Understanding How the Traditional and Information Technology Anti-Corruption Strategies intertwine to Curb Public Sector Corruption: A Systematic Literature Review

Completed Research Paper

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Abstract

The prevalence of public sector corruption has been a major concern for successive governments and citizenry. In order to curb corruption, previous studies have focused on anti-corruption strategies adopted by governments in isolation, but few studies have focused on the interactions between anti-corruption strategies. Using the concept-centric approach, we systematically reviewed over 70 studies to explore the trends of government anti-corruption strategies. Three dominant themes of anti-corruption strategies and their associated concepts were identified. Themes include traditional, technological, transparency and accountability anti-corruption strategies. We leveraged the identified themes and their associated concepts to develop a conceptual model that could help explain the trends of anti-corruption strategies for curbing the public sector corruption.

Keywords: Anti-corruption, public sector, e-government, transparency, accountability

Introduction

While there is a consensus that corruption is a global phenomenon in developing, emerging, and developed countries alike (OECD, 2016), its prevalence and effects are felt much more in the developing nations, especially those in Africa (Ewi, 2018). Report of the African Union (AU) in 2002 suggests that over US$148 billion (i.e., 25% of GDP) is lost to corruption annually in Africa (Ewi, 2018; Uneke, 2010). It is difficult to concisely define corruption (Lumumba, 2014), because what constitutes corrupt practices varies across countries and socio-cultural contexts (Angel & Bates, 2014; Askari, Rehman, & Arfaa, 2010). Therefore definitions of corruption can be contingent upon the context of occurrence (Angel & Bates, 2014). Although the concept of corruption is defined in numerous ways (Askari et al., 2010); in this context, corruption is defined as the ''*misuse of a public or private position for direct or indirect personal gain*'' (United Nations, 2004). Furthermore, corruption has been categorized into: political - which refers to the form of corruption that involves the ''*misuse by government or political officials of their governmental powers and resources for illegitimate, usually secret, private gain*'' (Organisation for Economic Cooperation and Development (OECD), 2007); grand – corruption: this kind of corruption manifests at the highest level of government in a democratic regime and it involves the sabotage of legal and economic systems, and the political

environment (Kanyam, Kostandini, & Ferreira, 2017); and bureaucratic or petty - corruption refers to the misuse of *"...entrusted power by low- and mid-level public officials in their interactions with ordinary citizens, who often are trying to access basic goods or services in places like hospitals, schools, police departments and other agencies"* (Kanyam et al., 2017, p. 273).

Regardless of the category of corruption, it is argued that corruption is difficult to measure or estimate the precise extent of its occurrence (Kanyam et al., 2017). The ongoing debate on the key determinants of corruption has yielded no consensus (Elbahnasawy & Revier, 2012). Considering the negative effects of corruption, some scholars proposed traditional anti-corruption strategies to curb this malaise (Kim, 2013). Other scholars have also considered the information technology (IT) anti-corruption strategies (Elbahnasawy, 2014; Krishnan, Teo, & Lim, 2012; Linhartová, 2017). However, little or no study have considered how the traditional anti-corruption strategies and the IT anti-corruption strategies interact to curb corruption in the public sector. Thus, we pose the following research question: "*How do the traditional and IT anti-corruption strategies intertwine to curb public sector corruption?"* To answer the research question, we adopt the systematic review method. Systematic review is a rigorous and transparent form of literature review (Okoli & Schabram, 2010) and is the most reliable and comprehensive statement about what works (Okoli, 2015). It involves identifying, synthesizing and assessing all available evidence, quantitative and qualitative, to generate a robust, empirically derived answer to a focused research question (Okoli & Schabram, 2010). However, despite its growing interest, systematic literature review has been very scanty in its use in deciphering the traditional anti-corruption and the IT anti-corruption strategies and their relations in curbing public sector corruption.   Thus, this paper aims to address this gap by offering critical reflections on the use of systematic review to answer the research question posed. The next section discusses the systematic review methodology in more detail and outlines how it was applied. Section 3 discusses its findings.

Systematic Literature Review Methodology

According to IS scholars (e.g., Rowe, 2014; Schryen et al., 2017; Watson, 2001; Webster & Watson, 2002) for a review of a specific topic, a review article should: (1) survey and synthesize prior research, (2) identify the relationships between key concepts, (3) identify gaps and (4) set directions for future research. To do this, we adopted a systematic literature review process as shown in Figure 1. Having the research question that focused the need for the research in our hindsight we developed the review protocol. The e-government reference library (EGRL) version 14.0, a database dedicated to e-government literature was accessed. Since the database does not have features to indicate titles, abstracts, and references of studies, we engaged EndNote (citation and referencing software) to extract over 10,000 titles, abstracts, and references from the EGRL into EndNote library 1. Within the EndNote library 1, we searched for papers that were published between 2008-2018 using "corruption" as the keyword. We got 128 studies that matched the search keyword and the period and we moved them to EndNote library 2. We accessed other databases such as EBSCO, Elsevier, Taylor & Francis, Palgrave & Emerald Insight using Google scholar for studies within 2008-2018 with the search keywords "corruption and e-government" OR "anti-corruption strategies" AND "curbing corruption with ICT". The first 200 studies were achieved, which we exported to EndNote library 2. One author has hand-searched (snowballing technique) the reference list of each included studies in EndNote library 2 and identified additional 10 studies that might be missing from the indexed databases, which were also moved to EndNote library 2. In total there were 338 papers residing in EndNote library 2. 58 of the papers were expunged due to duplication, while 208 papers were excluded because of not meeting the quality criteria questions such as whether the study clearly defined the concepts and the relationship among such concepts. Are there specifications of concepts moderating the relationships amongst concepts? If not can the moderator be easily inferred? And does the study use theory/theories to drive the identification of the concepts? In the end, we ended up with 72 papers as primary studies used in the review as shown in Figure 1 phase 2.
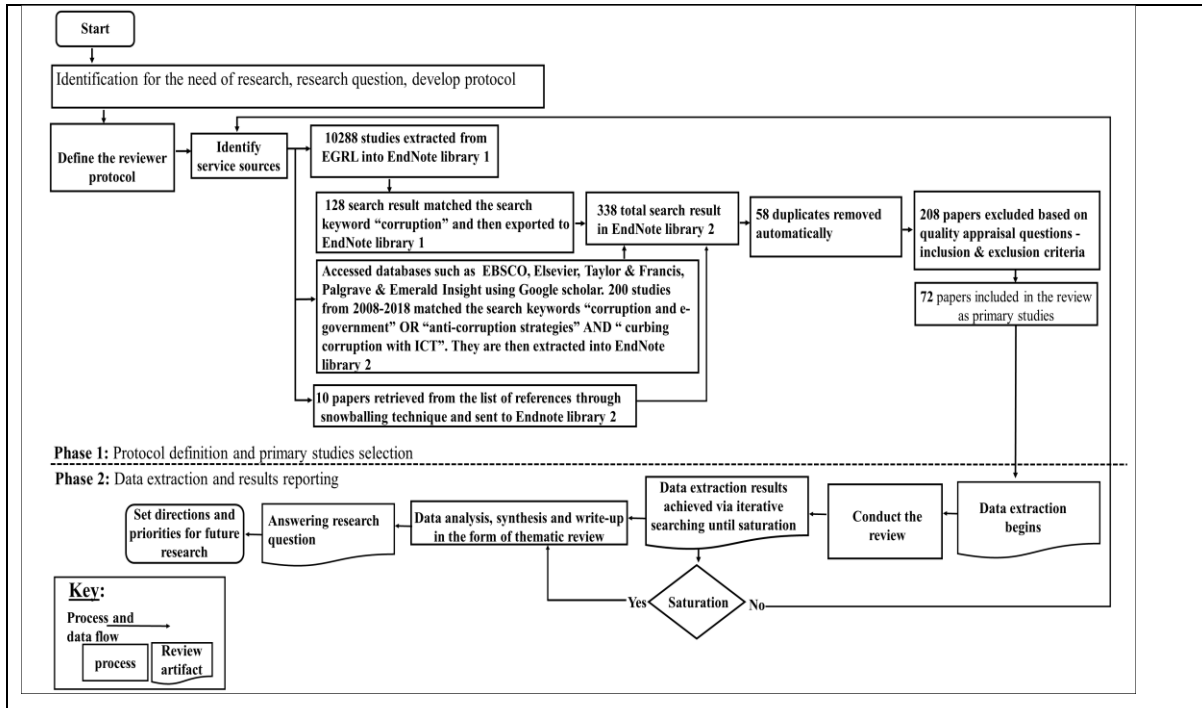
Figure 1. Process for the Systematic Literature Review

We considered the concepts in each of the 72 papers as basic themes. Thus, data extraction form was designed to hold the data by manually following a thematic analysis coding structure advocated by Braun and Clarke (2006) and adopted by Wiener, Mähring, Remus, and Saunders (2016). Being an iterative process, after a thorough read of the papers, we stop harvesting more papers when we reach saturation (Cecez-Kecmanovic, Galliers, Henfridsson, Newell, & Vidgen, 2014). Similar concepts with the same semantic commensurability from different papers were merged as one concept (Templier & Paré, 2018). A concept-centric approach (Webster & Watson, 2002) was adopted for analysing and organising the result.

Findings

We present the findings based on recognizable patterns and affinity in the data (Templier & Paré, 2017). We arranged such patterns into three thematic categories - traditional, transparency and accountability, and technological anti-corruption strategies as can be seen in Figure 2.
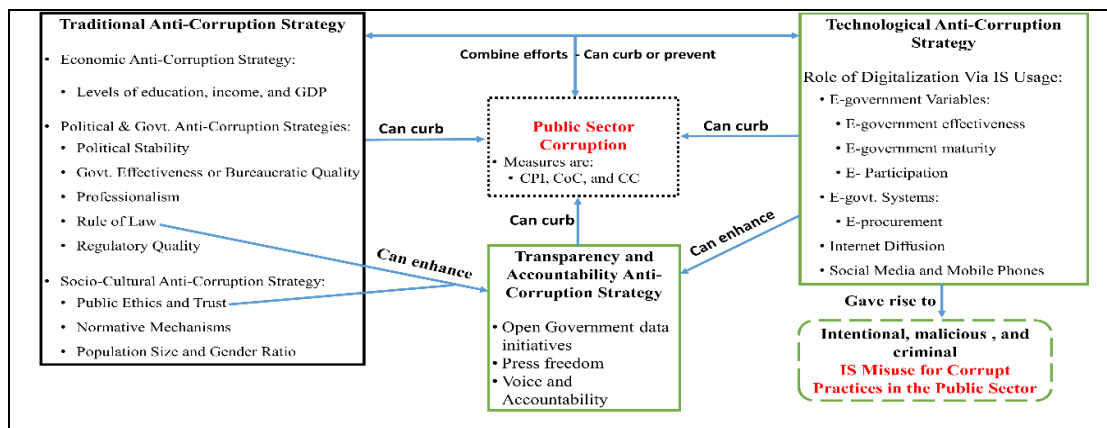

Figure 2: Conceptual Model of Anti-Corruption Strategies for Cubing Corruption

Theme 1: The Traditional Anti-Corruption Strategy

Within this theme, researchers argue on the relevancy of the traditional anti-corruption strategies that span political and governmental, economic and socio-cultural factors to curb public sector corruption.

Political and Governmental Anti-Corruption Strategies

Political and governmental anti-corruption concepts whose indexes range from -2.5 (highly unobserved, ineffective, or instable) to 2.5 (highly observed, effective, or stable) are measured and published annually by (Kaufmann, Kraay, & Mastruzzi, 2009). Such concepts include political stability, government effectiveness or bureaucratic quality, professionalism, and the rule of law. In particular, *political stability* which refers to the probability that government will be disrupted or removed from power by illegal or violent means, including domestic violence and terrorism (Kaufmann et al., 2009), is a variable that influences the pervasiveness of corruption perceptions in governance (Elbahnasawy & Revier, 2012). For example, recent empirical study on corruption identified political stability as a factor that can curb corruption in the countries that practice democracy (Fjelde & Hegre, 2014). Political stability seems to have a significant positive effects on corruption even when its influence on corruption perception was tested as a control variable (Shim & Eom, 2008; Shrivastava & Bhattacherjee, 2015). However, these findings contrast the findings of recent studies (Elbahnasawy & Revier, 2012; Zhao & Xu, 2015), greater political stability increases perceived corruption.

While individual government's efforts to reduce the levels of corruption perceptions have focused on political stability via steady and uninterrupted democracy, some researchers argued against the relevancy of *government effectiveness or bureaucratic quality* (Garcia-Murillo, 2013; Kim, 2013; Shim & Eom, 2008; Zhao & Xu, 2015). Government effectiveness by definition is the "*perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies*" (Kaufmann et al., 2009, p. 6). More importantly, the goal of government effectiveness in a bureaucratic regime is to remove bottleneck tendencies by bureaucrats while they deliver services to the citizenry. The quality of bureaucracy focuses on organizational structure and processes that can systematically reduce opportunities for corruption (Shim & Eom, 2008). Besides, researchers argue that democratic government that is effective and transparent can expose corruption (Shim & Eom, 2008; Zhao & Xu, 2015), even though government effectiveness or bureaucratic quality were found to be statistically significant in a number of empirical research studies (e.g., Garcia-Murillo, 2013; Kim, 2013; Shim & Eom, 2008; Zhao & Xu, 2015), individual governments can harness the potentials of government effectiveness on corruption especially when it is mediated by other traditional anti-corruption variables such as enforcement of rule of law bureaucratic professionalism (Kim, 2013; Shim & Eom, 2008, 2009).

Literature that stem from public administration argue that professional ethics can mediate the link between effective governance and public sector corruption (Shim & Eom, 2008). *Professionalism* is a form of traditional anti-corruption strategy that exist in two dimensions, namely, competency (i.e., the bureaucrat's professional competency in terms of service delivery) and anti-favoritism (i.e., the bureaucrat's professional expertise to resist favoritism or being bias in service delivery). The concept of professionalism focuses on the bureaucrat's core values (integrity, accumulated bureaucratic knowledge, & adherence to code of ethics) in order to curb corruption in public service (Shim & Eom, 2008). The relationship between the dimensions of professionalism (i.e., competency & anti-favoritism) and the perceived level of corruption was found to be significant (Shim & Eom, 2008). It therefore means that as the levels of competency and anti-favoritism rises, the perception of corruption tends to decrease, especially in presence of regulatory quality and the enforcement of rule of law (Shim & Eom, 2008, 2009).

The concept of *rule of law*, which refers to the "*perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement,*

property-rights, the police, and the courts, as well as the likelihood of crime and violence" (Kaufmann et al., 2009, p. 6), is one of the predictors of corruption (Elbahnasawy, 2014; Elbahnasawy & Revier, 2012; Kim, 2013). Rule of law falls within the legal-administrative anti-corruption strategy that focuses on prevention and curbing public sector corruption. The goal of rule of law is to ensure transparency and accountability in a bureaucracy through the establishment of an anti-corruption system in government. Studies investigating the impact of *rule of law and regulatory* **quality** have found them to be significant in reducing public sector corruption (Elbahnasawy & Revier, 2012; Garcia-Murillo, 2013; Kim, 2013; S. Kim, Kim, & Lee, 2009). However, other scholars argue that it may be challenging to implement and harness the influence of rule of law and regulatory quality in a bureaucracy (Palvia, Anand, Seetharaman, & Verma, 2017), especially in democratic countries (e.g., Nigeria) where corruption is heightened by politicians and agents of the law enforcement agencies (Adeleke & Olayanju, 2014; Bazuaye & Oriakhogba, 2016; Palvia et al., 2017). Consequently, Kim (2013) contends "*...creating an anti-corruption system [in form of rule of law, regulation, and administrative reforms] is one thing and changing corrupt behaviors of public officials and citizens is another. Many clients in developing and emerging countries, in fact, are willing to pay express fees or bribes to expedite public services and to gain greater private interest*" (p. 2). Besides, institutionalization of law enforcement frameworks in a bureaucracy may not result to enhancement of transparency and accountability, probably due to uncertainties and unpredictable "*implementations of anti-corruption initiatives or due to significant gaps between dominant cultures and subcultures in government and society*" (C. K. Kim, 2013). Furthermore, institutionalization theory, Kim et al. (2009) argues that "*a regulatory or coercive mechanism is based on political and legislative influences, and the regulatory factors are affected by politics and legislations*" (p. 43). This means that the traditional control strategies can be ineffective to mitigate and identify governmental corruption (Shim & Eom, 2008), for example, the regulatory quality and rule of law were found to be statistically non-significant by some scholars (X. Zhao & Xu, 2015).

Economic Anti-Corruption Strategy

The economic anti-corruption strategy is based upon the premise that "humans *are a product of economic conditions [GDP]*" (Kim, 2013). It is assumed that better economic conditions in a country can determine the corruption level (Kim, 2013). Besides, wealthy countries can dedicate their resources into education to curb and prevent corruption (Elbahnasawy & Revier, 2012). Thus, the complementary effects of developmental indices such as the *levels of education*, *income, and GDP* can influence corruption perception (Elbahnasawy & Revier, 2012; Garcia-Murillo, 2009; Kim, 2013). Measures for these developmental indices have been subjected to evaluations by third party agencies (Palvia et al., 2017). Their validity depends on the variable of interest. For instance, education is measured by the Education Index in the UN's Human Development Report, "*which measures a country's relative achievement in both adult literacy and combined primary, secondary and tertiary gross enrolment*" (Garcia-Murillo, 2009). For example, (Farzanegan & Witthuhn, 2017) leveraged on the percentage of the total secondary school enrolments as a measure for the level education in a country. Education can empower individuals with broader understanding of the diverse negative effects of corruption on economic growth (Garcia-Murillo, 2009). Thus, such an understanding can discourage individuals from the commission of corruption. In fact, individuals can protest against or expose corrupt bureaucrats who may demand bribes from the citizenry in order to offer services (Garcia-Murillo, 2009). Besides, *higher levels of education* can shape economic conditions which will in turn moderate the association between income and corruption (Farzanegan & Witthuhn, 2017; Garcia-Murillo, 2009). For example, C. K. Kim (2013) argues that "*…bribes and express fees,…and favoritism remarkably decline as public officials are well paid, citizens are better off, and living standards are higher* (p. 3)". On the contrary, levels of *income or economic* conditions of bureaucrats and citizens does not seem to be appropriate measure of the extent of corruption (Kim, 2013). Thus, irrespective of income levels, "*some politicians and bureaucrats are so corrupt*" in order to fulfil their selfish desires as against the national interest (Kim, 2013).

Socio-Cultural Anti-Corruption Strategy

Socio-cultural anticorruption strategy is an aspect of traditional anti-corruption strategy that focuses on **public ethics** and **normative mechanisms** in order to change human conduct in relation to corrupt practices (Bertot, Jaeger, & Grimes, 2010b; Kim, 2013; Kim et al., 2009). Such an approach bothers on "*advancing a strong sense of public service ethics, and building organizational integrity*" (Kim, 2013, p. 3) in public service delivery. Besides, the integration of behavioral norms into anti-corruption strategy can influence people's preferences and choices around corruption (Hoffmann & Patel, 2017).

This approach is designed to enhance transparency and accountability of government through incremental or radical changes of public officials' and citizens' behaviors toward high ethical standards and professionalism. "*A normative mechanism is motivated by norms that are prevalent and observed in the domain to which the organizations belong*" (Kim et al. 2009, p. 43). Having ethically conscious human behaviors and organizational cultures (e.g., normative mechanism & public trust) (Bertot et al., 2010b; Cox, 2014), would take much longer than an establishment of an anti-corruption system would in curbing corruption (Kim, 2013). Additionally, building social norms and values toward high ethical standards takes much longer than correcting unethical behaviors and organizational cultures. While social norms are mediated through bribe seeking from the bureaucrats, the giving of bribes is mediated by people's beliefs and circumstances (Kim, 2013). Dominant **cultures** in the form of religion (e.g., Catholicism, Islam, & Protestantism) were found to be statistically insignificant in reducing corruption (Elbahnasawy & Revier, 2012). Social and demographic factors such as **public trus**t (Cox, 2014), **population size, and gender ratio** (Saxena, 2017; Zhao & Xu, 2015) were perceived to have an effect on corruption perceptions. However, the effect of a nation's population density or size remains controversial. In some studies, population size and gender ratio do not seem to influence the perception of corruption (Elbahnasawy & Revier, 2012; Saxena, 2017; Zhao & Xu, 2015). The traditional anti-corruption strategy seems to be inconsistent and ineffective at curbing and detecting political corruption as a result of power manipulations to benefit the rich (Shim & Eom, 2008). Hence, corruption remains a prevalent issue that concerns governments (Zhao & Xu, 2015), therefore, in order to potentially curb corruption in the public sector, researchers and practitioners argued on the relevancy of **transparency and accountability anti- corruption strategies**.

Theme 2: Transparency and Accountability Anti-Corruption Strategies

This theme explores concepts that describe the relevancy of government transparency and accountability as anti-corruption strategies. Government transparency, defined as "*the extent to which [government] reveals relevant information about its internal workings, such as decision [making] processes, procedures, functioning and performance*" to its citizenry (Grimmelikhuijsen, 2010, p. 9). This means that through government social empowerment, citizens can have the opportunity to participate in official governmental "*reform movements and by cultivating a civil, law-based society as a long-term deterrent to corruption*" (Bertot et al., 2010b, p. 265). With governmental information availability, citizens can use such information to mitigate corruption (Bertot, Jaeger, & Grimes, 2010a). The right to know and transparency are "*internationally regarded as essential to democratic participation, trust in government, prevention of corruption, informed decision-making, accuracy of government information, and provision of information to the public, companies, and journalists, among other essential functions in society*" (Bertot et al., 2010b, p. 264). Therefore, government transparency can manifest in four different ways (Bertot et al., 2010b): 1) proactive dissemination by government; 2) release of requested materials by the government; 3) public meetings; and 4) leaks from whistle-blowers. On the other hand, accountability defined as the "*service guarantee of a government; the extent to which its actions are accounted for and corrected if not carried out correctly in the first instance*" can also empower individuals (Garcia-Murillo, 2013, p. 157). Therefore, because of government transparent data, bureaucrats who misuse their powers for corrupt practices can easily be held accountable by citizens. As Strand (2010) would say: "*[a] better informed and active citizenry, who can put pressure on national institutions to be accountable and responsive to citizens' needs and priorities, is a fundamental component of a functioning democracy*" (p. 1). By

so doing, corruption by bureaucrats can be mitigated through accountability through three key processes (Garcia-Murillo, 2013): 1) participation of the citizenry in political processes; 2) good governance and bureaucratic effectiveness; and 3) government commitment in terms of the rule of law enforcement.

For democracy to function, the citizenry should have access to government information through transparency and accountability (Saxena, 2017), a participatory society can decide the fate of corrupt bureaucrats. Corrupt public bureaucrats will weigh the cost of committing corruption especially if they are aware that citizens have adequate information that can hold them accountable for any corrupt act (Garcia-Murillo, 2013). Public access to information about governance can allow the citizenry to exercise their political and civil rights to curb electoral corruption and demand accountability for any expenditure of the government (Strand, 2010). Although recent studies (e.g., Bertot et al., 2010b; Grönlund, 2010; Stamati, Papadopoulos, & Anagnostopoulos, 2015) have argued that transparency and accountability in government can be enhanced through the use of technology. The major sources for digital transparency and accountability include ***open government data initiatives*** (Brito, Costa, Garcia, & Meira, 2015; Gonzalez-Zapata & Heeks, 2015; Ubaldi, 2013), ***press freedom***, and ***voice and accountability*** (Garcia-Murillo, 2013; Kock & Gaskins, 2013; Kock & Gaskins, 2014; Krishnan & Teo, 2012b; Krishnan et al., 2012; Stamati et al., 2015; Zhao & Xu, 2015).

Open government data refers to "*any sets of data which can be reused with no restrictions by any form of licensing or patents, data that are well structured and can be easily accessed and reused*" by the citizenry (Mungai, 2018, p. 1). With the advent of Web 2.0 technology, open government datasets such as registers, public tender, government expenditure, information such as transport, metropolitan, health, budget, and public administration among others are published on government portals (Brito et al., 2015; Ubaldi, 2013). The information on the portals can be used to scrutinize bureaucrats for accountability and thereby reduce corruption in government (Brito et al., 2015). Voice and accountability refer to "*capturing perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media*" (Kaufmann et al., 2009, p. 6). Voice and accountability are a vital dimension of governance through which the citizenry and organizations can intervene in public governance with help of ICTs (Garcia-Murillo, 2013; Heacock & Sasaki, 2010). Therefore, in principle, the citizen can use electronic media to publish their dislikes and criticisms about government misuse of power for corrupt tendencies (Bertot et al., 2010b; Grönlund, 2010).

The IS affordance of transparency, accountability, and non-repudiation of transactions seem to positively influence anti-corruption in developing countries (Bertot et al., 2010b; Garcia-Murillo, 2013). Some empirical findings suggest that an increase in levels of voice and accountability and transparency have led to reduction in the levels of corruption perception (Garcia-Murillo, 2013; Kock & Gaskins, 2014; Mimbi & Bankole, 2016). Besides, higher levels of press freedom of expression by is associated with lower levels of corruption (Zhao & Xu, 2015). Thus, governments with higher transparency are less corrupt when compared with non-transparent government (Mimbi & Bankole, 2016). However, while there is consensus that transparency and accountability can reduce corruption, factors such as citizen's or bureaucratic resistance to transparency and accountability initiatives, public trust in government data, culture, and fear of criticism in the part of the government among others (Bertot et al., 2010b; Cox, 2014; Grönlund, 2010; Heacock & Sasaki, 2010) may affect the effectives of this initiative. Moreover, without political will and change reediness; transparency and accountability initiatives may not strive in democracies (Bertot et al., 2010b; Heacock & Sasaki, 2010). Thus, to ensure transparency and accountability, IS researchers (e.g, Garcia-Murillo, 2013; Kim, 2013; Kim et al., 2009; Shim & Eom, 2008, 2009; Zhao & Xu, 2015), have advocated for the development and introduction of the technological anti-corruption strategies (alongside the existing traditional anti-corruption strategies), perhaps, because the technological anti-corruption factors seem to be more influential and statistically significant in curbing public sector corruption than the traditional anticorruption strategy (Krishnan & Teo, 2012a, 2012b; Mimbi & Bankole, 2016; Shim & Eom, 2009).

Theme 3: Technological Anti-Corruption Strategy (Role of Digitalization)

Within this theme, IS scholars have maintained that digitalization of government's services via e-government, Internet diffusion, e-government systems, and social media and mobile phones can serve as technological anti-corruption strategies for constraining corrupt practices within the public sector domain.

E-government

Several IS studies (e.g., Abu-Shanab, Harb, & Al-Zoubi, 2013; Bertot et al., 2010a; Bertot et al., 2010b; Wickberg, 2013) have posited that the establishment of e-government as an anti-corruption initiative in the public institution can build a culture of transparency, accountability, reduce the cost of running government businesses and thereby curb corruption tendencies (Bertot et al., 2010b; Bhuiyan, 2011; Chêne, 2016; Ear-Dupuy & Serrat, 2014). E-government "*…entails streamlining operational processes, transcribing information held by government agencies into electronic form, linking disparate databases, and improving ease of access to services for members of the public*" (Singh, Pathak, Naz, & Belwal, 2010, p. 256). Extant literature that focus on understanding the relationship and the mediating impact of e-government on corruption have measured e-government in terms of a country's e-participation index, e-government effectiveness index, and e-government readiness (i.e., e-government maturity/development) index among others. In particular, the ***e-participation index*** measures the degree to which different countries use online tools in mediating interactions among citizens and between G2C (Linde & Karlsson, 2013), while the ***e-government effectiveness*** "*measures the overall e-government competency and provides a snapshot of webpage presentations [of a country]*" (Shim & Eom, 2009). Webpage penetration (government websites for public participation), human capital (literacy & school enrolment rates) and technology infrastructure (use of computer, Internet, telephones & mobile phones in a country) were used by the UN to determine e-government effectiveness of a country (Shim & Eom, 2009). UN's e-government readiness index measures the e-participation and e-government effectiveness on a scale of 0 (i.e., low e-participation, low e-government effectiveness) and 1 (i.e., high e-participation, high e-government effectiveness) (United Nations, 2010).

Studies that assess the impact of e-participation and e-government effectiveness have found it to be positively associated with corruption perceptions. This means that increase in e-participation and e-government effectiveness leads to a reduction in corruption (Garcia-Murillo, 2013; Shim & Eom, 2008, 2009). For example, e-government initiatives in the form of web presence have reduced perceptions of corruption around the world (Garcia-Murillo, 2013). However, IS scholars have found conflicting results with e-participation (Asorwoe, 2014; Linde & Karlsson, 2013). The development of e-participation initiatives does not lead to positive effects in terms of mitigating corruption and increasing the quality of government (Asorwoe, 2014). In all, the results have shown no evidence that e-participation as having an anti-corruption effect or exercising a positive impact on the general quality of government in non-democratic countries (Linde & Karlsson, 2013). The ***e-government maturity/development index*** is also an e-government variable that measures the readiness and ability for a national government to use online services and telecommunication infrastructures to run bureaucratic functions (Amagoh, 2016; Elbahnasawy, 2014). The UN department of public administration developed and publishes the e-government maturity/development index on the scale between 0 (most developed) and 1 (least developed) of over 191 nations (Elbahnasawy, 2014).

Studies (e.g., Elbahnasawy, 2014; Kim, 2013) that assess the relationship between e-government maturity on corruption perceptions have found e-government maturity to be statistically significant on corruption perception in different contexts. Although e-government maturity has no direct effects on economic prosperity and environmental degradation, its value could be realized indirectly via the effects of e-government maturity on corruption, which in turn influences economic prosperity and environmental degradation (Krishnan et al., 2012). Similarly, Internet diffusion and e-government maturity/development, e-participation, and Internet penetration can have complementary effects on curbing corruption (Elbahnasawy, 2014; Shim & Eom, 2009). The mediating effects of governance

dimensions such as government effectiveness, regulatory quality, and political stability can shape e-government maturity in a country (Krishnan & Teo, 2012a, 2012b). These dimensions complement each other in shaping the maturity of e-government. Thus, as e-government matures in a country, the lower will be the level of corruption in that country (Krishnan et al., 2012). However, IS studies that investigated the effect of e-government on corruption perception argued that technology does not seem to have an effect on corruption perception in their contexts (Martinez, 2014; Pathak et al., 2010; Valle-Cruz, Sandoval-Almazan, & Gil-Garcia, 2015). This means that there is a diversity of findings in relation to the effects of technology maturity on corruption perceptions across different contexts (Pathak et al., 2010; H. Zhao, Ahn, & Manoharan, 2017). In particular, the e-government maturity affects corruption perceptions more effectively in countries with a culture that has lower levels of culture dimensions such as uncertainty avoidance and power distance (Zhao et al., 2017).

E-government Systems

An e-government system is an IS (e.g., e-procurement) developed to reduce corruption and to improve bureaucratic processes in the public sector. For example, online procedures enhancement for civil applications (OPEN) is an e-procurement system for enhancing administrative processes, transparency, and reducing corruption. The few studies that seek to understand how *e-government systems* in the public sector can serve as an anti-corruption strategy found it to reduce the cost of running government and bureaucratic corruption (Brito et al., 2015; Neupane, Soar, & Vaidya, 2012; Neupane, Soar, Vaidya, & Yong, 2014). By drawing on institutional theory, the concepts of regulatory, cognitive and normative mechanisms were used to elucidate how an e-government procurement system becomes institutionalized in government (Kim et al., 2009). The regulatory or coercive concept is defined on the premise that both political and legislative influences can use to affect or enforce organizational decisions to adopt a specific practice. The cognitive concept refers to copying other system's practices, this usually worked when there is prevalent uncertainty - organization may likely model themselves on other organizations. The normative concept refers to norms that are prevalent and observed in the domain to which the organizations belong. Thus, of all the three institutional concepts, the regulatory or coercive concept is the most effective while implementing the e-government system in organizations. The implementation of e-government system can be effective with strong leadership and political will as in the case of several IS implementations, such an e-government system (OPEN) having a positive impact on the reduction of corruption in the Seoul Metropolitan Government (Kim et al., 2009).

Other IS scholars (e.g., Neupane et al., 2012; Neupane et al., 2014) that deviate from the implementation factors of e-government systems focus on the evaluation of the users intent, perception, and acceptance of anti-corruption systems in public sector. They do so by drawing upon the concepts from TAM and Principal-Agency theories. The concepts of information asymmetry (which refers to the ability for an agent to have more information than the principal or vice versa, in a contract agreement between government and bidders), trust, were found to be significant on the intention or willingness to adopt e-procurement systems (Neupane et al., 2014).The intent to adopt public e-procurement in government showed a positive relationship with concepts of perceive usefulness, ease of use, and trust thereby curbing corruption in developing economies (Neupane et al., 2012). However, some IS scholars (e.g., Martinez, 2014; Saxena, 2017) published conflicting results that investment in transparency and accountability via e-government systems were perceived to be ineffective in combating corruption. For instance, the users an e-government system (Digital India) in India perceived that corruption is still pervasive and persistent as a result of government inefficiency, low transparency, high cost of procuring government serves, nepotism and favoritism (Saxena, 2017). In like manner, the assumption that investment in transparency and accountability via e-government systems is a failed one because it does not apply to several national contexts such as in the case of Brazil and Nigeria (Charoensukmongkol & Moqbel, 2012; Fabayo, Posu, & Obisanya, 2011; Martinez, 2014). In addition, most studies have so far relied on rational choice models and thus, could not demonstrate causation, often undertaking instead a strong normative undertone (Martinez, 2012, 2014).

Internet Diffusion

Internet diffusion or penetration rate relates to the percentage of the overall population (per 100 inhabitants) in a nation that uses Internet. It measures the number of Internet users or people that have access to the Internet. Such a measure is obtained from the World Development Indicators (WDIs) (Elbahnasawy, 2014). The introduction of Internet have mitigated corruption, fostered economic development globally (Jin & Cho, 2015). There is evidence that the Internet has suppressed corruption since its emergence (Elbahnasawy, 2014; Lee & Lio, 2016; Shrivastava & Bhattacherjee, 2015). Internet diffusion can exert effects on corruption perception primarily in bi-directional or indirect ways, both government and citizenry have utilized the Internet to foster bureaucratic processes (Kock & Gaskins, 2013; Lio, Liu, & Ou, 2011).

Extant studies that seek to understand the relationship between Internet diffusion and corruption have argued that the Internet can reduce corruption in a country (Andersen, Bentzen, Dalgaard, & Selaya, 2011; Elbahnasawy, 2014; Garcia-Murillo, 2009; Goel, Nelson, & Naretta, 2012; Kanyam et al., 2017; Kock & Gaskins, 2014; Lee & Lio, 2016; Lio et al., 2011; Shim & Eom, 2009). Although in some of these studies, an indirect relationship between Internet diffusion and government corruption was found to be significant, but a direct association between Internet diffusion and government corruption was found to be non-significant (Kock & Gaskins, 2014). Thus, the effect of Internet diffusion on corruption can be a bi-directional one (Lio et al., 2011). This means that other factors may mediate the relationship between Internet diffusion and corruption perception in a country or region (Elbahnasawy, 2014; Kanyam et al., 2017; Kock & Gaskins, 2014). For example, the relationship between greater levels of Internet diffusion within the Latin American and Sub-Saharan African countries were associated with greater levels of voice accountability but not with lower levels of corruption, however, the impact of Internet diffusion can lower levels of government corruption via greater levels of voice accountability (Kock & Gaskins, 2013; Kock & Gaskins, 2014). Thus, Internet diffusion and voice accountability have complementary effects on corruption perception. However, an effective government could use the Internet to manipulate the messages available on the Internet to their favor. The Internet can also offer the corrupt political elites the opportunity to retain power which could be a breeding ground for corruption (Kanyam et al., 2017; Linde & Karlsson, 2013), especially in the absence of rule of law or severity of sanction (Shrivastava & Bhattacherjee, 2015).

Social Media and Mobile Phones

Social media refers to mobile and web-based technologies (e.g., Facebook & WikiLeaks) for social interactions among individuals who share user-generated contents (Bertot et al., 2010b; Bertot, Jaeger, & Grimes, 2012). Social media technologies have properties such as communicability, interactivity, collaborative ability, anonymity, and visibility that can afford openness and accountability (Stamati et al., 2015). Thus, in recent years, many public sectors have leveraged the transparency and openness affordances of social media technologies and mobile phones to curb corruption (Arpit, 2012; Bertot et al., 2010a; Bertot et al., 2010b; Bertot et al., 2012; Enikolopov, Petrova, & Sonin, 2018; Essien, 2017; Hellström, 2010; Kanyam et al., 2017; Lee & Lio, 2016; Shrivastava & Bhattacherjee, 2015). Social media technologies and mobile phones can also be instrumental in empowering the citizenry to participate in and uphold good governance that will amount to transparency, accountability, openness, and mitigate corruption (Bekri, Dunn, Oguzertem, Su, & Upreti, 2011; Chatfield & Brajawidagda, 2013; Kanyam et al., 2017; Shrivastava & Bhattacherjee, 2015). For example, the launching of the "*mobile phones against corruption*" in 2014 by the United Nations Development Program (UNDP) in Papua New Guinea paved a way for the citizenry to report corruption cases via mobile phones applications (Kanyam et al., 2017). Similarly, the WikiLeaks site have over a million of user-generated documents in relation to anti-corruption struggles (Bertot et al., 2010b; Bertot et al., 2012; Shrivastava & Bhattacherjee, 2015). Such documents were used to expose and prosecute corrupt bureaucrats and also serve as deterrent to future corrupt officials (Kanyam et al., 2017; Shrivastava & Bhattacherjee, 2015). Recently, few empirical studies have sought to understand the relationship amongst social media technologies, mobile phones, telephones, and corruption (Arpit, 2012; Kanyam et al., 2017; Mimbi & Bankole, 2016; Shrivastava & Bhattacherjee, 2015; Valle-Cruz, Sandoval-

Almazan, & Gil-Garcia, 2016). Technologies such as mobile phones and WikiLeaks were found to be effective in curbing public sector corruption (Arpit, 2012; Kanyam et al., 2017; Lee & Lio, 2016; Mimbi & Bankole, 2016; Shrivastava & Bhattacherjee, 2015). The mobile phone, in particular, have two anti-corruption effects: 1) it can expose cases of corruption and 2) it can also reduce corruption (Lee & Lio, 2016). At first, the effect of mobile phones can manifest from the fact that they make it easier to report cases of corruption swiftly. Secondly, their effects might create a supervisory role that can deter corruption in the public sector (Lee & Lio, 2016; Valle-Cruz et al., 2016). However, there seems to be inconsistent evidence to show that social media technologies have significant effects on citizen's perception of corruption (Valle-Cruz et al., 2015, 2016). By this, it means that social media technologies seem not to have any effect on government performance and G2C interactions (Valle-Cruz et al., 2016). This could be as a result of less public services based on social media technologies and lack of public trust in the use of social media for G2C interactions (Valle-Cruz et al., 2015). IS researchers have cautioned that technology alone may not be instrumental on the public sector corruption (Kim, 2013; Shrivastava & Bhattacherjee, 2015). This is because, technology can provide opportunities for corrupt bureaucrats to misuse it for personal gains (Hutchings & Jorna, 2015; Kim, 2013). Recently, IS researchers have provided evidence to show that technology has been misused for corrupt practice in the public sector (Hutchings & Jorna, 2015).

Discussion

The literature reviewed so far, has revealed trends of anti-corruption strategies adopted by national governments in trying to curb corruption. The first anti-corruption strategy adopted was the traditional approaches that span the economic, political and socio-cultural strategies. However, such strategies do not seem to be sufficiently effective in curbing the prevalence of corruption. Thus, the combined efforts of the traditional, technological, transparency and accountability anti-corruption strategies were advocated as better alternatives to curbing public sector corruption. Individually, especially in the case of technology, the introduction of technological anti-corruption initiatives via e-government in both the developing and the developed countries have given rise to another form of corruption – misuse of IS for corrupt practices (Heeks, 2002; Hutchings & Jorna, 2015). Bureaucrats leverage their technical knowhow to foster corruption using the adopted anti-corruption technologies in the public sector (Heeks, 2002; Hutchings & Jorna, 2015). Thus, in this paper, we identified and discussed the concepts around various anti-corruption strategies in interactions. Such interactions are posited to curb corruption in the public sectors of a nation. Despite the inconsistencies in findings of anti-corruption strategies the review suggested that interactions among the concepts under each thematic category, i.e., the traditional, technological, transparency and accountability anti-corruption strategies could explain how we can curb the public sector corruption. Thus, following IS scholars (e.g., Wiener et al., 2016), the concepts extracted from the synthesized studies were arranged to form a conceptual model of anti-corruption strategies for curbing the public sector corruption as seen in Figure 2.

Conclusion and Future Research

The aim of this study was to provide an understanding of how the traditional and IT anti-corruption strategies intertwine to curb public sector corruption. Our study fulfills this aim in two ways: (1) by conducting a systematic review and synthesis of the extant body of research on anti-corruption strategies; (2) by developing a conceptual framework which could be used to conjecture theories/hypothesis in future research. Our literature review revealed that research in the area to date has focused on the traditional, technological, transparency and accountability anti-corruption strategies in an isolated manner, but none has focused on the interactions of such strategies to curb public sector corruption. In addressing this major research gap, our conceptual framework provides an integrative view of how such anti-corruption strategies and their associated concepts could interact to curb public sector corruption. Besides, the framework addresses other important research gaps such as how technological anti-corruption strategy can influence misuse of IS for corrupt practices. In addition to offering novel research opportunities within the IS field, we believe that our framework can also inspire future researchers to adopt the model in developing hypothesis that could later be tested empirically in the context of public sector corruption in developing countries.

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