-RESEARCH ARTICLE-

MODELLING THE IMPACT OF E-GOVERNMENT ON CORRUPTION FOR THE COVID-19 CRISIS

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─**Abstract**─

E-government is the transition of traditional government administration to digital platforms for the public good and increased efficiency. The covid-19 pandemic in ASEAN countries generated a new wave of corruption in public sector enterprises. This study is based on secondary data and utilizes credible studies and resources for its crucial findings. With effective e-government, corruption in Thailand's public sector departments can be minimized, according to the conclusions of this study. The scope of this study is confined to institutions in Thailand's public sector. This study reviewed data from Malaysia, Thailand, Singapore, and the Philippines acquired between 1960 and 2012 to assess the relationship between corruption (C), E-governance (EG), economic growth (EG), and good governance (GG) (GG). This study examined data collected from

Malaysia, Thailand, Singapore, and the Philippines between 1970 and 2022. The results reveal that e-governance is inversely associated with corruption, suggesting that e-governance decreases corruption. The findings indicate that the usage of electronic government is recommended as a technique that can boost the efficiency and effectiveness of government activities and give better service to the general public. This study contributes to the existing body of knowledge by demonstrating that the role of checks and balances in e-government functioning is essential since, without checks and balances, no government can function professionally. This study revealed to practitioners that, to limit corruption, a separate department of accountability should be created to oversee the entire operation of the government department, as the likelihood of corruption would be lower without sufficient oversight.

Keywords. E-government, transparency, public service, corruption, good governance

1. INTRODUCTION

Indeed, the covid-19 epidemic was critical for the community since it threatened human life (Homsombat et al., 2021). On the one hand, the covid-19 outbreak posed a medical risk to the community (Azam et al., 2017). In contrast, corruption was at its height during covid-19 because of poor government and mismanagement (Chokwarakul et al., 2021). The government of Thailand adopted e-governance initiatives to administer the country following the new ethos, as conventional governing approaches were no longer applicable in modern Thailand (Chulaphan et al., 2021). E-governance has brought about new developments in working practices as traditional techniques are replaced by new ones (Manoharan, 2012). E-government is the transition of conventional government administration to digital platforms (Sharma, 2015; Thoppae et al., 2021).

E-government is the transition of traditional government administration to digital platforms optimal for conducting business (Thoppae et al., 2021; Weerakkody et al., 2016). Modern nations use e-government since this service is readily accessible to the public. Digitalization places all services at their fingertips (Kašubienė et al., 2007; Sayin et al., 2013; Turuy et al., 2021). However, it is also considered that e-government facilitates transparent government operations because every citizen may access the services (Baharon et al., 2017; Kašubienė et al., 2007; Mishra et al., 2021; Turuy et al., 2021). In addition, monitoring cells are developed in several nations to provide checks and balances for e-government issues (Bernhard et al., 2018; N. David, 2018; Roziqin et al., 2022). In this sense, the citizen's fundamental right is the proper use of e-government services (Abdulkareem et al., 2021; Hooda et al., 2022; Nam et al., 2022). During the pandemic epidemic that prompted a nationwide lockdown, the crucial necessity of e-government has been evident (Abdulkareem et al., 2021; Hooda et al., 2022; Nam et al., 2022). French officials assert that e-government is essential to combating corruption in the various government agencies (Chohan et al., 2022; Lee et al., 2011; Zhang, 2013).

In the existing body of literature, a series of studies examine the crucial role of e-government for citizens' welfare (Abdel-Fattah, 2022; Boonratmaitree et al., 2020; Chatfield et al., 2013; Hariguna et al., 2021; Li et al., 2020; Sriyakul et al., 2020). In these papers, the important obligation of e-government to provide people's fundamental rights in a modern, nondiscriminatory manner is examined (H. S. M. Abbas et al., 2021; Hijazi et al., 2014; C. Kim et al., 2021; Welch et al., 2005). C. Kim et al. (2021) argued that e-government techniques are suitable for administering the nation by limiting the government's options. With e-governance, the government can be administered without corruption (Aritonang, 2017; Mishra et al., 2021; Sitthipon et al., 2022). Corruption is an emerging phenomenon in Thailand's government practices (Al Hujran et al., 2013; Kamarudin et al., 2021; Sá et al., 2016); thus, the focus of e-governance can reduce corruption and lead the government practices without discrimination (Krishna et al., 2021; Kumar et al., 2007; Sachan et al., 2018). Australia's well-established e-government policies have minimized public administration department corruption (Abdulkareem et al., 2021; Prybutok et al., 2008). Unsystematic checks and balances continue to ensnare the smallest and most backward nations in the chains of corruption (Bernhard et al., 2018; N. David, 2018; Roziqin et al., 2022). Due to discrimination, government department corruption is inappropriate for the community (Rossi, 2012; Wangroongsarb et al., 2016; Weerasombat et al., 2022).

Although previous research has examined e-government activities and corruption from various perspectives (Abdel-Fattah, 2022; Chatfield et al., 2013; Chohan et al., 2022; Hariguna et al., 2021; Lee et al., 2011; Li et al., 2020; Zhang, 2013), indeed, the incidence of covid-19-related corruption at a Thai government agency increased (H. S. M. Abbas et al., 2021; Abdel-Fattah, 2022; Chohan et al., 2022; Hariguna et al., 2021; Li et al., 2020). Determining the impact of e-government on corruption during the covid-19 crisis in Thailand is the goal of this study. The research gap was found since previous studies did not contribute to this field. Therefore, this study aims to address this gap in the literature and provide substantial knowledge to the body of knowledge. The problem also exists in government practice. In addition, the focus of this study is limited to e-governance in the government sector in ASEAN nations. In this sense, this research will have important consequences for reforming e-government procedures in Thailand to eliminate corruption.

2. LITERATURE REVIEW

Accountability is one of the essential factors facilitating the anti-corruption effects of e-government (Abdullah et al., 2022; Abdulwahhab et al., 2021). Indeed, those with accountability are more motivated to embrace sustainable working practices in public sector agencies and less inclined to engage in corruption (Fadel et al., 2020; Ghaffoori, 2021). Corruption is detrimental to society, and with the outbreak of covid-19, people began to abuse their authority for their advantage (Chulaphan et al., 2021; M.-L. T. Nguyen et al., 2022; White III et al., 2022). In this aspect, advanced nations such as

Denmark and the United States regulated systematic corruption better than the ASEAN nations (H. S. M. Abbas et al., 2021; Khalaf et al., 2022; Marks et al., 2021; Thabit, 2020). In this approach, accountability is regarded as the crucial aspect enabling the government machinery to function more efficiently with the aid of e-government (H. S. M. Abbas et al., 2021; Khalaf et al., 2022; Marks et al., 2021; Shyaa, 2022).

The misuse of authority by any authority is also regarded as corruption because those who engage in such reprehensible conduct receive benefits from their authorities that are unacceptable to society (Al Suwaidi, 2021; Alani, 2022; Bekheet, 2020; Novak et al., 2021). Bangkok's public sector corruption indicator climbed by 12 percent during the pandemic in Thailand (Ahmed et al., 2022; Chokwarakul et al., 2021). Because the general population could not receive services physically restricted by lockdowns, others could abuse their authority in service provision (Arayankalam et al., 2021; L. Nguyen, 2022; R. Zhao et al., 2020). Additionally, financial corruption was reported due to this corrupt system (Al-Maksousi, 2020; Jarwana et al., 2020; M.-L. T. Nguyen et al., 2022; Yassin et al., 2021; R. Zhao et al., 2020).

E-government in Thailand was established to efficiently operate government agencies (Younus et al., 2020). E-governance is a more controlled working method that provides services to the people, making Pakistan's government sector stronger for fair working (Shehaib, 2020). People's participation in e-government can be more engaging if good chances are provided (Yassin et al., 2021). In Thailand, the public sector is equipped with technology for effectively managing and supervising its employees (Homsombat et al., 2021). Moreover, e-government makes it easier for citizens to obtain superior services (Jespersen, 2020). To aid the public during the pandemic epidemic, the government department switched its operations to the e-government sector (Khan et al., 2020). However, charges of corruption and work against meritocracy were also filed against these actions at other police stations (Ateiah, 2020).

In Thailand, e-government facilitates citizen participation in public sector agencies because the government feels that citizen participation is essential for better and more equitable working conditions (Al-Bayati, 2021; Ateiah, 2020; Mohamed, 2022; Saleh et al., 2020). Citizens were direct benefactors of this system. Therefore their participation and communication in government matters expanded during the covid era (Al-Ghanimi, 2021; Cao, 2020; Rahbarqazi et al., 2020). Moreover, engagement between citizens and the government can improve e-government operations because it is advantageous to get citizen feedback (A. M. Abbas et al., 2020; Ali, 2021; Asaad et al., 2020). The Thai populace has a comprehensive understanding of how e-government operates, and more focus is placed on enhancing the performance of service departments for improved community development (Abd Alzahrh et al., 2021; Al-Maksousi, 2020; Susilowati et al., 2021).

Moreover, during the pandemic epidemic, the country was under lockdown, yet the administration facilitated communication with the public due to residents' increased awareness (Jarwana et al., 2020; Yassn et al., 2021; H. Zhao et al., 2021). The Thai government has exerted significant effort to assist its citizens in enhancing their performance (Ahmed et al., 2022; Chokwarakul et al., 2021; Drebee et al., 2020). Because they are its stakeholders, the systematic approach to citizenship behavior can improve the operation of the government agency (Homsombat et al., 2021). In Thailand, covid-19 hindered trade and other activities, but government-to-citizen communication helped improve medical facilities for the people (Ateiah, 2020).

Transparency is a fundamental aspect of e-government, and the Thai government is pushing toward transparent public service delivery operations (Homsombat et al., 2021). Transparency in government agencies enables the government to function optimally and provide superior services (Al-Ghanimi, 2021). During the pandemic epidemic in Thailand, the perceived provision of food and medical facilities by the government sector to the bureaucracy cast doubt on the openness of government services (Al-Bayati, 2021). Consequently, this charge of transparency gave the e-government functions a corrupt tone (Abdullah et al., 2022). On the other side, the e-government may regulate government affairs transparently on a bigger scale (Lee et al., 2011).

Nonetheless, 79% of the public in Bangkok agreed that e-government had altered the public service environment in modern countries (Chohan et al., 2022). The public thinks corruption is prevalent in many nations, but it should not be tolerated in Thailand (Li et al., 2020). During covid-19, the public's response to government services was inappropriate because individuals have diverse perspectives (Hariguna et al., 2021). On the other hand, it was reported that public sector departments engaged in fraudulent practices and lacked accountability (Abdel-Fattah, 2022). These types of sensors are not suitable for public use since they diminish the value of the community. The misconduct in government sector departments should be reduced (H. S. M. Abbas et al., 2021).

The public desires transparency in e-government services since it is considered that without it, it will be difficult to curb corrupt activities (Sitthipon et al., 2022). People must be enabled to work in an advanced manner, and government services should be given in the most efficient manner possible (Mishra et al., 2021). To improve the effectiveness of e-government, it is necessary to evaluate the alleged instances of corruption during the epidemic and to establish effective methods based on the e-government models of Denmark and Australia (Arayankalam et al., 2021). In fact, without clear and efficient operations, it would be unreasonable for people to receive the appropriate amenities (Kamarudin et al., 2021). The government sector should expand the scope of e-government, and nearly all public sector departments should be adapted for e-government (Krishna et al., 2021).

Existing research has identified corrupt activities as the root cause of social inequality; nonetheless, social equality can be improved by working more effectively (Thoppae et al., 2021). The Thailand government went through a lot during the pandemic, but it should learn from its mistakes and establish new anti-corruption tactics to aid the public (Turuy et al., 2021). In Thailand, the aim of e-government should be realized with integrity. To reduce the likelihood of corruption and corrupt behaviors, it is necessary to develop an efficient monitoring division (Roziqin et al., 2022). Thus, the proper development of e-government would help the efficient working of the populace (Shah et al., 2022). In addition, government practices should be brought up to an advanced level, and citizen participation should be promoted to minimize corrupt practices (Abdulkareem et al., 2021).

3. METHODOLOGY

This study examined data from Malaysia, Thailand, Singapore, and the Philippines collected between 1970 and 2022 to establish the relationship between corruption (C), E-governance (EG), economic growth (EG), and good governance (GG) (GG). Analysis was performed using the co-integration model. Malaysia, Thailand, Singapore, the Philippines, and Indonesia are among the afflicted nations. According to an analysis of relevant published data, no empirical research has utilized a co-integration model to examine how corruption affects energy consumption, environmental quality, and economic growth. Reviewing the pertinent published data led to this result. In their conclusions, the authors of this study accounted for the effect of e-governance on instances of corruption using a structural model with three equations. The effects of various levels of corruption on the quality of the environment have been hypothesized using the following functional forms. When two or more series are coupled in a way that provides a relationship of long-term equilibrium, we say that they have co-integrated. This may contain multiple series. According to these experts, although R2 would be reliable, it would not shed light on why the estimate came out as it did. As a result of this line of reasoning, co-integration testing has become widespread in numerous contexts. When seen as a time series, the data for the stated variables will always reveal patterns, which may be deterministic or stochastic depending on the context. De-trending does not eliminate the problem of false regression, and the R2 statistic, which is used to determine whether or not regressions are acceptable, produces severely deceptive findings when applied to trending time series. Utilizing the Johansen co-integration approach, it is possible to successfully convert a basic equation for an error correction model into a multivariable equation. This ability will be examined in further detail in the subsequent sections. Let's assume that "C" stands for "corruption," "E" for "electronic governance," "G" for "economic growth," and "GG" for "excellent governance."

$$C_t = [E_t, E_t, GG_t]$$...(1)

The AR model of the equation can be

$$C_t = B_1 C_{t-1} + B_2 C_{t-2} \;\ldots. B_k B_{t-k} + \varepsilon_t \;\ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \quad (2)$$

Equation (2) may be altered to VECM as given in equation (3)

$$\Delta L_t = \Phi_1 \Delta C_{t-1} + \Phi_2 \Delta C_{t-2} \;\ldots. \Phi_{k-1} \Delta C_{t-k-1} + \Gamma C_{t-k} + \varepsilon_t \;\ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \quad (3)$$

Where, $\Phi_k = [\mathrm{I} - B_1 - B_2 - \cdots B_k]$, $i = 1,2,3,\ldots.k\text{-}1$

$$\Gamma = -(\mathrm{I} - B_1 - B_2 - \cdots B_k)$$

Since of this, it is a three-by-three matrix because it is presumed that there are three variables. One way to describe this is as the equation $\Pi = \alpha\beta$ where α, where is the pace at which the equilibrium adjusts. On the other hand, reflects the coefficient over the long term. Error correction is indicated by the letter βZ_{t-1} which is a word. To provide a clear example, takes k=2 equation three may be written as follows:

$$\begin{bmatrix} \Delta E_t \\ \Delta G \\ \Delta GG_t \end{bmatrix} = \Gamma_t \begin{bmatrix} \Delta E_{t-1} \\ \Delta G_{t-1} \\ \Delta GG_{t-1} \end{bmatrix} + \begin{bmatrix} \alpha_{11} & \alpha_{12} \\ \alpha_{21} & \alpha_{22} \\ \alpha_{31} & \alpha_{32} \end{bmatrix} \begin{bmatrix} \beta_{11} & \beta_{12} & \beta_{13} \\ \beta_{21} & B\beta_{22} & \beta_{23} \end{bmatrix} \begin{bmatrix} \Delta E_{t-1} \\ \Delta G_{t-1} \\ \Delta GG_{t-1} \end{bmatrix} + \varepsilon_t \ldots \ldots \ldots \ldots (4)$$

The impact of e-government, good governance, and economic growth on corruption is represented in the equation;

$$\Gamma_l C_t = [\alpha_{11}\beta_{11} + \alpha_{21}\beta_{21}][\alpha_{21}\beta_{12} + \alpha_{22}\beta_{22}][\alpha_{31}\beta_{13} + \alpha_{32}\beta_{23}] \begin{bmatrix} E_{t-1} \\ G_{t-1} \\ GG_{t-1} \end{bmatrix} \ldots \ldots \ldots (5)$$

The equation can be transformed into a yield equation as

$$\Gamma_i C_{t-1} = \alpha_{11}(\beta_{11}E_{t-1} + \beta_{21}G_{t-1} + \beta_{31}GG_{t-1}) + \alpha_{12}(\beta_{12}E_{t-1} + \beta_{22}G_{t-1} +$$
$$\beta_{32}GG_{t-1}) \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots (6)$$

According To Enders (2004) α_{11} and α_{12} are speed of adjustment terms.

4. RESULTS AND DISCUSSION

The correlational analysis of the variables is shown in table 1. The correlation value indicates that all the variables used in the current study are highly correlated. The correlation between corruption (C), E-governance (EG), economic growth (EG), and good governance (GG) are shown in table 1.

Estimating the lag length of an autoregressive process for a time series is a crucial econometric procedure required for most economic investigations. This is necessary due to the nature of the economics area. Information criteria are the starting point for determining the optimal "lag length" in a time series. This is because information criteria are the most essential.

Table 1. Correlation

		1	2	3	4
C	1	1			
EG	2	-0.1710	1		
G	3	-0.5321	0.4581	1	
GG	4	-0.7291	0.7321	0.8109	1

In the context of Johansen co-integration, however, conflicting findings have been reached regarding the 'lag length' when these criteria are applied. F. H. David, Juselius, K (2001) recommended that the lag duration be adjusted so that the VAR residuals are autocorrelation-free, even if this necessitates longer lags than the information criterion suggests. This proposal was made because achieving this objective would need longer lags. During their discussion over Johansen's co-integration, they proposed this concept. Before initiating the estimate procedure for the Johansen co-integration model, the lag duration must be determined or chosen. This process step will occur before any of the others. The first and most important step in performing the Johansen co-integration test is determining the optimal lag time. The optimal lag time is sufficient for white noise consistency.

Table 2. Lag Length Selection Criterion

Lag	LogL	LR	FPE	AIC	SC
0	-430.918	NA	5.04e+13	45.155	47.342
1	-427.667	42.043*	6.22e+11*	43.349	44.539*
2	-455.543	45.428	6.54e+11	43.463*	46.126

The Vector Autoregressive Model is the foundation for determining the optimal lag length necessary to accomplish Johansen co-integration (VAR). The lag order is then determined by the use of information criteria (Enders, 2004). Table 2 demonstrates that varying information requirements indicate various optimal delayed values for co-integration. The Akaike Information Criterion (AIC) determined that two delays were required, although the Schwartz Information Criterion (SIC) recommended employing only one. Both of the requested postponements by the AIC have been implemented. The purpose is to maximize output while minimizing waste to the greatest extent possible.

The concept of co-integration focuses on the relationship that develops over time between at least two nonstationary variables. The variables must be integrated in the same order to conduct the co-integration test. To identify the total number of co-integrating equations, the Johansen test includes both the trace test and the maximum eigenvalue test in its technique. The conclusions of the co-integration study are displayed in Table 3.

Table 3. Johansen Co-Integration Test

Dependent Variable:	Model (C)
C_{t-2}	0.1147***
	(0.000)
EG_{t-1}	-0.1184***
	(0.001)
G_{t-1}	0.1454***
	(0.000)
GG_{t-1}	0.2011**
	(0.020)

This study used a co-integration model to examine the effects of e-government on corruption. The results reveal that e-governance is inversely associated with corruption, suggesting that e-governance decreases corruption. The findings indicate that the usage of electronic government is recommended as a technique that can boost the efficiency and effectiveness of government activities and give better service to the general public. E-government is an inevitable next step in the evolution of reforms designed to boost the efficiency of the public sector. These modifications have been made to enhance the effectiveness of the public sector. Since the 1980s, governments worldwide have pursued New Public Management (NPM) reforms to increase their various institutions' administrative efficiency and independence. Despite this, the limits of NPM have become more generally recognized in recent years. Market-oriented reforms in the public sector aim to increase overall productivity. This can be achieved by reducing entry barriers and enhancing market-driven competition in the industry. Others, on the other hand, are concerned that the democratic process will be damaged and that the administration will fail to achieve its primary purpose. It has been demonstrated that enhancing the discretion of public employees by granting them more freedom to act on their own will increases their productivity. However, this comes at the cost of a rise in corruption due to laxer regulation (Y. J. Kim et al., 2016). E-government is receiving a great deal of attention as a potential solution to the problems inherent in the current administration system. This emphasis stems from the fact that these obstacles are inherent to the system. In other words, administrative efficiency and democratic values can be simultaneously increased through innovation by enhancing public engagement and control of external administration through web-based interactive services (Y. J. Kim et al., 2016). Since the 1980s, advancements in information and communication technologies such as computers and the Internet have prompted governments to recognize the potential of e-government and take concrete steps to capitalize on the information and communication revolution in government innovation. The United States is one of the most noteworthy examples of this trend since the number of states

implementing some e-government has increased in recent years. One of these governments is that of the United States, which in 2002 was the first country in the world to deploy government fully and is now listed alongside the other nations. Electronic governance is rapidly gaining importance in an increasing number of nations.

5. CONCLUSION

The outcomes of this study indicate that e-government plays an essential role in preventing corruption in ASEAN nations. In this sense, the government's role is to protect society from corruption by implementing properly controlled e-government facilities to boost government performance. Conversely, the government must raise knowledge about a corruption-free society, as this awareness is essential for enhancing government operations. Indeed, the transition of government agencies to the Internet would give more accurate services to the public and encourage meritocracy. To reduce the rate of corruption in society, the government should prioritize governance improvement, according to the findings of this study.

6. IMPLICATIONS

6.1 Theoretical Implications

There is a lacuna in the academic literature on the relationship between e-government and corruption in ASEAN nations. Consequently, this study's findings have significant significance for addressing this identified gap in the literature. This study contributes to the existing body of knowledge by demonstrating that the role of checks and balances in e-government functioning is essential since, without checks and balances, no government can function professionally. E-significance of government in corruption control was not addressed in previous studies connected to covid-19. This study demonstrated that the e-government mechanism is essential for preventing and minimizing corruption in the government sector.

The study added to the literature on the association between e-government and corruption control since the pandemic component was not previously discussed in the literature on the relationship between corruption and e-government. These repercussions would provide further data for future research on the correlation between the pandemic and corruption control. Similarly, this study contributes to the literature on the negative effects of covid-19 by demonstrating that the covid-19 pandemic also raised the likelihood of corruption in ASEAN nations. Prior research has found that excellent governance can improve government performance. Still, this study adds to the body of knowledge by demonstrating that good governance and corruption-free governance are crucial for managing crime and combating future pandemics. Consequently, the theoretical implications of this study are crucial for both the existing literature and future research.

6.2   Practical Implications

In addition to its theoretical implications, this study has important practical implications for enhancing the functioning of e-government in ASEAN countries. In the first place, the research demonstrates that e-government performance monitoring must be bolstered to limit corruption effectively. All government department services to the public should be switched to e-government since it is the most dependable and effective method for monitoring the operations of each department's higher authority. Implementing e-government in the public sector department would improve awareness of government operations, hence increasing the number of opportunities to operate most efficiently. Thirdly, to curb corruption, a separate department of accountability should be established to oversee the entire operation of the government agency, as the likelihood of corruption would be reduced in the absence of effective oversight.

In this context, the government should create stricter policies and methods for enhancing the performance of the government sector. Fourthly, the Thai government must engage with the public sector department and implement comprehensive anti-corruption campaigns. Importantly, organizational ethics and citizenship should be created for public sector employees to enhance their performance and limit the likelihood of corruption. Corruption in Thailand would be less likely if corruption and other behaviors were monitored appropriately and followed the societal principles that ban corruption. Consequently, these techniques could strengthen government processes in ASEAN nations to combat corruption in public sector departments.

7.   FUTURE DIRECTION

This study examines the influence of e-government on corruption in Thailand during the covid-19 crisis. In addition, the significant findings of this investigation validated the study's hypotheses. Nonetheless, future research must go deeper into this subject area. The conclusions of this study are limited to corruption in the Thai government sector; consequently, future research must concentrate on the function of government policy in corruption in Thailand to identify additional outcomes. Because the general public is a major stakeholder in Thailand, future studies may investigate corruption research using primary data by collecting responses from the public. Lastly, the study is limited to the functionality of e-government from the government's perspective; therefore, future research may concentrate on the functionality of e-government from the public's perspective to better understand e-government and corruption control in Thailand.

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