



# Virtual Social Networks as Public Sphere: Relating E-government Maturity, ICT Laws, and Corruption

Jithesh Arayankalam and Satish Krishnan<sup>(✉)</sup>

Indian Institute of Management Kozhikode, Kozhikode, India  
{jitheshallfpm, satishk}@iimk.ac.in

**Abstract.** The role of e-government in reducing corruption is an active area of research in information systems (IS). Drawing on the concept of public sphere from political science literature, we seek to explore how the diffusion of virtual social networks (VSNs) influence the relationships between e-government maturity in a country, its ICT laws and corruption. Our analyses based on publicly available archival data substantiates the (1) relationship between e-government maturity in a country and its corruption through the indirect effect of ICT laws; (2) interaction effect of VSN diffusion in a country on its e-government maturity and ICT laws; and (3) interaction effect of VSN diffusion in a country on its ICT laws and corruption. The key contribution of this research is the reestablishment of the idea of public sphere in the context of VSN diffusion, and how it affects e-government outcomes of a country.

**Keywords:** E-government maturity · ICT laws · Corruption · Virtual social networks diffusion · Public sphere

## 1 Introduction

E-government is defined as the delivery of government services using information communication technologies (ICTs) [31]; and its maturity is defined as the extent to which a government in a country has established an online presence [41]. Governments across the globe are adopting e-government by the virtue of its potential to improve the effectiveness and the efficiency in information and services delivery using ICTs [70]. With the rapid increase in the Internet usage and the arrival of new gadgets such as smartphones, society is becoming more connected than ever. As a result of this, information and services are available to the citizens in ways that couldn't have been imagined a few years ago. In this context, a deeper understanding on the impact of e-government has become much more relevant.

Extant studies on e-government can be grouped into three broad categories: (1) evolution and development; (2) adoption and implementation; and (3) impact [57]. While there are several studies related to the first two categories, research relating to the impact of e-government is scant [18]. The studies in this category focus on the benefits of e-government such as increase in citizen participation (e.g. [12, 60]), improvement in political trust (e.g. [50, 60]), better accountability (e.g. [2]), more openness (e.g. [2,

60]), and reduction in corruption (e.g. [4, 16, 41]), among others. In this study, we delve deeper into the relationship between e-government and corruption, defined as “the misuse of entrusted power for private gains” [59; p. 1], for two key reasons. First, the extant studies linking e-government with corruption offer contrasting results; and thus, require further inquiry. And second, the role of virtual social networks (VSNs), defined as ICT platforms that facilitate social interactions among people across the world [48], on e-government outcomes is underexplored.

While most research linking e-government and corruption deals with the direct relationship between them (e.g. [16, 41]), the possibility of an indirect effect between the two is less explored. Such an exploration is important as the extant studies offer mixed results in establishing whether or not e-government has a role in reducing corruption. For instance, studies by [4], [13], and [67], support the notion of effectiveness of e-government in combating corruption, while others (e.g. [39, 68]) question its effectiveness. This anomaly in results points to a possibility of exploring other intervening and/or moderating factors while studying the impact of e-government maturity on corruption.

One such intervening factor that may have an indirect role is ICT laws in a country. Given that privacy and security issues are one of the major concerns associated with cyberspace, they could pose a challenge for the maturity of e-government [21]. When engaging in online governmental activities, citizens fear that their sensitive information may be compromised by the government; and thus, having strong ICT based legal frameworks could enhance citizens’ trust on the government [61]. While citizens’ trust is identified as an important prerequisite for the success of e-government initiatives, building and restoring trust is possible only when assurance about safety from the concerns associated with engaging in online activities is incorporated in a country’s ICT laws [46]. As the presence of citizens’ trust has a negative effect on corruption [64], and as the poor development (or absence) of ICT laws is considered a major hurdle for the success of e-government initiatives [35], we argue that as the e-government matures in a country, its ICT laws also need to develop to deal with the challenges such as privacy and security that accompany online services. The implication of this is a possibility of an indirect relationship between e-government maturity of a country and its corruption through ICT laws. This leads us to our first research question (RQ1), which is as follows:

***RQ1:** What is the relationship between e-government maturity, ICT laws, and corruption in a country?*

Another byproduct of ubiquitous connectivity is the rise of VSNs such as Facebook and Twitter, among others. As a platform for open discussion and deliberation, we argue that VSNs has the potential to be a public sphere. A public sphere is a realm of our social life where citizens can engage in political discussions and debates on common issues [24]. By mediating between the society and the government, a public sphere keeps the government accountable for its actions [24]. To qualify as a public sphere, [23] proposed three criteria namely (1) disregard for status; (2) domain of common concern; and (3) inclusivity. While disregard for status indicates that all citizens, irrespective of their status, can participate in the public sphere, domain of common concern means that citizens should be able to engage in rational discussion

about affairs that concern them. And, inclusivity signifies that every citizen should be able to participate in the public sphere [23]. We argue that VSNs meets all these three criteria to be an ideal public sphere; and thus, has a potential to push the government in a country towards development of sophisticated ICT laws, and lowering corruption. This brings us to our second research question (RQ2), which is as follows:

***RQ2:** What is the role of VSN diffusion on the relationships between e-government maturity, ICT laws, and corruption in a country?*

As an attempt towards answering the aforementioned questions, we performed a cross-country analysis of 136 countries by utilizing archival data from publicly available data sources. By doing so, this research contributes to the knowledge base of e-government in three key ways. First, we identify ICT laws as an intervening variable having an indirect relationship between e-government maturity and corruption. Second, we establish the role of VSN diffusion in influencing e-government outcomes. And third, we introduce the concept of public sphere from political science literature to IS discipline by conceptualizing VSNs as public sphere, thus contributing to an interdisciplinary research.

The rest of the paper is organized as follows. In Sect. 2, we first discuss how e-government maturity in a country is related with its ICT laws and corruption. Next, by conceptualizing VSNs as public sphere, we elaborate how the diffusion of VSNs can affect the relationships of (1) e-government maturity and ICT laws; and (2) ICT laws and corruption. In Sects. 3 and 4, we focus our efforts on research design and analyses respectively. In Sect. 5, we discuss our results, and highlight how our study contributes to the knowledge base of e-government. Finally, we conclude with a restatement of the value of our work.

## 2 Theory and Hypotheses

### 2.1 Relating E-government Maturity, ICT Laws, and Corruption

E-government maturity is defined as the extent to which a government in a country has established its online presence [41]; and this definition indicates that e-government initiatives matures and develops in stages starting from cataloging of government information to horizontal integration of different functional departments in the government, which can provide seamless services to citizens engaging in transactions with the government [42, 43, 56]. Along with other benefits such as openness and accountability, the potential of e-government in reducing corruption has been established in several studies (e.g. [1, 4, 7, 13, 16, 41, 65]). In all these studies, e-government is assumed to have a direct negative relationship with corruption indicating that when the higher is the level of e-government in a country, the lower will be its corruption. However, a handful of studies have pointed out a different viewpoint where e-government may actually increase corruption as it encourages new ways of indulging in such acts [29, 68]. These studies corroborate the views of [39] that casted doubt on the effectiveness of ICTs in reducing corruption.

These conflicting views point to a possibility of the presence of intervening factors that may influence the relationship between e-government maturity and corruption. We propose ICT laws in a country as a key intervening variable through which e-government may have an impact on corruption. ICT laws include legal mechanisms to regulate the use of ICTs within a country [62]. As security and privacy issues are major barriers to e-government initiatives [32], the poor development (or absence) of ICT laws can become a major barrier not only in the context of e-government adoption [21], but also in deriving successful outcomes from them [35]. Further, as technology in the digital age has brought in new methods of engaging in corrupt practices because of the provisions such as enhanced anonymity, the legal mechanisms to deal with these new challenges need to be strengthened [55] to minimize corrupt practices.

A well-developed ICT based legal framework has the potential to enhance citizens' trust in a country's online governmental services [49]. As citizens' trust is an important prerequisite for the success of e-government initiatives [58], building and restoring of trust is possible only when assurances about safety from the concerns associated with engaging in online activities is incorporated into the ICT based legal framework and settings of a country [46]. Further, as ICT laws has the potential to influence e-government outcomes [46] including lowering of corruption, it is logical to expect that this could happen only when a sophisticated and sound ICT based legal framework is fully developed.

Although a few studies have argued against the effectiveness of ICTs in controlling corruption (e.g. [11, 20]), it is worthy to note that a lack of proper ICT based legal framework may not allow courts to accept evidences using ICTs, which might negatively affect effective adjudication and prosecution in corruption cases [8]. The presence of effective ICT laws encourages maintenance of electronic records, facilitating identification of suspicious transactions, along with helping courts in expediting the legal processes such as prosecution [8], thus reducing corruption. A similar view is reflected in the 'Model Law' adopted by the United Nations Commission on International Trade Law, according to which admissibility of electronic messages as evidence in the courts is an important measure against fraud [62]. As authenticity of an evidence is critical in legal proceedings, authentication techniques such as digital signature can facilitate speeding up adjudication process. Thus, ICT laws, which facilitate authenticity and integrity of electronic information, can smoothen the judicial processes in deciding on corruption cases. Taken together, we argue that as e-government matures, the extent of development of ICT laws would result in minimizing corruption (see Fig. 1). Accordingly, we propose:

*H<sub>1</sub>: The relationship between e-government maturity in a country and its corruption is mediated by ICT laws.*

## 2.2 Impact of Virtual Social Networks Diffusion

VSN is often interchangeably used with social media; and is defined as "a group of Internet-based applications that build on the ideological and technical foundations of

Web 2.0, and that allow the creation and exchange of user generated content” [36; p. 60]. VSN diffusion is defined as the extent to which individuals in a country use virtual social networks such as Facebook, Twitter, LinkedIn, etc. [66]. Even though VSNs have different affordances, the ability to share content publicly is something common among almost all platforms. According to [27], VSNs facilitate individuals to share and receive information regularly from their networked peers. This means that VSNs can serve as an open virtual space where individuals can engage in discussions, creating conditions for deliberative democracy [26]. One important ramification of this thought is the transformation of VSNs as public sphere.

In a public sphere, all citizens have equal access with guaranteed freedom of expression and assembly, thus encouraging opinions about affairs of general interest [24]. The original conceptualization of public sphere by Habermas included avenues of debates and discussions such as newspapers, magazines, journals, political clubs, and other meeting places where socio-political discussions were possible [23]. We extend this notion in the contemporary era of social media, and argue that VSNs are public spheres, where individuals discuss socio-political issues, among others. As mentioned earlier, there are three criteria for the formation of public sphere, namely, disregard for status, domain of common concern, and inclusivity [23]. Most VSN platforms have the potential to mimic the ideal public sphere as conceptualized by Habermas; and hence, they can be a repertoire of public demands, which have a great potential to influence government actions including framing of new laws and revamping the existing laws. Moreover, the membership on these platforms are increasing at a tremendous pace, paving the way for an increased public participation in the issues of common concern. For example, Facebook has 2.32 billion active monthly users as of December 2019 [17], making it the largest platform where people can engage in discussions and debates.

According to [9], public demand has the ability to induce and accelerate governments to make laws. For instance, the ability of VSNs to facilitate public demand, and cause government to take certain actions pertaining to public interest was witnessed during the Arab Spring revolutions [33]. In a similar instance, the power of VSNs at its zenith was noticed during the Egyptian revolution of 2011, which resulted in the ouster of President Hosni Mubarak, where the main medium of coordination and relay of information by citizens was Facebook [69]. And in 2006, using MySpace, American students pressured their government for immigration reforms [15]. Together, these instances depict how VSNs can be instrumental in pushing governments for legal reforms in a country. It can be argued that as more and more people participate on VSN platforms (i.e., when higher is the level of VSN diffusion), pressure on the government to act on public demands increases. Nevertheless, the extent of VSN diffusion varies across countries, which in turn indicates that the open participation of citizens on issues of common concern varies as well. In countries where VSN diffusion is high, more people can access VSN platforms, whereas in countries where VSN diffusion is low, such access is limited. Based on these arguments, it can be proposed that the relationship between e-government maturity and the development of ICT laws is strong

when the VSN diffusion is high, whereas the relationship is weak when the VSN diffusion is low. Hence, we formally hypothesize (see Fig. 1):

*H<sub>2a</sub>: VSN diffusion in a country will have a positive moderating effect on the relationship between e-government maturity and ICT laws.*

A mere presence of ICT laws, without proper implementation, need not guarantee a reduction in corruption. One important way the proper implementation and compliance of laws can be guaranteed is through public pressure. That is, when the demand from stakeholders is strong, it puts pressure on governments to act consequently [72]. According to [10], citizens’ demands affect the outcomes of law compliance, and public pressure forces the government in controlling crime [54]. Having said this, we argue that VSNs has the potential to facilitate participation of citizens in discussions and debates on public issues such as corruption, and thus, pressurize governments to act accordingly. For instance, during 2011 London riots, people used Twitter to influence government actions [47]. While VSNs has the ability to make the government more responsive to the citizens [44], the extent of VSN diffusion, as mentioned earlier, varies across countries, limiting open participation of citizens on issues of common concern. Consequently, there is a possibility of variation across countries in access to different VSN platforms. Based on these arguments, it can be proposed that the relationship between development of ICT laws and corruption is strong when the VSN diffusion is high, whereas the relationship is weak when the VSN diffusion is low. More formally, we therefore hypothesize (see Fig. 1):

*H<sub>2b</sub>: VSN diffusion in a country will have a negative moderating effect on the relationship between ICT laws and corruption.*

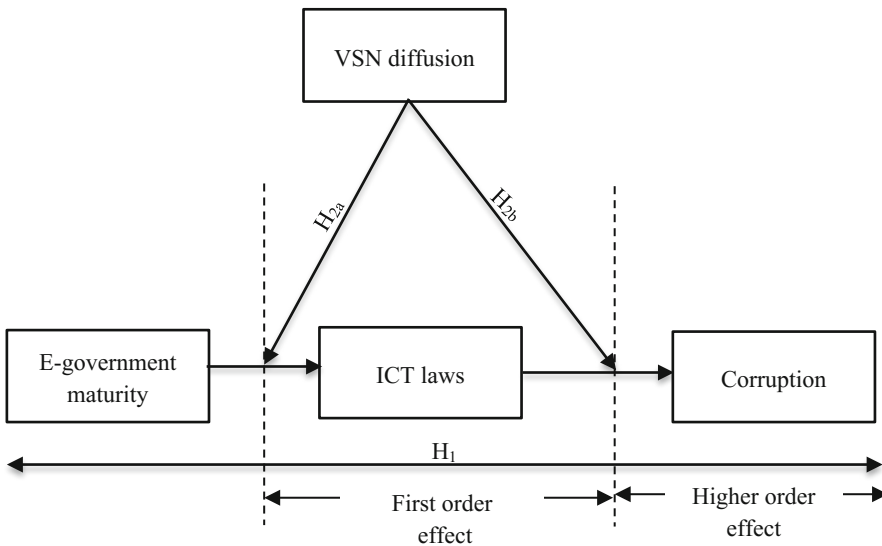


Fig. 1. Proposed model.

### 3 Research Design

Data to test the proposed model was obtained from the reports published by the reputed organizations such as the United Nations, World Economic Forum, Transparency International, the World Bank, etc. It is worthy to note that the research teams from these organizations followed stringent procedures and guidelines for ensuring the reliability and validity of the data. We preferred archival data as collecting primary data for several countries is constrained by the requirement of time and other resources such as money. Further, archival data has several advantages including (1) minimal common method bias [71]; (2) better reproducibility; and (3) greater generalizability [38]. Hypotheses were tested via a cross-sectional analysis of data from 136 countries. As this number is greater than the recommended value of 50 [25], we conclude that the issues pertaining to degrees of freedom in our model would be minimal.

Table 1 lists the study variables (including controls), its corresponding measures, and the sources from which the data for each variable was obtained. As the impact of e-government takes some time to show its effects [51], we considered a 2-year lag between the variables. Thus, for the variable of e-government maturity, we used data from the report published in the year 2012, and for ICT laws and corruption variables, 2014 and 2016 data were used respectively.

**Table 1.** Variables, measures and data sources.

Variable	Measure	Source
E-government maturity	Online Service Index	UN E-government Survey 2012 (UN, 2012)
Corruption	Corruption Perception Index	Transparency International (2016)
ICT laws	Laws relating to ICTs	Global IT Report (2016)
VSN diffusion	Use of virtual social networks	Global IT Report (2014, 2016)
Income level	GNP per capita	World Bank (2014)
Region	Region	World Bank (2014)
Internet penetration	Percentage of Internet users	International Telecommunication Union (2014)

As highlighted in the table, E-government maturity was measured using Online Service Index, the values for which were obtained from the UN E-government Survey 2012 report [63]. This index, which had been used in several past studies (e.g. [16, 73]) measured the extent of e-government in a country; and, its values ranged between 0 (low) and 1 (high). Corruption was measured using Corruption Perception Index (CPI), the scores for which were obtained from Transparency International (2016). Extant studies found CPI to have high validity (e.g. [5, 30, 34]), and its scores ranged from 0 (most corrupt) to 100 (least corrupt). For the ease of interpretation, in line with [53], we reverse coded the CPI scores. ICT laws was measured using the variable ‘Laws relating to ICTs,’ the data for which was taken from the Global IT Report (2016), and was

captured through an Executive Opinion Survey. This variable measured the development of laws in a country relating to the use of ICTs including-commerce, digital signatures, and consumer protection, among others [66]. Its values ranged from 1 (not developed at all) to 7 (extremely well developed). VSN diffusion was measured using the variable ‘Use of Virtual Social Networks,’ the scores for which were taken from the WEF’s Global IT reports (2014, 2016), and was used in several past studies (e.g. [40]). This variable was a measure of how widely virtual social networks are (e.g., Facebook, Twitter, LinkedIn, etc.) used in a country [66], and was captured through an Executive Opinion Survey. Its values ranged between 1 (not at all used) and 7 (used extensively). It is worthy to note that the Global IT Report (2016) contains data for VSN diffusion for the year 2014, and the Global IT report (2014) contains the data for 2012.

In addition, we controlled for the effects of several variables such as income level, region of a country, and Internet penetration. In line with extant macro level studies on corruption (e.g. [53]), we controlled for the effect of income level of a country, which is based on GNP per capita as per the World Bank’s classification. World Bank classifies countries into four categories: (1) low-income (coded as 1); (2) lower-middle-income (coded as 2); (3) upper-middle-income (coded as 3); and (4) high-income (coded as 4). According to [73], corruption level varies as per the region of a country. Thus, in order to control for this effect, we accounted for the region of a country based on World Bank classification. World Bank classifies countries into 7 categories: (1) South Asia (coded as 1); (2) Europe & Central Asia (coded as 2); (3) Middle East & North Africa (coded as 3); (4) East Asia & Pacific (coded as 4); (5) Latin America & Caribbean (coded as 5); (6) Sub-Saharan Africa (coded as 6); and (7) North America (coded as 7). Lastly, as extant studies showed that Internet penetration reduces corruption (e.g. [45]), we controlled for its effects as well.

## 4 Analysis and Results

### 4.1 Descriptive Statistics and Correlations

Descriptive statistics and correlations among the study variables are shown in Table 2. As shown, in line with our initial expectations, (1) e-government maturity was negatively correlated with corruption; (2) ICT laws was negatively correlated with corruption and (3) VSN diffusion was positively correlated with both e-government maturity and ICT laws. Further, as the correlations among all the variables were below 0.8 (except for the correlations between VSN diffusion for the years 2012 and 2014), we conclude that the issues pertaining to multicollinearity would be minimal [22]. Nevertheless, we conducted variance inflation factor (VIF) test, which indicated that the VIF values were below 2 (i.e., less than the suggested cut-off of 4 [19]).



**Table 2.** Descriptive statistics and correlations.

Variables	M	SD	1	2	3	4	5	6	7
1. EGOV	.49	.25							
2. ICTL	3.95	.89	.71**						
3. COR	54.09	19.14	-.63**	-.75**					
4. VSN12	5.52	.70	.63**	.71**	-.62**				
5. VSN14	5.49	.70	.68**	.73**	-.62**	.90**			
6. INC	2.89	1.05	.65**	.67**	-.67**	.71**	.73**		
7. REG	3.74	1.73	-.33**	-.37**	.30**	-.36**	-.39	-.41**	
8. INT	54.5	66.29	.28**	.19**	-.25**	.35**	.37**	.39**	-.25**

Note. N = 136; M = Mean; SD = Standard deviation; \*\*\*p < 0.001 \*\*p < 0.01 \*p < 0.05 (2-tailed); EGOV: E-government maturity; ICTL: ICT laws; COR: Corruption; VSN12: VSN diffusion (2012); VSN14: VSN diffusion (2014); INC: Income level; REG: Region; INT: Internet penetration.

## 4.2 Hypothesis Testing

Hypotheses were tested in SPSS using Hayes' PROCESS macro, a tool to automate the analyses of mediating and moderating relationships between different variables [28]. Particularly, we used bootstrapping analysis as it is considered to be one of the powerful methods to identify mediation [52]. That is, the bootstrapping method creates a large number of sub-samples (5000 in our study) from the main sample and the parameters are estimated using these subsamples.

Regression results for the indirect effect of ICT laws on the relationship between e-government maturity and corruption are shown in Table 3. The values reported are unstandardized as it is suggested to be a better metric while reporting the results of causal models [28]. The  $R^2$  value of 0.62 indicate that our model was effective in explaining the variance in corruption. Results in Table 4 shows that there is an indirect effect of e-government maturity on corruption through the variable of ICT laws, thus supporting hypothesis H1. It can be seen from the table that the effect is negative, indicating that as e-government in a country matured, its corruption reduced.

**Table 3.** Regression results for hypothesis 1.

Variables and statistics	$\beta^a$	
	ICT laws	Corruption
EGOV	1.71***	-6.89
ICTL	-	-11.00***
INC	0.31***	-4.94***
REG	-0.05	-0.38
INT	-0.001	-0.01
$R^2$	0.59	0.62

Note. N = 136; \*\*\*p < 0.001 \*\*p < 0.01 \*p < 0.05 (2-tailed); <sup>a</sup>Regression coefficients reported are unstandardized; EGOV: E-government maturity; ICTL: ICT laws; INC: Income level; REG: Region; INT: Internet penetration.

**Table 4.** Indirect effect of ICT laws.

	Effect	LLCI	ULCI
ICTL	-18.80	-26.94	-4.12

Note. LLCI: Lower-level confidence interval; ULCI: Upper-level confidence interval; ICTL: ICT laws.

Next step in our analyses was to find out how this indirect relationship is influenced by VSN diffusion. Results of this analysis is shown in Table 5.

**Table 5.** Regression results for hypotheses 2a and 2b.

Variables and statistics	$\beta^a$	
	ICT law	Corruption
EGOV	-2.1	-8.84
ICTL	-	22.45
VSN12	0.23	-
VSN14	-	19.95***
VSN12 x EGOV	0.61**	-
VSN14 x ICTL	-	-5.67***
INC	0.15**	-5.02***
REG	-0.04	-0.2
INT	-0.002**	-0.004
$R^2$	0.66	0.65

Note. N = 136; \*\*\*p < 0.001 \*\*p < 0.01 \*p < 0.05 (2-tailed); <sup>a</sup>Regression coefficients reported are unstandardized; EGOV: E-government maturity; ICTL: ICT laws; VSN12: VSN diffusion (2012); VSN14: VSN diffusion (2014); INC: Income level; REG: Region; INT: Internet penetration.

As shown, the interaction of VSN diffusion and e-government maturity on ICT laws was positive and significant ( $\beta = 0.61$ ;  $p < 0.01$ ), indicating that VSN diffusion strengthens the relationship between e-government and the development of ICT laws. That is, when the VSN diffusion is high, there is a better chance that e-government maturity facilitates development of ICT laws in a country.

In a similar vein, as shown in the table, the interaction of VSN diffusion and ICT laws on corruption was negative and significant ( $\beta = 5.67$ ;  $p < 0.001$ ), indicating that VSN diffusion strengthens the negative relationship of ICT laws with corruption. This implies that the higher the VSN diffusion in a country, the higher is the effectiveness of its ICT laws in reducing corruption.

To further understand the role of VSN diffusion on the relationships between (1) e-government maturity and ICT laws; and (2) ICT laws and corruption, we graphed these significant interaction effects as recommended by [14], which are shown in Figs. 2 and 3 respectively. Further, we performed slope analyses as suggested by [3], the results of which are reported in Tables 6 and 7. Figure 2 shows the interaction of VSN diffusion on e-government maturity and ICT laws. As shown, when VSN diffusion was high, the significant positive relationship between e-government maturity and ICT laws was stronger in comparison to when VSN diffusion was low. Corroborating this, a simple slope analysis revealed that when VSN diffusion was high, the relationship of ICT laws with e-government maturity was positive and significant (slope = 1.83,  $t = 11.08$ ;  $p < 0.001$ ). Similarly, when VSN diffusion was low, this relationship was positive and significant (slope = 1.03;  $t = 38.42$ ;  $p < 0.001$ ). Figure 3 shows the interaction of VSN diffusion on ICT laws and corruption. As shown, when there was high VSN diffusion, the negative relationship between ICT laws and corruption was stronger. When VSN diffusion was low, this relationship was weaker. Confirming this, a simple slope analysis showed that when VSN diffusion was high, the relationship of ICT laws with corruption was negative and significant (slope =  $-12.64$ ;  $t = -76.94$ ;  $p < 0.001$ ). Similarly, when VSN diffusion was low, this relationship was negative and significant (slope =  $-4.74$ ;  $t = -177.53$ ;  $p < 0.001$ ). In sum, these results indicate that Hypotheses H2a and H2b were supported.

Among the three control variables, while income level was found to significantly affect ICT laws ( $\beta = 0.15$ ;  $p < 0.01$ ) and corruption ( $\beta = -5.02$ ;  $p < 0.001$ ), Internet penetration had a significant relationship with ICT laws ( $\beta = -0.002$ ;  $p < 0.01$ ). These findings are in line with the extant studies that have argued for the role of income and Internet penetration on corruption.

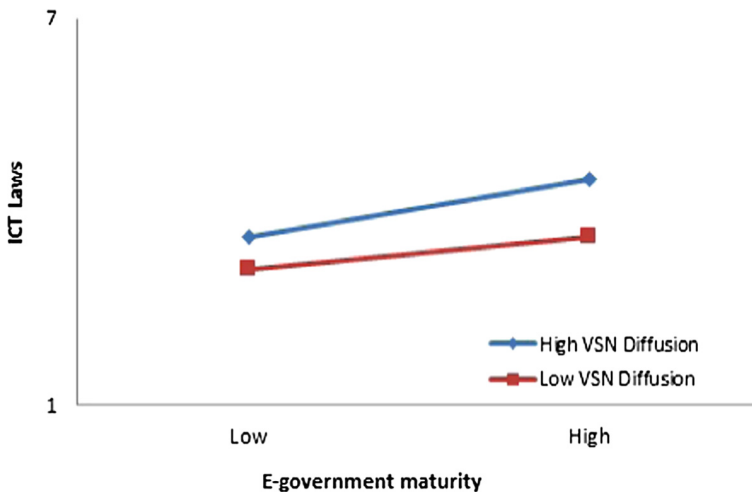
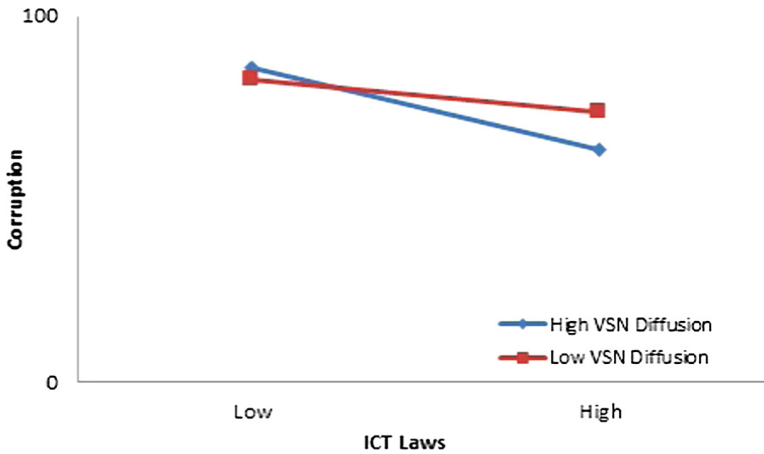


Fig. 2. Moderation effect of VSN diffusion on e-government maturity and ICT laws.



**Fig. 3.** Moderation effect of VSN diffusion on ICT laws and corruption.

**Table 6.** Slope analysis for hypothesis 2a.

	Simple slope	SE	t
High Mod (+1 SD)	1.83	0.17	11.08
Med Mod (Mean)	1.43	0.08	18.04
Low Mod (-1 SD)	1.03	0.03	38.42

Note. N = 136; t statistic is computed based on the degrees of freedom; SE: Standard error; SD: Standard deviation.

**Table 7.** Slope analysis for hypothesis 2b.

	Simple slope	SE	t
High Mod (+1 SD)	-12.64	0.16	-76.94
Med Mod (Mean)	-8.69	0.20	-42.52
Low Mod (-1 SD)	-4.74	0.03	-177.53

Note. N = 136; t statistic is computed based on the degrees of freedom; SE: Standard error; SD: Standard deviation.

## 5 Discussion

Utilizing archival data from 136 countries, we sought to explore the factors affecting “e-government maturity and corruption” relationship. Specifically, this research strived to investigate the (1) indirect effect of ICT laws on the relationship between e-government maturity and corruption; and (2) moderating effects of VSN diffusion on the relationships between e-government maturity, ICT laws, and corruption. The findings corroborate our initial argument that there could be other factors which might

play a vital role in justifying the relationship of e-government maturity in a country with its corruption. Our findings indicate that when VSN diffusion is higher in a country, the extent of e-government maturity facilitates the development of ICT laws. Further, when VSN diffusion in a country is higher, better is the effectiveness of its ICT laws in reducing corruption.

Conceptualizing VSN as a public sphere, our study indicates that VSNs provides citizens a platform to connect with others, share information, voice their opinions, and achieve a common goal, which in turn are achieved by ensuring open access to all [6]. Thus, the presence of a VSN based public sphere strengthens democracy through open participation [24]. In other words, when there is a public sphere in form of VSNs, citizens have a major role in influencing their government towards development of sound ICT based laws. Further, such a public sphere, not only has the capability to complement the role of e-government in facilitating the development of sophisticated ICT laws but also has the potential to reduce corruption in a country. Taken together, in line with Srivastava's [57] value framework for assessing e-government impact, our study highlights that the impact of e-government maturity in a country on its corruption is not very direct and straightforward; rather, it is contingent on its ICT laws and VSN diffusion.

Our study contributes to the knowledge base of e-government in three key ways. Firstly, our study proposes that there could be important intervening factors between "e-government maturity and corruption" relationship, and identifies ICT laws in a country as one such intervening variable. Through this proposal, we argue that one plausible reason for the mixed findings from the extant studies on e-government and corruption could be due to the lack of focus on intervening factors. Secondly, our study acknowledges the vital role of VSNs in realizing the payoffs from e-government initiatives. By grounding the discussion on Habermasian public sphere, our study established the rediscovery of public sphere through VSNs. To elaborate further, our study is one of the first studies to conceptualize VSNs as a public sphere, and to explore the role of VSN diffusion on e-government outcomes in terms of (1) development of sound ICT based legal framework; and (2) minimizing the corruption. And lastly, our study introduces the concept of public sphere from the reference discipline of political science to information systems, thereby contributing to an inter-disciplinary research.

From a practical standpoint, our study offers several important implications for policy makers. For instance, to effectively use e-government as a tool to combat corruption our study suggests that there is a need for a comprehensive understanding of the phenomenon. That is, knowledge about intervening variables in terms of ICT laws between e-government maturity and corruption would give policy makers an idea about reducing corruption through e-government. Further, our study highlights the complementary role of VSNs for realizing the benefits from e-government initiatives.

This study is not without its limitations. First, we used archival data to arrive at the findings. Though secondary data we used in our study were from reputed sources, primary data would have enabled a better control over the definition and operationalization of variables. Second, we did not include countries such as North Korea and Hong Kong in our analyses, as the data pertaining to these countries were not available in the reports we used. Third, while we acknowledge the possible roles of other intervening factors, we limited our efforts and attention to only one variable

namely, ICT laws in a country. Future research may look into other intervening variables such as administrative efficiency and governance, among others. Also, there are studies, which shows the reverse causal relationship between corruption and e-government maturity (e.g. [37]). The influence of VSN diffusion on this relationship may be explored in future research. And lastly, while our study utilized data from different years for each variable and had considered the effect lag, future research may focus on doing a longitudinal study with panel data.

## 6 Concluding Remarks

The relationship between e-government and corruption, though an active area of research, is underexplored and less understood. In this study, we examined the possibility of ICT laws as an intervening factor alongside the role of VSNs in influencing e-government outcomes. Specifically, our findings depict that the VSN diffusion in a country has the potential to strengthen the negative relationship of (1) e-government maturity with ICT laws; (2) ICT laws with corruption. Further, our study acknowledges the capability of VSNs in facilitating the rediscovery of public sphere as conceptualized by Habermas.

## References

1. Abu-Shanab, E.A., Harb, Y.A., Al-Zoubi, S.Y.: E-government as an anti-corruption tool: citizens perceptions. *Int. J. Electron. Gov.* **6**(3), 232–248 (2013)
2. Ahn, M.J., Bretschneider, S.: Politics of e-government: e-government and the political control of bureaucracy. *Public Adm. Rev.* **71**(3), 414–424 (2011)
3. Aiken, L.S., West, S.G., Reno, R.R.: *Multiple Regression: Testing and Interpreting Interactions*, 1st edn. Sage Publications, Thousand Oaks (1991)
4. Banerjee, P., Chau, P.Y.K.: An evaluative framework for analysing e-government convergence capability in developing countries. *Electron. Gov. Int. J.* **1**(1), 29–48 (2004)
5. Barr, A., Serra, D.: Corruption and culture: an experimental analysis. *J. Public Econ.* **94**(11–12), 862–869 (2010)
6. Bertot, J.C., Jaeger, P.T., Grimes, J.M.: Using ICTs to create a culture of transparency: e-government and social media as openness and anti-corruption tools for societies. *Gov. Inf. Q.* **27**(3), 264–271 (2010)
7. Bhatnagar, S.: E-government and access to information. *Glob. Corruption Rep.* **2003**, 24–32 (2003)
8. Bhattacharjee, A., Shrivastava, U.: The effects of ICT use and ICT Laws on corruption: a general deterrence theory perspective. *Gov. Inf. Q.* **35**(4), 703–712 (2018)
9. Burstein, P.: Public opinion, demonstrations, and the passage of antidiscrimination legislation. *Public Opin. Q.* **43**(2), 157–172 (1979)
10. Camaj, L.: From ‘window dressing’ to ‘door openers’? Freedom of Information legislation, public demand, and state compliance in South East Europe. *Gov. Inf. Q.* **33**(2), 346–357 (2016)
11. Charoensukmongkol, P., Moqbel, M.: Does investment in ICT curb or create more corruption? A cross-country analysis. *Public Organ. Rev.* **14**(1), 51–63 (2014)

12. Chawla, R., Bhatnagar, S.: Online delivery of land titles to rural farmers in Karnataka, India. In: *Scaling Up Poverty Reduction: A Global Learning Process and Conference*, pp. 25–27. The World Bank, Shanghai (2004)
13. Cho, Y.H., Choi, B.D.: E-government to combat corruption: the case of Seoul metropolitan government. *Int. J. Public Adm.* **27**(10), 719–735 (2004)
14. Cohen, J., Cohen, P., West, S.G., Aiken, L.S.: *Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences*, 3rd edn. Lawrence Erlbaum Associates, New Jersey (1983)
15. Costanza-Chock, S.: The immigrant rights movement on the net: between web 2.0 and communication popular. *Am. Q.* **60**(3), 851–864 (2008)
16. Elbahnasawy, N.G.: E-government, internet adoption, and corruption: an empirical investigation. *World Dev.* **57**, 114–126 (2014)
17. Facebook Company Info. <https://newsroom.fb.com/company-info>. Accessed 30 Mar 2019
18. Flak, L.S., Dertz, W., Jansen, A., Krogstie, J., Spjelkavik, I., Ølnes, S.: What is the value of e-government—and how can we actually realize it? *Transform. Gov.: People Process Policy* **3**(3), 220–226 (2009)
19. Fox, J.: *Regression Diagnostics*, 1st edn. Sage Publications, Newbury Park (1991)
20. Garcia-Murillo, M.: Does a government web presence reduce perceptions of corruption? *Inf. Technol. Dev.* **19**(2), 151–175 (2013)
21. Gilbert, D., Balestrini, P., Littleboy, D.: Barriers and benefits in the adoption of e-government. *Int. J. Public Sector Manag.* **17**(4/5), 286–301 (2004)
22. Gujarati, D.N.: *Basic Econometrics*, 3rd edn. Tata McGraw-Hill Education, New York (2009)
23. Habermas, J.: *The Structural Transformation of the Public Sphere*, 1st edn. MIT Press, Cambridge (1989)
24. Habermas, J., Lennox, S., Lennox, F.: The public sphere: an encyclopedia article (1964). *New German Critique* **3**, 49–55 (1974)
25. Hair, J.F., Black, W.C., Babin, B.J., Anderson, R.E., Tatham, R.L.: *Multivariate Data Analysis*, 6th edn. Pearson Prentice Hall, Uppersaddle River (2006)
26. Halpern, D., Gibbs, J.: Social media as a catalyst for online deliberation? Exploring the affordances of Facebook and YouTube for political expression. *Comput. Hum. Behav.* **29**(3), 1159–1168 (2013)
27. Hampton, K.N., Lee, C., Her, E.J.: How new media affords network diversity: direct and mediated access to social capital through participation in local social settings. *New Media Soc.* **13**(7), 1031–1049 (2011)
28. Hayes, A.F.: *Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach*, 2nd edn. Guilford Publications, New York (2017)
29. Heeks, R.: Information technology and public sector corruption. *Information Systems for Public Sector Management Working Paper No. 4* (1998)
30. Heidenheimer, A.J.: The topography of corruption: explorations in a comparative perspective. *Int. Soc. Sci. J.* **48**(149), 337–347 (1996)
31. Ho, A.T.: Reinventing local governments and the e-government initiative. *Public Adm. Rev.* **62**(4), 434–444 (2002)
32. Holden, S.H., Norris, D.F., Fletcher, P.D.: Electronic government at the local level: progress to date and future issues. *Public Perform. Manag. Rev.* **26**(4), 325–344 (2003)
33. Howard, P.N., Duffy, A., Freelon, D., Hussain, M.M., Mari, W., Maziad, M.: Opening closed regimes: what was the role of social media during the Arab Spring? *Social Science Research Network* (2011). SSRN: <https://ssrn.com/abstract=2595096> or <http://dx.doi.org/10.2139/ssrn.2595096>
34. Husted, B.W.: Wealth, culture, and corruption. *J. Int. Bus. Stud.* **30**(2), 339–359 (1999)

35. Hwang, M.S., Li, C.T., Shen, J.J., Chu, Y.P.: Challenges in e-government and security of information. *Inf. Secur.* **15**(1), 9–20 (2004)
36. Kaplan, A.M., Haenlein, M.: Users of the world, unite! The challenges and opportunities of social media. *Bus. Horiz.* **53**(1), 59–68 (2010)
37. Khan, A., Krishnan, S.: Conceptualizing the impact of corruption in national institutions and national stakeholder service systems on e-government maturity. *Int. J. Inf. Manag.* **46**, 23–36 (2019)
38. Kiecolt, K.J., Nathan, L.E.: *Secondary Analysis of Survey Data*, 1st edn. Sage Publications, New Delhi (1985)
39. Kim, S., Kim, H.J., Lee, H.: An institutional analysis of an e-government system for anti-corruption: the case of OPEN. *Gov. Inf. Q.* **26**(1), 42–50 (2009)
40. Krishnan, S., Lymm, J.: Determinants of virtual social networks diffusion: insights from cross-country data. *Comput. Hum. Behav.* **54**, 691–700 (2016)
41. Krishnan, S., Teo, T.S.H., Lim, V.K.G.: Examining the relationships among e-government maturity, corruption, economic prosperity and environmental degradation: a cross-country analysis. *Inf. Manag.* **50**(8), 638–649 (2013)
42. Layne, K., Lee, J.: Developing fully functional e-government: a four stage model. *Gov. Inf. Q.* **18**(2), 122–136 (2001)
43. Lee, J.: 10 year retrospect on stage models of e-government: a qualitative meta-synthesis. *Gov. Inf. Q.* **27**(3), 220–230 (2010)
44. Lee, G., Kwak, Y.H.: An open government maturity model for social media-based public engagement. *Gov. Inf. Q.* **29**(4), 492–503 (2012)
45. Lio, M.C., Liu, M.C., Ou, Y.P.: Can the internet reduce corruption? A cross-country study based on dynamic panel data models. *Gov. Inf. Q.* **28**(1), 47–53 (2011)
46. Nyman-Metcalf, K.: e-Governance in law and by law. In: Kerikmäe, T. (ed.) *Regulating eTechnologies in the European Union*, pp. 33–51. Springer, Cham (2014). [https://doi.org/10.1007/978-3-319-08117-5\\_3](https://doi.org/10.1007/978-3-319-08117-5_3)
47. Panagiotopoulos, P., Bigdeli, A.Z., Sams, S.: Citizen–government collaboration on social media: the case of Twitter in the 2011 riots in England. *Gov. Inf. Q.* **31**(3), 349–357 (2014)
48. Panteli, N.: Virtual social networks: a new dimension for virtuality research. In: Panteli, N. (ed.) *Virtual Social Networks*, pp. 1–17. Palgrave Macmillan UK, London (2009). [https://doi.org/10.1057/9780230250888\\_1](https://doi.org/10.1057/9780230250888_1)
49. Papadopoulou, P., Nikolaidou, M., Martakos, D.: What is trust in e-government? A proposed typology. In: 2010 43rd Hawaii International Conference on System Sciences, pp. 1–10. IEEE (2010)
50. Parent, M., Vandebek, C.A., Gemino, A.C.: Building citizen trust through e-government. *Gov. Inf. Q.* **22**(4), 720–736 (2005)
51. Picci, L.: The quantitative evaluation of the economic impact of e-government: a structural modelling approach. *Inf. Econ. Policy* **18**(1), 107–123 (2006)
52. Preacher, K.J., Hayes, A.F.: Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behav. Res. Methods* **40**(3), 879–891 (2008)
53. Robertson, C.J., Watson, A.: Corruption and change: the impact of foreign direct investment. *Strateg. Manag. J.* **25**(4), 385–396 (2004)
54. Shaw, M.: Crime, police and public in transitional societies. *Transform. Crit. Perspect. South. Afr.* **49**(1), 1–24 (2002)
55. Shelley, L.I.: Crime and corruption in the digital age. *J. Int. Aff.* **51**(2), 605–620 (1998)
56. Siau, K., Long, Y.: Synthesizing e-government stage models - a meta-synthesis based on meta-ethnography approach. *Ind. Manag. Data Syst.* **105**(3/4), 443–458 (2005)



57. Srivastava, S.C.: Is e-government providing the promised returns? A value framework for assessing e-government impact. *Transform. Gov.: People Process Policy* **5**(2), 107–113 (2011)
58. Teo, T.S.H., Srivastava, S.C., Jiang, L.: Trust and electronic government success: an empirical study. *J. Manag. Inf. Syst.* **25**(3), 99–132 (2008)
59. TI: TI Source Book (2000). <https://www.transparency.org.nz/.../2000/Elements-of-a-National-Integrity-System.pdf>. Accessed 30 Mar 2019
60. Tolbert, C.J., Mossberger, K.: The effects of e-government on trust and confidence in government. *Public Adm. Rev.* **66**(3), 354–369 (2006)
61. Turow, J., Hennessy, M.: Internet privacy and institutional trust: insights from a national survey. *New Media Soc.* **9**(2), 300–318 (2007)
62. UN: Information and Communication Technology Policy and Legal Issues for Central Asia (2007). <http://www.unecce.org/info/ece-homepage.html>. Accessed 30 Mar 2019
63. UN.: The United Nations E-Government Survey (2012). <https://publicadministration.un.org/egovkb/en-us/reports/un-e-government-survey-2012>. Accessed 30 Mar 2019
64. Uslaner, E.M.: Trust and corruption. In: *The New Institutional Economics of Corruption*, pp. 90–106. Routledge (2004)
65. Von Haldenwang, C.: Electronic government (e-government) and development. *Eur. J. Dev. Res.* **16**(2), 417–432 (2004)
66. WEFGITR: The global information technology report 2016. World Economic Forum, vol. 1. Citeseer (2016). [www3.weforum.org/docs/GITR2016/WEF\\_GITR\\_Full\\_Report.pdf](http://www3.weforum.org/docs/GITR2016/WEF_GITR_Full_Report.pdf). Accessed 30 Mar 2019
67. Welch, E.W., Wong, W.: Global information technology pressure and government accountability: the mediating effect of domestic context on website openness. *J. Public Adm. Res. Theor.* **11**(4), 509–539 (2001)
68. Wescott, C.G.: E-government in the Asia-pacific region. *Asian J. Polit. Sci.* **9**(2), 1–24 (2001)
69. Wilson, C., Dunn, A.: The Arab Spring| Digital media in the Egyptian revolution: descriptive analysis from the Tahrir data set. *Int. J. Commun.* **5**, 25 (2011)
70. Wimmer, M., Codagnone, C.: Roadmapping e-Government: Research Visions and Measures Towards Innovative Governments in 2020. eGovRTD2020 Project Consortium, Clusone (2007)
71. Woszczynski, A.B., Whitman, M.E.: The problem of common method variance in IS research. In: *The Handbook of Information Systems Research*, pp. 66–78. IGI Global (2004)
72. Yang, K., Callahan, K.: Citizen involvement efforts and bureaucratic responsiveness: participatory values, stakeholder pressures, and administrative practicality. *Public Adm. Rev.* **67**(2), 249–264 (2007)
73. Zhao, F.: An empirical study of cultural dimensions and e-government development: implications of the findings and strategies. *Behav. Inf. Technol.* **32**(3), 294–306 (2013)