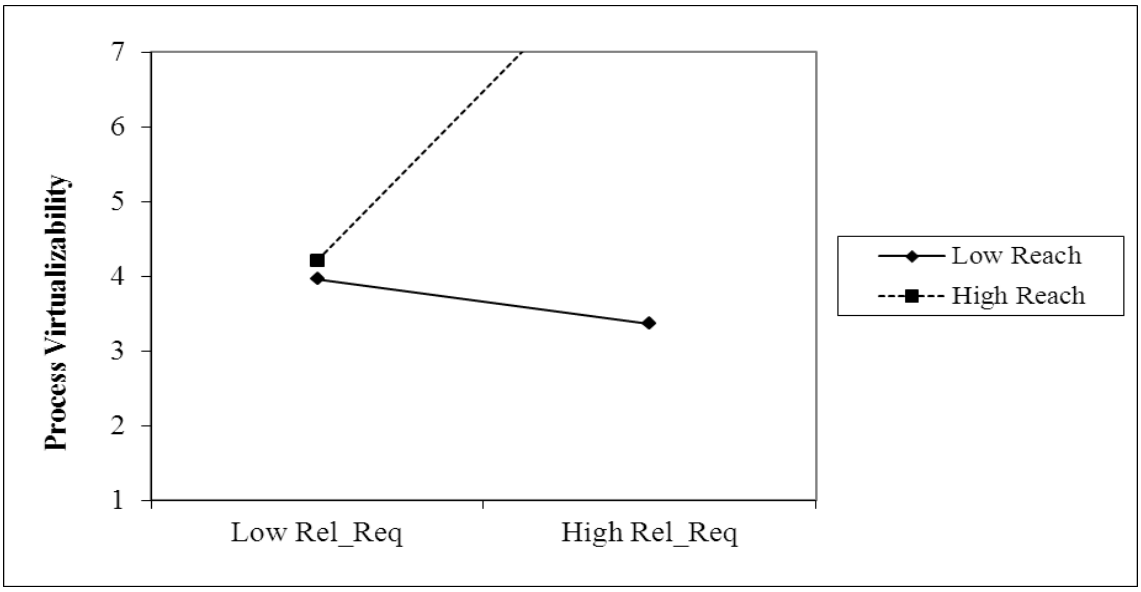
Note: N= 317; * indicate * $p < .05$, ** $p < .01$, *** $p < .001$;

Source: Field Data, 2015

Hypothesis 2a predicted that the higher (lower) the relationship requirements (RR) of the registration process, the less (more) suitable it is to being conducted virtually. Stated differently, there is a negative relationship between relationship requirement and registering using an online platform. Following the three-step moderated hierarchical regression the results as illustrated in Table 6.5 above, shows that the beta coefficients of relationship requirement and reach were -.080 and -.041 respectively. This means there was an inverse relation between relationship requirement and process virtualizability. Lastly the coefficient of the interaction term was .086.

There is evidence to support that relationship requirement is negatively correlated to the virtualization of the registration process. However, the corresponding coefficient for relationship requirement is insignificant. This suggests that a negative relationship exists but it adds no explanatory beyond that of the other independent variables, hence there is no support for hypothesis 2a. In a similar vein, the moderating term of Reach was negative and further insignificant hence it does not support hypothesis 6a. Figure 6.3 below depicts Reach did not moderate the relationship between Relationship Requirement and Process Virtualizability.

Figure 6.3: Reach as a Moderator of Relationship Requirement and Virtualizability of Registration Process



Source: Field Data, 2015

6.7.3 Analysis of Hypothesis 3_a

Hypothesis 3a deals with the synchronism requirement of the registration process. This hypothesis was analyzed alone because it had no moderating variable as illustrated in Chapter Four.

Table 6.8: Hierarchical Moderated Multiple Regression Analysis for Synchronism Requirement and Process Virtualizability in the Registration Process

Variable	β	R^2	Δ R^2	F	Δ F
Step 1					
Synchronism Requirement	-.093*	.011	.011***	3.37	3.37

Note: N= 317; * indicate * $p < .05$, ** $p < .01$, *** $p < .001$

Source: Field Data, 2015

Synchronism as an independent construct was regressed on process virtualizability. No moderating variables were introduced here. According to Overby (2008), not all the constructs in

the PVT can be applicable hence exemptions were made on the moderation construct of the synchronism requirement. When the predictor variable which is Synchronism Requirement, was entered into the model, the beta coefficient was -.093 at a significance level of $p < .05$ further giving support to hypothesis 3a which predicts that the higher (lower) the synchronism requirements (SR) of the registration process, the less (more) suitable it is to being conducted virtually.

6.7.4 Analysis of Hypothesis 4_a and 7_a

Hypothesis 4_a predicted that the higher (lower) the identification and control requirements (IDC) of the registration process, the less (more) suitable it is to being conducted virtually. Hypothesis 7_a on the other hand predicted that there is a positive moderation effect of monitoring and capability between identity & control requirements and the virtualizability process of registration

Table 6.9: Hierarchical Moderated Multiple Regression Analysis for Identification & Control Requirement and Process Virtualizability

Variable	β	R^2	Δ R^2	F	Δ F
Step 1					
ID & Control Requirement	-.002	.000	.000	.001	.001
Step 2					
ID & Control Requirement (A)	-.003	.003	.003	.53	1.07
Monitoring & Capability (B)	.083				
Step 3					
ID & Control Requirement (A)	-.003	.004	.000	.39	.091
Monitoring & Capability (B)	.083				
Interaction (A) × (B)	.30	.004			

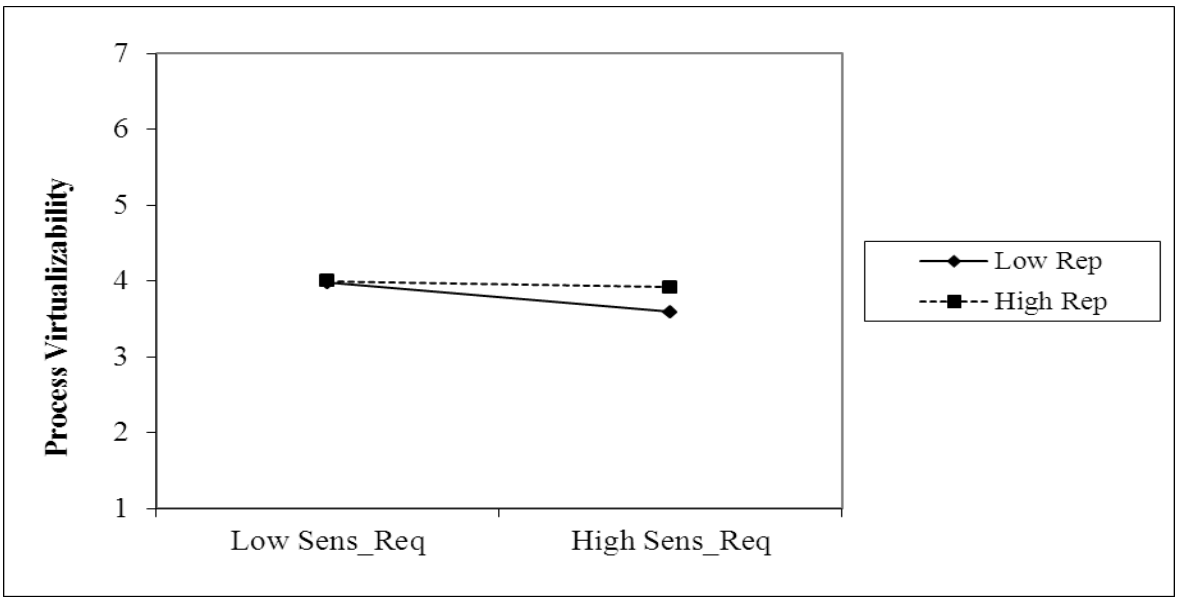
Note: N= 317; * indicate * $p < .05$, ** $p < .01$, *** $p < .001$
Source: Field Data, 2015

As illustrated in Table 6.9 above, the beta coefficients of ID & Control Requirement and Monitoring & Capability were -.003 and .083 respectively. These coefficient values do not however contribute significantly to the model; hence hypothesis 4a is not supported. Lastly the

interaction term had a coefficient value of .30. Monitoring & Capability is positively correlated to Process Virtualizability (.083). This suggests a positive relationship exits, but that it adds no explanatory power beyond that of the other variables hence hypothesis 7a is not supported.

Figure 6.4 below depicts that the monitoring and capability indeed did not moderate the relationship between Identification and Control and process virtualizability.

Figure 6.4: Monitoring & Capability as a Moderator of Identification and Control Requirement and Virtualizability of Registration Process



Source: Field Data, 2015

6.8 Explorative Analysis for the Written Test Exams

Apart from the registration process, the written test exam was also measured quantitatively. The two activities (i.e. registration and written test) were considered from the perspective of the customers (citizens) while the rest of the activities were analyzed from both management (Government) and citizens' (license holders) perspective where necessary.

Table 6.10 below details the outcome for the descriptive statistics relating to all the variables in the Process Virtualization model. This was carried out to ascertain the mean and standard deviations of the various variables. This position is supported by Pallant (2011) who argued that data needs to be subjected to descriptive analysis before any other analysis should be done.

Table 6.10: Descriptive Test of Means for the Written Test Exams

Variables	Mean	Std. Deviation	Std. Error Mean
Sens1. I like to see where I am taking my exams	3.26	1.295	.073
Sens2. I like to physically write my exams with pen and paper	3.03	1.201	.067
Sens3. I like to sit in an examination room	3.01	1.231	.069
Sens4. While I am writing the exams, I would like to personally hear instructions given to me by instructors	2.85	1.204	.068
Sens5. I like a panel to ask me questions before and after my test	*2.31*	1.113	.063
Sens6. I like to see and touch my exams questions before I start writing	2.76	1.280	.072
Sens7. I need to provide my bio data during registration	3.37	1.217	.068
Sens8. I like my documents to be endorsed physically	3.31	1.261	.071
Rel1. I enjoy making new friends at the exams center	3.13	1.176	.066
Rel2. It is important for me to have a personal relationship with instructors	2.85	1.233	.069
Rel3. I enjoy to mingle with other test candidates	3.03	1.170	.066
Rel4. I like to be called by instructors when it is my turn to write	2.92	1.230	.069
Rel5. I like to ask for clarity on questions	3.53	1.149	.065
Syn1. After the written test, I need to do an eye test and practical test	3.80	1.116	.063
Syn2. I wouldn't mind to have access to my results after a few days	3.46	1.308	.073
Syn3. It bothers me if I do not directly receive my license on time	4.04	1.278	.072
Syn4. It bothers me if my license is not processed after I pass my test	**4.21**	.994	.056
ID1. I like to take note of other test candidates	2.79	1.168	.066
ID2. I like to alter my answers when I deem it right	3.71	1.098	.062
ID3. I like to know the examiners and invigilators	*2.57*	1.227	.069
ID4. I like to identify where and who I pay my fees to before I write the exams	3.63	1.227	.069
ID5. I like authorities to confirm my identity before I take the test	3.62	1.276	.072
Rep1. I can get information about my test when I am on the Internet	3.64	.979	.055
Rep2. I can get frequent update of the exams online	3.57	1.040	.058
Rep3. I get to know the rules for writing the exams on the Internet	3.81	.928	.052
Rep4. The Internet allows me to know the results of my test when I finish writing	**4.10**	.852	.048
Reach1. I use the Internet to write my exams because it is more convenient	3.61	1.031	.058
Reach2. The Internet allows me to have sample test exams before the real test	3.76	.943	.053

Reach3. I use the Internet to access information about test exams all around the world	3.82	.982	.055
Mon1. The online system will check for authentication before I write the test	3.87	.758	.043
Mon2. The system will have to grant me access before I start the test	3.99	.661	.037
Mon3. I will have to enter their reference number	4.03	.731	.041
Mon4. Supervisor will also enter a code to confirm that the applicant has the right to sit for the exams	3.90	.840	.047

Bold figures are the two variables with the highest means. Italized figures are the two figures with the least means

Source: Field Data, 2015

Table 6.10 displays the means, standard deviations and standard error means of the variable that measures process virtualizability. The results as shown were based on a 5-likert scale questionnaire which participants responded to. The lowest point on the scale was "Strongly Disagree" coded as "1"while the strongest point on the scale was "Strongly Agree" coded as "5". The odd number on the scale was "3" which indicated a neutral position of the participants. The various mean results signify how each of the variables performed from the 317 participants. The lowest mean from the results were 2.31 (Sens5. I like a panel to ask me questions before and after my test) and 2.57 (ID2. I like to alter my answers when I deem it right). The highest means from the table are: 4.21 **(**Syn4. It bothers me if my license is not processed after I pass my test**)**, and 4.10 **(**Rep4. The Internet allows me to know the results of my test when I finish writing),

6.9 Exploratory Factor Analysis

The thirty three (33) variables were later rotated using the Varimax rotation as the extraction method. The results revealed that twenty one (21) variables loaded perfectly onto seven factor components; thus there is an indication that twelve (12) of the initial variables failed to meet the rotation criteria. These variables include: Sens6 (I like to see and touch my exams questions before I start writing), Rel5 (I like to ask for clarity on questions), Sens3 (I like to sit in an examination room), Sens1 (I like to see where I am taking my exams), Sens2 (I like to physically write my exams with pen and paper), ID1 (I like to take note of other test candidates), Rep4 (The

Internet allows me to know the results of my test when I finish writing), Sens7 (I need to provide my bio data during registration), Sens8 (I like my documents to be endorsed physically), Syn1 (After the written test, I need to do an eye test and practical test), Rel4 (I like to be called by instructors when it is my turn to write), ID3 (I like to know the examiners and invigilators). The first component from the table has 4 items. Three of the items loaded are related to Relationship Requirement while 1 of the item is related to Sensory Requirement. The second component also loaded four items, all of which relate to Monitoring and Capability. The third component loaded 3 items which related to Reach. The fourth component loaded 3 items which were also related to Representation. Fifth component loaded 3 items related to Synchronism Requirement; while the sixth component loaded 3 items related to Identification and Control Requirement. The final component had just one item which was related to Sensory Requirement. The results of the Varimax rotation have been displayed in Table 6.4 below.

Table 6.11: Rotated Component Matrix

Rotated Component Matrix[a]

	Component						
	1	2	3	4	5	6	7
Rel1. I enjoy making new friends at the exams center	.878						
Rel2. It is important for me to have a personal relationship with instructors	.817						
Rel3. I enjoy to mingle with other test candidates	.813						
Sens4. While I am writing the exams, I would like to personally hear instructions given to me by instructors	.652						
Mon1. The online system will check for authentication before I write the test		.852					
Mon2. The system will have to grant me access before I start the test		.801					
Mon3. I will have to enter their reference number		.791					
Mon4. Supervisor will also enter a code to confirm that the applicant has the right to sit for the exams		.752					
Reach3. I use the Internet to access information about test exams all around the world			.902				
Reach1. I use the Internet to write my exams because it is more convenient			.876				
Reach2. The Internet allows me to have sample test exams before the real test			.723				
Rep1. I can get information about my test when I am on the Internet				.902			
Rep2. I can get frequent update of the exams online				.895			
Rep3. I get to know the rules for writing the exams on the Internet				.729			
Syn3. It bothers me if I do not directly receive my license on time					.879		
Syn4. It bothers me if my license is not processed after I pass my test					.818		
Syn2. I wouldn't mind to have access to my results after a few days					.811		
ID4. I like to identify where and who I pay my fees to before I write the exams						.874	
ID2. I like to alter my answers when I deem it right						.736	
ID5. I like authorities to confirm my identity before I take the test						.659	
Sens5. I like a panel to ask me questions after my test							.901

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. a. Rotation converged in 6 iterations.

Source: Field Data, 2015

6.10 Reliability and Re-specification of Factors

This section follows the approach adopted in re-specification. This is based on suggestions by researchers such as Hair et al. (2010) and Pallant (2011) that values greater than 0.7 were considered acceptable for the reliability and re-specification though the threshold level of 0.6 could be used in exploratory research.

In view of this, the 21 variables were re-specified into seven factors based on the Process Virtualization Theory. Two items were loaded in the first factor. These items related to Sensory Requirement. The second factor loaded 3 items which were related to relationship requirement. Factor three loaded 3 items relating to synchronism. Factor three was able to load 3 items relating to Identification Requirement. Factor five loaded 3 items which were also related to Reach. Factor six loaded 3 items related to Representation while factor 7 was able to load 4 items related to monitoring and capability. From the reliabilities, only factors that have satisfied the minimum value of 0.6 as posited Hair et al., (2010) were accepted. The results appear in Table 6.12 below.

Table 6.12: Internal Consistency and Related Decisions

Factor Components	Loadings	No. of Items	Cronbach's Alpha
Factor 1		**2**	**.507**
Sens4. While I am writing the exams, I would like to personally hear instructions given to me by instructors	**.652**		
Sens5. I like a panel to ask me questions after my test	**.901**		
Factor 2		**3**	**.831**
Rel1. I enjoy making new friends at the exams center	**.878**		
Rel2. It is important for me to have a personal relationship with instructors	**.817**		
Rel3. I enjoy to mingle with other test candidates	**.813**		
Factor 3		**3**	**.791**
Syn3. It bothers me if I do not directly receive my license on time	**.879**		
Syn4. It bothers me if my license is not processed after I pass my test	**.818**		
Syn2. I wouldn't mind to have access to my results after a few days	**.811**		
Factor 4		**3**	**.729**
ID4. I like to identify where and who I pay my fees to before I write the exams	**.874**		
ID2. I like to alter my answers when I deem it right	**.736**		
ID5. I like authorities to confirm my identity before I take the test	**.659**		
Factor 5		**3**	**.863**
Reach3. I use the Internet to access information about test exams all around the world	**.902**		
Reach1. I use the Internet to write my exams because it is more convenient	**.876**		
Reach2. The Internet allows me to have sample test exams before the real test	**.723**		
Factor 6		**3**	**.882**
Rep1. I can get information about my test when I am on the Internet	**.902**		
Rep2. I can get frequent update of the exams online	**.895**		
Rep3. I get to know the rules for writing the exams on the Internet	**.729**		
Factor 7			
Mon1. The online system will check for authentication before I write the test	**.852**	**4**	**.828**
Mon2. The system will have to grant me access before I start the test	**.801**		
Mon3. I will have to enter their reference number	**.791**		
Mon4. Supervisor will also enter a code to confirm that the applicant has the right to sit for the exams	**.752**		

Sens. is Sensory Requirement scale. **Rel.** is the Relationship Requirement. **Syn**. is the Synchronism Requirement scale. **ID**. is Identification and Control Requirement. **Rep** is Representation. **Reach** still remains the same. **Mon**. however is Monitoring and Capability. *N= 317.*

Source: Field Data, 2015

6.11 Reliability of the Dependent Variable

Aside from measuring the reliability of the independent factors, reliability scales were also used for the dependent variables. Four variables had high loadings and loaded perfectly on the dependent variable (Process Virtualizability) with a very good cronbach's alpha of .715. Table 6.13 summarizes the results of these findings.

Table 6.13: Reliability of Scales for Dependent Variables

Variables	Loadings	No. of Items	Cronbach's alpha
Process Virtualizability		**4**	**.715**
I am satisfied with the process of writing my exams online	.849		
Writing my exams online increases my control over the process	.821		
The online written test process has completely replaced the traditional process	.630		
Through the online exams, I save myself some time to do other things	.635		

Source: Field Data, 2015

Per the Cronbach's alpha coefficient results, it is clear that all the scales for the independent variables exceeded the conventional acceptable 0.6, and thus proved to be adequate for multiple regression analysis.

6.12 Examination of Hypotheses

In identifying predictors that support the PVT, a hierarchical multiple regressions was performed to test the various hypotheses (see Chapter 3). Since the model has moderator variables, it was important to understand under which conditions the predictor variables influence the dependent variables (Baron & Kenny, 1986). It is also important to know whether or not the moderator

variables influenced the direction of the relation between the predictor and dependent variables (Kim et al., 2001).

To analyze the relationships between the various antecedents and process virtualizability, a hierarchical multiple regression was used. The variables predicted are the dependent variable (the outcome variable). The variable used to predict the other variables is the independent variable (the predictor variable). Because there are more independent variables, multiple regression was employed. The three-step level moderated hierarchical regression used is based on the following three processes: the first predictor variable is entered into the model. Second, the moderating variable is entered into the model. Finally, the interaction term (i.e., the product was entered into the model. The use of regression is justified by the fact that the independent variables * interaction term and whether the interaction are modeled best using the multiple regression (Goodhue et al., 2007). In determining the interaction effects of the various constructs, we multiplied each of the constructs by their respective moderating factors.

6.12.1 Analysis of Hypothesis 1_b and 5_b

Hypothesis 1_b predicted that sensory requirement will negatively affect the citizens' use of the Internet to register and write their online exams. Stated differently, the higher (lower) the sensory requirements (SR) of the written test process, the less (more) suitable it is to being conducted virtually. Karl Pearson's Product moment Correlation Coefficient and hierarchical regression analyses were used to test the hypothesis. The results revealed that sensory requirement was negatively related to process virtualizability ($r = -.178$, $p < .01$).

Table 6.14: Hierarchical Moderated Multiple Regression Analysis for Sensory Requirement and Process Virtualizability in the Written Test Exams

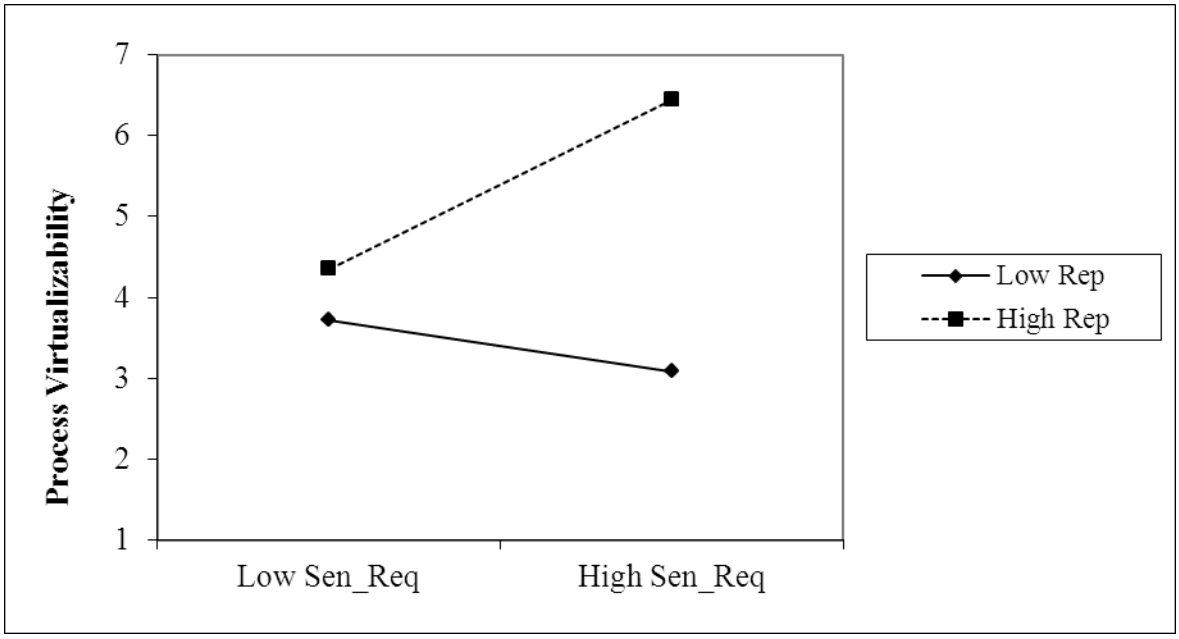
Variable	β	R^2	Δ R^2	F	Δ F
Step 1					
Sensory Requirement	-.178*	.012	.012*	3.971*	3.971*
Step 2					
Sensory Requirement (A)	-.167	.025	. 013	.034*	4.059*
Representation (B)	.193*				
Step 3					
Sensory Requirement (A)	-.167	.036	.011	.860**	3.450
Representation (B)	.193*				
Interaction (A) × (B)	.453	.036			

Note: N= 317; * indicate * $p < .05$, ** $p < .01$, *** $p < .001$;

Source: Field Data, 2015

Hypothesis 1_a and 1_b predicted that sensory requirement will be moderated by representation in process virtualizability. This was ascertained by performing a three-step moderated hierarchical regression. The analysis in this section and subsequent sections followed the steps illustrated in performing a three-step multiple hierarchical regression. As illustrated in Table 6.14 above, the beta coefficients of sensory requirements and representation were -.167 and .193 respectively. Per the outcome of the regression analysis, sensory requirements have a significant negative impact on citizens using the online exams ($\beta = -.167$; $p < 0.05$); giving support to hypothesis 1_b. The addition of representation to the model contributed significantly to process virtualizability ($\beta = .193$, $\Delta R^2 = .02$, $p < .05$) further giving support to hypothesis 5_b. Lastly, the interaction term had a coefficient value of .45.

Figure 6.5: Representation as a Moderator of Sensory Requirement and PV in the Written Test Exams



Note: Sen_Req indicates Sensory Requirement, Rep denotes Representation

Source: Field Data, 2015

From figure 6.5, although the moderating variable contributed significantly to process Virtualizability it however was not able to moderate the relationship between sensory requirement and process virtualizability.

6.12.2 Analysis of Hypothesis 2_b and 6_b

Analyzing hypothesis 2_b and 6_b was necessitated by the fact these a relationship exist between the two as discussed in Chapter Four. There is a moderating effect of IT on representation hence these two hypotheses were analyzed together.

Table 6.15: Hierarchical Moderated Multiple Regression Analysis for Relationship Requirement and Process Virtualizability

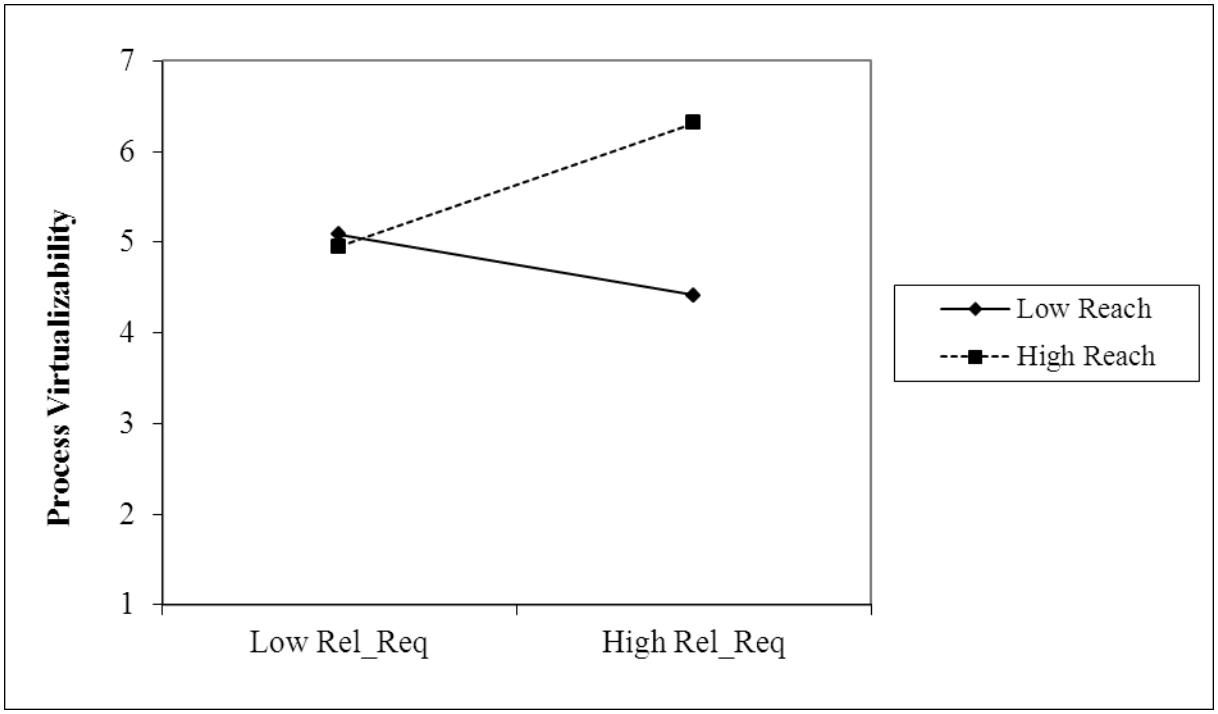
Variable	β	R^2	Δ R^2	F	Δ F
Step 1					
Relationship Requirement	-.191*	.017	.017*	5.448*	5.448*
Step 2					
Relationship Requirement (A)	-.204*	.021	.0043	.406	1.358
Reach (B)	-.114				
Step 3					
Relationship Requirement (A)	-.204**	.031	.0103	.358*	3.215
Reach (B)	-.114				
Interaction (A) × (B)	.340	.031			

Note: N= 317; * indicate * $p < .05$, ** $p < .01$, *** $p < .001$;

Source: Field Data, 2015

Hypothesis 2_b, predicted that the higher (lower) the relationship requirements (RR) of the written test process, the less (more) suitable it is to being conducted virtually. On the other hand, hypothesis 6_a predicted that there is a positive moderation effect of reach on the relationship between relationship requirements and the virtualizability process of written test. As illustrated in Table 6.15 above, the beta coefficients of relationship requirement and reach were -.204 and -.114 respectively. Relationship Requirement with its beta value of -.204 was also significant at $p < 0.05$); giving support to hypothesis 2_b. Per the prediction of Hypothesis 6_b Reach is supposed to have a positive impact on process virtualizability but in this case it is negative and was found to have an insignificant impact on the virtualizability of the written test exams. In view of this, hypothesis 6_b was not supported. Lastly, the interaction term had a beta coefficient of .340 but it did not explain a significant variance in process virtualizability (Δ R^2 .0103). Figure 6.6 below depicts that reach did moderate the relationship between relationship requirement and process virtualizability even though the beta coefficient values shows otherwise.

Figure 6.6: Alternative Reach as a Moderator of Relationship Requirement and PV



Note: *Rel_Req* indicates Relationship Requirement, *Reach* denotes Reach

Source: Field Data, 2015

6.12.3 Analysis of Hypothesis 3_b

Hypothesis 3_b was not moderated by any variable hence it was analyzed alone. The results from the analysis are displayed in Table 6.16

Table 6.16: Hierarchical Moderated Multiple Regression Analysis for Synchronism Requirement and Process Virtualizability

Variable	β	R^2	Δ R^2	F	Δ F
Step 1					
Synchronism Requirement	.469***	.098	.098***	34.155***	34.155***

Note: N= 317; * indicate * $p < .05$, ** $p < .01$, *** $p < .001$
Source: Field Data, 2015

Synchronism as an independent construct was regressed on process virtualizability. According to Overby (2008), not all the constructs in the PVT can be applicable hence exemptions were made on the moderation construct of the synchronism requirement. When the predictor variable (Synchronism Requirement) was entered into the model, the beta coefficient was .47 at a significant level of $p< .001$. This value does not give support to hypothesis 3_b which predicted a negative impact on process virtualizability.

6.12.4 Analysis of Hypothesis 4_b and 7_b:

The analysis of Hypothesis 4_b and 7_b was a result of the relationship that exists between the two constructs. From Chapter Four, it was established that Identification and control requirements were moderated by monitoring and capability. In lieu of this relationship the two hypotheses were analyzed together.

Table 6.17: Hierarchical Moderated Multiple Regression Analysis for Identification & Control Requirement and Process Virtualizability

Variable	β	R^2	Δ R^2	F	Δ F
Step 1					
ID & Control Requirement	-.211**	.018	.018*	5.857**	5.857*
Step 2					
ID & Control Requirement (A)	-.158	.049	.031 **	8.079** *	10.130**
Monitoring & Capability (B)	-.444**				
Step 3					
ID & Control Requirement (A)	-.158	.054	.005	5.915** *	1.560
Monitoring & Capability (B)	-.444**				
Interaction (A) × (B)	.360	.054			

Note: N= 317; * indicate * $p < .05$, ** $p < .01$, *** $p< .001$
Source: Field Data, 2015

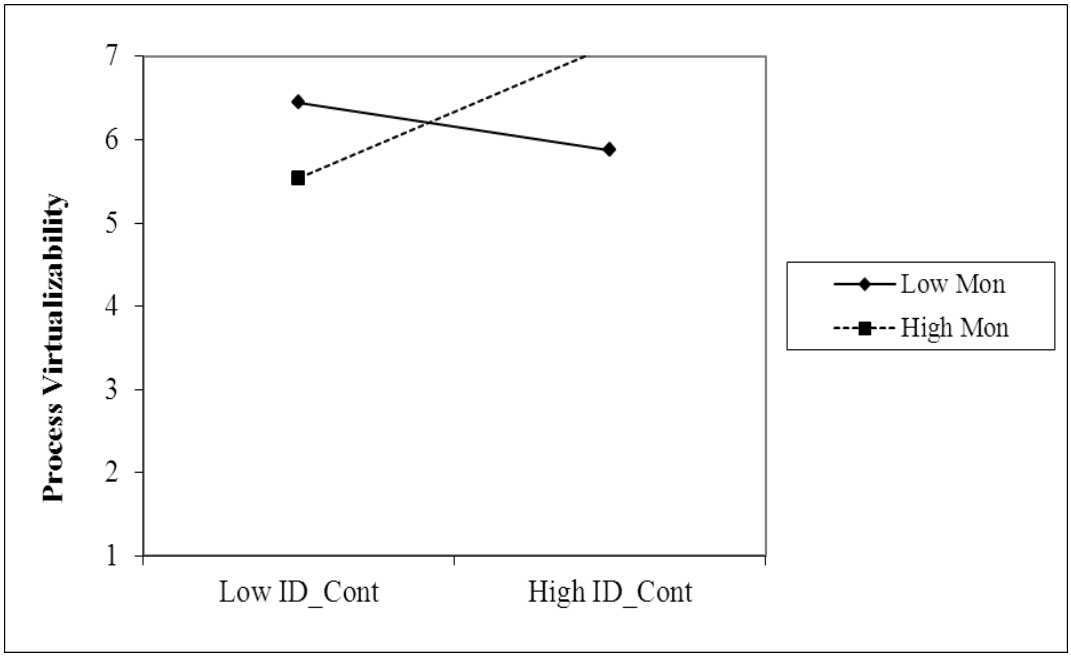
Drawing from previous analysis and the postulations of hypothesis 4_b and 7_b the researcher again performed a three-step level moderated hierarchical regression. As illustrated in Table 6.17

above, the beta coefficients of ID & Control Requirement and Monitoring & Capability were -.158 and -.444 respectively. Both variables were significant at a $p < .01$. Lastly the interaction term had a coefficient value of .360.

In analyzing the hypothesis, it is evident that hypothesis 4_b had a significant negative impact on citizens use of the Internet to write the exams (-.158; $p < .01$); giving support to hypothesis 4_b. Hypothesis 7_b was however not supported since it did not have any positive impact on citizens use of the Internet to write the exams (-.444; $p < .01$).

Figure 6.7 below depicts that monitoring and capability indeed perfectly moderated the relationship between Identification and Control and process virtualizability though the beta coefficient says otherwise.

Figure 6.7: Alternative Monitoring and Capability as a Moderator of Identification and Control Requirement and PV



Note: *ID_Cont indicates* Identification and Control Requirement, *Mon* denotes Monitoring and Capability Requirement.

Source: Field Data, 2015

6.13 Discussion of Results

The process virtualization theory is nascent; hence there are limited studies on the use of the PVT. However, there are a few studies that used the PVT in various contexts. For instance, Overby and Konsynski (2010) used the PVT in assessing the use of electronic channels to process of purchasing vehicles in the wholesale automotive market. Barth and Veit (2011) also used the PVT to investigate the characteristics of process and factors that cause users' resistance to using virutalized processes (online buying). Balci (2014b) also used the PVT to investigate the airline check-in processes. An evaluation of the model and relevant questions indicates that there are some consistencies between the current study and previous research works. While some have confirmed previous research, others are contradictory to past research findings.

Today, there is a large number of a government-to-citizen engagement process but only a small percentage is conducted via e-services (Barth & Veit, 2011). Over the years large number of these e-services projects have failed with factors such as citizens' unwillingness to use the e-services and the lack of awareness (Chan et al., 2010). By using the demand side of e-government services, this study reports that the level of awareness of DVLA online services is good 61.5% *(n = 195)*. These results however might be based on the fact that the majority of the population is either bachelor's degree holders or masters' degree holders. Arguably, government e-service awareness within the educated class will continue to increase. This stems from the fact that the DVLA online services had been made available for the past two years and more than 60% of the respondents were fully aware of the services. We can conclude that an increase in e-service awareness will lead to an increase in service usage.

Due to the newness of the PVT, only a few studies have been able to test the models. In this vein, discussions are based on limited literature. The results were based on the independent variables of interest with their corresponding moderating variables. This was done because of the two activities that were analyzed using the three step regression model. Furthermore, this study empirically validates the PVT in the domain of e-government.

Additionally, the current study empirically validates this integrated model in the scenario of process virtualizability. Out of the fourteen hypotheses that were tested, six of the hypotheses specified in the model were supported; showing that the majority of the hypotheses specified were not supported. Reasons for this might range from the context of the study (developing country perspective) and how some people would like to make full use of their senses (i.e seeing, touching) with regards to going through the process of acquiring a new drivers' license. Hence they place less importance to how IT can make these processes easy.

6.13.1 Hypotheses 1_a and 1_b (Sensory Requirements and Process Virtualizability)

In reference to hypothesis $H1_a$ and $H1_b$, which postulated that the higher (lower) the sensory requirements (SR) of the registration process, the less (more) suitable it is to being conducted virtually and the higher (lower) the sensory requirements (SR) of the written test process, the less (more) suitable it is to being conducted virtually respectively, the sensory characteristics of the process were all found to have a significant negative influence on the virtualizability of the registration and writing exams processes respectively. This finding suggests that citizens have placed less importance on the characteristics of the process, hence the process is more amanable to virtualization. Similarly, it becomes useful to virtualize the registration process and written test.

According to Overby (2008), the preposition behind this construct is that when there is an increase in sensory requirements of a process, then the less amenable the process is to be conducted virtually and the vice-versa. This finding is congruent with a recent study that states that sensory requirements have a significant negative impact on PVT (Balci, 2014b). In conclusion since the sensory requirement is low then the sensory aspect of the process of writing the DVLA exams is truly highly amenable to virtualization. This suggests enough evidence to prove the veracity of the sensory requirement variable of the PVT.

6.13.2 Hypotheses 2_a and 2_b (Relationship Requirements and Process Virtualizability)

The second independent variable in the PVT is Relationship Requirement. Hypothesis 2_a predicted that the higher (lower) the relationship requirements (RR) of the registration process, the less (more) suitable it is to being conducted virtually and hypothesis 2_b also predicted that the higher (lower) the relationship requirements (RR) of the written test process, the less (more) suitable it is to being conducted virtually. Results show that while there is evidence to prove that the process characteristics of RR in the registration process was insignificant (β = -.080), that of the written test exams was significant (β = -*.191; p < .05*). In this study, the registration process of acquiring a new drivers' licence is unlikely to be amenable to vitualization. This is arguably because the entire process starts online and ends manually. As a result, citizens will prefer to exploit the full potentials of their relationship characteristics by interacting and socializing with others in a professional context. This result gives credence to past research which argued that purely virtual relationships have a propensity to be weaker and less developed than their equivalent relationships developed in the physical environment (Mesch & Talmud, 2006).

In the instance of the written test exams, the results prove otherwise (β = -*.191; p < .05*). This result confirms earlier findings from Overby and Konsynski (2010) who found that relationship

requirement significantly contributed negatively to how buyers use electronic channels to do purchases. Similarly, Balci (2014b) disclosed that relationship requirements contribute negatively to participants using airline check-in processes. All these findings tend to corroborate what was originally proposed by Overby (2008). This result shows that the citizens do not place much importance on the characteristics of the process hence is highly amenable to virtualization.

6.13.3 Hypotheses 3_a and 3_b (Synchronism Requirements and Process Virtualizability)

With respect to the process characteristics of the registration process, evidence proves that there is a significant negative impact on citizens' use of the Internet to register for their services (license acquisition) ($\beta = .093; p < .05$). This result could be necessitated by the fact that citizens would like the registration process to be completed without any form of delay. Arguably the delay occurs when, after starting the process online, it needed to be finalized manually by going to the designated offices of the DVLA.

Users who one way or the other attach more magnitude on the characteristic of the process, was found to make the process less amenable to virtualization as in the case of hypothesis 3_b. This result proves that in the case of the written test exams, it is unlikely for it to be conducted virtually with the synchronism characteristics in place. Synchronism contributed positively to the model. This is contrary to what has been stated in the hypothesis. Although there was a positive contribution the significance level was very high ($\beta = .469; p< .001$). This finding contradicts prior research. For instance, Overby and Konsynski (2008) identified that synchronism requirements are negatively related to the way people use electronic markets. As the synchronism requirement has increased in this case, citizens will use less of the DVLA online written test. This will afford resistance to the DVLA online process. This finding is quite unexpected since most citizens would like to go through the written test exams with minimum or

no delay. This could mean that the synchronism requirement of the written test exams doesn't play an important role in the virtualizability of the process and hence it means citizens will like to write the physical exams.

6.13.4 Hypotheses 4_a and 4_b (ID & Control Requirements and Process Virtualizability)

The hypothesis for the registration predicted that the higher (lower) the identification and control requirements (IDC) of the registration process, the less (more) suitable it is to being conducted virtually. Per the results, this hypothesis was not supported. This is not surprising because past research acknowledges that Identification and Control requirements have hindered the virtualization of several processes such as shopping process where most buyers find it difficult identifying the seller as a genuine provider of the products (Ba & Pavlou, 2002; Friedman & Resnick, 2001; cited in Overby & Konsynski, 2010). This result might be necessitated by the fact that customers might be concerned about the misuse of the data they provide online. Similarly they are cautious about privacy issues since virtual processes are susceptible to identity spoofing and control (Overby & Konsynski, 2010). This result however contradicts prior studies (Overby & Konsynski, 2010; Balci et al., 2013; Balci & Rosenkranz, 2014). A recent study by Balci (2014b), revealed that Identification and Control requirements do not affect the virtualizability of the airline check-in process. It is can be established that in the case of this study, identification and control requirements could not play any significant role in the process of registering, hence it is not likely for it to be virtualized.

Contrary to hypothesis 4_a, Hypothesis 4_b proved otherwise. The outcome of this study reveals that Identification & Control Requirements have a negative impact on citizens' use of the Internet to write the DVLA written test. Identification & Control Requirement also significantly impacts the process of writing exams online (β = -.*211; p* < *.01*). The results indicate that the

hypothesis is supported accordingly. This result is largely a confirmation to prior studies (Overby & Konsynski, 2008; Overby & Konsynski, 2010; Balci et al., 2013; Balci & Rosenkranz, 2014). Similarly the results proves that citizens do not place much importance on the characteristics of the process hence it is likely for the process to be virtualized.

6.13.5 Hypotheses 5_a and 5_b (Sensory Requirements, Representations and Process Virtualizability)

Hypothesis 5a stated that there is a positive moderation effect of representation on the relationship between sensory requirements and the virtualizability process of registration. It was established that representation was not able to contribute significantly to the process of registering ($\beta = .00$). This result proves that representation did not moderate sensory requirement and the virtualization of the registration process even though it has a positive moderating effect. A high and significant representation capability would have made the process more suitable to virtualization. This outcome is a little surprising because it was expected that the representation effect of IT will present customers with information relevant to the registration process which will reduce or eliminate the physical properties of sensory requirements (sight, sound, touch, etc) (Overby, 2012). This outcome proves that customers place more importance on the characteristics of the process neglecting the characteirstics of the virtualization mechanism (IT) hence making the process less useful to virtualization.

Conversely to the outcome of hypothesis 5_a, Hypothesis 5_b proves a positive moderation effect of representation on the relationship between sensory requirements and the virtualizability process of the written test. The results ($\beta = .193$; $p < .05$) showed that representation had a positive influence (moderation) between the independent variable (sensory requirement) and the dependent variable (virtualizability of the written test exams). This result is not different from

past studies that indicate the Internet can reduce the physical interaction that is involved in processes (Barth & Veit, 2011). Similarly, IT can enable the virtualization of the written test process.

6.13.6 Hypotheses 6_a and 6_b (Relationship requirements, Reach and Process Virtualizability)

Both hypothesis 6_a and 6_b were not supported. Although the outcome is startling, it gives room for further in-depth investigations. The outcome of hypothesis 6_a *(β = -.041)* did not corroborate the concepts and relationships that the PVT upholds. In this vein it is difficult to tell whether the reason for the outcome is because IT makes the process better or worse.

Similarly, hypothesis 6_b states that there is a positive moderation effect of reach on the relationship between relationship requirement and process virtualizability. As the level of reach increases, the relation weakens. From the analysis, reach does not contribute positively to the model *(β = -.114)*, although the entire construct was able to contribute significantly to the model at $p < .05$. The single contribution of the moderating factor reach is contrary to earlier findings (Overby & Konsynski, 2010; Balci, 2014b). According to Overby (2011), the PVT does not determine whether IT makes a process better or worse. In view of this the null hypothesis in this case is accepted since the alternative hypothesis was not supported.

6.13.7 Hypotheses 7_a and 7_b (ID & Control Requirements, Monitoring & Capability and Process Virtualizability)

With respect to hypothesis 7a, there is a positive moderation effect of monitoring and capability between identity & control requirements and the virtualizability process of registration (β =

.083). The result did not however contribute significantly to the entire model. Again we find this result quite disturbing. Monitoring and Control Requirement as an IT construct is supposed to authenticate process participants and track their activities. In the case of the registration process, users are allowed to login to the online systems to go through the process of registration. This login process requires a valid email address and a password. In reference to the result the IT construct of Monitoring and Control do not matter to the customers when they want to register. Earlier it was revealed that identification and control requirements in the registration process were not supported. Arguably because of the risk of data misuse by unauthorized users the ability of IT to provide authentication will not matter to customers. A past study did not consider monitoring capability (Overby & Konsynski, 2010). In lieu of this there is arguably no existing literature to corroborate or otherwise contradict this finding.

Correspondingly, the moderation effect (monitoring capability) on the virtualizability of the written test exams contributed negatively to process virtualizability, although it contributed significantly at *(β = -.444; p < .01)*, and the overall model was however significant at p< .001. To this effect monitoring and capability was found to have a negative effect on citizens' use of the Internet to write the exams. Reasons for this result might be similar to that of the registration process which involves misuse of data which might prevent users from exploiting the full potential of IT. As posited earlier, these findings with respect to the moderating effects are worrying. However this result might result from the context of this study, thus a developing country perspective.

6.14 Summary of Hypothesis

Having analysed and discussed the research data, this section details the summary of the hypotheses that were tested. Out of the fourteen hypotheses, six were supported while the rest were not. Table 6.18 provides details of the hypotheses.

Table 6.18: **Summary of Hypothesis Results**

No	Hypothesized path	Coefficient (β)	P-Values	Support for Model
H_{1a}	Sensory Requirement → Process Virtualizability (PV) of Registration process	-.141	.011	Supported
H_{1b}	Sensory Requirement → PV of written test process	-.167	.047	Supported
H_{2a}	Relationship Requirement → PV of Registration process	-.080	.126	Not Supported
H_{2b}	Relationship Requirement → PV of written test process	-.204	.020	Supported
H_{3a}	Synchronism Requirement → PV of Registration process	-.093	.057	Supported
H_{3b}	Synchronism Requirement → PV of written test process	.47	.000	Not Supported
H_{4a}	Identification and Control Requirement → PV of Registration process	-.003	.947	Not Supported
H_{4b}	Identification and Control Requirement → PV of written test process	-.158	.016	Supported
H_{5a}	Sensory Requirement & Representation → PV of Registration process	.000	.998	Not Supported
H_{5b}	Sensory Requirement & Representation → PV of written test process	.193	.044	Supported
H_{6a}	Relationship Requirement & Reach → PV of Registration process	-.041	.588	Not Supported
H_{6b}	Relationship Requirement & Reach → PV of written test process	-.114	.014	Not Supported
H_{7a}	Identification and Control Requirement & Monitoring Capability → P V of Registration process	.083	.303	Not Supported
H_{7b}	Identification and Control Requirement & Monitoring Capability → P V of written test process	-.444	.002	Not Supported

Source: Field Data, 2015

CHAPTER 7

QUALITATIVE ANALYSIS AND DISCUSSION

7.1 Introduction

Upon doing a quantitative analysis of the registration and written test exams using the constructs of the PVT, this section provides the qualitative analysis of the other activities such as the eye test, the practical test and the driving sign test. It further discusses the nature of virtualization at the DVLA.

7.2 Why did the DVLA Virtualize its Processes?

Since 2002, the DVLA began the written test exams as one of the processes that lead to the issuance of a drivers' license. In this regard all the DVLA offices nationwide were required to conduct written test exams to prospective license owners. During this period of writing the manual exams, the pass rate nationwide was between 70-95%. This high rate is in sharp contrast to the over 90% of road caused as a result of human factors; like unqualified drivers using the road. The National Road Traffic Fatality indices indicated that Ghana's fatality rate as at 2009 was approximately 21.72 per 10,000 vehicles. It became expedient to conduct a survey on the way the written test was administered and subsequently the issuance of licenses. One interviewer assets:

"Basically, the rationale for automating the written test is due to internal and external factors. Internal factors include corruption among DVLA officials, elimination of middlemen "goro boys" and inefficiency. External factors include the DVLA meeting international best practice standards in the administration of test." (DVLA interviewer 1)

In 2010, nationwide survey showed that the manual exam was characterized by fraud, impersonation, leakage of exam questions, human interferences and other credibility issues. In lieu of these challenges, the authority introduced innovative ways that would ensure transparency and credibility in the administration of tests, hence the introduction of the Computer-Based Theory (CBT) test in 2012. Aside this the DVLA also introduced the online registration for any of its services so as to reduce the long queues at their offices. The motive behind this innovative method is to meet the international best practices, introduce efficiency in the driver license administration, and improves credibility in the driver license acquisition and to provide accurate data on driver license applicants. The CBT was to replace to manual written test.

7.3 Registration and Process Virtualizability

Per the procedure of the DVLA, the process of acquiring a new driver's license begins with an online registration. The process starts online and ends manually. In view of this the researcher critically probed the rationale for doing this. With a mandate of providing services to citizens on behalf of government, the DVLA has put in place measures to provide efficiency in service delivery. In view of this, a customer who wants to access DVLA services such as applying for a new driver's license has to register online. Things are done this way to bring effective service delivery to DVLA customers. The position of efficient service delivery is strongly supported by one of the informants:

"We introduced the online system or the automated system to provide efficient and effective service delivery to our clients and also reduce the workload of officials. With the new online system, almost 80% of the work such as registration is done by the customer online. Another reason is that over the years we have been in the center of corruption allegation leveled against

us we have see that most of our officials connived with candidates to manipulate the process of acquiring a license." (DVLA respondent 2)

This position is strongly supported by the fact that the manual method used previously to register and write exams had a lot of setbacks such customers cheating in the exams and delays in service delivery resulting in long queues at the offices of the DVLA. Aside from this, the DVLA believes that the automation of the process is in line with international best practices.

There are however, some divergent views as to why the entire registration process cannot be fully virtualized. The DVLA is mandated under section 26 of the Driver and Vehicular Licensing Authority ACT 1999 (ACT 569) to make regulations relating to driving of motor vehicles. This includes guidelines for issuance of drivers' licenses etc. These regulations stipulate requirements needed for the various services rendered by the DVLA. For instance in case of registration, Regulation 29 of the New Road Traffic Regulation, 2012 (L.I 2180) demands the physical presence of applicants who are applying for a new drivers' license. To this, one informant strongly affirms that

"We work in the confines of the law. The regulations are there to guide us in our mandate of ensuring best practices for licensing and promoting road safety. However in the absence of the law, we have regulations that guide our operations. In any case, you and I know that there are a lot of fakes in the system. In view of that, we still require the physical presence of the applicant. I know our customers will wish to do everything online and even get the license online, but it is not possible. We have to see you, examine you and make sure you are who you said you are." (DVLA respondent 1)

Even without fully virtualizing the registration activity of the new driver license acquisition process, it offers some form of convenience to the customers. For the fact that customers can register for their services online without joining long queues as done previously was laudable. This is evidenced by what informants said (interviewee 6, 7, 8, 9). One informant had this to say:

"I actually heard you can register online, make payment at the bank before going to the DVLA office. I actually registered using my laptop and then latter printed out my invoice. I have been able to avoid the long queues. It was really fun. I think the DVLA is doing a very good job." (Interviewee 8)

Conversely, requiring the physical presence of applicants does not go down well with some respondents. One group of interviewees (Interviewee 2, 3, 5) believes that once you have been able to start the registration process online which you do in the absence of DVLA officials, there is no need to complete the process at the DVLA office. To this group of interviewees, the DVLA is not able to fully exploit the benefits that information systems afford.

"I don't know why the DVLA still needs my physical presence even when I registered online. I don't think it is important because I will still have to travel from wherever I come from to the office of the DVLA."(Respondent 3)

7.3.1 Written Test and Process Virtualizability

Although the variables used in the written test were measured in the quantitative analysis, the researcher further probed from the perspective of the DVLA management why the written test has migrated online. The researcher again interviewed some customers through the use of focus groups to give support to the quantitative findings. It is important to state here that the challenges faced during this phase led to the automation of most of the services of the DVLA.

Over the years the DVLA faced challenges in relation to the administration of the written test exams which is one of the core activities that every license applicant must undertake per the DVLA guidelines. Some of the challenges faced by the previous manual process were leakage of exams questions, bribery and corruption scandals which resulted in a higher pass rate of the candidates. An informant shared this view on the virtualization of the written test exams:

"*The whole idea is to eliminate corruption in the system and make the system easier for our customers.*" (DVLA respondent 2)

Prior to the introduction of the automated exam system, management recorded a very high number of people who passed the previous paper based test. It became evident that some corrupt officials took the exams on behalf of candidates and then issue them with licenses after collecting money from them. These happenings at the DVLA resulted in an increased number in road accidents. As part of measures to curb the situation, management introduced the automated exam system. Subsequently, there has been a significant reduction in the number of people who passed the exams. Aside from this, it has minimized the work load of management and offers efficiency in the delivery of services to clients.

"*We have made the web based test (CBT) very transparent. I don't need to go round and see if everything has been done right because I trust the CBT."* (DVLA respondent 1)

With this position it is evident that information systems have taken over the prior physical inspection done by the officials of the DVLA. The manual process requires officials to visit the various exams centers to see to it that things are done right. This result affirms a prior study by Overby (2008) that a process is considered as virtualized if an information system has taken over the human aspects of it. Currently there is a reduction in fraud cases, impersonation and leakage

of exams questions. Consequently the pass rate dropped from an average of 70% to an average of 50%.

Just as with most distance education courses, the primary intention of management was to allow candidates sit in the comfort of their homes and take the exams. This priority however changed in respect to best practice policies and ensuring the credibility of the exams. One respondent had this to say:

"There was a time we asked ourselves why can't the applicant take the test in the comfort of their homes? But then we are not sure who is taking the test. Someone could call on another person; an experienced driver for instance, to take the test for him/her. Because we want fairness and accuracy, the person has to come to our center and take the exams." (DVLA respondent 1)

Currently, the learner test is partially virtual. This is in the sense that the test is only accessible on the DVLA intranet. As a result, candidates cannot access the test everywhere. While this phenomenon might be attributed to inadequate funding, the management of DVLA does not think so. Administering the test in their offices is part of regulations guiding the operations of the DVLA as spelt out in L.I 2180. One respondent had this to say:

"Demanding that candidates come to our offices to write the exams is part of our mandate as spelt out in the L.I 2180. The thing is if there is enough money to spend in making the entire process fully virtual, we still need the physical presence of the candidates. We need to ascertain their true identity before they take the test." (DVLA respondent 1)

Apart from the views and responses by DVLA management, the researcher also ascertained views from license holders (citizens') with respect to the online written test. One informant that

used the online test explicitly stated that he feels more secure with online exams since it gives no room for manipulation what so ever.

"Compared to the manual exams where you will have to wait for the exams to be marked manually to know whether you have passed or not; with this online exam, I was able to know my exams score just seconds after I took the test. This procedure I believe will go a long way to eliminate corruption that has engulfed the DVLA." (Interviewee 5)

7.3.2 Eye Test and Process Virtualizability

As discussed in previous sections, the eye test exam is one of the many activities in the acquisition of a new drivers' license (See Chapter 3). This activity requires the physical presence of a prospective license owner at the designated DVLA office. Specialists examine the visual capabilities of the candidate and determine whether the candidate is fit to drive on the road. Within this activity, some independent constructs of the PVT comes into play. The physical presence of the candidate is required, the candidate is further required to see and touch some symbols as directed by the instructor or eye specialist. Aside from this is the possibility of candidates establishing personal relationships with those in charge of the eye test, as candidates will also like to socialize and make new friends through identification of various people at the designated places.

In the case of the manual process used in the eye test examination, we probed for the reasons behind such a decision and why it cannot be virtualized. While some of the activities can be conducted from a distance using the Internet (some cases using the intranet), the fundamental question was why is it that the eye test examination requires the physical presence of the candidate? For one group of interviewees (interviewees 1, 2), it was revealed that the rationale

for the physical presence of the candidates was to check for the true reflection of the results (i.e. ensuring trust). While it is possible to have the test at a different location, it is crucial for the DVLA to be able to issue a license to people who truly qualify for it. One of the interviewees responded:

"With ICT now you can do a whole lot of things. Our concern is that we need to trust the results of the eye test. So by coming to the DVLA approved offices for the eye test, our personnel are able to determine whether a candidate is qualified to drive on our roads or not. We cannot allow blind people to drive on our roads. This is one of the reasons why we cannot do everything virtual. In any case we have fake doctors all over the country and they can fake eye test results to us." (DVLA Respondent 1)

The issue of trust seems to be pivotal with the results that the DVLA needs. Arguably the DVLA has done thorough preliminary checks on the pros and cons of this issue. Since a country like Ghana is still developing and it has become a major challenge to crack down on illegal doctors, the conclusion was to have all customers and prospective license owners come into the DVLA premises and do the eye test (myjoyonline.com, 2010). Inherently there are certain processes that cannot just be virtualized especially in Ghana since certain conditions are only demonstrable in the physical environments.

In the case where each process involved in acquiring a new drivers' license is regulated by law, it will be very difficult to violate such laws. Some of the laws guiding the issuance of new drivers' license demand the physical presence of applicants. Poor eyesight is regarded as one of the causes of road accidents on Ghanaian roads hence the legislature that regulates these processes. For instance Regulation 29 demands the physical presence of candidates to take an eye test. This

aspect is very critical because people with visual problems cannot be allowed to drive on public roads. If they are allowed, they endanger the lives of other road used. One respondent adds:

"We have researched and seen that poor eye sight is a major cause of road accidents in Ghana. In this view, we critically examine the eyes of all our candidates and determine whether they are fit to drive on our roads or not." (DVLA respondent 1)

Furthermore, migrating the eye test exams unto the online platform will give room for several privacy issues; since eyesight results will have to be uploaded online. This is because the results might end up with unauthorized persons. Inasmuch as the DVLA concern of the DVLA is to provide efficiency in providing services to their clients through the use of information systems, these developments will however not eliminate the physical presence of clients at their offices. Currently, there is an ongoing study to examine how to integrate the eye test exams unto the current DVLA system. Primarily, this new system when implemented will perform an examination of the candidate and provide a score. This has become imperative as a result of the falsified eye test results which the DVLA has had in the past. Nonetheless, this new system will still require the physical presence of a candidate.

"We are planning to integrate the eye test system so that the person examining your eye will be able to authenticate your results indicating that you passed. In case of accidents involving eye sight problems, we will be able to track who tested the applicant." (DVLA respondent 2)

In the case of the customers who patronize the services provided by the DVLA, they would prefer to establish personal relationships and conversations with whoever is attending to them. While some may want to ask further questions, some are interested in establishing personal relationships. Some customers do prefer coming to the DVLA offices. For one group of

interviewees (interviewees 5, 6, 7, 10), they would prefer to visit the designated DVLA office and interact with officials since the online systems have a tendency to fail.

"The issue of Internet connection in Ghana is a major problem. Sending my health information online is not even the best in the first place. To be on the safer side, I don't mind travelling to the DLVA office to have my eye test. At least I am told right there whether I have passed or not. So there's no big deal." (Interviewee 7)

Conversely, there were some respondents (Interviewee 8, 9) who would prefer the online eye test procedure. This group of people thinks less of the manual process of queuing for long hours at the DVLA offices hence they tend to either use the Internet to send their eye test results over to the respective DVLA office. In this case the more they want to use the Internet to send their eye test results, the more amenable the process would be to virtualization.

"I have seen situations whereby you will have to stand in long queues for hours to go for your eye test and other stuff like that. This is a problem for me because I can see an optician, and then send the results via the Internet to DVLA through a secured server. I could use those times I have spent joining long queues to do something more productive." (Interviewee 9)

7.3.3 Driving Sign Test and Process Virtualizability

The driving sign test requires taking the prospective license owner through road signs. This activity also requires the physical presence of a prospective license owner at the selected places. Probing into this activity requires that questions are asked in relation to the applicable constructs of the PVT.

In the case of the physical process used in the driving sign test examination, we investigated the reasons behind such decision and why it cannot be virtualized. For one group of interviewees (interviewees 1, 2, 3), it was revealed that the activity needed the supervision of the DVLA officials. This is because it is one of the requirements in acquiring a drivers' license, and the DVLA could do nothing but demand the physical presence of the prospective license owner. The candidate needs to be scored since it was an exam and that it needs to be supervised or else the integrity of the exam could be undermined. To some of the respondents, it is mandatory and they cannot do anything about it. One of the interviewees argued:

"Everybody will pass the exams if we asked them to do it online. The Internet can help them pass the exams and that will not be a true manifestation of the knowledge of the candidate. Although it might be inconvenient to some candidates, there is a price to pay for everything and they need to pay the price to acquire a drivers' license." (DVLA Respondent 2)

Some respondents believe that virtualizing the entire license acquisition process will not be possible. Arguably the conclusion they want to draw in such an instance is that we cannot virtualize all the processes and that the physical presence of the candidates is required no matter what. The regulations in the L.I. 280, demands the physical presence of candidates to determine their ability and understanding of the various road sings.

"When you drive on the roads, the signs talk to you. So you are in constant communication with the road signs. Otherwise you may find yourself at the wrong side of the road. The Internet affords us the opportunity to migrate most of our services online. But the truth is that we cannot do away with the physical presence of the people we serve." (DVLA Respondent 1)

Conversely, the customers demand the sign test be conducted the same way the written test is conducted. Some customers are of the view that both processes could be merged into one process. When this is done, the entire process of acquiring a new drivers' license will be reduced which subsequently will reduce the workload of the employees and bring more efficiency to the system. Maintaining this stance, one respondent had this to say:

"It is important to have efficiency in service delivery. If the DVLA wants to achieve this, what prevents them from merging the written test and the road sign test? It is just about adding the road sing questions to that of the written test questions. In any case, some of the written test questions are road sign questions." (Interviewee 9)

7.3.4 Practical Test or In-traffic Test and Process Virtualizability

The practical test requires that applicants drive through selected roads to ascertain his/her practical driving skills. In relation to the constructs of the PVT, applicants could establish personal relationships, they are also able to see and operate the vehicles they will drive. To a large extent, these construct have the tendency of either enabling or hindering the virtualization of the practical test. The researcher investigated why this activity is conducted manually while others like the written test and registration are conducted online. Having already been able to successfully automate the written test and still piloting other processes, it is the long term goal of the DVLA to virtualize the practical test as well. However funding happens to be one crucial hindrance to this project; a position that one respondent holds:

"Cost is one major challenge why this process is conducted manually. Currently, nothing is being done about automating or integrating the practical test unto the online environment. In any case we don't even have the technology to make this possible."(DVLA respondent 1)

Although the reasons vary in relation to the amenability of some of the processes, lack of appropriate technology and financial constraints hinder the amenability of the practical test. Migrating the various license acquisition process is been done in phases. Nonetheless funding obstructs the implementation of this phase of the new driver licensing acquisition.

Some customers shared similar views with regards to the manual practical test since it is not a bad idea. Even though the test could be simulated onscreen, it is best to take the test manually. To some though information technology helps to make work easier; there are some things that we do not need information technology to do. The practical driving test provides them with the opportunity of testing the skills they have either learnt in driving school or have acquired on their own. This is clearly demonstrated by one of the respondents who believe the simulated practical test is arguably a waste of money.

"This is common sense. I wouldn't be driving my car using some computer screen. It doesn't make sense. I need to drive on the road since it will boast my confidence. IT cannot do that for me, so I see nothing wrong with the staff of DVLA supervising me to drive so I can get my license."(Interviewee 9)

One other concern of respondents as to why they will prefer the manual driving test is the unreliability of Internet connectivity. One group of informants (interviewees 5, 6, 7, 8, 9), concurred that the bad Internet connection in Ghana could be a major hindrance to them since the unstable Internet connection could disrupt their test and cause delays in issuance of licenses.

"Yes, it is a common problem in Ghana. Internet connectivity is very bad in Ghana. This minute the Internet is on and before you realize it is off the next minute. How can you do something like that using unreliable Internet? It is going to be a disaster."(Interviewee 7)

7.4 Discussion of Case Findings

Findings in this section further explain prior quantitative findings. The qualitative approach was deliberately used to answer questions that quantitative method could not answer. This finding is also an attempt to answer the first research question in the introductory chapter; thus the nature of virtualization at the DVLA; and further give more support to the second research question. The findings of the case study are presented in lessons.

7.4.1 Benefits of Virtualization

There are several benefits government derives when it virtualizes its processes. From the analysis it was realized that engaging in processes that require physical interaction between people and objects increase corruption among government officials. The analysis further showed that most DVLA officials connived with candidates to manipulate the process of acquiring a license. The introduction of information systems which has enabled some of the processes to be virtualized (especially the written test) has reduced corruption among government officials. This finding tends to be consistent with previous research. For instance Mistry and Jalal (2012) contend that with the use of Information Systems in government engagement processes, corruption decreases. Similarly, Heeks (2002) opined that government online processes bring about transparency in the delivery of services.

Secondly is the virtualization of written test process as well as the written test exam has brought some level of efficiency in the operations of the DVLA. The long queues that were recorded in the past have been reduced drastically because majority of the work has been shifted to information systems; which implies that users making use of the information systems. This finding is congruent to past studies by (Chun et al., 2010; Nam, 2012) who argue that putting

government services online enhances work efficiency, provides accountability and provides convenience to users (Heeks 2002).

Lesson one: Process virtualization in the government sector can reduce opportunities for corruption and provide convenience in service delivery

7.4.2 Nature of Virtualization

Virtualization of DVLA's processes is done in phases. The virtualization started with the registration and online test in the year 2012. These proccesses were pilot tested gradually before covering the entire country. This discussion confirms previous studies that organizations that are successful in providing new services to their customers most often keep the service development on an ad hoc basis (Bitner et al., 2007). Stated differently, the new service (virtual) should not wipe out completely the old service (manual). This is manifest in the data presented in the analysis as the DVLA first started the pilot test in Accra and gradually wiped out the mnaual test. Overby et al. (2010) also argued that virtual and physical manifestations of the same process could exist in parallel, so people can choose between them or use both. In the case of the DVLA the online written test started in the greater Accra Region and then it was gradually implemented in the other regions. Management of the DVLA have projected that by the end of 2015 the final region Northern should be integrated to write the online test.

Lesson two: Organizations who want to migrate to virtual environments integrate the process gradually

7.4.3 Challenges of Virtualization at the DVLA

It has been established from previous chapters that governments invest huge amounts of money in putting their services online. While some of the processes require minimum amounts of

money (i.e. setting up a website to collect citizen information), others require heavy investments (i.e. e-taxation). From the analysis, it was established that financial constraints hinders the virtualization of some of the DVLA processes (e.g. virtualizing the in-traffic test). This form of process requires investment in heavy machinery since it will require some 3D effects. This is because the customer must be able to interface with the computer by making use of the various senses. This finding is not different from the findings of Bailey & Ngwenyama (2011). They found at that challenges that confront the development of e-government is low-income and technology challged citizens.

Lesson three: Financial challenges and the lack of technology hinders the virtualization of processes

Again, from the analysis, it was realized that government laws and other government regulations go a long way to hinder the virtualization of DVLA processes. In instances where the regulations require the physical presence of citizens when applying for a license, it will only take an amendment or otherwise revocation of these regulations to enable the full virtualization of the processes identified.

Lesson four: Government regulations in Ghana affect the virtualizability of a process

7.4.4 Forms of Virtualization

This discussion is congruent with ealier findings by Overby and Konsynski (2010). They opined that a fully virtualized process is not the best hence there is supposed to a blend of the physical process and virtualized process. This is termed as a hybrid approach. In the case of the DVLA, the process of acquiring a driver's license and registration follows the preposition made by Overby and Konsynski (2010). For instance, there is a part of the test that involves practical driving to ascertain how well one can drive. Aside from this, it is also important to see the

prospective driver's license owner at the offices of the DVLA where s/he is expected to take the various tests. In any case, when a candidate passes the exams, s/he needs to come physically to the DVLA office for his/her license. This is again inline with previous findings by Becker et al. (2010), who argued that although products might be sold and bought online, they need to be delivered physically to the customer.

Lesson five: It is not always the case for processes to be fully virtualized. A blended form is also necessary

7.4.5 Process Virtualization and Social Media

Previous literature posits that most e-government services that are centered on citizens have failed because of their unwillingness to patronize the service (Chan et al., 2010). This arguably, may result in users not being familiar with the online system. Hence, it will be difficult for them to use the services that have been provided online. In line with this it will also be difficult for the users to trust the online system since past literature points out that trust impedes the acceptance of government online services (Pe´rez et al., 2005).

Lesson six: Creating awareness of virtualized service is crucial to having a successful use of the system

7.5 Summary of Research Issues

Having focused on the purpose of the study, this section provides a summary of the major research issues in this study. Table 7.1 gives a summary of findings of the main research questions as outlined in the introductory chapter.

Table 7.1: Summary of Research Issues

Main Research Issues	Matching Findings and Lessons
What is the nature of virtualization of processes in government-to-citizen electronic services?	The nature of virtualization at the DVLA first of all born out of a need. It started with a survey to investigate the challenges associated with the manual exams process. This was after the DVLA juxtaposed the number of those who passed the manual exams to the number of road accidents which were recorded. Evidence from the survey showed that fraud, impersonation, leakage of questions, human interferences were the challenges associated with the manual exams process, hence the introducing of a computer based test (CBT) in 2012. The CBT integration started in Accra, and currently been ended in the Northern Region of Ghana. By this process, the manual process of registration and writing exams has been eliminated In summary, the virtualization of the DVLA processes, are in four major strands. Thus reduce corruption in the system, improve work efficiency, promote good record keeping and enhance transparency
Which factors enable or constrain the virtualization of processes in government-to-citizen electronic services?	The process of license acquisition has been broken down into activities. The registration process and written test for instance have been tested and seen to be amenable to virtualization; thus from the perspective of the citizens even though some sub activities within the process might not be amenable to virtualization some proved to be amenable. Interestingly, majority of the hypotheses of the written test process were supported while that of the registration process were not supported The in-traffic test and eye test for instance (from the government perspective) are not amenable to virtualization because of the financial constraints and laws that govern the process. This finding calls for a revision of the legislative instrument that regulates the process of acquiring a drivers' license

Source: Field Data, 2015

Table 7.2: Construct Outcomes

PVT Constructs	Status/outcome (Virtualizable or not virtualizable)
Sensory requirement of registration process	Virtualization is possible
Sensory requirement of written test process	Virtualization is possible
Relationship requirement of registration process	Virtualization is unlikely
Relationship requirement of written test process	Virtualization is possible
Synchronism requirement of registration process	Virtualization is possible
Synchronism requirement of written test process	Virtualization is unlikely
Identification and Control Requirement of registration process	Virtualization is unlikely
Identification and Control Requirement of written test process	Virtualization is possible
Sensory Requirement & Representation of Registration process	Virtualization is unlikely
Sensory Requirement & Representation of written test process	Virtualization is possible
Relationship Requirement & Reach of Registration process	Virtualization is unlikely
Relationship Requirement & Reach of written test process	Virtualization is unlikely
Identification and Control Requirement & Monitoring Capability of Registration process	Virtualization is unlikely
Identification and Control Requirement & Monitoring Capability of written test process	Virtualization is unlikely

Source: Field Data, 2015

7.6 Conclusion

The chapter provides an analysis and discussion of findings of the qualitative data. The analysis and discussion was to help in answering the research questions posed in the introductory chapter. The discussion on the findings from the analysis in relation to the research objective indicates that financial constraints and existence of legislative instruments make activities more unlikely to be virtualized (e.g. eye test and in-traffic test). Conversely activities such as the registration, and written tests are largely likely to be amenable to virtualization. The next chapter focuses on the summary, conclusions and recommendation of this study.

CHAPTER 8

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

8.1 Introduction

This study investigated what factors enable or constrain virtualization processes at DVLA. The previous chapter focused on the analysis and discussion of findings. The following research objectives as formulated in the introductory chapter guided the researcher to arrive at the current findings:

1. To explore the nature of virtualization of processes in government-to-citizen electronic services.
2. To understand what factors enable or constrain the virtualization of processes in government-to-citizen electronic services.

8.2 Summary of Research Findings

To address the research objectives above, this study began with the identification of some research gaps. First was to ascertain which factors enable or constrain virtualization of government-to-citizen engagement services. The study adopted a mixed-methods approach in order to unearth hidden truths in the process. Survey questionnaires were used as the main data collection tool for the quantitative analysis while a case study was used for the qualitative analysis. The study used DVLA as a case study. In all a total of 317 questionnaires were analyzed. Data collected from the survey was analyzed using descriptive statistics and hierarchical regression analysis. This study selected a public institution as a case study. The selected public institution is an e-government sub-domain. Further, the processes investigated were provided by a public institution and targeted for citizens. Thus the process belongs to the government-to-citizen services (Barth & Veit, 2011). This study has examined why some

activities involved in acquiring a new drivers' license were online while others were not. From the review of extensive literature and by choosing an appropriate paradigm and methodology, and analysis and discussion of findings in the previous chapter, the study arrived at some crucial findings.

From the analysis, the independent constructs of sensory requirement for both the registration and written test had a significant negative relationship on process virtualizability. This gives support to the fact that these processes can well suit the virtual environment. This is because citizens (license holders) were not concerned about the physical interaction that exists between the processes. Relationship requirement for the written test was not however supported but that of the written test was supported. Synchronism requirement for the registration process was also supported but that of the written test was not supported. Again, identification and Control Requirement for the registration process was not supported but that of the written test was supported.

In the case of the moderating constructs which were practically tested, the results showed that apart from the moderating effect of representation on sensory requirement and the PV of the written test process, all the other moderating effects were not found to be statistically significant. Within the confines of the moderating effects, it means that license holders did not place much importance on how IT can present them with relevant information relating to the written test process. What this indicates is that license holders will place much importance on the physical process involved rather than allow IT to mediate for them. Such a result was found to be disturbing.

On the qualitative front, there have been some interesting revelations. The nature of virtualization at the DVLA is primarily done in phases. Virtualization started after a need was realized. These needs range from preventing fraud, impersonation, corruption and providing efficient services to customers. First was to automate the written test process which started in 2012. This approach starts with one particular region at a time until all the ten regions in Ghana were actively moved onto the virtual platform. Furthermore, the virtualization of the DVLA processes, are in four major strands namely: reduce corruption in the system, improve work efficiency, promote good record keeping and enhance transparency.

It has also been observed that government regulations could inform the decision of government not to fully virtualize its processes. This is as a result of the laws that govern the issuance of licenses in Ghana. The legislative instrument that guides the operations of the DVLA requires the physical presence of candidates in most cases before licenses are issued. In lieu of this, removing the physical or face-to-face interactions involved in the process will require the amendment of the law and legislative instrument that governs the operations of the DVLA. Financial constraints have also been seen as a major reason why some processes (e.g the in-traffic test) cannot be virtualized. It is therefore imperative to state that these hindrances have the proclivity of modifying the PVT. Aside from this, the geographical location (Africa-Ghana) to a large extent has an influence on the practicability and realization of the exploitation of the PVT.

8.3 Conclusions

In general, this study contributes to the existing literature in the field of information systems and e-government research. It also has some unintended consequences of contributing to the body of knowledge on the migration of processes from the physical environment to the online

environment. It establishes important factors that influence the virtualizability of a particular process. The study was also able to establish that the constructs of the PVT all have peculiar characteristics on the virtualizability of a process. Six out of the fourteen hypotheses have proven to enable virtualization whiles eight of the hypothesis hinder virtualization. Furthermore, the study proved that the DVLA process virtualization was based on a need (i.e. Fraud, impersonation, corruption and efficient service delivery). This led to the introduction of a computer based test system to help reduce the challenges identified. The process of integrating all the regions in Ghana unto the automated system was done in phases. This has been done in order to have a coherence and proper integration of all the regions. The result of this study is not only unique and helpful to governments but also to businesses and companies who want to comprehend processes that they plan on virtualizing. From the fourteen hypotheses tested, six were supported which provides valid evidence of demonstrating the applicability of the PVT. To the best of our knowledge, this study is the first that has fully tested all seven constructs in the process virtualization theory.

8.4 Implications for Research

This research has made several contributions to research in the area of government-to-citizen, Process Virtualization Theory as well as government-to-citizen processes in Ghana. The study provides significant contributions to research, policy and practice. Details of these contributions are discussed in subsequent sections.

8.4.1 Contribution to e-Government Literature

All over the world governments are gradually virtualizing their process so as to make their services available and accessible to their citizens. In several countries there has been a growing pressure for government services to move online (Mostafa & El-Masry, 2013). While many

governments are putting in their best to virtualize their processes, the majority of these services are regarded as failures (Heeks, 2002). Practitioners have, over the years proposed a number of theoretical models to analyze the reasons for the failure of e-government projects. This study moved beyond analyzing the processes to analyze the activities within the process. The study contributes to the general body of knowledge in e-government by arguing that in order to minimize the massive failure of government projects, the projects should undergo an amenability test to show which ones can suite the online environment from the citizen's perspective.

8.4.2 Contribution to Process Virtualization Theory

The information systems discipline over the years has been criticized for relying on imported theories. As such IS scholars are advocating for new theories developed by IS scholars (Holmström & Truex, 2011). One such IS owned theory is the process virtualization theory which formed the theoretical background for this study. A recent study on the systemization of the process virtualization theory in IS literature showed that empirical studies of PVT are lacking (Balci, 2014). This study adds to the few studies that have used the PVT in a single study. In lieu of this, the findings contribute to the information systems discipline. This study will advance our knowledge of the information systems discipline in relation to processes within various contexts.

8.4.3 Contribution to Government-to-citizen Processes in Ghana

To the best of the knowledge of the researcher, this is the first study that has used the PVT in a single study that focuses on a government institution. Having said this, this study will go a long way to help agencies and institutions that act on behalf of governments to know which processes they can send online. This is because this study has shown that the DVLA cannot send all its

processes online. In view of this it will serve as a map to other agencies and institutions to consider testing the process to see whether it will be suitable for the online environment or not.

8.5 Implication for Policy

For policy, the results of the study points to a better understanding of policy makers in sending government-to-citizens engagement processes online. The study provided the factors that predict the amenability of government-to-citizen processes. Moreover at an organizational level, policy makers can rely on the PVT to determine the amenability of future processes.

8.6 Implications for Practice

For practice, managers at various government institutions can learn how the PVT can be used to study processes that need to be virtualized. Arguably, this is the first study that used the PVT from an African perspective. The finding from this study will help practitioners in overcoming the massive failure that has characterized e-services especially in African countries (Elkadi, 2013). It is without doubt that institutional forces and pressures have resulted in the decision to automate some of the processes of DVLA; hence citizens are compelled to use the automated services. Similarly, government policies have also forced some of the processes to be partially virtual.

8.7 Limitations and Future Research

The study is limited to the Greater Accra region (Ghana) with majority of the respondents coming from the University of Ghana. The study only covers a section of citizens who own drivers' license. Other regions have not been captured in this study. Again all the respondents hold at least a senior high school certificate, a degree or a PhD. Hence future research can cover other regions (e.g. a rural context). Future research can employ the behavioral theory and process

virtualization theory to determine the behavioral relation with PVT. This work is not in any way exhaustive. The findings and lessons are stepping stones towards analyzing and virtualizing processes as well as to determine outcomes of an already virtualized process. Future research should look into cloud computing and the process virtualization theory in e-government since it is evident many government are also considering cloud computing (Fathey & Othman, 2014). Future research could introduce some control variables such as gender and age improve the current work.

8.8 Recommendations

It is evident from the results presented that there is inadequate public education of the online services provided by the DVLA. Approximately 31% of the participants in the survey are not totally aware of the services provided by the DVLA. The high number of those aware of the services is attributed to the sample used (the majority being master degree holders). It is therefore for the public to be informed adequately about the benefits they can derive from the online system and hence patronize it.

Except for the DVLA official website, the authority does not have any form of official social presence. Most of the time, information delivery to the public is through word of mouth. In the advanced world like the UK, the DVLA has a heavy presence on all social websites like facebook, twitter, YouTube, DVLA Digital Services Blog, and LinkedIn. In this regard it is recommended that the DVLA have some social presence to drive traffic to its site. This will increase the level of awareness.

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Appendix A

Introduction: This questionnaire forms part of an MPhil research work being carried out at the University of Ghana Business School (UGBS). The study seeks to solicit information, opinions and perceptions on the virtualization of government-to-citizen engagement processes by using DVLA as a case study.

I am therefore seeking your views and perspectives on the virtualization of some services that the DVLA provides. The study is purely for academic purposes, the information you provide will be kept in strict confidence, and that your name will not in any way be associated with the comments you make.

NB: *A virtualized task or process here involves the removal of the physical interaction aspects that have traditionally characterized it. In another regard it is when we shift a human beings responsibility of a process to an information system.*

Background information

1. Gender: a. Male b. Female
2. Age: a. 18-24 b. 25-30 c. 31-35 d. 36-40 e. Greater than 40
3. Educational Background: a. High school b. Bachelor's degree c. Master's degree d. PhD e. Professional degree f. Others, please specify ……

Service awareness

4. Are you aware of the services provided by DVLA online?

a) Yes
b) No
c) Somewhat

5. For how long have you been aware of the DVLA online services?
   a) 1-6 months
   b) 7-12 months
   c) 1-2 years
   d) More than two years
   e) I can't specify the duration

Registration process

Sensory requirements

They are explained as your ability to enjoy full sensory requirements (seeing, hearing, smelling, touching and tasting) of a process.

6. Please indicate the extent to which you agree or disagree with the following statements?

Sensory Requirement	SD	D	N	A	SA
Sens1: I prefer to pick up my registration documents from the DVLA office	1	2	3	4	5
Sens2: I prefer to fill my form with pen and paper	1	2	3	4	5
Sens3: I feel more comfortable when I hold and submit my registration forms	1	2	3	4	5
Sens4: I prefer getting immediate feedback on my registration status	1	2	3	4	5
Sens5: I need to touch and verify registration documents before filling them out	1	2	3	4	5
Sens6: While I am doing my registration, I like to be able to see and touch registration documents	1	2	3	4	5

Relationship requirements

This is explained as the need for a process participant to interact with one another in a social or professional context.

7. Please indicate the extent to which you agree or disagree with the following statements?

Relationship Requirement	SD	D	N	A	SA
Rel1: I enjoy socializing with other people at the premises of the DVLA	1	2	3	4	5
Rel2: I enjoy having personal contact and informal interaction with the responsible employees	1	2	3	4	5
Rel3: I would like to call for assistance and advice from the responsible personnel	1	2	3	4	5
Rel4: I enjoy my physical presence at the offices so that I can ask the names and contacts of the responsible personnel	1	2	3	4	5

Synchronism requirements

These requirements are defined as the extent to which various activities that are in a process need to occur quickly with minimal delay

8. Please indicate the extent to which you agree or disagree with the following statements?

Synchronism Requirement	SD	D	N	A	SA
Syn1: I like to submit my form immediately I complete it	1	2	3	4	5
Syn2: I think that my registration will be faster using an online method	1	2	3	4	5
Syn3: I like to pay my fees at the same time	1	2	3	4	5
Syn4: It is important to me that my registration process is carried out as soon as possible	1	2	3	4	5

Identification and control requirements

NB: They are defined as the degree to which a given process requires a peculiar identification of process participants and the ability to exert control over/influence their behavior

9. Please indicate the extent to which you agree or disagree with the following statements?

Identification and control	SD	D	N	A	SA
ID1: I like to take note of other people who come to register	1	2	3	4	5
ID2: I like the staff of DVLA to recognize me	1	2	3	4	5
ID3: I would like to know who receives my forms	1	2	3	4	5
ID4: The online system used for registration is not safe	1	2	3	4	5
ID5: I don't have control over my personal information and data while registering online.	1	2	3	4	5

Representation:

NB: This is an IT construct

It is defined as "IT's capacity to present information relevant to a process including simulations of actors and objects within the physical world, their properties and characteristics, and how we interact with them.

10. Please indicate the extent to which you agree or disagree with the following statements?

Representation	SD	D	N	A	SA
Rep1: I can get information about the registration online	1	2	3	4	5
Rep2: I can use the Internet to register for my license	1	2	3	4	5
Rep3: I can use the Internet I can get all the requirements for registering	1	2	3	4	5
Rep4: The Internet notifies me if I complete my registration process	1	2	3	4	5

Reach

NB: This is an IT construct

It is IT's capacity to allow process participation across both time and space. With respect to reach across time, IT allows many processes to be conducted throughout the day

11. Please indicate the extent to which you agree or disagree with the following statements?

Reach	SD	D	N	A	SA
Reach1: I can register for my license at anytime	1	2	3	4	5
Reach2: I can register for my license at any place	1	2	3	4	5
Reach3: I can request for other services that I want	1	2	3	4	5
Reach4:					

Monitoring and Capability:

NB: This is an IT construct: IT's capacity to authenticate process participants and track activity.

12. Please indicate the extent to which you agree or disagree with the following statements?

Monitoring and capability	SD	D	N	A	SA
Mon1: I have to provide my bio data online	1	2	3	4	5
Mon2: My national ID card has to be confirmed	1	2	3	4	5
Mon3: I have to enter a valid email address	1	2	3	4	5
Mon4: The Internet is able to track my progress when registering	1	2	3	4	5

Process virtualizability: Process virtualizability is operationalized as process use; the degree of process usage.

Process virtualizability of registration process	SD	D	N	A	SA
Overall, online registration process supports my needs to manage my license acquisition process					
The online exams has completely replaced traditional method					
Overall, the online exams gives me control what I do					
I will rate the online process of acquiring a new drivers' license as satisfactory					

WRITTEN TEST PROCESS

Writing the exams

13. Which of the following methods did you use to write your exams?

a) Manual
b) Electronic
c) Partly did some online and did some in person

To what extent would you agree or disagree with the following statements based on writing the driving test?

SD=Strongly Disagree, **D**=Disagree, **N**=Neutral, **A**=Agree, **SA**=Strongly Agree

Sensory requirements

They are explained as your ability to enjoy full sensory requirements (seeing, hearing, smelling, touching and tasting) of a process.

14. Please indicate the extent to which you agree or disagree with the following statements?

Sensory Requirement	SD	D	N	A	SA
Sens1: I like to see where I am taking my exams	1	2	3	4	5
Sens2: I like to physically write with pen and paper	1	2	3	4	5
Sens3: I like to sit in an examination room	1	2	3	4	5
Sens4: While I am writing the exams, I would like to personally hear instructions given to me by instructors	1	2	3	4	5
Sens5: I like a panel to ask me questions after my test	1	2	3	4	5
Sens6: I like to see and touch my exams questions before I start writing	1	2	3	4	5
Sens7: I need to provide my bio data during registration	1	2	3	4	5
Sens8: I like my documents to be endorsed physically	1	2	3	4	5

Relationship requirements

This is explained as the need for a process participant to interact with one another in a social or professional context.

15. Please indicate the extent to which you agree or disagree with the following statements?

Relationship Requirement	SD	D	N	A	SA
Rel1: I enjoy making new friends at the exams center	1	2	3	4	5
Rel2: It is important for me to have a personal relationship with instructors	1	2	3	4	5
Rel3: I enjoy to mingle with other test candidates	1	2	3	4	5
Rel4: I like to be called by instructors/ invigilators when it's my turn to write	1	2	3	4	5
Rel5:I like to ask for clarity on questions	1	2	3	4	5

Synchronism requirements

These requirements are defined as the extent to which various activities that are in a process need to occur quickly with minimal delay.

16. Please indicate the extent to which you agree or disagree with the following statements?

Synchronism Requirement	SD	D	N	A	SA
Syn1: After the written test, I need to do an eye test and practical test	1	2	3	4	5
Syn2:I wouldn't mind to have access to my results after a few days	1	2	3	4	5
Syn3: It bothers me, if I do not directly receive my license on time	1	2	3	4	5
Syn4: It bothers me, if my license is not processed after I pass my test	1	2	3	4	5

Identification and control requirements

They are defined as the degree to which a given process requires a peculiar identification of process participants and the ability to exert control over/influence their behavior

17. Please indicate the extent to which you agree or disagree with the following statements?

Identification and control	SD	D	N	A	SA
ID1: I like to take note of other test candidates	1	2	3	4	5
ID2: I like to alter my answers when I deem it right	1	2	3	4	5
ID3: I like to know the examiners and invigilators	1	2	3	4	5
ID4: I like to identify where and who I pay my fees to before I write the exams	1	2	3	4	5
ID5: I like authorities to confirm my identity before I take the test	1	2	3	4	5

Representation:

NB: This is an IT construct

It is defined as "IT's capacity to present information relevant to a process including simulations of actors and objects within the physical world, their properties and characteristics, and how we interact with them.

18. Please indicate the extent to which you agree or disagree with the following statements?

Representation	SD	D	N	A	SA
Rep1: I can get information about my test when I am on the Internet	1	2	3	4	5
Rep2: I can get frequent update of the exams online	1	2	3	4	5
Rep3: I get to know the rules for writing the exams on the Internet	1	2	3	4	5
Rep4: The Internet allows me to know the results of my test when I finish writing	1	2	3	4	5

Reach

NB: This is an IT construct

It is IT's capacity to allow process participation across both time and space. With respect to reach across time, IT allows many processes to be conducted throughout the day

19. Please indicate the extent to which you agree or disagree with the following statements?

Reach	SD	D	N	A	SA
Reach1: I use the Internet to write my exams because it is more convenient	1	2	3	4	5
Reach2: The Internet allows me to have sample test exams before the real test	1	2	3	4	5
Reach3: I use the Internet to access information about test exams all around the world	1	2	3	4	5

Monitoring and Capability:

NB: This is an IT construct IT's capacity to authenticate process participants and track activity.

20. Please indicate the extent to which you agree or disagree with the following statements?

Monitoring and capability	SD	D	N	A	SA
Mon1: The online system will check for authentication before I write the test	1	2	3	4	5
Mon2: The system will have to grant me access before I start the test	1	2	3	4	5
Mon3:I will have to enter their reference number	1	2	3	4	5
Mon4: Supervisor will also enter a code to confirm that the applicant has the right to sit for the exams.	1	2	3	4	5

Process virtualizability: Process virtualizability is operationalized as process use; the degree of process usage.

Process virtualizability of written test process	SD	D	N	A	SA
I am satisfied with the process of writing my exams online					
Writing my test online increases the control of my process.					
Online written test process has completely replaced traditional process					
Through online written test, I save myself some time to do other things					

Your experiences ***(please answer question # 21 if you wrote the exams online; and answer question 22 if you wrote the exams manually)***

21. How would you rate the DVLA online written test?

Extremely difficult	**1**	**2**	**3**	**4**	**5**	**Extremely easy**
	○	○	○	○	○	

22. How would you rate the DVLA manual written test?

Extremely difficult	**1**	**2**	**3**	**4**	**5**	**Extremely easy**
	○	○	○	○	○	

23. Have you ever failed the online written test?

a) Yes
b) No

(If no, please answer question # 26)

24. If yes, how many times have you failed the test?

a) Once
b) Twice
c) Thrice
d) More than three times

25. If yes what are some of the factors that you think led to your failure?

……
……
……

26. Do you trust the online system in relation to writing your written test exams online?

a) I have no choice so I just have to trust it
b) No I don't
c) Yes I do
d) Somewhat
e) In fact I don't care

27. How would you rate the DVLA for the ease of use of their online system?

a) Excellent
b) Very good
c) Neutral
d) Poor
e) Very poor

Privacy issues

28. To what extent do you agree with the following statements when providing your background information on the Internet in acquiring your drivers' license?

Privacy	SD	D	N	A	SA
I fear my personal information will be vulnerable	1	2	3	4	5
I worry that others might access my personal information	1	2	3	4	5
I can manually provide my background information at the registration center	1	2	3	4	5

29. To what extent do you have challenges in using the online system to go through all the processes in order to acquire your drivers' license?

Challenges	SD	D	N	A	SA
Lack of constant power/electricity supply	1	2	3	4	5
I don't trust the online system	1	2	3	4	5
Poor Internet services	1	2	3	4	5
The website is sometimes unavailable for use	1	2	3	4	5
I am not very good in using a computer	1	2	3	4	5

30. How would you rate the outcome of the online process of acquiring a drivers' license?

a) Very good
b) Good
c) Poor
d) Very poor

31. How would you rate the outcome of the manual process of acquiring a drivers' license? **(Reverse-coded)**

e) Very good
f) Good
g) Poor
h) Very poor

32. Overall how would you rate your satisfaction with the online processes of acquiring your drivers' license? Please use a 5-point scale where 1 is Not Satisfied and 5 is Completely Satisfied

Not satisfied	**1**	**2**	**3**	**4**	**5**	**completely satisfied**
	○	○	○	○	○	

33. How would you rate your satisfaction with the manual process? **(Reverse-coded)**

Not satisfied	**1**	**2**	**3**	**4**	**5**	**completely satisfied**
	○	○	○	○	○	

34. How would you assess DVLA's website?

a) Useful
b) Very useful
c) Somewhat
d) Can't tell

35. What is your general perception about the online written test?

a) Excellent
b) Very good
c) Good
d) Bad
e) Very bad
f) Can't tell

36. How likely are you to use the DVLA website again?

a) Definitely
b) Probably
c) Might or may not
d) Probably not
e) Definitely not
f) Never

37. Would you recommend DVLA online services to others?

a) Definitely
b) Probably
c) Might or may not
d) Probably not
e) definitely not

38 To what extent would you agree with the following statement with the introduction of information systems in the operation of DVLA services?

Impact of Information Systems	SD	D	N	A	SA
IS has simplified the services provided by the DVLA	1	2	3	4	5
It has reduced corruption within the DVLA	1	2	3	4	5
Things are still the same. I think it is a waste of time	1	2	3	4	5
Information systems has ensured fairness in the examination	1	2	3	4	5
Information system has impacted the activities of the DVLA positively	1	2	3	4	5
It has caused more candidates to fail their exams	1	2	3	4	5

38. Which of these two modes of writing your exams would you prefer at any given time?

a) Manual process
b) Electronic process
c) Partially manual and partially electronic

Your expectations

39. What are your expectations of the online system?

……
……
……..

Appendix B

INTERVIEW GUIDE FOR DVLA MANAGEMENT

1. Background/Assessment
   1.1 DVLA background
   1.2 Why did the DVLA choose to virtualize its processes?
   1.3 How effective is the online license acquisition processes?
   1.4 What is the cost of sending the exams online?
   1.5 Why are some the DVLA processes still not virtualized?

2. Effect of online written test
   2.1 have people been laid off after you virtualized the exam process?
   2.2 Why are you blending both the physical and online processes?
   2.3 How would you compare the outcomes of those who use the online process to those who used the manual processes in acquiring a new driver's license?

3. Exams Registration
   3.1 What are the procedures for registration?
   3.2 What are the challenges faced during registration?
   3.3 Why are the other activities not online?
   3.4 Why the need of virtualizing the registration process?

4. Legal Issues
   4.1 Does the authority have any legal backing to send its services online?
   4.2 What are the legal instruments that back the operation of the DVLA?

   4.3 Do these legal instruments have any effect on how processes are virtualized?

5. Customer relations
   6.1 Do prospective license owners complain after going through the online processes?
   6.2 If yes why?
   6.3 What are some of the regular complaints you have received?
   6.4 What measures have been taken to solve them?

6. Support
   7.1 Does government support your operations?
   7.2 How often do you receive support from government?

7. Perceptions
   8.1 What is DVLA's perception of the online process?
   8.2 What do your customers (citizens) say about the online process?

8. Outcome
   9.1 What are the outcomes of the online process?
   9.2 How would you compare it with the outcomes of the manual process?

9. What are the future plans for the DVLA?