E-Government, E-Participation, and the Rule of Law: Examining their Combined Effect on Corruption in Arab Countries

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Abstract

Corruption is a wicked issue that severely impacts governments' economic development and the living standards of its citizens. As a result, many governments have invested heavily in the implementation of information and communication technologies with the assumption that it will help in curbing corruption. In response to this growing assumption, this study investigates the impact of e-government and e-participation, as well as the direct and moderating effect of the rule of law on corruption in Arab countries.

This study is based on secondary data collected from 2012 to 2020. Based on the study results, the rule of law is found to be statistically significant in curbing corruption. While the use of e-government and e-participation are found to have no relationship. However, e-government and e-participation can have a significant effect in curbing corruption only when there is an effective enforcement of anti-corruption laws and policies.

***Keywords**: Corruption, Rule of Law, E-government, E-participation.*

Introduction

In 2010, corruption was the spark of huge political unrest across many Arab countries also known as the Arab Spring movement (Arampatzi et al., 2018). Before that time, many government officials abused public resources and their powers causing numerous civilians to suffer from the deprivation of good living and prosperity (Arampatzi et al., 2018). Furthermore, corruption is considered a serious global threat. The World Economic Forum (2019) has estimated the number of damages that corruption costs around the world, which they announced that it accounts for $1.26 trillion per year. In addition, Transparency International (2017), estimated that around the world nearly one out of four persons may confess to giving a bribe in the last 12 months for public services. Also, they found that almost worldwide there is a consensus that police officers and elected officials are the most corrupt in public service. Accordingly, many governments are working to take effective actions to eliminate corruption with different technology tools and policies (Kim et al., 2009; Zheng, 2016; Žuffová, 2020).

However, the availability of these technological tools doesn't ensure the control over corruption and the misuse of public resources. As there is large body research that has shown the importance of the exitance of non-technological factors that needs to be in place in order for corruption to be controlled. For instance, Shim and Eom (2008) found that corruption levels are decreasing when governments enjoy a high level of professionalism, quality, and law enforcement. Also, Castro and Lopes (2022) have found that curbing corruption require governments to maintain good political stability and good economic wealth. Like-

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wise, Forghani-Brusca et al. (2017) have found that fiscal transparency along with high quality budgetary management and auditing systems can have significant impact on fighting corruption.

In addition, there are some suspicions about the effective impact of technology in reducing corruption. For instance, it's found that governments need to have more than 0.39 in the United Nations E-government Development Index to their e-government infrastructure could assist in controlling corruption (Castro & Lopes, 2022). Furthermore, it's found that e-government could not have an impact on corruption where a government environment is based on opaque legal system and runs under politicians' influence, as well as their rules are applied selectively. In addition, there is some evidence that e-government impact is contingent on governments' enforcement of anti-corruption policies (Kim, 2014). These all show that there is a need for further examination of the impact of e-government on corruption.

Research Problem

Building on that this research is trying to investigate the following research questions:

- What is the impact of e-government and e-participation on curbing corruption in Arab countries?
- What is the impact of e-government and e-participation on curbing corruption with the existences of the rule of law in Arab Countries?

Study Objectives

This research aims to fulfil the following objectives:

- Reviewing the literature of e-government, e-participation, and the rule of law in the context of corruption.
- Discussing the current state of corruption in Arab Countries.
- Finding the moderating effect of the rule of law on the relationship between e-government, e-participation, and corruption.

Research Contribution

This research contributes by providing further evidence on the impact of governments' use of technology on corruption. In fact, many researchers asked for further research on the impact of e-government and e-participation on corruption (Park & Kim, 2020; Shim & Eom, 2008; Bertot et al., 2010). Furthermore, this research considers the role of the rule of law in limiting corruption. As there are many scholars agree that e-government and e-participation alone have a limited impact (Castro & Lopes, 2022; Park & Kim, 2020; Kim, 2014; Shim & Eom, 2008). Therefore, this research contributes by examining the direct relationship between these variables and corruption, in addition to the moderating effect of the rule of law.

Furthermore, this research contributes by focusing on the Arab countries' context. As Arab countries in particular were not given any attention in the last ten years in the literature, especially with a similar scope to this study (Arampatzi et al., 2018). In addition, Arab countries vary significantly in their economic development, regime type, and political stability. Thus, studying their use of information technology to control corruption is worth attention.

Literature Review

Corruption

Corruption can appear in multiple forms in different sectors and at different levels. Corruption can occur in the public or the private sector and appear at the societal and organizational levels. In any

form, it is always considered an immoral and unacceptable act that only causes harm and destruction (Breen & Gillanders, 2012). In this paper, the literature review mainly discusses corruption in the public sector with some concentration on public finance. According to Shleifer and Vishny (1993), corruption is "the sale by government officials of government property for personal gain" (p.599). In other words, corruption means the use of public resources to gain a private benefit. In addition, corruption comes in many faces and types.

Graycar and Prenzler (2013) listed the forms of corruption, as it includes: "bribery, extortion, embezzlement, conflicts of interest, patronage, nepotism, and cronyism" (p.2). Bribes are gifts given to public officials with the intention of facilitating a satisfactory outcome (Graycar & Prenzler, 2013). In terms of extortion, Graycar and Prenzler (2013) noted that it illustrates the use of force and coercion to extract payments or benefits, as in some cases when official inspectors use their authority to threaten the business unless compensated. Whereas embezzlement means the use of public funds that are under direct supervision to fund personal interest (Graycar & Prenzler, 2013). In terms of conflicts of interest, it's the use of public power to make a decision that would benefit a person, or an organization related to the public official. The difference between embezzlement and conflicts of interest is that embezzlement involves a direct self-benefit from public resources (Graycar & Prenzler, 2013). In contrast, conflict of interest is the use of decision-making abilities to benefit someone other than the public official (Graycar & Prenzler, 2013). Regarding patronage, nepotism, and cronyism, they all share the notion of favoritism in employment (Graycar & Prenzler, 2013). Patronage can be defined as the promotion of someone influential over a qualified candidate while nepotism is the promotion of a friend or a relative, and cronyism is the promotion of a direct family member instead of a qualified individual (Graycar & Prenzler, 2013).

Moreover, corruption can occur in multiple forms in the process of public budgeting (Dorotinsky & Pradhan, 2008). According to Mikesell (2018), the public budgeting cycle in general consists of four stages, budget preparation, political consideration, execution, auditing, and evaluation. In the process of budget preparation, the executive branch of the government initially takes over the process of drafting the public budget for the upcoming fiscal year, in this process, some officials may engage in a systematic overestimation of their budget proposals, this overestimation creates a less transparent estimation for public funds which creates vulnerabilities and incentives for corruption (Dorotinsky & Pradhan, 2008). Alternatively, poor classification of public spending and revenues, unreported operations, and incomplete fiscal information could create weakness in the budget formation process and contribute to a lack of transparency.

In the political consideration process, politicians review the budget proposal and decide whether the public funds allocation is favorable to their representatives. However, some political figures get into the trap of conflict of interest by seeking negotiations for subsidies and tax relief programs in order to favor some interest individuals or groups, and other politicians fight for earmarks and resources for the areas that hold similar political affiliation (Martinez-Vazquez et al., 2004). However, not to conflict the practice of conflict of interest with lobbying, as lobbying means using the information and the data proposed by lobbyists under integrity regulations to support a political position and to advance their interests, but when the politicians take gifts or use the final outcome for a personal advantage then his/her action could be labeled under the conflict of interest (Statsch & Berkhout, 2020).

In the budget execution stage, the public funds are distributed to the public agencies to issue payments for the public programs. This stage in public budgeting is largely known to be the most fruitful area of corrupt activities due to the fact of the extensive exchange of resources among different groups from the public and the other sectors (Dorotinsky & Pradhan, 2008). Public procurements in some state-owned establishments are underregulated, which allows some officials to engage in transactions with suspicious private entities

that offer unreasonable pricing for their goods and services (Dorotinsky & Pradhan, 2008). Søreide (2002) listed several strategies for how public officials can make bribing businesses win the bids for public contracts. For example, some officials sell confidential information like the most significant parameters of the evaluation of bids to businesses or the favorable procurement price; alternatively, the public official might abuse their decision-making power to shorten the number of bidders to a selective business. Even corruption can occur in the administration of public revenue when public officials engage in "skimming of receipts, collusive administrative reductions in tax liability, selective enforcement of tax obligations or unjustified writing off of tax arrears" (Dorotinsky & Pradhan, 2008: 272).

In the stage of auditing and evaluation, public expenditures and revenue are revisited and reviewed for the purpose of accountability and reporting. Although corruption is hardly expected in this stage due to the extensive auditing, corruption can occur when auditors overlook budgeting issues. Auditors may experience political pressures that force them to engage in underreporting of fraudulent behaviors (Dorotinsky & Pradhan, 2008). Thus, governments' auditing needs to be implemented on specific mandates and audit recommendations need to be investigated after their submission (Dorotinsky & Pradhan, 2008: 276).

Corruption Adverse Impact

Corruption also impacts governments adversely in multiple and unexpected ways. Aidt (2009) tested two interesting theoretical positions guiding corrupted individuals and their impact on economic development. The first group is labeled as the "sanders", which are the corrupted individuals who consume public resources for their own benefit without any consideration for economic development, whereas the second group is labeled as "greasers", which refers to the individuals who seek to corrupt means to cut red tape and to facilitate political complexities, that is in order to conduct more efficient trades and contribute to economic development. Interestingly, Aidt (2009) found that both groups had a negative impact on economic development and sustainable growth. In fact, many studies show that corruption is responsible for lower investments, high price inflations, and currency depreciation in many countries. Furthermore, corruption can impact human development, Akçay (2006) examined how corruption negatively limits the living choices of individuals and how in return limits the development of their capabilities. Akçay used a sample of 63 countries and three different corruption indexes. He found that corruption has a significant negative correlation with human development. In more detail, Akçay argues that countries with higher corruption rates tend to have lower spending on health and education. This in return causes countries' GDP, standards of living, life expectancy rate, and human capital accumulation to fall below the global average, which ultimately leads to human development deterioration. Corruption can also impact on political systems. Andreev (2008) studied how the increase in corruption in Latin and East European countries eroded the trust in democratic systems. Andreev found that systemic corruption in the public sector is negatively associated with political legitimacy. Since corruption leads to a lack of responsiveness of political bodies to the expectations and beliefs of their constituents, which then damages citizens' levels of trust in democracy. All these studies show the different ways in which corruption could damage nations prosperity and well-being.

E-government and E-participation Impact on Corruption

In the traditional mode of governance, corruption was controlled through red tape and rigid rules, as well as, through excessive surveillance, auditing, and evaluation of internal affairs, which imposed the needed impersonal treatment and legal mandates to reduce the possibility of misuse of power (Merton, 2004). However, studies have shown that these traditional procedures hinder governments' efficiency in service delivery (Anechiarico & Jocob, 1994). Also, these traditional measures limit the availability of feedback and public participation (Lips, 2020; Abu-Shanab, 2015; Žuffov, 2020).

Alternatively, many governments started to offer e-government services to become more efficient in-service delivery while maintaining information secrecy and impersonal treatment (Von Haldenwang, 2004; Lips, 2020). Furthermore, e-government enabled governments to limit some discretions that were abused for corrupted means (Lips, 2020; Buffat, 2015). Also, e-government limited street-level bureaucrats' capacity to manipulate information and their decision-making power (Buffat, 2015). Unlike before e-government when street bureaucrats were the only medium between the state and citizens. Furthermore, the use of e-government reinforces the checks and balances doctrine in governments. In other words, e-government has promoted citizens to be able to view government information and hold governments accountable for their actions (Abu-Shanab, 2015; Janssen & Van den Hoven, 2015). This is because administrative activities become registered electronically thereby limiting illegal transactions. For instance, E-procurement systems offered by governments are argued to minimize unnecessary projects, allow real-time bidding, increase competition, increase tracking and monitoring, reduce human intervention, and increase accountability (Neupane et al., 2012). Other examples of e-government services that serve to limit corruption are e-tax systems, e-customs, and e-debt management (Ameen & Ahamed, 2012).

Moreover, several countries developed e-participation platforms to curb corruption (Abu-Shanab, 2015; Bertot et al., 2010; Zheng, 2016). E-participation are digital platforms that enable the inclusion of citizens in the decision-making process and political process (Abu-Shanab, 2015; Bertot et al., 2010). E-participation creates an additional layer of accountability as it helps to empower governments to become more decentralized (Abu-Shanab, 2015; Bertot et al., 2010). Also, it empowers citizens and stakeholders to question and report corruption from outside the government, such as the reporting of conflicts of interest or overestimation of budgets (Gulati et al., 2014; Zheng, 2016).

Bhatnagar (2003) noted that e-governments and e-participation play a major role in terms of controlling corruption as they can help in "providing information on government rules and citizen rights; providing information about government decisions and actions; promoting monitoring of government actions and expenditures; disseminating information on government performance; opening government processes, like land records, applications for licenses, and status of tax payments; identifying elected officials and civil servants under investigation for corruption and fraudulent activities; and disclosing of assets and investments of elected officials and civil servants" (as cited in Žuffov, 2020: 267). Therefore, e-government and e-participation implementation increased internationally, as they are expected to help in control corruption and replace traditional forms of organization (Bertot et al., 2010; Zhang, 2016).

However, there are some questions about how well technology can fight corruption. For instance, it is found that governments need to score higher than 0.39 on the UN E-government Development Index for e-government to have an impact on controlling corruption (Castro & Lopes, 2022). Furthermore, it has been found that e-government is unable to fight corruption in settings where the government selectively enforces its laws, is influenced by politicians, and is founded on an opaque legal system. Additionally, there is evidence that the effectiveness of governments in enforcing anti-corruption laws determines the impact of e-government (Kim, 2014). All of these suggest the need for non-technology approaches to control corruption.

Enforcement of Laws and Policies on Corruption

Countries respond to corruption differently, but they all agree on the development of anti-corruption norms that criminalize and condemn corrupt activities of all kinds. The institutionalization of anti-corruption norms could be through the enforcement of anti-corruption policies and sanctions (Breen & Gillanders, 2012). Plus, corruption can be controlled through the enactment of public policies that incentivize groups and individuals to embrace ethical and honest behaviors (Breen & Gillanders, 2012). For example, Singapore has constructed its civil service system based on a high-wage system since high wages would prevent public of-

ficials from accepting bribes and engaging in corrupt activities (Rahman, 1986). However, Van Rijckeghem and Weder (2001) found a significant negative correlation between high wages and low levels of corruption in low-income countries, which contradicts the common understanding about the relationship of the civil service wage system and corruption. They explained that corrupt officials in low-income countries will seek more income even with a high wage system if there are available public policies that could enable them to gain more income. Therefore, governments need to enforce effective anti-corruption policies.

Therefore, many scholars have investigated other policies and organizational dynamics impact on corruption. For instance, there is some evidence about the effectiveness of the decentralization of decision-making in fiscal management to curb corruption levels. Fiscal decentralization was first expressed by Tiebout (1956), who argued that the decentralization of fiscal decisions among localities could greatly bring governments more closely to citizens. In fact, Fisman and Gatti (2002) found that the decentralization of fiscal management across localities can limit corruption since decentralization induces inter-jurisdiction competition, increases accountability and monitoring, and enhances the distribution of power. In more detail, the competitiveness among localities tends to limit public officials from accepting rents due to increased government efficiency (Fisman & Gatti, 2002). Also, decentralization enforces closer accountability since centralized elected officials are far from local citizens while decentralization closes this gap (Fisman & Gatti, 2002). Whereas regarding the notion of the enhanced distribution of power, decentralization tends to break up the amount of power held by public officials in working the government. As in centralized governments, more power is in the hand of higher officials, which permits higher opportunities for the misuse of power and the acceptance of rents, but in decentralized government authority and power are distributed more greatly among officials which hinders any attempt for facilitating illegal actions (Fisman & Gatti, 2002).

Furthermore, governments need a mixture of public entities that practice scrutiny to add an extra layer of control over corruption. For example, many governments established Anti-Corruption Agencies (ACA) that audit government activities and enforce sanctions on corrupt activities. This is after the consensus among governments about the inefficiency of conventional law enforcement agencies like police and attorney general officials in combating corruption in a systematic fashion (de Sousa, 2010). The roles of ACA differ based on their design and scope. Some countries assign these agencies less punitive authority, thereby their role gets limited to the educational and informative roles, whereas other countries assign ACA with sanctioning powers, which gives them the authority to open investigations and practice prosecution. In a report published by the OECD (2007), the anti-corruption agencies can be classified based on size, specialization, and punitive competencies. According to de Sousa (2010), the success of ACAs is dependent on the existence of some factors. First, these entities must be independent, meaning that they need to be far away from political interference. Since some political bodies may impose some mandates on the agency's scope and power or reduce its finances. Second, de Sousa (2010) ACAs need to be linked to inter-institutional cooperation and international anti-corruption networks. These entities can provide the needed resources and knowledge to combat corruption. Lastly, de Sousa (2010) advocated for the institutionalization of these agencies to ensure their sustainability. Meaning that the three branches of government need to provide long-term political will, legal consideration, and administrative support.

Theoretical Framework and Hypotheses

Traditionally, corruption is vastly explained through principal-agent theory. The notion behind it is that the principals who are the superiors and the agents who are the subordinates fall into a conflict of coordination due to their inequivalent interest in the assignment and the discrepancy of information they both receive (Eisenhardt, 1989). In this context, corruption appears when corrupted officials mostly follow their self-interest and distort information by taking advantage of being remote and away from scrutiny. Howev-

er, the principal-agent theory was criticized for its inability to capture the ongoing systematic corruption. Furthermore, it presumes that there is a "principled principle" meaning that principals are committed to be always strict on immoral behaviors, but this is not completely accurate, as principals can be corrupted as well (Marquette & Peiffer, 2015).

Instead, the collective action theory offers a more accurate depiction of corruption. According to Marquette and Peiffer (2015), corruption occurs when groups or individuals across different groups do not act collectively to achieve the common goal, but they instead seek self-interest. Also, this theory assumes that interests are set based on the expected perception of others. This means that if "corrupt behavior is the expected behavior, everyone should be expected to act corruptly" (Marquette & Peiffer, 2015: 7). In fact, in some countries with systemic corruption, corrupt officials justify their corrupt behavior with the belief that everyone is corrupt. Unfortunately, there is no cure for systematic corruption, but the collective action theory argues that social and collective problems can only be controlled through comprehensive systems (Marquette & Peiffer, 2015). Therefore, many scholars are trying to find some evidence about the impact of the tools that increase transparency and accountability in governments like e-government and e-participation (Kim et al., 2009; Zheng, 2016; Žuffová, 2020; Shim & Eom, 2008), in addition to the effectiveness of anti-corruption laws and policies (Castro & Lopes, 2022; Kim, 2014; Forghani-Brusca et al., 2017). Based that this research adds to this line of research from the context of Arab Countries, through the following hypotheses:

- *Hypothesis 1*: The more advanced the services of the e-government in an Arabic country the higher its ability to control corruption.
- *Hypothesis 2:* The more advanced the services of the e-participation in an Arabic country the higher its ability to control corruption.
- *Hypothesis 3:* The higher the level of rule of law in an Arab country the higher its ability to control corruption.
- *Hypothesis 4:* The effectiveness of e-government in curbing corruption in an Arabic country is positively moderated by the rule of law.
- *Hypothesis 5:* The effectiveness of e-participation in curbing corruption in an Arabic country is positively moderated by the rule of law.

Methodology

Data Collection

To test these proposed hypotheses, four secondary data sources from three international organizations were collected from 2012 to 2020 every two years for 21 Arabic countries. The time range for the data starts in the year 2012 since it was the period after the end of the Arabic Spring (Arampatzi et al., 2018). The data time range was limited to the year 2020 to create a balance across the different data sources and because some of the data was limited to the year 2021 only.

The first dataset was obtained from the International Transparency Agency which publishes data on countries' level of corruption through its Corruption Perception Index (CPI). It gauges the level of corruption based on a scale of zero to 100, where zero refers to the most corrupt while 100 refers to the least corrupt. CPI is the dependent variable for this study. The CPI was chosen over the Control of Corruption Index (CoC) published by the World Bank since the CoC captures experts' and citizens' perceptions of their country's level of corruption (Heywood & Rose, 2014). The issue with CoC is that citizens might exaggerate their opinions on the level of corruption in their governments since they are far away from the internal government affairs. Also, citizens' perceptions might not accurately represent the current situation due to their negative

historical experiences associated with their governments. On the other hand, CPI only takes experts' perceptions of the level of corruption. It's assumed that experts are potentially closer to the current seen in their governments and more prone to objectivity in their answers than citizens. However, the negative side of CPI is that it doesn't capture the data related to petty corruption but only the data that is related to grand corruption (Žuffov, 2020). However, petty corruption might not be useful for measuring corruption since respondents are expected to be prone to a social desirability bias, meaning that the survey respondents may become reluctant to associate themselves with undesirable actions of corruption like bribes (Žuffov, 2020). Accordingly, the use of CPI is more suitable than CoC in this study.

Regarding the independent variables, this study uses three sources of data. First, the data related to e-government and e-perception was collected from the United Nations e-government Index and E-participation Index. Both indices use a scale of 0 (low maturity) to 1 (high maturity). Also, the study uses The Rule of Law Index published in the World Governance Indicators by the World Bank as a proxy for governments' effectiveness in enforcing laws. The Rule of Law Index measures the effective enforcement on a scale of -2.5 (low enforcement) to 2.5 (high enforcement). These three data sources were chosen since they are widely known for their validity and robustness in e-government research. Finally, countries' GDP per Capita were added in the study to serve as a control variable. This is because countries with higher resources have a greater capacity to control corruption (Bertot et al., 2010; Zhang, 2016).

Methods of Analysis

The analysis used for this study is pooled regression analysis which is known to be suitable for panel data (Salkind, 2010). This research also used a fixed effect regression model in its analysis to best deal with its type of data. This is based on the Hausman test which enables the differentiation between random and fixed effects in panel analysis (Salkind, 2010). The test resulted in a p-value of 3.632e-05 indicating that this model is suitable for fixed effect analysis since the p-value is less than 0.05. The advantage of the fixed-effect model is that it controls observed and unobserved variables associated with the analysis model (Salkind, 2010). Also, the fixed effect model is the most efficient model since it allows purposeful and non-random selection of the study sample (Salkind, 2010). It even offers the ability to observe the study's results without the fear of falling into errors caused by the lack of control of unobserved variables.

Table (1): *Countries' average corruption, e-government, e-participation, rule of law, and GDP between 2012 and 2020.*

Country	E-government Index	E-participation Index	CPI	Rule of Law
United Arab Emirates	0.777	0.842	69	0.752
Qatar	0.675	0.650	65	0.868
Saudi Arabia	0.710	0.668	50	0.200
Oman	0.655	0.675	49	0.500
Jordan	0.521	0.370	49	0.316
Bahrain	0.782	0.760	44	0.404
Kuwait	0.692	0.571	42	0.192
Tunisia	0.574	0.640	42	-0.006
Morocco	0.508	0.663	39	-0.154
Algeria	0.382	0.121	35	-0.794
Egypt	0.495	0.538	34	-0.474
Djibouti	0.203	0.112	32	-0.918
Mauritania	0.215	0.081	29	-0.758
Lebanon	0.525	0.376	28	-0.800
Comoros	0.229	0.046	25	-1.048
Iraq	0.352	0.263	18	-1.592
Libya	0.313	0.064	17	-1.624
Syrian Arab Republic	0.369	0.292	17	-1.720
Yemen	0.253	0.168	17	-1.536
Sudan	0.266	0.192	14	-1.172
Somalia	0.058	0.129	10	-2.352

Study Results

Descriptive Results

Table 1 below shows the countries' average in each of the study variables to provide a greater understanding of the collected data. Also, Table 1 sorts the countries based on their scores in CPI. As such it shows the lowest countries in terms of corruption at first and the most corrupted countries at the end.

Overall, gulf countries between the years 2012 and 2020 by average are much higher in their control

over corruption and development of e-government and e-participation services, as well as the enforcement of law in comparison to other Arab countries. Whereas, Arab countries of North Africa, particularly, Tunisia, Morocco, Algeria, and Egypt are in a better position than North Mideastern countries, namely, Lebanon, Iraq, and Syria except for Jordan. Jorden has a great performance in all the indexes, it even scores higher than some Gulf countries like Kuwait and all North African Arab countries.

The United Arab Emirates owns the lowest rate of corruption and the highest rates of e-government, and e-participation but second in terms of rule of law. Qatar has the highest level of rule of law and the second lowest corruption rate but scores third in the level of e-government and e-participation by average. Furthermore, Saudi Arabia is the third-lowest Arab country in terms of corruption and the second-highest country in the maturity index of e-government and e-participation. However, Saudi Arabia scores a lower average than Bahrein and Jorden in terms of the rule of law. Furthermore, Bahrain has some interesting results, as it is the second highest country in terms of e-government and e-participation and third in the rule of law, but it still has a higher level of corruption than other advanced countries in the study. On the other extreme, Somalia, Sudan, and Yemen hold the highest rate of corruption and the lowest rate of e-government, e-participation, and rule of law.

Regression Results

This study has applied different statistical methods to verify the suitability of its data and models for analysis. Regarding the multicollinearity assumption, a correlation matrix has shown high multicollinearity between e-government and e-participation, see Appendix I. To resolve this issue, this research avoided combining both variables in the same model. In terms of the normality assumption, the data is found to be slightly deviating from normality according to the results of the Shapiro-Wilk normality test (W = 0.978 and p-value = 0.087). Furthermore, there seem no issues in terms of the heteroscedasticity assumption according to the Breusch-Pagan test results (BP = 18.772, df = 2, p-value = 8.39e-05). Likewise, the study models show no serial correlation issues according to Wooldridge's test, as none of them had a p-value lower than 0.05. Lastly, this study is interested in finding the moderating effect of the rule of law on e-government and e-participation on the control of corruption. Thus, two visualizations were generated to check for the existence of moderation. Figure 1 shows that the rule of law has a positive moderation effect on e-government and e-participation role in curbing corruption. Meaning the higher the rule of law the greater the effect of e-government and e-participation on controlling corruption and vice versa. Overall, the pre-analysis shows that the data and study models are suitable for further analysis and could generate trusted results.

According to the results shown in Table 2, the study reveals unanticipated results. First, the analysis shows no significant effect of e-government on curbing corruption according to (β = 9.91 and p-value = 0.051). Therefore, this study finds no support for hypothesis 1. Second, the analysis shows no significant effect of e-participation on curbing

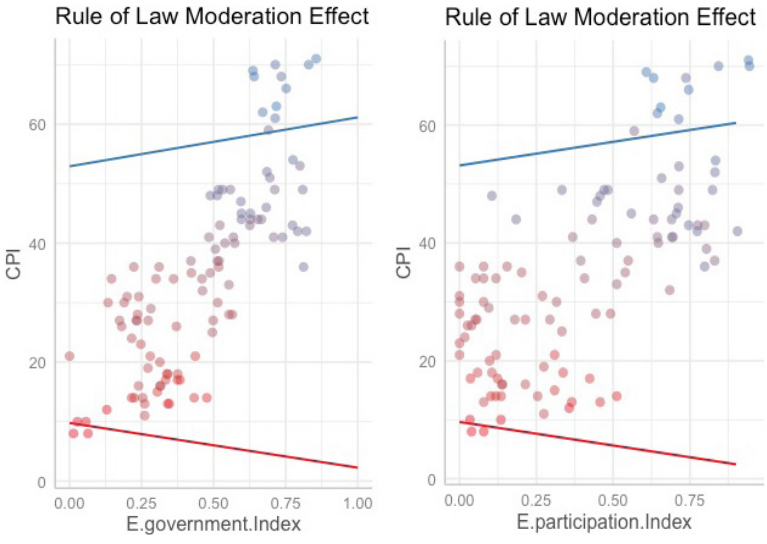

Figure (1): Moderation Effect of Rule of Law on E-government and E-participation on Corruption

corruption according to (β = 5.82 and p-value = 0.066). Therefore, this study finds no support for hypothesis 2. Third, the analysis shows that the rule of law has a positive and significant effect on curbing corruption in both models with a p-value lower than 0.001. Accordingly, this study supports hypothesis 3. Fourth, the analysis in model 1 shows that there is a positive and significant moderating effect for the rule of law on e-government and controlling for corruption with (β = 9.644 and p-value = 0.002). Therefore, this study finds support for hypothesis 4. Fifth, the analysis also shows a positive and significant moderating effect for the rule of law on e-participation and controlling for corruption with (β = 8.769 and p-value = 0.003). Therefore, this study finds support for hypothesis 4. Lastly, the results in Table (2) show that the R-squared for both models is 0.893. This means that the performed regression analysis is a good fit for the existing data which adds to the validity of the results. In summary, the results show that the rule of law in Arabic countries is highly significant in curbing corruption. In addition, e-governments and e-participation are shown to have no effect in limiting corruption without the preexistence of an effective rule of law.

Table (2): Pooled Regression Analysis

	DV: CPI	
Predictors	**(Model 1)**	**(Model 2)**
E government Index	9.91 (-0.08 – 19.91)	
E participation Index		5.82 (-0.40 – 12.05)
Rule of Law	11.50 *** (7.98 – 15.02)	12.82 *** (10.00 – 15.63)
E government Index * Rule of Law	9.64 ** (3.51 – 15.78)	
E participation Index * Rule of Law		8.77 ** (2.97 – 14.57)
Observations	105	105
R^2 / R^2 adjusted	0.893 / 0.886	0.893 / 0.885
* p<0.05 ** p<0.01 *** p<0.001		

Findings Discussion

The significant contribution of this article lies in its exploration of the efficiency of the e-government and e-participation in limiting corruption and the misuse of public resources among Arabic countries. In literature, e-government and e-participation were not given much attention regarding their impact on corruption (Park & Kim, 2020; Shim & Eom, 2008).

This article examined the direct relationship between these two variables and corruption. Plus, it considers the role of the effectiveness of anti-corruption policies and laws of governments. This is because the availability of ICT by themselves doesn't assure control over corruption and the misuse of public resources within governments (Kim, 2014). Thus, ICT must be accompanied by anti-corruption policies to have an effective role (Kim, 2014). Therefore, this research contributes by offering more evidence of the necessity for the rule of law along with e-government and e-participation services to curb corruption in the context of Arab countries.

Also, this research contributed by applying the Collective Action Theory in the context of corruption, which matches the contemporary understanding of corruption as it is a systematic phenomenon involving multiple actors with different power and authority who collaborate to facilitate corrupted actions (Marquette & Peiffer, 2015).

Study Recommendations

Based on the study results, there are a couple of theoretical and practical implications that worth attention. This study suggests that the effectiveness of e-government and e-participation in curbing corruption are significantly contingent on the effectiveness of the implementation of laws and policies. This means that e-government and e-participation are means to ends or can be considered as strategic tools for achieving greater integrity and less corruption, but not a solution by themselves. This specifically applies to developing Arab countries. Accordingly, policymakers and public officials are advised to significantly

concentrate their efforts on reforming their anti-corruption laws and policies and at the same time should apply these laws strictly when corruption appears.

There are many different policies that can help in curbing corruption, such as applying fiscal transparency policies, institutionalizing independent anti-corruption agencies, encouraging independent media, raising public officials' wages, applying whistleblower protection policies, and supporting freedom of information (Žuffová, 2020, Piotrowski, 2007, Huther & Shah, 2000).

Furthermore, officials should give adequate attention to developing their e-government and e-participation anti-corruption services using the latest technologies, as they will have an effective impact when proper anti-corruption policies are in place. For instance, policy makers might consider the implementation of intelligent systems in their e-procurement system that can track and capture suspicious financial trends (Neupane et al., 2012).

In addition, they might consider the implementation of some e-participation services, which can help in engaging citizens to develop anti-corruption policies (Zheng, 2016). Also like, launching citizens-sourcing applications that enable citizens to monitor and report corrupt activities. As such taking these recommendations into consideration is expected to help policy makers to achieve greater control on corruption.

Study Limitations and Future Research

Although this research has contributed to the current literature on corruption, it is still limited by several aspects. For example, this research has not examined the cultural and political dimensions' impact on the effectiveness of e-government and e-participation in curbing corruption. Therefore, future research might consider these variables and study how e-government and e-participation impact corruption. Furthermore, this research is limited by not considering a more complex relationship.

Future research might consider exploring the mediating relationship of the rule of law between e-government and corruption. In addition, future research might consider using newer and different datasets to validate the study findings.

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Appendix I: Correlation Matrix

	E-government Index	E-participation Index	CPI	Rule of Law
E-government Index	1			
E-participation Index	0.8670587	1		
CPI	0.7941045	0.7000311	1	
Rule of Law	0.826958	0.7243437	0.9386052	1