Accepted version (to be published March – April 2021)

*Citation (APA):*

Addo, A. (2021). Controlling petty corruption in public administrations of developing countries through digitalization: An opportunity theory informed study of Ghana customs. *The Information Society*, 37 (2),

**Controlling petty corruption in public administrations of developing countries through digitalization: An opportunity theory informed study of Ghana customs**

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**Abstract**

Despite myriad anti-corruption interventions, including digitalization-based efforts, petty corruption in public administrations of developing countries persists, undermining socioeconomic development. Extant research that links corruption to social and economic conditions has yielded inconclusive findings on whether digitalization can reduce corruption. Informed by opportunity theory from the field of criminology, which suggests that opportunities – rather than motives or systemic factors – beget crimes, we explore an alternative approach in this study: how digitalization could reduce the opportunities for petty corruption. We draw on a case study of the 30-year digitalization effort at Ghana’s customs administration based on fieldwork, including 91 in-depth interviews with current and former customs officials, importers, clearing agents, banks, regulators, and other stakeholders. Our findings suggest that information technology (IT) enables corruption control over time by reducing corruption opportunities through sociotechnical reconfiguration of work practices and organizational arrangements.

**Keywords:** petty corruption, digitalization, anti-corruption, public administration, developing countries, Ghana

# Introduction

Corruption occurs in governments around the world but is more prevalent in developing countries where it impedes socioeconomic development (Argandoña 2007; Klitgaard 1991; Olken and Pande 2012; Senior 2004; Treisman 2007). Commonly defined as the misuse of public office for private gain (Rose-Ackerman 1999), corruption has been understood by looking at specific forms it takes, e.g. grand versus petty corruption – bribes to high-level officials or the amounts involved (Lambsdorff 2007; Rose-Ackerman 1999); systematic versus venal – whether corruption is for political ends or for private economic interests (Toyama 2015); base versus permeated – whether corruption occurs among the elite in national institutions such as political, legal or media organizations or within service systems where businesses as well as ordinary citizens might interact day-to-day with government (Srivastava, Teo, and Devaraj 2016); and whether a corrupt individual acts alone, in concert with another, or with multiple parties (Muno 2013).

Petty corruption, as seen above, is one manifestation of the broader phenomena of government corruption (Carr and Jago 2014). Compared to grand corruption that often grabs the headlines because it involves large sums, petty corruption typically stays under the radar because it involves “soliciting or extortion of small payments by low level officials in order to expedite business by cutting through red tape; or to do what they are supposed to do anyway” (Doig and Theobald 1999, 3). In developing countries with weak, inefficient, and ineffective administrations, petty corruption is said to provide “much-needed grease for the squeaking wheels of rigid administration” (Bardhan 1997, p.1322). However, petty corruption is harmful for several reasons (Riley 1999; Seyf 2001), including its adverse effects on the poor and vulnerable who are made worse off by the “arbitrary tax” it imposes (Carr and Jago 2014). For example, in many developing countries bribes must be paid to receive treatment at public hospitals, to enrol a child in public school, to obtain a passport or driver’s licence, or to get police or judges to intervene (Riley 1999).

Government reforms in developing countries – under the belief that dysfunctional administration contributes to malpractices and petty corruption – have typically involved digitalization and concomitant reorganizations to improve functions like benefits processing, customs clearance, financial, and payroll management (Bhatnagar 2014; United Nations 2016; World Bank 2011, 2016).[[1]](#endnote-1) Yet, whether and how digitalization enables control of corruption in public administrations of developing countries remains open to debate. On one hand, digitalization has been depicted as a means to stamp out corruption and to transform corrupt institutions (Shim and Eom 2009; Srivastava, Teo and Devaraj 2016); on the other hand, it is claimed to be an amplifier of existing corruption (Toyama 2011, 2015) or to provide new corruption opportunities (Heeks 1999). Decades of case study research on information technology and government reform casts doubt on the idea that technology, by itself, can stamp out corruption or reform government (Danziger, Dutton, Kling, and Kraemer 1982; Dutton and Kraemer 1978; Kraemer and King 2006; Laudon 1974). In particular, studies have noted the difficulty of changing corrupt behaviours of government officers through digitalization (Davis 2004; Heeks 1999), or of making sweeping organizational and broader anti-corruption changes through a “big bang” approach (Addo and Avgerou 2021; Michael, Ferguson, and Karimov 2010; Rothstein 2011; Sundell 2016).

Against this backdrop, in this study we investigate how and why digitalization might enable the control of petty corruption in the public administration of developing countries without needing to change the corruption behaviours of actors or the organizational and broader context. Informed by opportunity theories of crime – that opportunities are at the “root” of offences (Felson and Clarke 1998), in this study we pursue the following research questions: (1) What opportunities exist for petty corruption to occur in the public administration of a developing country? (2) How and why might digitalization affect such opportunities for petty corruption? The questions are addressed with a case study of IT reorganizations and implementations of petty corruption control at Ghana customs over a 30-year period (1986-2015). Customs was chosen for study because it is regarded as one of the most corrupt public administrations (Walsh 2003; De Wulf and Sokol 2005; World Customs Organization 1993). Ghana customs was selected as the research site because it has been cited as a successful case of digitalization improvement in a developing country public administration (De Wulf 2004; World Bank 2010).

The article proceeds as follows. A critical review of relevant literature on digitalization and petty corruption is presented, followed by the theoretical framing for the study. The empirical sections are then outlined, along with a discussion section where this study’s contribution is articulated. The article concludes by reflecting on limitations of the study and implications for further research.

## **Digitalization and corruption**

Review of government corruption studies in relevant journals of information systems, e-government, management, public administration, and development, reveals mixed findings on the implication of digitalization because of varying conceptualizations of corruption (Addo 2019; Addo and Senyo 2020). Studies typically take the view that corruption is linked to social and economic conditions. They identify conditions such as the neopatrimonial context that conditions corrupt practices (Addo 2016; Addo and Avgerou 2021), weak institutions that incentivize corruption or impede enforcement (Andrews 2013; Turner 2013; van den Bersselaar and Decker 2011), and the lack of organizational enablers for successful digital transformation such as effective managerial controls and implementation capabilities (Bhuiyan 2011; Madon 1993; Masiero and Prakash 2015).

In studies on IT and corruption, the two most common approaches are observational studies and case studies (Addo 2019). Observational studies rely on corruption perception indices and their observed associations with quantifiable measures. Their findings suggest that IT in government reduces corruption (Andersen 2009; Mistry 2012; Mistry and Jalal 2012; Shim and Eom 2008, 2009), although the association between digitalization and corruption might be bidirectional as corruption also undermines digitalization and restricts the capacity required for successful digitalization (Aladwani 2016; Singh, Das, and Joseph 2007). Observational studies, however, typically do not provide rich explanation for observed associations; a limitation that case studies help to address.

Case studies suggest myriad ways IT might enable corruption control through its effect on controlling behaviour (Heeks 1998; Ramasoota 1998; Shim and Eom 2008, 2009), or enhancing transparency and accountability (Bertot, Jaeger, and Grimes 2010; Cho and Choi 2004; Corojan and Criado 2012; Kim, Kim, and Lee 2009; Relly 2012). Studies have also employed theoretical lens such as affordance (Stamati, Papadopoulos, and Anagnostopoulos 2015), surveillance (Ramasoota 1998), accountability (Relly 2012), panopticon (Heeks 1998), agency theory (Neupane, Soar, and Vaidya 2012; Neupane, Soar, Vaidya, and Aryal 2014), power (Introna, Hayes, and Petrakaki 2010), and deterrence (Shrivastava and Bhattacherjee 2015).

However, the actual experience on the ground casts doubt on the suggested efficacy of digitalization in curtailing corruption behaviour (Heeks 1999). For example, in spite of computerization of India’s public distribution system, widespread leakage persisted and corrupt officials continued to divert provisioning such as rice meant for the vulnerable poor (Masiero 2015). At the water board in Hyderabad, India, officers falsified entries to undermine an electronic system intended to streamline repair requests and to make processes more transparent (Davis 2004). Similarly, in Malawi, corrupt officials looted more money than ever after they manipulated a modern integrated financial management system intended to control government accounting practices (Baker Tilly 2014; Economist 2014). Given the limits of digitalization in changing corruption behaviours or the social and economic structures conditioning corruption, in this we study consider an alternative framing of how digitalization enables petty corruption control by constraining corruption opportunities in work arrangements.

## **Work arrangements as fertile grounds for petty corruption**

An assumption underlying our conceptual framework is that the widespread petty corruption observed in public administrations of developing countries is not adequately explained by individual agency (e.g. bad or immoral people, or people merely acting in selfish interest), nor by institutional deficits alone, but rather, derives in significant part from the “material arrangements” of work that give rise to corruption opportunities in the work system. Azad (2013, p.16216) has shown how “there is a significant material component to corruption; that the latter materiality is consequential … and that corruption can ‘metastasize’ and evolve” away from entrenched parties to others with changes in the material work arrangements. For example, in many developing countries since the era of colonial administration, excessive manual processes and widespread paperwork in everyday administration processes have necessitated face-to-face interactions between bureaucrats and service-seekers, as well as the intermediation of actors who might opportunistically exploit the resulting inefficient and ineffective processes (Addo and Avgerou 2021; Cantens 2013; Hull 2012a, 2012b; Syed and Bandara 2019). In addition to making effective managerial controls and oversight difficult, such manual, paper-based processes create useless, inefficient and ineffective bottlenecks in administrative processes – inducing petty corruption such as “speed money” or “grease money” – bribes for quicker service delivery (Bozeman 2000; Guriev 2004; Hors 2000; Kaufman 1977; Kaufmann and Wei 2000; Mauro 1995). The entrenchment of such corrupt practices recursively creates more inefficiencies and further undermines efforts to improve efficiency through technology-based interventions (Aladwani 2016; Hossan and Bartram 2010).

## ***Petty corruption in customs organizations***

Petty corruption types identified in customs organizations include bribery, extortion, “speed money”, kickback, cronyism, and collusion (Chalfin 2008; Ferreira, Engelschalk, and Mayville 2007; Hors 2001; Mclinden and Durrani 2013; Widdowson 2013). In their detailed study of IT and imports clearance at Ghana customs, Addo and Avgerou (2021) identify over 20 specific kinds of petty corruption carried out by government officers and other actors from the private sector and society at large. Petty corruption is enabled by preconditions such as secrecy to operate within a network of trusted accomplices, inefficient and ineffective processes and controls, and discretionary and coercive powers at the interface with citizens and businesses (Hors 2001). It is further driven by a set of factors that determine the associated risk versus reward (from the offenders’ perspective), and a set of material opportunities for realization. These characteristics are summarized in Table 1.

|  |  |
| --- | --- |
|  | **Attributes** |
| Parties per corruption transaction | * At least two, an offender and a target e.g. a taker and a giver of bribes |
| Enabling organizational factors | * Secrecy/ lack of transparency in administrative procedures * Wide discretion exercised by government officers * Monopoly over government services * Coercive powers of government officers |
| Motivational drivers | * Perceived as low risk-high reward by involved parties * Inefficient and ineffective formal processes, as well as high taxes and duties increase costs for service users who prefer to pay bribes to circumvent these |
| Corruption Opportunities via: | * Frequency of interactions between government officers and service users * Collocation of transacting parties in place/time * Weak monitoring/lax control of access to source of gains, e.g. accounts, records, service-seekers |

Table 1. Characteristic of petty corruption in customs administration.

## **The opportunity theory perspective**

In contrast to approaches that explain crime motivation through factors related to individuals or social contexts, opportunity theory sees opportunity at the “root” of all criminal offense (Felson and Clarke 1998; Wilcox and Cullen 2018). It has found support over decades of research on various forms of crime (Clarke 1983; Cohen, Felson, and Land 1980; Felson 2002; van Dijk 1994 ).

According to opportunity theory, for a crime to occur, two necessary conditions need to present: a motivated offender, and the opportunity for the offence. In effect, a motivated offender without opportunity will not commit a crime. This suggests that while both are necessary conditions, motivation is not a sufficient condition and opportunity can be a limiting factor. Empirical research shows how environmental changes for everyday activities, situations ,and settings, that reduce opportunities reduce offences (Clarke 1997; Clarke and Mayhew 1988). Opportunity theory has been called “environmental criminology” in view of its focus on the social and physical environment that creates opportunities for crime (Bottoms 1994). While displacement – the shifting of crime from one form or location to another – remains a risk, no study has found such displacement to be complete (Felson and Clarke 1998; Guerette 2009; Mayhew, Clarke, and Elliot 1989). This suggests that situational prevention and opportunity-constraining efforts produce gains, even if crimes are not stamped out completely.

From the opportunity theory perspective, a petty corruption offense such as bribery or extortion requires for its realization a motivated offender and an opportunity – a set of circumstances in the physical and social environment that enable an action in a given place and time. Petty corruption – sometimes called “incidental corruption” (Riley 1999, 190) – is an instantiation of a crime of opportunity arising through work routines, established practices, and work arrangements. As such, although motivated offenders (government officers inclined towards corruption) can pose a formidable challenge to anti-corruption efforts by finding or creating new opportunities, corrupt practices *per se* –especially at the system level – depend on the quantum of opportunities available and can be controlled by reducing them.

# Methodology

The customs office at Ghana’s largest port, the Tema harbour, was the primary research site for the case study. The harbour, which began operations in 1962, was a busy hub of complex clearance activities that involved declarants, customs officers, officers from over 20 government agencies, as well as staff from private companies such as banks and technology providers. Customs itself was much older, having existed since 1839.

The research focus was on work arrangements and petty corruption opportunities afforded by two customs digitalization initiatives, over a period of 30 years (1986-2015), centred on the ASYCUDA[[2]](#endnote-2) and TradeNet[[3]](#endnote-3). Customs was chosen because customs departments are known to be one of the most corrupt government entities in countries across the world (Cantens, 2012; Hors, 2001; Michael, Ferguson, and Karimov 2010; World Customs Organization (WCO), 2012). Further, in the case of Ghana customs, its TradeNet implementation has been cited as a successful case of public administration digitalization in a developing country (Adaba and Rusu 2014; Asuliwonno 2011; De Wulf 2004; World Bank 2010). The long-term 30-year view was taken because changes in public administration take a long time to unfold (Chang 2001; Schacter 2000).

***Data collection***

Data was collected between 2014-2016 during three field trips to Ghana that lasted a total of 8 months. The first trip in June and July 2014, was exploratory and helped identify relevant informants and data sources. The bulk of the data was collected between May and September 2015 after additional literature review and refinement of the research focus. During this second trip, relationships were formed with customs officers of various ranks, as well as other government officers and staff from private companies involved in trade clearance. From initial contacts with two senior customs officers and a senior official at the ministry of trade and industry, an additional set of 65 informants was identified through snowballing. The final round of data collection occurred between August and September 2016, enabling validation of themes that emerged in the course of interviews with informants.

Sixty-eight informants were interviewed from 12 stakeholder groups involved with customs clearance. A subset of 23 informants was interviewed specifically about the ASYCUDA operations in the 1980s and 1990s which had been eclipsed by subsequent developments. This smaller group of informants comprised of the most senior and experienced informants who were deeply familiar with the history of digitalization initiatives at Ghana customs. Informants were asked about how clearance practices had changed with digitalization, and whether experiences of petty corruption at the ports had changed because of technology use. Initial interviews were open-ended but slowly became more focused as themes began to emerge. Most of the interviews lasted about an hour, ranging between 30 minutes and 3 hours. They were recorded and later transcribed, or notes were taken when informants were reluctant to be recorded. From our interviews, we were able to triangulate findings to mitigate biases of informants. Table 2 presents an overview of informants.

|  |  |  |  |
| --- | --- | --- | --- |
| **Trade clearance stakeholders** | **Description of stakeholder** | **TradeNet interviews** | **ASYCUDA interviews** |
| Exporters | Entrepreneurs and businesses that sell goods and services outside Ghana. Case study focused on non-traditional exports like handicrafts. | 10 | 2 |
| Importers | Entrepreneurs and businesses that buy and move goods and services into Ghana. | 5 | 3 |
| Ghana Community Network (GCNet) | Public-private organization formed to design, develop, and implement IT systems for trade facilitation and revenue mobilization (TradeNet). | 6 |  |
| Ghana Customs Division | Focal organization of IS innovation. | 10 | 4 |
| Freighters/ Clearing Agents | Connects traders, IS innovator, and related stakeholders. | 4 | 2 |
| Shippers and Logistics Providers | International transport and logistics operators. | 4 | 2 |
| Destination Inspection Agencies (DICs) | Contractors dealing with inspection and valuation of goods. This function was previously performed by customs. | 5 |  |
| Ghana Ports and Harbours Authority | Management and operators of port facilities and related infrastructure. | 5 | 2 |
| Ministry of Trade and Industry (MOTI), Ghana Export Promotion Authority | Sets and implements policy related to trade. | 6 | 2 |
| Regulatory agencies e.g. Ghana Museums and Monuments Board (GMMB), Forestry Commission and Environmental Agency | Sets and implements national and international standards related to various aspects of trade. | 4 | 2 |
| Other players, e.g. banks and financial institutions | Facilitate sundry activities related to trade. | 4 | 1 |
| Experts, e.g. academics, World Bank consultants, policy analysts, business journalists | Outside perspectives on trade and development regime, IT, and organizational change. | 5 | 3 |
| Total interviews |  | **68** | **23** |

**Table 2.** Overview of informants.

Additional fieldwork data included research notes from direct observations of clearance operations, transcripts from workshops, and news clippings.

***Data analysis***

Using qualitative analysis software (Atlas.ti) to organize and code the data, our analysis traced clearance practices of customs during the ASYCUDA and TradeNet periods and examined various opportunities associated with petty corruption in each period. The sense-making technique of narratives was used to organize our data chronologically in accordance with the process orientation of our research (Langley 1999; Mohr 1982). Narratives provided rich exposition of particular activities and how and why they unfolded the way they did. Specific configurations of clearance document processing were identified, and configurations in adjacent periods compared to trace changes in corruption opportunities over time.

# Ghana customs: Changes in Sociotechnical Systems

Ghana relies heavily on its ports for government revenues. For example, in 2011 the state collected 37% of total revenues (tax and non-tax) through customs operations at the ports (Bank of Ghana 2012, p.2). This figure consisted of import duties, import VAT, and petroleum taxes. By 2020 although the proportion had declined due to changes in the fiscal and macroeconomic environment, revenues from customs duties and taxes was 10% of the national revenue (Bank of Ghana, 2020, p. 12).

The evolution of customs import clearance processes over the years is discussed below, delineated in three periods centred on changes in the configuration of the sociotechnical[[4]](#endnote-4) systems of Ghana customs.[[5]](#endnote-5)

## ***Patrimonial administration (Pre-IT period)***

The first period from about 1900 until 1986 was characterized by patrimonial administration[[6]](#endnote-6) where customs procedures were personalized, arbitrary, and entirely conducted on paper. Paper documents were bulky, slow to process, and the processes were error prone as each of the 30+ steps had to be done manually. Oversight was difficult, inconsistent, and lax.

Manual processing often involved face-to-face interactions between corruptible customs officers and anxious declarants. Tightly linked steps (steps that depended entirely on precedent steps) created hold-ups and bottlenecks that allowed officers to induce bribes. The government suffered revenue losses as tampering, falsification, and fraud were difficult to detect and check. One retired customs officer recalled:

Customs work in those days [before IT reforms] was very cumbersome. Everything was manual, and everything was paper. The systems did not work well because it was too burdensome, and officers capitalized … In terms of getting officers to do the right thing, it was almost impossible. The whole system was not transparent, even for the bosses at the top.

Another veteran customs officer recounted:

In the 80s … customs corruption was terrible … it was too easy to be corrupt and very hard not to. Some of us tried to do the right thing … but at the end of the day it was one man against the whole system. Many officers left the office each day with their car boots or briefcases full of cash. There were powerful networks of officers within customs who would collude and divide their “spoils” according to rank.

Automated System for Customs Data (ASYCUDA) was introduced to stamp out patrimonial malpractices and to improve data collection and transparency for the government.

## ***Bureaucratic administration (ASYCUDA period)***

ASYCUDA, used from the mid-1980s, improved revenue collections by enhancing document processing and statistical analysis (Castonguay 1999; Tettey 1997). It harmonized several paper forms needed for different commodities in the pre-IT period when a single declaration required several bulky paper documents to cover miscellaneous imports or exports. The enormous complexity created meant that backlogs, high error rates, delays, and missing documents were common as piles of paperwork moved across officers’ desks and from one station to another. ASYCUDA helped declarants to assess duties and tax obligations, with entries checked against harmonized item codes. However, paper still played a significant role as multiple paper copies had to be submitted to multiple agencies involved in trade processing as shown in Figure 1.

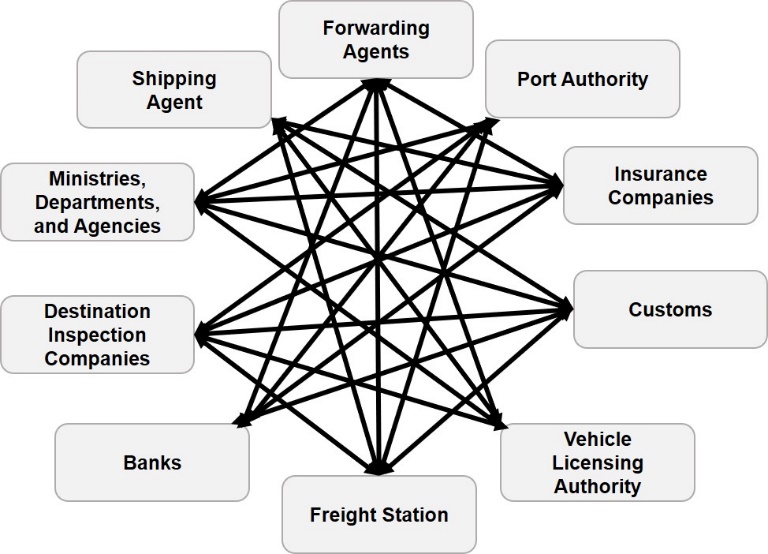


Figure 1. Inefficient data flows across government agencies via ASYCUDA. (source: Ghana customs)

The locus of SAD (Single Administrative Document) processing at customs was the “long room” – a hallway with rows of glass partitions (multi-window) where officers stationed to interact with declarants. The long room created an enabling environment where various corruption opportunities coincided in place and time. Although ASYCUDA automated aspects of document processing, various steps remained manual. As such, interactions between corrupt officers and declarants in the long room were still frequent, and unavoidable. Tightly-linked steps created opportunities for hold-ups and exposure to multiple corrupt officials; and the overall inefficiency and bottlenecks – requiring as many as 13-30 steps depending on various factors – created frustration and costs for declarants, hence, bribery opportunities. A senior officer indicated,

With so many steps, by the time you completed a single clearance process, chances were that you had encountered one or multiple corrupt officers who collected or expected bribes. At a minimum a declarant needed a lot of patience, and perfect paperwork, and even that could not save you.

ASYCUDA brought improvements but did not eliminate malpractices. A veteran officer observed:

ASYCUDA replaced a lot of what we did manually before and also helped us to more consistently classify and value goods. This not only improved our operations but also helped improve government data collection. But you know, there was still a lot of paperwork, and in many ways, IT speeded up how we already did things … problems remained, and officers still solicited and received bribes routinely.

## ***Public management (TradeNet period)***

TradeNet, a business-to-government electronic data interchange (EDI) that integrates clearance processing, was in use from 2004 – envisioned as a “single window” system for providing a “one-stop solution”. Its interface connected public and private stakeholders such as government agencies, destination inspection companies (DICs), and banks as shown in as shown in Figure 2.

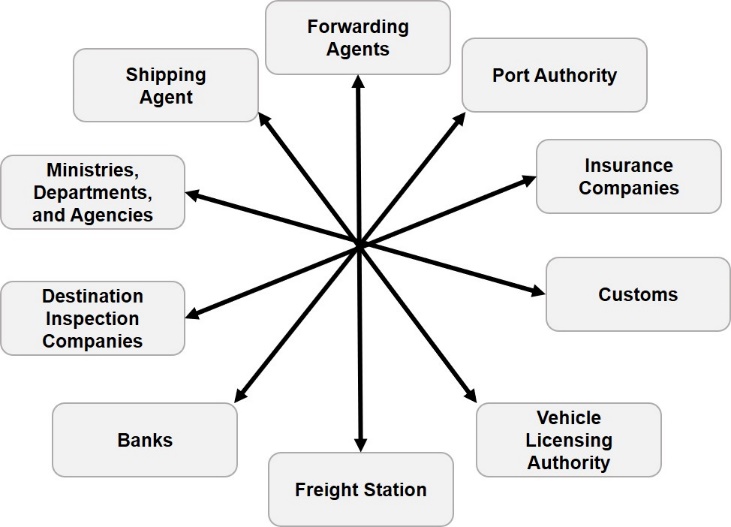


Figure 2. Streamlined data flows between across government agencies via TradeNet (source: Ghana customs)

The government introduced public managerial arrangements such as public-private-partnerships to support TradeNet’s operation and to bring private sector ethos into customs. Declarants were to submit one electronic form, the import declaration form (IDF), although in practice some paper use persisted, with more steps than the intended “one-stop solution”.

As part of public administration reform, customs officers were disintermediated from various core functions. For example, TradeNet was not administered by Ghana customs but by the Ghana Community Network (GCNET), a public-private company jointly owned by government and firms, international and local. Classification and valuation, critical clearance functions that were previously performed by customs during the ASYCUDA period were similarly outsourced to five private DICs. Classification and valuation – a process that involved negotiations with declarants on value of declared goods and duties due – was one of the most corruption-prone steps as it afforded immense discretion to customs officers in the exercise of their authority. A senior executive of one of the DICs noted:

Classification and valuation was one of the ways corrupt officers made the most money. That is where they could collude with declarants to misclassify or undervalue goods for a bribe, intentionally turn a blind eye in exchange for a pay out, or deliberately challenge a valuation with the hope that a declarant will come and see them with an envelope.

Although outsourcing does not necessarily improve public services, in this case, the DICs whose revenues were tied to total revenue collected for the government were often lauded by pro-reform elements in the government and the press for conducting a more efficient, transparent, arms-length, back-end operation. By having an incentive to maximize revenues, the DICs put in place managerial practices and checks that customs administration lacked. Their operations effectively reduced face-to-face opportunities for petty corruption. A senior government official at the finance ministry explained:

One big reason customs revenue jumped up was the DICs. The destination inspection scheme has worked well as the DICs have been professional and honest in their dealings. You could say, we outsourced the integrity customs lacked.

TradeNet – envisioned as a “single window” providing a “one-stop solution” – enabled significant reductions in number of processing steps (from 13-30 to about 5-10), as well as opportunities for corruption. However, some paper use and certain manual steps remained. A senior TradeNet specialist reflected:

The system was intended to drive us toward paperless processing … but that is currently not the case even with improvements … the problem is not technical; the technology is there but people are hard to change and there are powerful people that do not want changes because it interferes with their selfish interests. We are making progress, even if slowly …

## **Reconfiguring clearance document processing through IT**

The story of reforms over the course of 30 years – from the pre-IT period associated with the patrimonial administration, to the ASYCUDA and TradeNet periods, associated with bureaucracy and public management respectively – shows sociotechnical changes in the practice of clearance document processing. The sociotechnical configuration of each period was associated with particular technological artefacts, with peculiar functionalities that underpinned the set of characteristic practices in the administration. For example, the pre-IT period was marked by paper documents, which were easy to use and robust in terms of not requiring additional infrastructure such as computers, efficient servers, and electricity. On the other hand, processes based on paper documents were error-prone, cumbersome, and inflexible – creating hold-ups, delays, and high transaction costs across the entire process.

ASYCUDA automated some steps by digitizing aspects of the paper-based process. It introduced electronic features such as data aggregation, tracking and reporting, randomization of the process for assigning customs officers to cases, harmonization of import/export item codes, as well as enhanced revenue control features. ASYCUDA helped bring notable improvements but only insofar as they enhanced, rather than fundamentally transformed the previous paper-based regime. As such, face-to-face interactions still occurred at various points in the manual, paper-based process with attendant hold-ups, delays, and high transaction costs. Finally, TradeNet helped bring about the most significant changes by increasing digitization and automation, reducing paper use substantially. By deploying a network structure to data flows (instead of the previous tightly linked sequential flows), processes and interactions between stakeholders were streamlined, made more transparent, and less rigid. These changes, as well as outsourcing of critical classification and valuation functions to private companies (DICs), diminished levels of face-to-face interactions and disintermediated customs bureaucrats from key revenue-generation steps. Processes were also made more efficient by removing the need to duplicate forms, as well as managerial controls that enhanced efficient monitoring and controls. Table 3 summarizes key features and functionalities of ASYCUDA and TradeNet helped bring about to reconfigure clearance document processing.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Changes in clearance document processing in different administrative regimes | | |
|  | Patrimonial (pre-IT) | Bureaucratic (ASYCUDA “multi-window” system) | Public management (TradeNet “single window’ system”) |
| * Features of practice artefacts | * Hard copy * Sequential, manual process, e.g. steps in long room | * Digital/hard copy assemblage * Mixed automated/manual steps at long room, offices * Standard, off-shelve customs management tools for internal use | * Digital/hard copy assemblage * Less paper/more digitization; long room no longer used * Modular and configurable * Online multi-user platform for all stakeholders |
| * Enablements | * Ease of use, e.g. produced/viewed “on demand” * Robust, e.g. independent of complex, sometimes unreliable infrastructure like servers, electricity | * Data aggregation, tracking, reporting * Automation * Randomization feature to assign cases to officers * Standardization/controls, e.g. harmonization codes * Enhanced security, e.g. digital trail harder to tamper than paper | * Streamline data flows between stakeholders by integration and removal of the need to duplicate forms * Increased automation/digitization * Data sharing and transparency * Enhanced security and risk controls, e.g. audit and complex forensic features |
| * Characteristics of sociotechnical system | * Paper with face-to-face interactions * Rigid interactions with hold-ups, delays * High transaction costs/inefficiency | * Digital/paper combo with face-to-face interactions at paper interface * Strengthened bureaucratic capabilities but hierarchical steps enabled hold-ups, delays * Tightly coupled interactions * High transaction costs | * Face-to-face interactions diminished with paper reduction and disintermediation by DICs * Enhanced efficiency, effectiveness, transparency * Network configuration aids transparency and reduces hold-ups * Process streamlining aids efficiency/ reduces transaction costs * Disintermediation reduces exposure to corrupt officers |

Table 3. Artefacts and sociotechnical configurations of practices over time.

Next, we assess how the sociotechnical reconfiguration of clearance document processing enabled reduction of corruption opportunities, followed with an assessment of how digitalization-enabled corruption control links to corruption opportunity reduction.

**Reduction of corruption opportunities**

Using the corruption opportunities framework, we assess how the sociotechnical reconfiguration of clearance document processing enabled reductions of petty corruption opportunities across periods of customs reform. We examine how sociotechnical reconfigurations changed petty corruption opportunities in terms of access to sources of corrupt gains, collocation of interacting parties (giver and recipient of bribes or other illicit payments) in place and time, the frequency of interactions, and the extent of red tape.

Over time, technology – enabling digitization, automation, risk controls, disintermediation and transparency – helped reduce access to sources of gains. Similarly, increasing digitization and automation of manual paper processes shifted action away from spaces of collocation in place and time to online spaces. Frequency of interactions between declarants and officials were also reduced as hold-ups and bottlenecks were reduced through digitalization-enabled process and service improvements. Finally, red tape was curtailed over time as technology enabled a progressive reduction in the number of document processing steps, as well as loosening of rigid steps, de-duplication, and generally increased efficiency. Table 4 summarizes these findings.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Reductions in petty corruption opportunity over time | | |
| Petty Corruption Opportunities | Patrimonial (pre-IT) | Bureaucratic (ASYCUDA “multi-window” system) | Public management (TradeNet “single window” system) |
| Weak monitoring/lax control of access to source of gains | * Multi-window process allowed corrupt officers access to declarants * Paper records * Easily accessed and tampered, falsified * Could be stolen/ destroyed to erase trail * Cumbersome, constrains auditing/ risk controls | * SAD (digital-paper combo) with face-to-face interaction at paper interface allowed lesser access * Digital capabilities enhance monitoring/risk controls to increases risk of getting caught | * Face-to-face interactions diminished with paper reduction, disintermediation by destination inspection companies, more automation * Enhanced monitoring/risk controls, efficiency, effectiveness, transparency * Network configuration aids transparency as documents tracked by different stakeholders |
| Collocation of parties in place/time | * High volumes of action in long room gave place/time for corrupt officials to interact freely with declarants | * Significantly reduced action in long room * More action moved to customs back offices | * Long room action eliminated. Waiting room for declarants * IDF processing off-site at the DIC’s offices, in customs offices |
| Repeated interactions | * Deliberate process delays and holdups by corrupt officers encouraged unnecessary frequent interactions with declarants, a practice known as “go and come” | * Randomization feature to reduce repeated interactions/collusions among familiar parties * Deliberate delays /holdups by corrupt officers create interactions with declarants, a practice known as “go and come” * Holdups/delays occur at different stages of paper-based processes | * DICs perform key classification and valuation function * Almost no contact with declarants as operation online, away from ports * Customs role restricted * Holdups/delays reduced through performance metrics |
| Red tape/ inefficiency | * 30+ steps needed to complete a standard clearance | * 13-30 steps to complete standard clearance * Fragmented and tightly coupled interactions allowed for coercion/ discretion by officers * High transaction costs | * 5-10 steps to complete standard clearance * Network configuration reduces hold-ups and delays * Process streamlining aids efficiency/ reduces transaction costs * Outsourced functions to improved efficiency |

**Table 4.** Changes in petty corruption opportunities at Ghana customs over time.

By 2016, when our data collection concluded, TradeNet -enabled reforms at Ghana customs’ Tema office had led to a 31% year-on-year increase in government revenues despite fluctuating cargo volumes that increased by a modest 6% (GPHA 2015; Ghana Revenue Authority data cited in Owusu-Gyimah 2015). In other words, revenues collected for government instead of private pockets grew at 5 times the rate of normal growth in cargo volumes, suggesting significant efficiency gains and likely reduction in corruption leakage through the sociotechnically reconfigured clearance document processing. Furthermore, about 70% of clearance documents were processed between 1-5 days (GCNet 2015), a significant improvement over the previous ASYCUDA and pre-IT periods when the 13-30+ steps could take weeks to months. Although such metrics are not conclusive evidence of corruption control, they suggest *prima facie* gains from digitalization.

While the gains from reduction of corruption opportunities are difficult to measure given the challenges of studying corruption directly, opportunity theory suggests that a reduction in corruption opportunities reduced corruption. Hence, IT-enabled corruption opportunity reductions (e.g. decrease in number of processing steps from 30+ to 5-10; decrease in number of collocated, face-to-face interactions with corrupt officials) can be reasonably inferred to have led to a decline in aggregate corruption levels (even granting possible displacement, which, as discussed earlier, is never complete). Consistent with this view, various stakeholders interviewed reported improvement in their perception and experiences of customs corruption in Ghana. Long-serving officials, declarants, clearing agents, and other informants with experience of all three periods of reforms, spoke positively about gains in petty corruption control even while admitting there was more progress to be made.

# Discussion

Existing research points to the failure of digitalization to reform administration or to stamp out corruption as behaviours and socioeconomic conditions in developing countries, cautioning against thinking based on technological deterministic assumptions (Fountain 2001; United Nations 2016; World Bank 2011, 2016). Against this backdrop, in this study we explored an alternative explanation of how digitalization might enable control of government corruption in developing countries.

By analysing digitalization and petty corruption control efforts at Ghana customs over a thirty-year period, we suggested that IT enables corruption control by reducing corruption opportunities through sociotechnical reconfiguration of work practices and organizational arrangements. Our approach stands in contrast to research in IS and related areas of management, public administration and development that theorize government corruption as individual-level or social-level phenomena, without considering external/environmental enabling opportunities in the sociotechnical work system.

While observational studies – the most common type of research on digitalization and corruption – have noted associations between levels of corruption and digitalization related variables, they typically do not explain the means or processes of corruption control. On the other hand, case studies that explore the question of how digitalization plays a role in corruption control point to behavioural change, social change, or transparency and accountability as key to the fight against corruption. The latter view of the role of digitalization, however, reduces corruption to a problem of information asymmetry between principals and agents (“those in charge” and corrupt officers) that might be solved by transparency.

It is questionable, however, the degree to which transparency mechanisms are sufficient in the context of public administrations in developing countries where systems are inefficient, administrative rationalities different, and enforcement structures generally weak.

We show that digitalization in the context of long-term government reforms achieves more than reducing information asymmetry alone. Digitalization and process re-engineering in the public administrations of developing countries often result in sociotechnical reconfiguration. This not only improves service effectiveness and efficiency but also curtails previous opportunities that existed for petty corruption.

# Conclusion

Our study contributes to the literature on digitalization and corruption control by focusing attention on sociotechnically curbing opportunities for petty corruption at the situated work and organizational levels without first changing corrupt officers’ motivations and behaviours, or directly addressing socioeconomic or cultural causes – two approaches that have proven to be unyielding (Hors 2001; Treisman 2007). Everyday corruption opportunities (external to corrupt actors) are the limiting factor, without which social, economic and individual corruption determinants remain moot.

However, this is not to suggest that sociotechnically curtailing corruption opportunities through digitalization is sufficient to stamp out government corruption, or that other approaches are not needed. Rather, technology could be deployed as a corruption-control measure as part of broader government reforms over a sustained period.

Current research emphasizes the informational role of digital technologies – enabling monitoring, transparency, and accountability through information sharing, rather than their potential to enable changes in work practices and organizational arrangements that sustain or cause corruption. Our study suggests that researchers might usefully consider how digitalization could sociotechnically reconfigure the corrupt practices and work arrangements and reduce opportunities for corruption in the public administration of developing countries. Our study’s limitation is that we only consider digitalization-enabled reduction of petty corruption opportunities within an isolated organizational and functional domain of customs clearance document processing. A broader view of practices within and beyond customs might inform a richer view of the phenomena. Furthermore, we only consider petty corruption at the government-citizen or government-business interface during service delivery, rather than elite corruption – theft or grand corruption by powerful officials. Anti-corruption measures in developing countries might be better pursued holistically across levels of government, not just by tackling petty corruption in service delivery systems.

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1. **Notes**

   The term digitalization is used to mean a “range of sociotechnical changes resulting from the adoption of digital technologies” (Legner et al. 2017, p. 301). [↑](#endnote-ref-1)
2. ASYCUDA or the Automated System for Customs Clearance. [↑](#endnote-ref-2)
3. TradeNet, an electronic data interchange (EDI), was deployed to integrate all stakeholders involved in the customs clearance process. [↑](#endnote-ref-3)
4. Sociotechnical refers to the heterogeneous ensemble of processes, material artefacts and social elements (Leavitt 1964; Sawyer and Jarrahi 2014). [↑](#endnote-ref-4)
5. The shifts in administration paradigms have been associated with digitalization initiatives that have sought to change sociotechnical configurations of each administration type to overcome dysfunctions and inefficiencies associated with corruption. For example, since the 1950s, back office, rule-based information systems translating regulation into streamlined service have been deployed to support bureaucracies (Danziger, Dutton, Kling, and Kraemer 1982; Dunleavy, Margetts, Bastow, and Tinkler 2006). New Public Management (NPM) reforms have occurred through IT systems that enable process redesign and cross-agency infrastructures (Aydinli, Brinkkemper, and Ravesteyn 2009; Bernardi, 2009). Reforms based on prescriptions of Washington-based development organizations such as the World Bank and the IMF, emphasized fundamental economic reforms and pro-market interventions, and similarly required inter-organizational IT infrastructures to streamline multi-stakeholder processes of private-public-partnership (De Wulf 2005). By supporting work according to such administration paradigms, digitalization has supported administration reforms through sociotechnical reconfiguration as old work practices are disrupted and new work practices emerge. [↑](#endnote-ref-5)
6. Bureaucracy, which Max Weber (1978) said was a means to overcome traditional patrimonial administration characterized by arbitrariness and corruption, in many developing countries has failed to bring about a fair, impartial, rule-based administration. Rather, many developing countries have versions of bureaucracy that hybridize with traditional patrimonial practices (Eisenstadt 1973; Erdmann and Engel 2006).

   Reforms to address the shortcomings of public administrations in developing countries are typically guided by models and principles borne out of the experience of developed countries (Bale and Dale 1998; McCourt 1998; Sulle 2010; Wallis and Dollery 2001). This includes even models and principles from the private sector in developing countries (Dunleavy and Hood 1994; Hood 1995). For instance, reforms have sought to re-engineer government structure, culture, processes, and to emphasize client-orientation and quality (Halachmi 1995; Osborne and Gaebler 1992). [↑](#endnote-ref-6)