Theoretical and Practical Research in Economic Fields

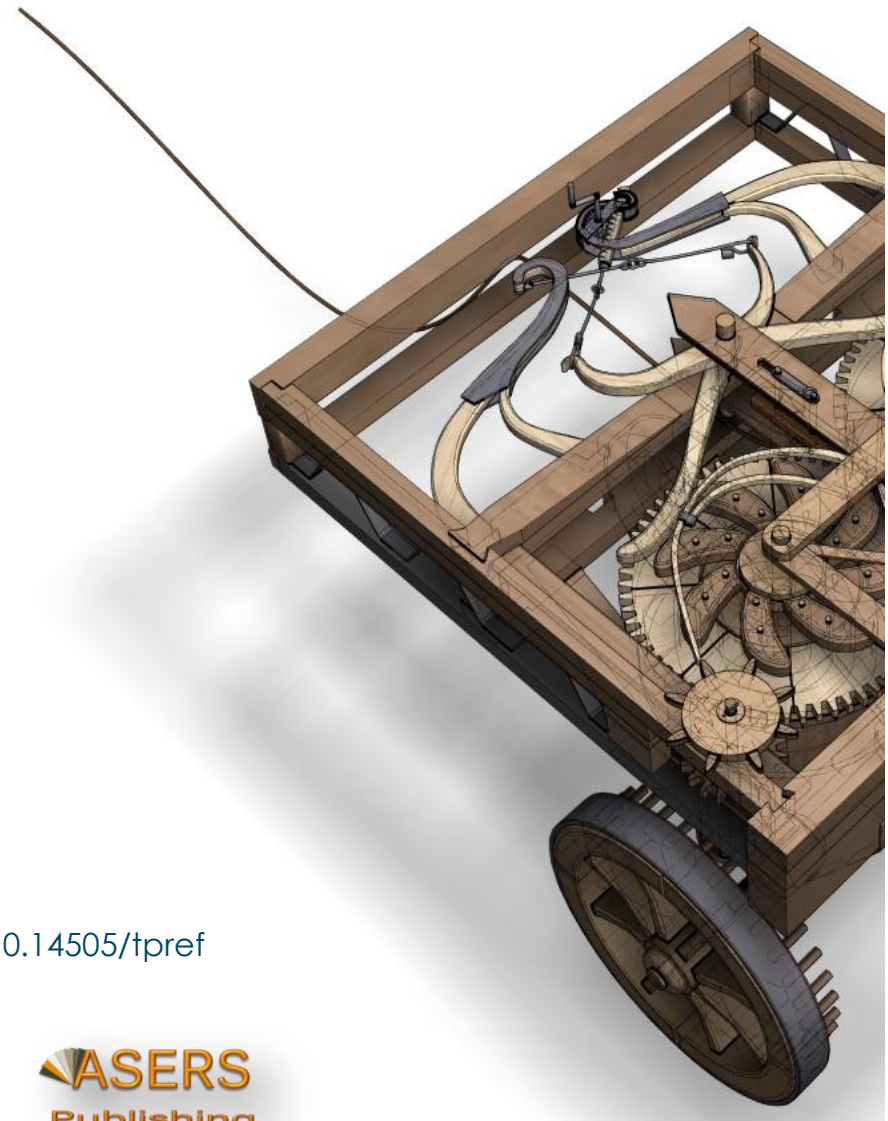

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Table of Contents

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Exploring Crime Rate through the Lens of Poverty and Education in Indonesia: Evidence from Panel Data Approach

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Abstract: This study investigates the determinants of crime rates across 34 Indonesian provinces from 2007 to 2023, with a particular focus on the impact of poverty and education. Employing a panel data approach with an Autoregressive Distributed Lag (ARDL) model, the research reveals significant long-term and short-term relationships between these factors and crime

rates. The findings indicate that poverty rates have a significant positive long-term effect on crime rates, whereas the influence of average years of schooling is not statistically significant in the long run. In the short term, both the change in crime rates from the previous period and the change in average years of schooling from the two prior periods significantly affect current crime rate fluctuations. The presence of significant error adjustment coefficients suggests a cointegration relationship or long-term equilibrium among the model variables. Based on these results, this study recommends that policymakers and stakeholders develop strategies aimed at poverty reduction and improved access to quality education as a potential means to mitigate crime rates in Indonesia. Furthermore, the research emphasizes the need for additional investigation of other potential contributing factors, such as family structure, peer group influence, and availability of legal and illegal opportunities, to enhance the effectiveness and sustainability of crime prevention and reduction efforts.

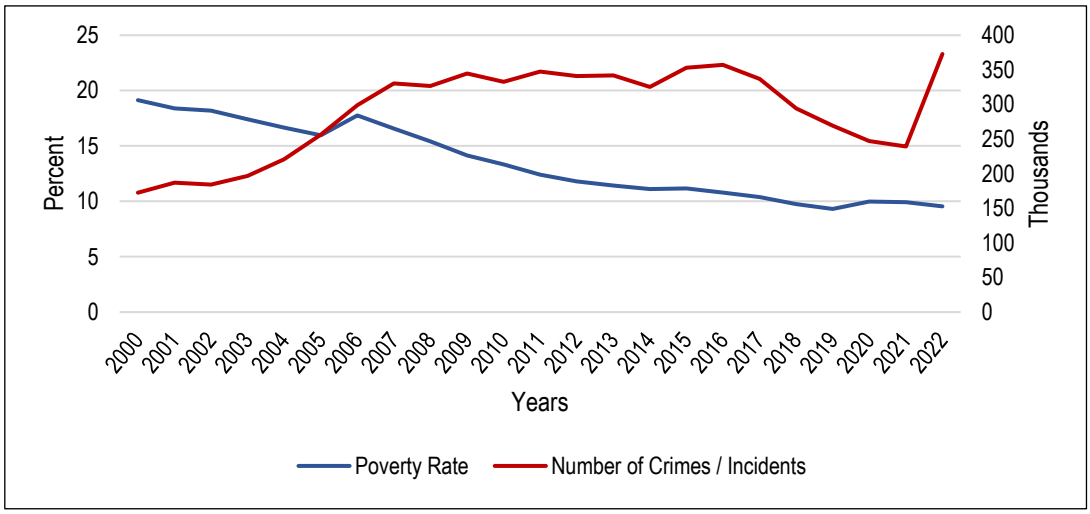
Keywords: crime rate; education; poverty; ARDL panel.

JEL Classification: I24; I32; K42; C33.

Introduction

Poverty has emerged as a significant challenge affecting numerous countries, particularly developing nations, such as Indonesia. Only a fraction of Indonesia's population experiences prosperity or full benefits from the country's development, while the majority remains impoverished and unable to reap the complete rewards of progress (Anjawarti & Rosmiati, 2022). A nation's development is typically assessed using indicators such as economic growth, poverty levels, and educational attainment. While countries strive to optimize these three indicators through various strategic initiatives, they do not entirely comprehensively encapsulate societal welfare. Among these factors, a high incidence of poverty is believed to exert a complex influence on social literacy within communities. According to a recent report by the Asian Development Bank (2023), Indonesia's population living below the poverty line, based on purchasing power parity, is 2.7%. This statistic positions Indonesia as the sixth country with the highest poverty rate in Southeast Asia at 9.5%. In comparison, Timor Leste leads the region with a poverty rate of 42%, followed closely by Myanmar at 40% (Aditiya 2023). These figures underscore the persistent nature of poverty in the region and highlight the need for continued efforts to address this pressing issue.

Figure 1. Poverty Rate in Indonesia for 2000 to 2022



Source: Central Bureau of Statistics (2023)

The poverty rate in Indonesia has shown a consistent downward trend (Figure 1). In 2000, the poverty rate reached 19.14%, with 38.70 million people living below the poverty line (Central Bureau of Statistics, 2023). A significant decline occurred between 2000 and 2005, with the poverty rate reaching its lowest level of 15.97% in 2005. This reduction can be attributed to several factors, including positive economic growth, increased investment, and effective government poverty alleviation programs (Crews 2012). Following the 2005 low, the poverty rate experienced considerable fluctuations. In 2006, it rose sharply to 17.75%, primarily due to increases in fuel oil (BBM) and food prices, which negatively affected the purchasing power of low-income individuals (Kompas.com 2022). However, the largest year-on-year (y-o-y) downward trend was observed in 2009, with an 8.24% decrease. From 2015 to 2022, the poverty rate in Indonesia demonstrated a relatively consistent downward trend, albeit with minor fluctuations. By 2022, the poverty rate decreased to 9.55%. This continued decline can be attributed to various factors, including stable economic growth, more targeted government

programs, and improved access to education and health services for low-income populations (Central Bureau of Statistics, 2023).

During the 22 years from 2000 to 2022, the cumulative reduction in Indonesia's poverty rate was 50.07%. This statistic indicates that more than half of those previously classified as poor rose above the poverty line during this timeframe. The government's efforts to address poverty are driven by the recognition of its wide-ranging social and economic impacts. Poverty can lead to various negative externalities, including criminal activities such as theft, embezzlement, fraud, and assault. These criminal behaviors are often rooted in economic factors that affect an individual's ability to meet basic needs, such as food, housing, and education (Dong, Egger, and Guo 2020; Spada, Fiore, and Galati 2023). The relationship between socio-economic disparities and criminal behavior is well established, highlighting the inextricable link between poverty and crime as interconnected social problems (Rusnani, 2015). Figure 1 illustrates that 2000 witnessed the lowest number of crimes in the subsequent 22-year period, with 172,000 incidents occurring at intervals of 182 seconds. Crime rates continued to escalate until 2007, reaching a 91.49% increase. From 2008 to 2016, Indonesia experienced fluctuating crime rates.

Subsequently, a downward trend was observed from 2017 to 2021, with a 28.86% decrease (BPS 2023). The COVID-19 pandemic in 2020 slightly altered this trend, with poverty rates rising to 9.98%, while crime rates paradoxically decreased to 247,218 cases. This reduction may be attributed to pandemic-related restrictions on community activities, which potentially curtailed criminal behavior. Over the past two decades, Indonesia has experienced an overall upward trend in crime rates, peaking by 2022. However, the past decade has shown a general decline, except 2022. Despite this, Indonesia's crime rate remains comparatively high among Southeast Asian nations, such as Singapore and Malaysia. Studies conducted by organizations such as Transparency International and the Asia-Pacific Economic and Social Organization (APEC) suggest that more robust anti-corruption measures and improved law enforcement are necessary to reduce crime in Indonesia. The literature often highlights the correlation between poverty and crime. A World Bank (2022) report indicated that poverty and significant economic disparities can foster an environment conducive to crime and violence. Braithwaite (2018) found that most offenders come from economically disadvantaged backgrounds with limited access to resources. The government is expected to implement appropriate policies to address these issues. A fundamental approach currently emphasized is improving mobility and access to education, providing various societal elements with opportunities for quality education. Enhancing individual quality through education is anticipated to positively impact quality of life and economic mobility, thereby comprehensively addressing various socioeconomic problems (Marin 2020).

The improvement in educational access is reflected in the increase in the average number of years of schooling (RLS) in Indonesia over the past 22 years. RLS indicates the duration of an individual's participation in formal and informal educational activities. It is postulated that longer engagement in educational pursuits increases the potential for developing knowledge related to various life aspects, including awareness of crime and criminality. Data from the Central Bureau of Statistics (2023) reveal a consistent, albeit modest, annual increase in RLS. The average RLS growth rate was only 1.27% per year. However, when considering the cumulative growth from 2000 (6.6 years) to 2022 (8.7 years), Indonesia's RLS experienced a substantial increase of 31.67%, equivalent to an annual growth of 2.09%. Education can potentially address social issues, such as poverty and crime. Research indicates a strong correlation between education and economic growth, with increased education levels associated with higher income and reduced poverty rates (Spada *et al.* 2023). Humble & Dixon (2017) suggested that global poverty rates could be halved if all adults in low-income countries have completed secondary education. Education equips individuals with the skills and knowledge necessary for better opportunities, breaking the cycle of poverty and crime (Majumder & Biswas, 2017). Character education, legal awareness, and social skills development through education can help individuals understand the consequences of criminal behavior and reduce the likelihood of engaging in such acts (Abdali and Suherman 2018). The role of parents and teachers in guiding children is crucial in preventing criminal behavior. Education fosters a better understanding of societal values, norms, and laws, thereby reducing the tendency toward criminal behavior (Faizal & Aisah, 2019).

Poverty, education, and crime were interconnected. Individuals living in poverty may struggle to meet their basic needs and access education, potentially leading to criminal activity as a means of survival. There is a research gap in analyzing the long-term effects of poverty and education levels on crime in Indonesia, with most previous studies focusing on short-term relationships or using national-level data. This study addresses this gap by examining the impact of poverty and education on crime rates across 34 Indonesian provinces from 2007 to 2023. By utilizing provincial-level data and a longer timeframe, this study seeks to provide a more comprehensive

understanding of the relationships between these variables. This study aims to assess the effectiveness of educational instruments in creating a stable society and explore how higher poverty levels may potentially drive individuals or groups towards criminal behavior. This study employs a more comprehensive analytical approach that considers inter-regional variations and long-term dynamics. The findings are expected to offer new insights and policy recommendations for addressing criminality by targeting root causes, such as poverty and low education levels, ultimately contributing to the development of a safer environment for all.

1. Literature Review

1.1. Poverty and Crime Rates

The relationship between poverty and crime rates is complex and multifaceted. Poverty has been identified as a potential contributing factor to criminal behavior, affecting individuals economically, socially, and psychologically. Numerous studies have demonstrated a correlation between poverty and increased crime rates. For instance, a study conducted across 34 provinces in Indonesia revealed that poverty, particularly in isolated areas, can lead to crimes such as theft, mugging, and stabbing (Fachrurrozi *et al.* 2021). The impact of poverty extends beyond immediate economic hardship, influencing educational levels, access to employment, and economic opportunities, all of which can contribute to criminal activity. Riskinanti & Ardianto (2020) examined this correlation in Indonesia by analyzing data from the Indonesian National Socio-Economic Survey and crime statistics. Their findings indicate a significant positive relationship between poverty levels and property crime rates, especially in urban areas. This finding supports the notion that economic deprivation can increase motivation to commit property-related crimes as a means of survival or resource acquisition.

Similar findings have been reported in other regions. A study focusing on Latin American countries explored the role of poverty and social exclusion in driving crimes. Research examining data from various Latin American countries found a strong positive correlation between poverty levels and rates of property and violent crime (Santos *et al.* 2021). However, it is crucial to note that poverty does not directly cause criminal behavior. As emphasized by Sampson & Laub (2017), poverty interacts with a range of individual, community, and societal factors. Effective crime prevention strategies must address the root causes of poverty, such as a lack of economic opportunities, inadequate education, and limited access to social services, while promoting social inclusion, community empowerment, and targeted interventions for at-risk populations. Several theories attempt to explain the relationship between poverty and crime rates. One such theory is the strain theory proposed by Robert K. Merton, which posits that the inability of individuals to achieve socially important goals can cause pressure (strain), potentially leading to criminal behavior.

In the context of poverty, individuals experiencing economic difficulties in achieving these goals may respond to criminal acts (Prayetno 2013). Dulkiah and Nurjanah (2018) argued that poverty can also affect education levels and access to resources crucial for reducing the likelihood of criminal involvement. Individuals living in poverty often have limited access to quality education and economic opportunities, which potentially increases their risk of engaging in criminal offenses. Factors such as difficulties in meeting basic needs for food, housing, and education can also trigger criminal behavior, including theft, fraud, and abuse. It is important to recognize that poverty is not the sole cause of increased crime rates. Crime rates are often influenced by a complex interplay of social, economic, and political factors. In the pursuit of improved social mobility, increased income, and enhanced quality of life, poverty and crime rates should be considered holistically. Therefore, efforts to expand employment opportunities, improve the quality of education, and assist individuals in overcoming poverty are crucial for creating a more just, sustainable, and developed society (Sugiarti 2014). Thus, poverty can contribute to crime through various mechanisms, including its influence on economic conditions, access to education, and economic opportunities. Efforts to address crime stemming from poverty require comprehensive and sustainable poverty reduction initiatives, as well as the strengthening of character education and legal awareness within communities.

1.2 Education and Crime Rate

The relationship between education and criminal behavior has been extensively studied, with numerous researchers suggesting an inverse correlation between the two. Higher levels of education have been found to reduce the likelihood of engaging in criminal activity, although the relationship is indirect (Crews 2012). Several studies have demonstrated a negative association between education and crime rates, indicating that individuals with higher educational attainment are less prone to criminal behavior. Bernard (2022) reported that a one-year increase in average years of schooling can lead to significant reductions in various types of crimes, including a 30% decrease in homicide and assault, a 20% reduction in motor vehicle theft, a 13% decrease in arson, and

approximately 6% reduction in burglary and theft. These findings align with previous research conducted by Becker (2020), who posited that education provides individuals with enhanced skills, knowledge, and life opportunities.

Stixrud & Urzua (2006) found that each additional year of formal education can reduce the probability of an individual's involvement in criminal offenses by up to 7%. The authors argue that education contributes to the development of improved cognitive abilities, social skills, and self-control, thereby diminishing the tendency to engage in criminal behavior.

Furthermore, education offers better employment prospects, increases income, and alleviates poverty, which are significant risk factors for criminal involvement (Stixrud & Urzua (2006). However, it is important to note that the relationship between education and crime is not always linear. The crime-reducing effect of education appears to be more pronounced at higher education levels such as secondary and tertiary education. This suggests that investing in quality and sustainable education is crucial for preventing future criminal involvement (Dong *et al.* 2020; Spada *et al.* 2023). Additionally, the impact of education on crime rates may vary depending on factors such as gender, race, and socioeconomic status (Rennison and Hart 2022). For instance, the crime-reducing effect of education tends to be stronger for men than women and for minorities and underprivileged groups. This highlights the need for a more comprehensive and integrated approach to improve access to and quality of education in communities. Contrary to these findings, some studies have found no significant relationship between education and crime rates after controlling for individual characteristics, such as wages.

Groot and van den Brink (2010) reported that researchers identified a significant negative relationship between wage levels and crime but found no association between education and crime after controlling for wages. Education can generally help individuals become more aware of their rights and responsibilities in society, thereby reducing their likelihood of engaging in criminal activity. Research has demonstrated that education can have a substantial impact on crime rates, and policies aimed at increasing educational attainment and improving the quality of schooling can effectively reduce crime and criminality rates (Hjalmarsson & Lochner, 2012). The impact of education on crime rates is a complex issue with multiple factors to consider. Lochner (2004) suggests that education can increase an individual's forbearance or risk aversion, which may influence their decision to engage in criminal activities. Education can also indirectly alter preferences, potentially affecting the decision to participate in a crime. However, most of these channels lead to a negative relationship between education and violent and property crimes.

2. Materials and Methods

This study employed a quantitative approach to examine the relationship between crime rates, poverty levels, and education in Indonesia. The research encompasses all 34 provinces of Indonesia over 17 years from 2007 to 2023. Secondary panel data, sourced from the Central Bureau of Statistics (BPS), form the basis of this analysis. The Autoregressive Distributed Lag (ARDL) regression model is utilized to analyze the panel data, resulting in a specific equation that captures the dynamic relationships between the variables of interest. This methodological approach allows for exploring the short- and long-term effects of poverty and education on crime rates across different provinces in Indonesia.

$$\Delta LCR_{it} = \beta o + \sum_{t=1}^{p} \beta_1 \Delta LCR_{it-1} + \sum_{it=1}^{p} \beta_2 \Delta LEDU_{it-1} + \sum_{it=1}^{p} \beta_3 \Delta POV_{it-1} + \varphi_1 LEDU_{it-1} + \varphi_2 POV_{it-1} + \mu_{it-1} \quad (1)$$

where LCR is the log crime rate, LEDU is the log average years of schooling, and POV is the poverty rate. β_1, β_2, and β_3 are short-run coefficients. φ_1 and φ_2 are long-run ARDL coefficients, μ is the disturbance error. The testing stages carried out in this modelling are data stationarity test, cointegration test, and optimum lag test.

3. Results

This section delineates multiple stages of testing and provides an overview of the applied test variables. Before proceeding with the estimation and analysis, the initial step involved examining the data characteristics through descriptive statistics. This preliminary analysis offers insights into the data distribution, central tendencies, and extreme values of the variables under consideration. Subsequently, several stages are undertaken, including stationarity tests, cointegration tests, optimum lag tests, and Autoregressive Distributed Lag (ARDL) estimation. Employing this model enables the researcher to estimate both long- and short-term relationships among the variables as well as identify crucial factors influencing the crime rate in Indonesia, such as poverty and education levels.

3.1. Descriptive Statistics

The results revealed significant variations in crime rates and educational attainment across the 34 Indonesian provinces from 2007 to 2023. Table 1 presents the descriptive statistics for the three primary variables examined in the panel data study. The number of crimes exhibited considerable variability, with a mean of 10,259.360 cases per province during the study period. However, the range of crime rates was substantial, ranging from a minimum of 499 to a maximum of 63,661 cases. This wide disparity is further evidenced by the large standard deviation of 10,622.87, indicating substantial differences in crime rates among Indonesian provinces. Community education, measured by average years of schooling, demonstrated a mean of 8.10 years. This suggests that, on average, residents in Indonesian provinces completed education equivalent to the primary and partial junior secondary levels. However, educational attainment also varied across provinces, ranging from a minimum of 5.23 years to a maximum of 11.44 years. This disparity highlights the differences in educational levels among the provinces studied. These descriptive statistics provide a foundational overview of the data characteristics, setting the stage for more in-depth analyses of crime rates and educational attainment across Indonesian provinces during the specified timeframe.

Table 1. Result of Descriptive Statistics Analysis

	Crime	Education	Poverty
Mean	10259.36	8.10	12.41
Maximum	63661.00	11.44	40.78
Minimum	499.00	5.23	3.44
Std. Dev.	10622.87	1.09	6.91
Skewness	2.31	0.32	1.20
Kurtosis	8.81	3.29	4.47
Jarque-Bera	1289.64	11.58	186.20
Prob. Jarque-Bera	0.711050	0.209288	0.000025*
Observations	561	561	561

Note: * implies 1% significant level.

The interregional poverty rate exhibited a mean value of 12.41% for the population living below the poverty line. However, the substantial disparity between the maximum (40.78%) and minimum (3.44%) values indicates considerable variation in poverty rates across Indonesian provinces. Descriptive statistics also provide insights into the skewness and kurtosis of each variable. The crime rate (2.31) and poverty rate (1.20) displayed positive skewness, suggesting right-skewed distributions, with some observations significantly exceeding the average values. Conversely, the education variable (0.32) demonstrated a slightly left-skewed distribution, implying the presence of observations notably below the mean value. All variables exhibited kurtosis values exceeding 3 (crime: 8.81, education: 3.29, and poverty: 4.47), indicating leptokurtic distributions with fatter tails compared to normal distributions. The Jarque-Bera test was conducted to assess normality. The poverty variable's Jarque-Bera probability value (0.000025) fell below 1%, indicating a non-normal distribution. In contrast, the crime (0.711050) and education (0.209288) variables showed Jarque-Bera probability values above 1%, suggesting a tendency toward normal distribution.

3.2. Unit Root Test

The stationarity tests, conducted using Augmented Dickey-Fuller (ADF) and Phillips–Perron (PP) methods, are presented in Table 2. These tests were employed to detect the presence of unit roots in the data, which would indicate non-stationary. The tests were performed at both the level (I(0)) and the first difference (I(1)) stages. The ADF test results revealed that the LCR and POV variables exhibited stationarity at the I(0) level, with test statistical values significant at the 1% confidence level. This finding suggests that crime and poverty data are free from unit roots, allowing for their direct utilization in the analysis without the need for differencing.

The results indicate varying levels of stationarity among the variables examined. The LEDU variable exhibited non-stationarity at the I(0) level but achieved stationarity after first-order differencing at the I(1) level. This is evidenced by the ADF test statistic, which was not significant at the I(0) level but became significant at the 1% confidence level after differencing at I(1). Consistent findings were observed using the Phillips - Perron (PP) method for stationarity testing. In contrast, the LCR and POV variables demonstrated stationarity at the I(0) level.

Table 2. Result of Unit Root Test

Variable(s)	Augmented Dickey-Fuller test stat (ADF)			Philip-Perron (PP)		
	I (0)	I(1)	Order	I (0)	I (1)	Order
LCR	121.785*	-	I (0)	109.572*	-	I (0)
POV	136.122*	-	I (0)	420.426*	-	I (0)
LEDU	18.9712	218.922*	I (1)	56.9948	364.744*	I (1)

Note: * implies 1% significant level.

The presence of variables that are stationary at different levels (I(0) and I(1)) fulfills a key prerequisite for employing the Autoregressive Distributed Lag (ARDL) model in panel data analysis. The ARDL model is particularly suitable for handling situations in which variables in the model exhibit different orders of integration, with some being stationary at the level and others becoming stationary after differencing. Given these stationarity test results, the application of the ARDL panel model appears to be an appropriate approach for analyzing the relationships among the variables of crime rate (LCR), poverty (POV), and education (LEDU).

3.3. Cointegration Test

After conducting the stationarity test and ensuring that the data used fulfils the requirements to use the panel Autoregressive Distributed Lag (ARDL) model, the next step is to conduct the cointegration test. Table 3 displays the results of the cointegration test conducted using two methods, namely ADF panel and PP panel. Both methods are used to detect the existence of a cointegration relationship or long-run equilibrium between the variables in the model.

Table 3. Result of Cointegration Test

Panel ADF-Statistic		Panel PP-Statistic	
Statistic	Prob.	Statistic	Prob.
-4.269503	0.0000*	-5.079718	0.0000*

Note: * implies 1% significant level.

Table 3 presents the results of the ADF panel cointegration test. The analysis yielded a statistical value of -4.269503 with a probability of 0.0000. This probability value is less than the 1% significance level, allowing for rejecting the null hypothesis, which posits the absence of cointegration. Consequently, this finding suggests the presence of a cointegration relationship or long-run equilibrium among the model variables. Comparable outcomes were observed in the cointegration test employing the PP panel method. Similarly, a statistical value of -5.079718, accompanied by a probability of 0.0000, indicates a cointegration relationship or long-term equilibrium among the model variables at the 1% significance level. Given the evidence of cointegration from both the panel ADF and panel PP tests, the application of panel ARDL models is deemed appropriate for analyzing the relationships among the variables in this study: crime rate (LCR), poverty (POV), and education (LEDU). The established cointegration relationship implies that while the variables may exhibit short-term imbalances, they tend to converge toward equilibrium in the long run. Consequently, the panel ARDL model can estimate the long- and short-run relationships among these variables. This approach allows for a comprehensive examination of the dynamic interactions between crime rate, poverty, and education within the studied context.

3.4. Optimum Lag-Length Selection Criteria

Selecting an appropriate lag length is crucial, as it significantly impacts the estimation results and interpretation of variable relationships within the model. An insufficient lag length may result in omitting vital information, whereas an excessive lag length can lead to reduced degrees of freedom and diminished estimation efficiency. To determine the optimal lag length, the Akaike Information Criterion (AIC) was employed to evaluate the performance of models with varying lag lengths. A lower AIC value indicates a superior and more favorable model. As illustrated in Figure 1, the model with a lag length of 3 for the LCR, LEDU, and POV variables yielded the lowest AIC value. This finding is further corroborated by Table 4, which demonstrates that the ARDL (3, 3, 3) specification exhibited the lowest AIC value of -0.250810 compared to alternative models.

Figure 1. Optimum Lag with Akaike Information Criterion (AIC)

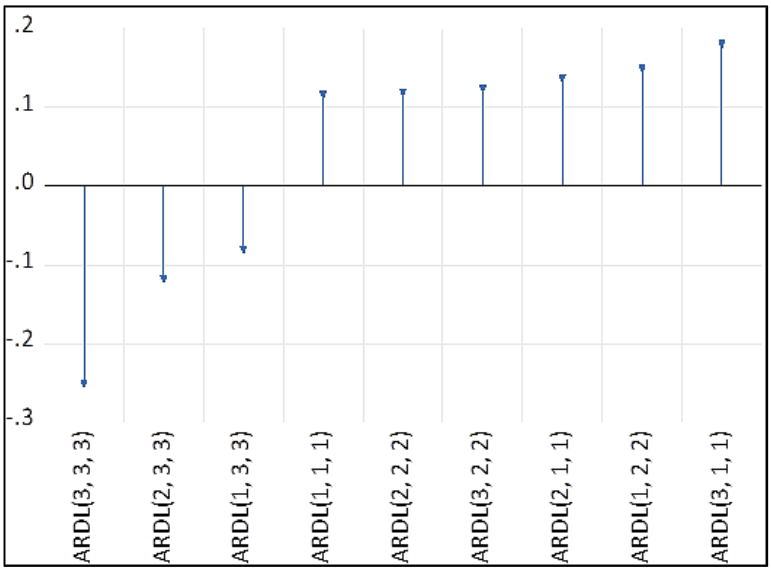


Table 4. Result of Lag-Length Selection

Lag Selected	HQ	BIC	AIC	LogL	Model
ARDL(3, 3, 3)	0.919241	2.721067	-0.250810	389.937223	9
ARDL(2, 3, 3)	0.936478	2.559207	-0.117274	326.090200	6
ARDL(1, 3, 3)	0.857253	2.300885	-0.080198	284.525666	3
ARDL(1, 1, 1)	0.589114	1.316357	0.116864	107.004457	1
ARDL(2, 2, 2)	0.941362	2.205897	0.120211	205.231163	5
ARDL(3, 2, 2)	1.062327	2.505959	0.124876	237.153555	8
ARDL(2, 1, 1)	0.726005	1.632345	0.137455	135.247867	4
ARDL(1, 2, 2)	0.854780	1.940218	0.149930	165.366222	2
ARDL(3, 1, 1)	0.886191	1.971628	0.181341	158.110311	7

Table 4 indicates that the optimal lag length selection can be informed by various information criteria, including the Bayesian Information Criterion (BIC) and Hannan-Quinn Criterion (HQ), in addition to the Akaike Information Criterion (AIC). Table 4 reveals that the ARDL (1, 1, 1) specification yields the lowest BIC value of 1.316357, whereas the ARDL (2, 3, 3) specification produces the lowest HQ value of 0.936478. Despite minor discrepancies in the optimal lag length selection across different information criteria, the ARDL (3, 3, 3) specification emerges as the most appropriate model for this study. This selection is primarily based on the achievement of the lowest AIC value and the consideration that AIC serves as a key indicator criterion among the information criteria. Consequently, the panel ARDL equation incorporating lag coefficients can be formulated as follows:

$$\Delta LCR_{it} = \beta_o + \beta_1\Delta LCR_{it-1} + \beta_2\Delta LCR_{it-2} + \beta_3\Delta LEDU_{it} + \beta_4\Delta LEDU_{it-1} + \beta_5\Delta LEDU_{it-2} + \beta_6\Delta POV_{it} + \beta_7\Delta POV_{it-1} + \beta_8\Delta POV_{it-2} + \varphi_1 LEDU_{it-1} + \varphi_2 POV_{it-1} + \mu_{it-1} \quad (2)$$

In the ARDL model equation after lag adjustment for each variable, the short-term coefficient is β_1 - β_8 and φ_1 - φ_2 is the long-term coefficient. The test variables are also stated to have a cointegration relationship, so the determination of the model equation in this study is as follows:

$$\Delta LCR_{it} = \beta_o + \lambda ECT_{t-1} + \beta_1\Delta LCR_{it-1} + \beta_2\Delta LCR_{it-2} + \beta_3\Delta LEDU_{it} + \beta_4\Delta LEDU_{it-1} + \beta_5\Delta LEDU_{it-2} + \beta_6\Delta POV_{it} + \beta_7\Delta POV_{it-1} + \beta_8\Delta POV_{it-2} + \varphi_1 LEDU_{it-1} + \varphi_2 POV_{it-1} + \mu_{it-1} \quad (3)$$

where λ is the cointegration adjustment coefficient (speed of adjustment) of the ECT (error correction term). This study considers the effect of three lag periods and their ability to reach long-run equilibrium after a short-run shock. The selection of an appropriate lag length allows the model to capture the dynamics and lagged effects of changes in the independent variable on the dependent variable.

3.5. Result of ARDL Estimation

The panel ARDL model estimation results, presented in Table 5, provide insights into the long- and short-run effects of education (LEDU) and poverty level (POV) on crime rate (LCR). The long-run coefficients reveal that an increase of one year in the average years of schooling is associated with a 0.0756% decrease in the crime rate. However, this relationship was not statistically significant at the 95% confidence level ($p = 0.6155$). Conversely, the poverty rate demonstrates a significant long-term effect on crime rates. A 1% increase in poverty was associated with a 0.8921% increase in crime rate, with this relationship being statistically significant at the 99% confidence level ($p < 0.01$).

Table 5. Result of ARDL Estimation

Variable(s)	Coefficient	t-Statistic	P-value
LEDU	-0.0756	-0.5029	0.6155
POV	0.8921	4.4559	0.0000*
ECT(-1)	-1.1669	-8.6069	0.0000*
D(LCR(-1))	0.3652	3.9863	0.0001*
D(LCR(-2))	0.2986	4.2756	0.0000*
D(LEDU)	-0.4782	-0.1545	0.8774
D(LEDU(-1))	-3.7951	-1.3043	0.1934
D(LEDU(-2))	-7.1723	-2.6935	0.0076*
D(POV)	-3.3345	-1.4573	0.1464
D(POV(-1))	-0.4795	-0.3428	0.7321
D(POV(-2))	-1.0829	-0.5903	0.5555
C	9.7088	8.5570	0.0000*

Note: * implies 1% significant level.

Table 5 presents the coefficients and significance levels of the variables in the short-run context. The error correction term (ECT), which measures the speed of adjustment towards long-run equilibrium, exhibits a coefficient of -1.1669 and is significant at the 99% confidence level. This indicates that approximately 116.69% of the short-run imbalance will be adjusted within one time period towards the long-run equilibrium. The short-run coefficients for the lagged dependent variables D(LCR(-1)) and D(LCR(-2)) are significant at the 99% confidence level, suggesting that changes in crime rates from previous periods significantly influence current crime rate changes. The unlagged LEDU variable D(LEDU) and its one-period lag D(LEDU(-1)) do not show statistical significance, as evidenced by the probability values exceeding 0.05. However, the two-period lagged variable D(LEDU(-2)) is significant at the 99% confidence level, with a coefficient of -7.1723. This implies that an increase in the average number of years of schooling from two prior periods leads to a reduction in the current period's crime rate.

Regarding the POV variable, neither the unlagged D(POV) nor the one-period lagged D(POV(-1)) coefficients demonstrate statistical significance. Similarly, the two-period lagged variable D(POV(-2)) failed to achieve significance at the 95% confidence level. In addition, the table reveals that the constant coefficient (C) is significant at the 99% confidence level, with a value of 9.7088. This constant represents the influence of other factors not included in the model on the crime rate. The empirical findings offer valuable insights into both the long- and short-term impacts of various factors on crime rates. In the long run, poverty levels demonstrate a significantly positive correlation with criminal activity, whereas educational attainment, measured by average number of years of schooling, does not exhibit a statistically significant effect. Conversely, short-term dynamics reveal that fluctuations in crime rates are significantly influenced by changes in criminal activity from the preceding period, as well as variations in educational attainment observed over the past two periods.

4. Discussions

The estimation results reveal a significant positive long-term effect of poverty on crime rates. This finding aligns with Meloni (2014) and Hu *et al.* (2024), who concluded that poverty is a primary driver of crime. These studies demonstrate a strong correlation between poverty and crime rates, with areas experiencing higher poverty levels tending to exhibit higher crime rates. Conversely, the long-term effect of education on crime rates was not statistically significant. This result, although not entirely unexpected, is consistent with the mixed findings reported in previous studies examining the relationship between education and crime. Wang *et al.* (2022) noted that

although many studies have identified an association between higher education levels and lower crime rates, the evidence remains inconclusive, and the relationship is not consistently strong. In the short-term context, changes in crime rates from the previous period were found to significantly influence current crime rates. This observation aligns with findings suggesting that past crime rates can impact current rates, indicating a cyclical pattern of criminal activity (Moffitt, 2013; Weijer *et al.* 2017).

Furthermore, the estimation results demonstrate that increased education levels from the previous two periods significantly negatively affect crime rates. This finding corroborates that of Groot & van den Brink (2010), who conclude that schooling significantly reduces the likelihood of detention and arrest. Their research indicated that each additional year of average schooling significantly decreased participation in criminal activities (Groot & van den Brink, 2010; Rusnani, 2015; Spada *et al.* 2023). However, the short-term effect of changes in poverty levels on crime rates was not statistically significant in this study. This result contradicts the findings of Nichols & Rothstein (2016), who reported that short-term fluctuations in economic conditions, such as unemployment and poverty rates, significantly influence crime rates. The discrepancy in these results may be attributed to differences in the research context and methodology.

Conclusions and Further Research

This study concludes that both the poverty rate and average years of schooling significantly influence crime rates in Indonesia, demonstrating both long-term and short-term effects. Specifically, an increase in the poverty rate contributes to a rise in the crime rate over the long term, while an increase in average years of schooling can reduce crime rates in both the long and short term. These results align with those of previous empirical studies investigating the factors contributing to crime and strategies for its reduction. The panel ARDL model estimation results reveal a cointegration relationship or long-run equilibrium between the variables in the model. This indicates that, despite short-term imbalances, there is a tendency to return to equilibrium in the long run. This finding strengthens the argument for formulating effective policies and strategies to address crime in Indonesia by considering crucial factors such as poverty and education. On the basis of the findings, several recommendations for the government and other stakeholders can be proposed. First, prioritize efforts to reduce poverty levels through comprehensive and sustainable poverty alleviation programs. Second, enhance access to and quality of education, particularly in areas with high crime rates, by allocating adequate resources and facilitating community participation in the education process. Finally, develop an integrated crime prevention strategy involving various stakeholders, including educational institutions, civil society organizations, and law enforcement agencies. This strategy should also consider other potential contributors to crime rates, such as family structure, peer group influence, and legal and illegal factors.

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Credit Authorship Contribution Statement

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T. Zulham: Conceptualization, Investigation, Methodology, Project administration, Writing – original draft, Supervision, Writing – review and editing, Visualization, Funding acquisition).
Suriani: Conceptualization, Investigation, Methodology, Project administration, Formal analysis, Writing – original draft, Supervision, Writing – review and editing.
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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Declaration of Use of Generative AI and AI-Assisted Technologies

The authors declare that they have not used generative AI and AI-assisted technologies during the preparation of this work.

References

[1] Abdali, Z., and Suherman, A. (2018). Peran Pendidikan Karakter Dalam Mengantisipasi Tindak Kriminalitas Siswa Di Sekolah Menengah Kejuruan Negeri (Smkn)1 Sindang Indramayu. *Jurnal Edueksos,* 7 (2): 179–98. DOI: https://doi.org/10.24235/edueksos.v7i2.3171 (in Indonesian)

[2] Aditiya, M. (2023). Indonesia Duduk Di Peringkat Ke-6 Negara Dengan Angka Kemiskinan Tertinggi Di Asia Tenggara. Tingkat Kemiskinan Di Asia Tenggara 2023. 2023. Available at: https://goodstats.id/infographic/tingkat-kemiskinan-di-asia-tenggara-2023-HBHy1 (in Indonesian)

[3] Anjawarti, T., and Rosmiati. (2022). Pengaruh Distribusi Penduduk Tidak Merata Dan Pendapatan Perkapita Terhadap Pembangunan Ekonomi Di Indonesia Sebagai Negara Sedang Berkembang. *Jurnal EduSosial,* 2 (2): 9–20. DOI: https://doi.org/10.22437/jeso.v2i2.20674 (in Indonesian)

[4] Bernard. (2022). The Clear Correlation Between Education and Crime.

[5] Braithwaite, R. (2018). *Restorative Justice: A Response to Crime*. Routledge.

[6] Crews, G. A. (2012). Education and Crime. In *21st Century Criminology: A Reference Handbook*, 59–66. DOI: https://doi.org/10.4135/9781412971997.n8

[7] Dong, B., Egger, P. H. and Guo, Y. (2020). Is Poverty the Mother of Crime? Evidence from Homicide Rates in China. *PLoS ONE,* 15 (5): 1–22. DOI: https://doi.org/10.1371/journal.pone.0233034

[8] Dulkiah, M., and Nurjanah Nurjanah. (2018). Pengaruh Kemiskinan Terhadap Tingkat Tindak Kriminalitas Di Kota Bandung. *JISPO Jurnal Ilmu Sosial Dan Ilmu Politik,* 8 (1): 36–57. (in Indonesian)

[9] Fachrurrozi, K., *et al.* (2021). Pengaruh Kemiskinan Dan Pengangguran Terhadap Kriminalitas Di Indonesia Di Tahun 2019. *Jurnal Real Riset,* 3 (2). DOI: https://doi.org/https://doi.org/10.47647/jrr (in Indonesian)

[10] Groot, W., and van den Brink, H. M. (2010). The Effects of Education on Crime. *Applied Economics,* 42 (3): 279–89. DOI: https://doi.org/10.1080/00036840701604412

[11] Hu, X., Song, J. and Wan, G. (2024). Transborder Spillover Effects of Poverty on Crime: Applying Spatial Econometric Models to Chinese Data. *China Economic Review,* 85: 102178. DOI:https://doi.org/https://doi.org/10.1016/j.chieco.2024.102178

[12] Humble, St., and Dixon, P. (2017). The Effects of Schooling, Family and Poverty on Children's Attainment, Potential and Confidence - Evidence from Kinondoni, Dar Es Salaam, Tanzania. *International Journal of Educational Research,* 83: 94–106. DOI: https://doi.org/https://doi.org/10.1016/j.ijer.2017.03.001

[13] Lochner, L., and Moretti, E. (2004). The Effect of Education on Crime: Evidence from Prison Inmates, Arrests, and Self-Reports. *American Economic Review,* 94 (1): 155–89. DOI:https://doi.org/10.1257/000282804322970751

[14] Marin, I. (2020). The Role of Education in Reducing Poverty Social Exclusion. *Proceedings of the International Conference on Business Excellence,* 14 (1): 505–13. DOI: 10.2478/picbe-2020-0047

[15] Meloni, O. (2014). Does Poverty Relief Spending Reduce Crime? Evidence from Argentina. *International Review of Law and Economics,* 39: 28–38. DOI: https://doi.org/https://doi.org/10.1016/j.irle.2014.05.002

[16] Moffitt, T. E. (2013). Childhood Exposure to Violence and Lifelong Health: Clinical Intervention Science and Stress-Biology Research Join Forces. *Development and Psychopathology,* 25(4): 169–34. DOI:https://doi.org/10.1017/S0954579413000801

[17] Nichols, A., and Rothstein, J. (2016). The Medicaid Program. In *Economics of Means-Tested Transfer Programs in the United States*, 1:21–136. University of Chicago Press. DOI:https://doi.org/10.7208/chicago/9780226370507.003.0001

[18] Prayetno. (2013). Kausalitas Kemiskinan Terhadap Perbuatan Kriminal (Pencurian). *Media Komunikasi FIS,* 12 (1): 30–45. (in Indonesian)

[19] Rennison, C. M., and Hart, T. C. (2022). *Research Methods in Criminal Justice and Criminology*. 2nd ed. Sage Publications.

[20] Riskinanti, E., and Ardianto. (2020). Hubungan Antara Tingkat Kemiskinan Dan Tingkat Kejahatan Properti Di Indonesia: Analisis Data Survei Sosial Ekonomi Nasional Dan Statistik Kejahatan. *Jurnal Kriminologi Indonesia,* 8 (1): 43–56. (in Indonesian)

[21] Rusnani. (2015). Pengaruh Kemiskinan Terhadap Meningkatnya Kriminalitas Di Kabupaten Sumenep. *"Performance" Bisnis & Akuntansi*, 5 (1): 42–59.(in Indonesian)

[22] Sampson, and Laub, J. H. (2017). *A Collective Perspective on the Causes of Crime*. Cambridge University Press.

[23] Santos, M. I. D., *et al.* (2021). Urban Income Segregation and Homicides: An Analysis Using Brazilian Cities Selected by the Salurbal Project. *SSM - Population Health,* 14 (June): 100819. DOI:https://doi.org/10.1016/j.ssmph.2021.100819

[24] Spada, A., Fiore, M. and Galati, A. (2023). The Impact of Education and Culture on Poverty Reduction: Evidence from Panel Data of European Countries. *Social Indicators Research*, no. 0123456789. DOI:https://doi.org/10.1007/s11205-023-03155-0

[25] Stixrud, J., and Urzua, S. (2006). The Effects of Cognitive and Non-Cognitive Abilities on Labor Market Outcomes and Social Behavior. *Journal of Labor Economics,* 24 (July): 411–82. DOI:https://doi.org/10.1086/504455

[26] Sugiarti, Y. (2014). Kemiskinan Sebagai Salah Satu Penyebab Timbulnya Tindak Kejahatan. *Jurnal Jendela Hukum,* 1 (1): 1–10. DOI: https://doi.org/10.24929/fh.v1i1.23 (in Indonesian)

[27] Wang, C., *et al.* (2022). Higher Education Expansion and Crime: New Evidence from China. *China Economic Review,* 74: 101812. DOI: https://doi.org/https://doi.org/10.1016/j.chieco.2022.101812

[28] Weijer, S. van de, Augustyn, M. and Besemer, S. (2017). Intergenerational Transmission of Crime: An International, Empirical Assessment. In *The Routledge International Handbook of Life-Course Criminology*, 279–97. DOI: https://doi.org/10.4324/9781315747996

[29] Asian Development Bank. (2023). Asian Development Outlook 2023: Accelerating Progress, Ensuring Inclusion. Manila.

[30] Badan Pusat Statistik. (2023). Statistik Kriminal. *Badan Pusat Statistik*. (in Indonesian)

[31] Badan Pusat Statistik. (2023a). Jumlah Tindak Pidana Menurut Kepolisian Daerah. (in Indonesian)

[32] Badan Pusat Statistik. (2023b). Profil Kemiskinan Di Indonesia Maret 2023. Available at: https://www.bps.go.id/id/pressrelease/2023/07/17/2016/profil-kemiskinan-di-indonesia-maret-2023.html

[33] Badan Pusat Statistik. (2023c). "Rata-Rata Lama Sekolah." (in Indonesian)

[34] Kompas.com. (2022). Anggaran Pandemi Susut, Belanja Kesehatan Tahun 2023 Turun Jadi Rp 153,8 Triliun. Kompas.Com. 2022. (in Indonesian)

[35] World Bank. (2022). "Poverty." 2022

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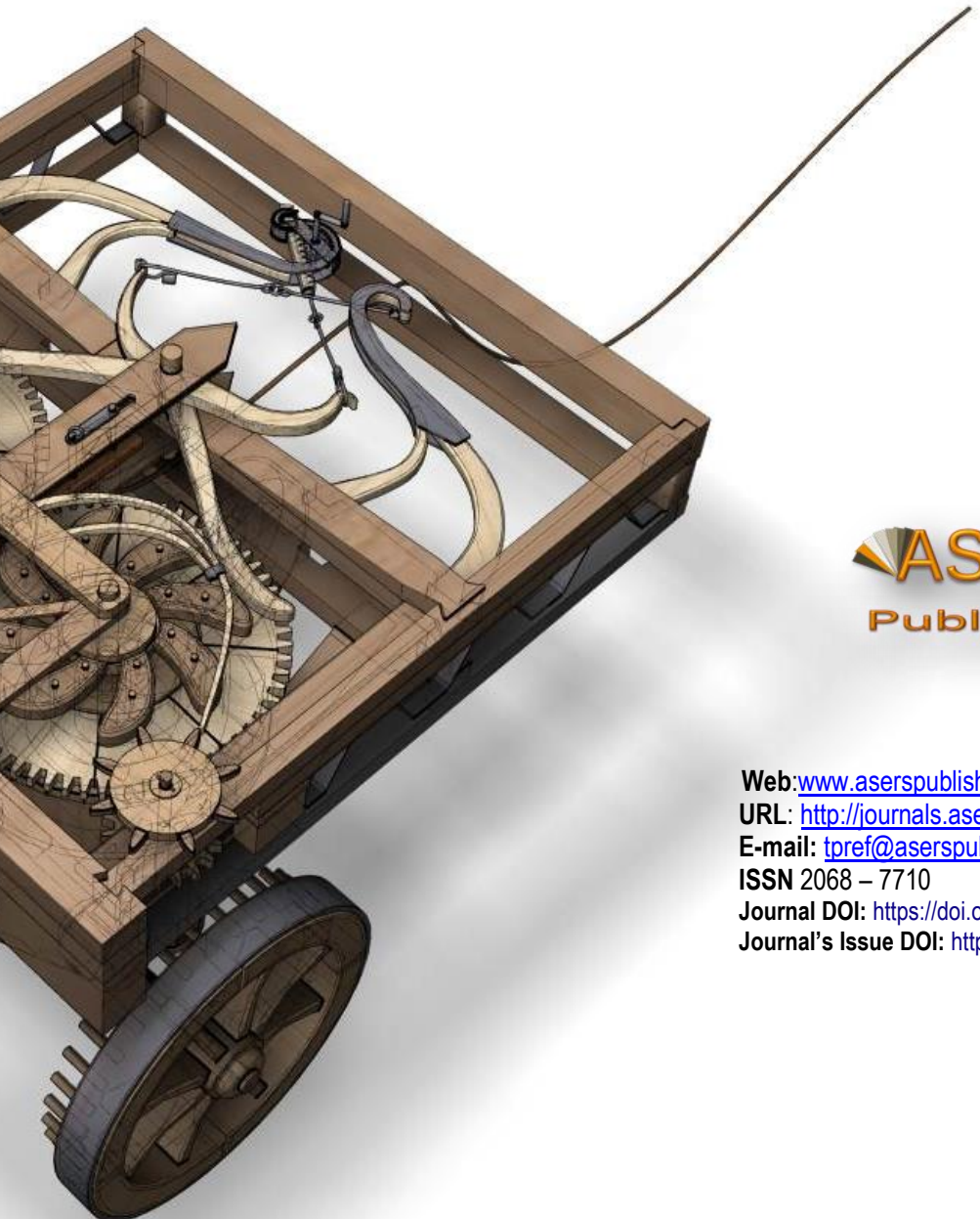

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