

RESEARCH ARTICLE



Determinants of Exports in Muslim Countries Developing Eight (D-8): Institutional Quality and Infrastructure Technology

Agitsna Alya Rizqa, Muhammad Ghafur Wibowo, Taosige Wau, Ibnu Muhdir

Sunan Kalijaga University, Yogyakarta, Indonesia

Article History

Received:

5 December 2024

Revised:

10 November 2025

Accepted:

1 December 2025

Published:

31 December 2025

Keywords

Exports, Generalized Method of Moments (GMM), Institutional Quality, Technological Infrastructure



ABSTRACT

International trade problems in developing countries are caused by inflation, low labor productivity, lagging technological infrastructure, and lack of investment. High export demand will create new jobs, reduce unemployment rates, and increase state revenue sources, which will ultimately improve public welfare. The purpose of this study is to examine the determinants of exports in Developing Eight (D-8) countries from a macroeconomic perspective, institutional quality, and technological infrastructure. This study strengthens previous findings by using institutional quality and technological infrastructure variables and is processed using the efficient, consistent, and unbiased Generalized Method of Moments (GMM). This study uses eight Muslim countries that are members of the Developing Eight organization with a research period of 2017-2022. The research findings show that Foreign Investment, Economic Growth, Institutional Quality, and Technological Infrastructure significantly influence exports, while Inflation is insignificant. This study presents new research by showing negative results on the relationship between Fixed Broadband Subscription (FBS) and Exports. FBS can reflect inefficient digital infrastructure. The increase in FBS is primarily directed at domestic consumption rather than productive export activities, while high costs and low service quality actually burden businesses. Technology has a greater impact on imports than exports because consumers utilize the ease of cross-border technology access more to purchase imported goods.

ABSTRAK

Masalah perdagangan internasional negara-negara berkembang disebabkan oleh inflasi, rendahnya produktivitas tenaga kerja, infrastruktur teknologi yang tertinggal, dan kurangnya investasi. Permintaan ekspor yang tinggi akan menciptakan lapangan kerja baru, mengurangi tingkat pengangguran, dan menambah sumber penerimaan negara, yang pada akhirnya akan mencapai kesejahteraan masyarakat. Tujuan penelitian ini yaitu menguji faktor-faktor penentu ekspor di Negara Developing Eight (D-8) baik dari sisi makroekonomi, kualitas institusi, dan infrastruktur teknologi. Penelitian ini memperkuat temuan sebelumnya dengan menggunakan variabel kualitas institusi dan infrastruktur teknologi serta diolah menggunakan metode Generalized Method of Moments (GMM) yang efisien, konsisten, dan tidak bias. Objek penelitian ini menggunakan 8 negara muslim yang tergabung dalam organisasi Developing Eight dengan periode penelitian tahun 2017-2022. Temuan penelitian menunjukkan bahwa Investasi Asing, Pertumbuhan Ekonomi, *Institutional Quality*, dan Infrastruktur Teknologi signifikan mempengaruhi ekspor, sementara Inflasi tidak signifikan. Penelitian ini menyajikan kebaruan penelitian dengan memperlihatkan hasil negatif pada hubungan Fixed Broadband Subscription (FBS) dan Ekspor. FBS dapat mencerminkan infrastruktur digital yang belum efisien. Peningkatan FBS lebih banyak diarahkan pada konsumsi domestik daripada aktivitas produktif ekspor, sementara biaya tinggi dan kualitas layanan yang rendah justru membebani pelaku usaha. Teknologi memiliki dampak yang lebih besar terhadap impor daripada ekspor karena kemudahan akses teknologi lintas negara lebih dimanfaatkan konsumen untuk berbelanja barang impor.

Introduction

International trade can occur due to differences in resources, economic conditions, government systems and infrastructure facilities. Fluctuations in export development in developing countries occur due to increasingly tight competition in international markets. Macroeconomic conditions between different countries can produce different impacts on exported goods and services. The Organization of Developing Countries-Eight (D-8) was formed to increase the participation of developing countries in making decisions at the global level. The trade volume of D-8 member countries reaches 50 percent of the total trade of OIC members and 5 percent of total world trade, this is an opportunity for member countries to take advantage of the global market (Kementerian Luar Negeri Republik Indonesia, 2022).

Based on World Bank data, Turkey recorded the highest total exports among D-8 countries, amounting to \$315.6 billion in 2022, while Pakistan and Bangladesh lagged behind with \$44.3 billion and \$46.7 billion, respectively, in the same year. Meanwhile, according to The Observatory of Economic Complexity (2022), among the eight Developing Eight (D-8) member countries, Malaysia ranked highest in total exports at 22nd place, followed by Indonesia and Turkey at 26th and 29th, respectively. Nigeria ranked the lowest at 136th, followed by Iran at 86th and Pakistan at 66th. This lag indicates that these countries have not yet fully utilized their resources. Nigeria, Pakistan, and Bangladesh recorded higher total imports than total exports, indicating that these countries are still experiencing trade deficits.

Pakistan, Nigeria, and Bangladesh face trade deficits because imports exceed exports. This situation is triggered by currency depreciation, inflation, low labor productivity, underdeveloped infrastructure, and minimal investment. Currency depreciation, which should increase competitiveness, actually worsens the import-dependent economy. Pakistan relies on imports to support exports, increasing production costs such as fuel, transportation, and logistics. The depreciation of the Pakistani rupee has resulted in increased import bills, fueling inflation due to high cost-push inflation. Lack of investment in infrastructure hinders production, thus preventing local producers from competing (Tricontinental, 2023).

Bangladesh is a low-income country with an economic structure dominated by labor-intensive manufacturing (RMG) exports, which employ 20.4% of the workforce. The agricultural sector contributes only 13.6% to GDP despite employing 40.6% of the workforce, due to low urbanization, which has only reached 38.2% (International Trade Administration, 2022). Meanwhile, Nigeria has experienced two recessions, exacerbating multidimensional poverty. Nigeria's economy is characterized by low productivity, weak expansion of highly elastic labor-intensive sectors, and neglect of the manufacturing sector, which has hampered growth and reduced the capacity to meet domestic and export needs (Erumebor, 2023).

Turkey and Iran have faced severe inflation that has risen sharply in recent years, while Egypt experienced a decline before rebounding. Prolonged political turmoil has left Egypt vulnerable to currency depreciation and balance of payments pressures (Atlantic Council, 2017). The situation worsened after Russia's invasion of Ukraine, disrupting food supplies and raising energy prices, a key import for all three countries. The surge in inflation triggered the exodus of foreign investors and deepened the economic crisis, forcing them to rely on IMF support (Welle, 2022).

The development of international trade, apart from being supported by the country's macroeconomic conditions, is also determined by the quality of government and technological infrastructure. Malaysia shows a good level of rule of law, but other countries still show weak rule of law, such as Iran and Nigeria. Low rule of law reduces public trust in institutions as policy makers, this triggers more complex economic problems. Other Institutional Quality indicators such as government effectiveness, voice and accountability, regulatory quality, political stability and control of corruption show similar results, where D-8 member countries show unstable governance.

The quality of a country's infrastructure can influence trade flows because it is related to efficiency and minimizing trade barriers, especially for exporters. Infrastructure indicators can be in several sectors such as transportation infrastructure, energy, technology and finance. Zhou et al. (2022) measure technological infrastructure using broadband. The existence of Broadband policy intervention can effectively increase the use of internet facilities thereby encouraging the growth of export trade. Broadband provides information efficiency thereby minimizing production costs. Infrastructure in the technological sector facilitates trade flows with the support of sophisticated technology and fast internet access.

High export demand will create new jobs for the population and increase sources of state revenue. This state income can be reallocated for the welfare of its people, such as improving public services, infrastructure facilities, social programs and developing the industrial sector. This is an urgency why the factors determining exports still need to be studied, especially in Muslim countries. This research examines the determinants of exports in the Developing Eight

(D-8) countries both in terms of macroeconomics, institutional quality and technological infrastructure. This study strengthens previous findings by presenting the determinants of exports within the context of institutional quality as a measure of good governance and technological infrastructure as an indicator of a country's development. The Generalized Method of Moments (GMM) is used to address bias and inconsistency issues.

Stephen Hymer's theory states that FDI is driven by firm advantages and market imperfections, with the goal of maximizing profits, controlling resources, reducing competition, and encouraging operational cooperation (Rahajeng, 2016). FDI increases global efficiency and supports the host country's economy through job creation and technology transfer. Investors are attracted to lower raw material and labor costs and benefit from increased demand (Najih, 2019).

FDI Spillover Theory states that foreign investment generates indirect economic spillover effects, where the benefits gained are in the form of knowledge, skills, and technology, which ultimately drive productivity and economic growth. Yasin & Purwono (2024) state that the presence of foreign (multinational) companies encourages domestic companies to start exporting and increase their export intensity through both capital support and the transfer of managerial skills.

Endogenous growth theory explains that long-term economic growth is driven by factors within the economy itself, such as innovation, investment in knowledge and quality human resources, and the existence of incentives that encourage economic activity. Ilmi (2017) found that technological innovation and FDI increase exports because the products offered have high competitiveness.

The export equation in this study employs the national income formula using the expenditure approach, $X = Y + M - C - I - G$, where the export value (X) is derived from national income (Y), total imports (M), household consumption (C), investment (I), and government expenditure (G). An increase in national income reflects higher purchasing power, which encourages greater production of goods and services. Higher demand and production levels lead producers to expand their production capacity, generating a surplus of goods that can be marketed abroad, thereby increasing exports. However, excessive household consumption may create inflationary pressures (price increases), which ultimately reduce purchasing power if not accompanied by a proportional increase in income.

Previous literature shows varied results regarding the determinants of exports. An increase in GDP per capita indicates that a country can produce according to market demand, thereby increasing exports to other countries (Jayadi & Retnosari, 2020). However, GDP per capita will reduce the country's exports because the goods exported have low added value in the global market (Asikin et al., 2016).

Inflation has a positive impact on export in developing countries, while in developed countries it has an inverse relationship (McCloud & Taylor, 2022). Nugraheni et al. (2021) and Irawan & Gurning (2023) found a negative relationship between inflation and exports because price increases due to inflation make commodities less competitive in the global market.

Inflation can have a positive impact, where a stable, low to moderate inflation rate can positively impact economic growth (moderate inflation). Controlled inflation encourages households and businesses to increase consumption and investment due to expectations of future price increases. This condition can stimulate aggregate demand, support wage increases, and prevent deflation, thus creating a more dynamic and sustainable economy.

Institutional Quality can be measured by several indicators. Government effectiveness will increase international trade because government policies in revitalizing the manufacturing industry make it easier for investors to invest and trade (Suryanto & Kurniati, 2022). Bah et al. (2021) found that political stability, voice and accountability, rule of law, and Corruption control positively influences exports. Infrastructure indicators can be of several types such as transportation, energy, technology and financial infrastructure. Rehman et al. (2020) Developing country economies are catching up with developed countries. Zhou et al. (2022) reveal that Broadband Infrastructure provides information efficiency thereby minimizing production costs.

This research differentiates itself from previous studies by examining the macroeconomic determinants of exports in D-8 countries and adding variables such as Institutional Quality and technological infrastructure. Of the six WGI indicators, this study uses only the Rule of Law to represent governance quality, while technological infrastructure is measured using Fixed Broadband Subscription as a proxy for digital capacity.

This research gap arises because most previous studies use more general institutional indicators and the limitations of research using broadband indicators as a measure of digital infrastructure. The selection of D-8 countries is based on their shared characteristics as developing countries with significant export potential but facing similar institutional and digital infrastructure challenges. By applying the GMM method, this study deepens the analysis of the

relationships between variables and is expected to provide more comprehensive empirical evidence regarding the role of governance and digital infrastructure on exports.

Research Methodology

The type of research used is explanatory research to explain the position of each variable studied and the influence between variables (Sugiyono, 2017). This research uses a quantitative approach, where in the process of collecting data, interpreting the data, until the results are required to use numbers, this is used to test the hypothesis used (Abdullah et al., 2022). Data processing in this research uses the Generalized Method of Moments (GMM) using E-views 12. This study employs secondary panel data, with cross-sectional data covering eight developing countries and time-series data consisting of annual observations for the period 2017–2022. The secondary data are sourced from the World Bank, while additional research information is obtained from books, journals, and other relevant references.

The research population consists of export variables, Foreign Direct Investment (FDI), Gross Domestic Product (GDP) Per Capita, Rule of Law, and Fixed Broadband Subscriptions in eight countries Developing Eight (D-8). The research samples taken only came from countries that had complete data, so seven countries could be taken, namely Indonesia, Malaysia, Pakistan, Turkiye, Iran, Bangladesh and Egypt. Exports (Y) are used as the dependent variable in this study, temporarily Foreign Direct Investment (FDI) (X1), GDP per capita (X2), Inflation (X3), Institutional Quality (X4), and Technology Infrastructure (X5) are used as independent variables.

The dynamic panel data regression method is a variable value that is influenced or has a relationship with other variables in the past. This method has a lag from the dependent variable which is used as the independent variable. This research uses test estimates Generalized Method of Moments (GMM) Arellano-Bond to produce efficient estimates and eliminate bias and inconsistency problems when using OLS estimates on dynamic panels. FD GMM or Arellano Bond GMM (AB-GMM) is used to eliminate individual effects in the model and overcome the correlation problem between the lag of the dependent variable and the error component. Regression analysis using GMM is carried out with several analysis steps, namely instrumental variable validity test (IV), consistency test, unbiased test, hypothesis test, and Generalized Method of Moments (GMM) estimation.

The following is the dynamic panel equation model:

$$EKS_{i,t} = \alpha + \delta EKS_{i,t-1} + \beta_1 FDI_{i,t} + \beta_2 PDB_{i,t} + \beta_3 INF_{i,t} + \beta_4 ROL_{i,t} + \beta_5 FBS_{i,t} + u_{i,t} \dots (1)$$

Information:

- δ : Scalar
- α : Constanta
- EKS : Exports of goods and services (Million USD)
- FDI : Foreign Direct Investment (Million USD)
- PDB : Per Capita Income (USD)
- INF : Inflation (%)
- ROLE : Rule of law
- FBS : Fixed Broadband Subscription (per 100 customers)
- $u_{i,t}$: Error

The following is the Generalized Method and Moments estimation model:

$$\left(\frac{\delta}{\beta} \right) = \{ (N^{-1} \sum_{i=1}^N (\Delta y_{i,t-1} \Delta x_i)' Z_i) \Lambda^{-1} (N^{-1} \sum_{i=1}^N Z_i' (\Delta y_{i,t-1} \Delta x_i)) \}^{-1} \{ (N^{-1} \sum_{i=1}^N (\Delta y_{i,t-1} \Delta x_i)' Z_i) \Lambda^{-1} (N^{-1} \sum_{i=1}^N Z_i' (\Delta y_i)) \} \dots (2)$$

Approximation equation First Difference GMM with AR(1):

$$Y_{it} = \alpha Y_{it-1} + n_i + v_{it} Y_{it} \dots (3)$$

Results and Discussion

The data analysis stages in this research began with instrumental variable validity testing, consistency testing, unbiased testing, hypothesis testing, and Generalized Method of Moments testing. The Instrumental Variable (IV) Validity Test used uses the Sargan Test, the Consistency Test uses the Arellano Bond Test, the Unbias Test is obtained from

comparing the GMM lag coefficient values with FEM and PLS. The J-statistic probability value based on the Sargan test is 0.260598 where greater than 0.05 means that H0 is accepted and H1 is rejected. The AR(2) probability value based on the Arellano Bond Test is 0.981 which is greater than 0.05, meaning that H0 is accepted and H1 is rejected. The unbiased test results show that the GMM dependent lag coefficient value is between FEM and PLS. The Wald test results show that the chi-square value is 1030.948 with a probability of 0.00, meaning that the independent variables together (simultaneously) can influence the dependent variable. Based on the analysis stages, it can be concluded that the estimation Generalized Method of Moments (GMM) is valid, consistent and unbiased.

Table 1. Generalized Method of Moments (GMM) Test Results

Variable	Coefficient	t-Statistic	Prob
EKS(-1)	-3.18E-05	-1.156431	0.2915
FDI	1.475146	4.871167	0.0028 *
PDB	34.89492	2.818160	0.0034 *
INF	2112.712	2.397639	0.0535
ROL	184380.1	5.760461	0.0012 *
FBS	-8918.057	-2.663037	0.0374 **
J-stat	1.265577		
Prob (J-stat)	0.260598		

Notes: *alpha 1%, **alpha 5%

Source: Data Processing Results, 2024

Interpretation of the regression equation:

- The coefficient value of the Foreign Direct Investment (FDI) variable is 1.475147, showing that FDI can have a positive effect on exports. This implies that holding other factors constant, a 1 Million USD increase in FDI is associated with a 1.47-million-USD increase in exports. The p-value of 0.0028 indicates that the effect of FDI on exports is statistically significant at the 1% level (0.01).
- The coefficient value of the GDP per capita is 34.89492, showing that GDP can have a positive effect on exports. This implies that holding other factors constant, every 1 USD increase in GDP will increase exports by 34.89 Million USD. The p-value of 0.0034 indicates that the effect of GDP on exports is statistically significant at the 5% level (0.05).
- The inflation variable coefficient (INF) value of 2112.71 shows that INF can have a positive effect on exports. This implies that holding other factors constant, every 1% increase in INF will increase exports by 2112.71 Million USD. The p-value of 0.0535 shows that INF does not significantly affect the exports of D-8 countries at the 5% significance level (0.05).
- The coefficient value of the Rule of Law (ROL) variable is 184380.1, showing that ROL can have a positive effect on exports. This implies that holding other factors constant, every 1 unit increase in ROL will increase exports by 184380.1 Million USD. The p-value of 0.0012 indicates that the effect of ROL on exports is statistically significant at the 1% level (0.01).
- The coefficient value of the Fixed Broadband Subscription (FBS) variable is -8918.057, showing that FBS can have a negative effect on exports. This implies that holding other factors constant, every increase per 100 customers on FBS will reduce exports by 8918.05 Million USD. The p-value of 0.0374 indicates that the effect of FBS on exports is statistically significant at the 5% level (0.05).

The Relationship of Foreign Direct Investment (FDI) to Exports

The results of this research support several previous research results such as Mukhtarov et al. (2019), Febrianti & Setiawan (2022), and Sahoo & Dash (2022). FDI facilitates international trade by minimizing production financing constraints Mukhtarov et al. (2019) as well as efforts to increase company productivity Febrianti & Setiawan (2022). FDI in developing countries has different impacts on exports because the country's level of development varies, and depends on the nature and purpose of the use of FDI. The impact on exports depends on absorption capacity on the country itself (Sahoo & Dash, 2022).

Foreign investment not only helps the country in the form of cash, but can also establish multinational companies in the recipient country so that they can absorb domestic labor and increase state income. Foreign investors who establish multinational companies with the orientation of maximizing business profits are not always bad for the recipient country. The profit orientation that multinational companies want to achieve in the manufacturing sector can produce output that can be re-exported, thus contributing to increasing international trade in recipient countries

in the global market. Improving quality in multinational companies through advanced technology makes it easier for recipient countries to increase the competitiveness of exported products.

Foreign investment entering D-8 countries is still fluctuating and has not consistently increased in the last 6 years, but has moved in line with the movement of total exports. The obstacles faced are low productivity and still depending on imports, such as Pakistan, Bangladesh and Nigeria, so that more foreign investment is needed to overcome production problems such as updating technology and increasing worker productivity through various training.

The use of foreign capital from member countries is used to increase the country's bargaining position in the global market, in line with the main objectives of the Developing Eight (D-8) organization. D-8 countries are still a destination for investors to invest their capital because of their competitive advantages, such as low production costs. This is supported by Stephen Hymer's theory that FDI occurs due to differences in costs between countries, by taking advantage of lower costs in other countries. FDI can occur because companies want to expand market access and increase operational efficiency. Maza & Gutiérrez-Portilla (2022) stated that groupings of countries that are connected through trade processes such as strong socio-economic integration will complement each other's FDI goals in maximizing exports.

The Relationship between GDP Per capita and Exports

The results of this research support several previous research results such as Febrianti & Setiawan (2022), Tito & Niniek Imaningsih (2023), and Manilet et al. (2023) which show that the relationship between GDP per capita and exports is significantly positive. An increase in GDP per capita indicates an increase in the wealth and social welfare of the country. (Tito & Niniek Imaningsih, 2023). An increase in population income indicates an increase in the value of domestic production to meet demand. Increased production allows for a production surplus so that it can export its products to destination countries (Manilet et al., 2023).

Increasing people's income makes capital turnover run faster, thereby encouraging production activities to produce higher processing output. An increase in income and credit distribution makes it easier for companies to meet capital needs such as expanding production land, updating the latest technology, and increasing employment opportunities, thereby minimizing production barriers for trading on the global market (Hutagalung & Siahaan, 2020).

Per capita income in Turkey and Malaysia outperforms the average income of the population in six other countries. Turkey is ahead with an average population income ranging from 11,953 to 14,055 USD annually, while Malaysia follows with per capita income ranging from 10,416 to 11,399 USD annually. Other countries have low per capita income showing average income ranging from 1,376 USD to 5,507 USD annually.

The higher level of state income indicates a high level of production in producing export products. This is one of the attractions for foreign countries to import because the products offered have the quantity, complexity and quality desired by the global market. An increase in the market value of an item causes the number of goods produced to increase to meet market demand (Suryanto & Kurniati, 2022). GDP per capita in D-8 countries reflects a measure of the country's ability to produce, utilize and manage its natural resources, therefore GDP per capita depends on the potential of the country's production factors.

Relationship of Inflation to Exports

The results of this research support several previous research results such as Nwosa (2019), Putri & Jayadi (2023), and Sovia Zahrianti & Wirawan Fadly (2022) which found that inflation cannot affect exports. The relationship between inflation and exports is not significant this is due to the existence of other factors that influence exports such as GDP, FDI, raw material costs, technology, free trade agreements (FTA), and tariff barriers (Putri & Jayadi, 2023). Siagian & Suharianto (2025) reveals that exchange rate stability and inflation control are important factors in improving competitiveness and export performance.

Inflation not only has a negative impact on international trade, but a controlled increase in inflation can provide benefits for the country. Inflation in developing countries can encourage investment and lower borrowing costs. The investment received by domestic companies can be used as capital to support their production activities in the face of rising domestic prices. Bank Indonesia said that inflation will remain at a safe point when it is still within controlled limits, that is, it remains balanced between supply and demand so that it does not disrupt the economy. Controlled inflation improves welfare because it remains within the purchasing power of the wider community. However, in the conditions of Country D-8, where the inflation rate is uncontrolled, this cannot affect the level of exports.

Each country has a different level of inflation when categorized according to its level of severity. Countries with low inflation rates in the range of below 10% annually are Indonesia, Malaysia and Bangladesh. Countries with moderate

inflation rates in the range of 10%-30% per year are Pakistan, Nigeria and Egypt. Meanwhile, countries with heavy inflation rates in the range of 30%-100% are Türkiye and Iran. The high inflation rate in Iran and Türkiye is clear evidence that even though the country's inflation is at a high level, it does not hinder its international trade.

Russia's invasion of Ukraine in 2022 will disrupt the stability of food supplies, which is troubling Egypt, Türkiye and Iran as countries that depend on imports. The Russo-Ukrainian war created high prices, especially in energy and fuel as the main sectors of highest imports for these countries. Inflation that continues to skyrocket makes foreign investors withdraw, and the economy worsens (Welle, 2022). The inflation problem in several D-8 countries has not reduced their export levels. The Turkish government prioritizes low interest rates in the face of high inflation rates and a weakening currency, as high interest rates are considered a cause of inflation. The bold steps taken by the government are aimed at increasing production, exports and investment in order to achieve a current account surplus (CNN Indonesia, 2022).

A depreciating currency means Turkish products can be purchased cheaply for foreign currencies thereby increasing demand for Turkish exports. Iron and steel commodities, which are Türkiye's main export commodities, will grow significantly to 94.1% in 2021 (Nurhadi, 2022). The increase in the value of Turkish exports is the result of export products being more competitive because they have a low cost advantage in the international market, due to the depreciating currency. Therefore inflation cannot affect exports in developing countries because there are other stronger factors such as exchange rates, prices and interest rates.

Egypt has implemented international trade in local currency (Trade in Local Currency) to stimulate the economy and reduce dependence on the US dollar. This policy is expected to reduce domestic prices while increasing global competitiveness. Furthermore, a barter agreement (counter-trade) exists between Indonesia and Egypt through PT Perusahaan Perdagangan Indonesia (PPI) to exchange Indonesian coffee for Egyptian grapes or pomegranates, in an effort to maintain foreign exchange reserves and reduce import price pressures because transactions are not dependent on the dollar. Although the barter policy and the use of local currency aim to reduce inflation and maintain foreign exchange, their impact on exports is insignificant. Egypt's export performance is more influenced by structural factors such as dependence on imported raw materials, low productivity, and high logistics costs. Thus, monetary and foreign exchange policies play a role in curbing price fluctuations, but have not been able to become the main drivers of export growth.

The Relationship of Institutional Quality to Exports

The results of this research support several previous research results such as Yushi & Borojo (2019), Bah et al. (2021), and Abreo et al. (2021). Institutional Quality helps facilitate trade thereby increasing export volumes and the possibility of trade participation (Yushi & Borojo, 2019). Political regimes influence export dynamics through policies created to provide an environment that supports export activities. Rule of law and strong protection of property rights will encourage market creation Fair and competitive regulations are made to encourage the production of goods of good quality (Bah et al., 2021).

D-8 countries have proven the development of the rule of law by having an increasing impact on international trade, especially exports. Developing countries tend to be characterized by weak institutional quality at varying levels such as dysfunctional public administration, rule of law, civil liberties, lack of political rights, and ineffective legislation. The weak level of quality of institutions continues to be an improvement for developing countries and shows progress compared to the last two decades.

The rule of law is defined as the level of public trust in the law, as well as the enforcement of contracts and property rights by the judiciary. High legal trust makes it possible to provide more incentives for producers to invest and expand their markets on an international scale. High trust indicates that the country will trade more than countries with low trust (Guiso et al., 2009). The rule of law increases international trading partners' dependence on formal institutions resulting in more trade.

Rule of law can also reflect perceptions of the quality of contract enforcement, property rights, police, courts, and the possibility of crime (Kaufmann et al., 2008). The rule of law shows two characteristics, namely the maintenance of property rights and the absence of corruption (Butkiewicz & Yanikkaya, 2006). Good rule of law will reduce the possibility of losing money due to a party violating the contract, because it is likely that they will lose the case (Pavel et al., 2019). Government institutions can influence economic efficiency by providing legal rules and facilitating economic transactions thereby minimizing risk and uncertainty (Wepo, 2023).

Low enforcement of contracts by institutions triggers increased trade costs for companies, thereby reducing exports, even though based on Douglass North's theory and New Institutional Theory, institutions help international trade by

minimizing costs. Default risk introduces uncertainty in trade integration, and this risk is determined through contract enforcement (Bah et al., 2021). Differences between countries in dealing with contract enforcement by their formal institutions will create uncertainty in trade transactions. National judicial institutions are considered the highest law enforcement power in resolving trade uncertainty (Yu & Hu, 2015).

The rule of law provides protection of property rights, ensuring that businesses can be owned, used and transferred without interference from unauthorized parties because business actors trust that their assets will be safe and can be legally enforced. The rule of law creates fairness in dispute resolution and ensures that conflicts can be resolved in a timely and transparent manner thereby encouraging individual trust because it reduces uncertainty between economic actors. In the context of international trade, having clear rules regarding how disputes are resolved helps prevent conflict and promotes stability in trade relations between countries.

The improved rule of law of developing countries encourages state participation in international activities, increases representation in international bodies, and increases involvement in world forums. These activities can be utilized by developing countries to expand international market access, encourage investment, and create fairer legal norms at the international level. Developing countries involved in international agreements can transform these provisions into their national law. The participation of developing countries is used to face competition with developed countries, so that they can defend their rights if they are violated (M. Gaffar, 2016).

The Relationship of Technology Infrastructure to Exports

The results of this research support several previous research results related to infrastructure such as Faisol & Novianti (2019) and Aryani et al. (2020). Faisol & Novianti (2019) found that infrastructure quality as measured by air transportation and railway track length had a negative influence on exports. While Aryani et al. (2020) found that Broadband in Indonesia has a negative influence on trade performance, where the level of Fixed Broadband and Mobile Broadband speed in Indonesia is still low compared to other countries so it has not been able to improve its export performance. Country characteristics lead to gaps and inequality in broadband services, and broadband use is dominated to fulfill tertiary rather than primary needs.

The development of the D-8 country's technological infrastructure using the Fixed Broadband measure has increased from year to year. Several countries continue to experience significant increases in economic crisis conditions. Improvements in technological quality in developing countries such as D-8 are still much lower than in developed countries. Countries that are unable to maximize the level of efficiency of information and communication technology will have a negative impact on international trade due to increased internet access costs and telephone subscription costs.

The negative relationship between Broadband and exports can be explained by the low quality of Broadband in D-8 countries so that they are not able to compete on the global market. The average network speed of D-8 countries will still range between 14-137 Mbps in 2023 where of the eight member countries, 7 countries are still below the average global network speed, namely 93.65 Mbps (Speedtest Global Index, 2024). This data illustrates that the technology of the D-8 countries is still far behind and has not yet reached its impact on international trade. Technology that is supposed to reduce trade costs actually reduces producer efficiency by increasing trade costs, difficulty running a business, and hampering product quality improvements.

Fixed Broadband offers more stable and faster network quality, but is less flexible and inefficient. If the user density is high, internet speed will split and weaken (Luky, 2023). This makes it difficult for small exporter industries to support trade activities. According to Montobbio & Rampa (2005) developing countries tend to focus their innovative activities on industries with stagnant or poor technology. Kusuma & Muta'ali (2019) revealed that infrastructure does not always reflect economic development because it depends on geography and the resources of each country.

The positive relationship of technological infrastructure with export volume has a greater impact on imports than on exports. Technological infrastructure has an impact on international trade, but its influence is stronger on total imports than total exports. Import activity that is higher than total exports results in a trade deficit and triggers other, more complex economic problems. Developing countries are still the target market for developed countries because they are import-oriented countries that depend on goods and services from foreign countries. People use the ease of access to technology across countries to import rather than export products, especially in countries experiencing trade deficits such as Nigeria, Pakistan and Iran.

When broadband is high but inefficient, internet access costs burden businesses, and usage is largely diverted to domestic consumption, weakening exports. Low broadband access forces businesses to rely on traditional trade channels that don't rely on digital infrastructure. Exports continue through labor-intensive or natural resource-based

sectors that relatively don't require high-tech support. Limited broadband isn't always a barrier; in some contexts, it can actually lead to relatively higher exports compared to when broadband is widespread but inefficient.

Conclusions

The aim of this research is to analyze and test the effect Foreign Direct Investment (FDI), GDP per capita, inflation, Institutional Quality, and Technology infrastructure for exports. Based on the results of research on the determining factors of exports in Muslim countries Developing Eight (D-8). Foreign Direct Investment (FDI), GDP per capita, Institutional Quality, and Technological Infrastructure significantly influence exports, while Inflation is not significant. This research presents novel research by showing negative results on the relationship between Fixed Broadband Subscription (FBS) and exports. The significant and negative effect of FBS on developing country exports may reflect inefficient digital infrastructure. Increased FBS is primarily directed at domestic consumption rather than productive export activities, while high costs and low service quality burden businesses. Resource allocation for broadband development may reduce investment in export-supporting physical infrastructure, resulting in a negative relationship.

D-8 countries are still a destination for investors to invest their capital because they consider competitive advantages, namely low production costs. The incoming capital is used to overcome production obstacles and increase bargaining position in the global market. An increase in people's income makes capital turnover run faster, thus encouraging production activities to produce higher processing output and encouraging exports. Government institutions can influence economic efficiency by providing legal rules, facilitating transactions, and minimizing costs thereby reducing trade barriers, risks, and uncertainties. Inflation cannot affect exports in developing countries because there are other stronger factors such as exchange rates and interest rates. In times of crisis, the Turkish government prioritized low interest rates to increase production, exports and investment in order to create a current account surplus.

The governments of the D-8 countries need to formulate policies focused on increasing FDI inflows by providing legal certainty, simplifying licensing processes, and providing attractive fiscal incentives to encourage foreign investors to contribute to increasing domestic production capacity. Per capita GDP growth must continue to be encouraged through pro-growth policies and job creation to boost purchasing power and maintain the production cycle.

Governments also need to strengthen institutional quality by improving governance, minimizing transaction costs, and creating a transparent business climate to reduce trade uncertainty. Technological infrastructure must be directed not only at consumption but also at increasing production capacity and supporting exports. Macroeconomic policies, such as controlling inflation, must be balanced with exchange rate and interest rate policies that support productivity and export competitiveness.

Author Contributions

AAR: Conceptualization, Writing, Methodology; MGW: Data Processing; TW: Review; IB: Manuscript Editing,

AI Writing Statement

During the preparation of this work authors used Grammarly in order to paraphrase and proofread the sentences. After using this service, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

Conflicts of interest

The authors declare that there are no conflicts of interest related to the publication of this article. There are no financial, personal, or other relationships that could influence the objectivity of this research.

Acknowledgments

The author would like to thank the team at Buletin Ilmiah Litbang Perdagangan, as well as all those involved in the writing of this work for their contributions and assistance.

References

- Abdullah, K., Jannah, M., Aiman, U., Hasda, S., Fadilla, Z., Taqwin, Masita, Ardiawan, K. N., & Sari, M. E. (2022). Metode penelitian kuantitatif (N. Saputra (ed.)). Yayasan Penerbit Muhammad Zaini.
- Abreo, C., Bustillo, R., & Rodriguez, C. (2021). The role of institutional quality in the international trade of a Latin American country: evidence from Colombian export performance. *Journal of Economic Structures*, 10(1), 24. <https://doi.org/10.1186/s40008-021-00253-5>

- Aryani, Y., Andari, W., & Suhindarto, S. (2020). Pengaruh teknologi informasi dan e-commerce terhadap perdagangan Indonesia ke negara ASEAN. *Jurnal Ekonomi Indonesia*, 9(1), 53–66. <https://doi.org/10.52813/jei.v9i1.30>
- Asikin, Z., Daryanto, A., & Anggraeni, L. (2016). Pengaruh infrastruktur dan kelembagaan terhadap kinerja ekspor agregat dan sektoral Indonesia. *Jurnal Manajemen Dan Agribisnis*, 13(2), 145–156. <https://doi.org/10.17358/JMA.13.2.145>
- Atlantic Council. (2017). Why Inflation is So High in Egypt. Atlantic Council.
- Bah, M., Atangana Ondo, H., & Kpognon, K. D. (2021). Effects of governance quality on exports in Sub-Saharan Africa. *International Economics*, 167, 1–14. <https://doi.org/10.1016/j.inteco.2021.05.003>
- Butkiewicz, J. L., & Yanikkaya, H. (2006). Institutional quality and economic growth: Maintenance of the rule of law or democratic institutions, or both? *Economic Modelling*, 23(4), 648–661. <https://doi.org/10.1016/j.econmod.2006.03.004>
- CNN Indonesia. (2022, May 6). Penyebab inflasi Turki nyaris capai 70 persen. CNN Indonesia. <https://www.cnnindonesia.com/ekonomi/20220506135731-92-793546/penyebab-inflasi-turki-nyaris-capai-70-persen>
- Erumebor, W. (2023, February 6). Nigeria in 2023: Bridging the productivity gap and building economic resilience. Brookings. https://www-brookings-edu.translate.google/articles/nigeria-in-2023-bridging-the-productivity-gap-and-building-economic-resilience/?x_tr_sl=en&x_tr_tl=id&x_tr_hl=id&x_tr_pto=tc
- Faisol, A., & Novianti, T. (2019). Analisis pengaruh kualitas infrastruktur terhadap arus perdagangan bilateral Indonesia-APEC 2011 - 2016 [Institut Pertanian Bogor]. In IPB University. <https://repository.ipb.ac.id/handle/123456789/98407>
- Febrianti, N. T. S., & Setiawan, S. (2022). Pemodelan ekspor ASEAN data panel dinamis dengan pendekatan generalized method of moments Arellano-Bond. *Jurnal Sains Dan Seni ITS*, 11(2), 2337–3520. <https://doi.org/10.12962/j23373520.v11i2.73437>
- Guiso, L., Sapienza, P., & Zingales, L. (2009). Cultural biases in economic exchange? *Quarterly Journal of Economics*, 124(3), 1095–1131. <https://doi.org/10.1162/qjec.2009.124.3.1095>
- Hutagalung, D. S., & Siahaan, J. (2020). Analisa hubungan antara produk domestik bruto dan ekspor Indonesia (uji kausalitas granger). *Jurnal Ekonomi Dan Bisnis (EK&BI)*, 3(2), 299–305. <https://doi.org/10.37600/ekbi.v3i2.191>
- Ilmi, N. (2017). The Impact Of Innovation And Foreign Direct Investment (FDI) And Its Interaction To Export Value Of High-Technology Products Of ASIAN-10. *Journal of Developing Economies*, 2(1). <https://doi.org/10.20473/jde.v2i1.5095>
- International Trade Administration. (2022). Bangladesh- Country Commercial Guide. International Trade Administration. https://www-trade-gov.translate.google/country-commercial-guides/bangladesh-market-overview?x_tr_sl=en&x_tr_tl=id&x_tr_hl=id&x_tr_pto=tc
- Irawan, A., & Gurning, R. V. M. (2023). Pengaruh Nilai Tukar dan Inflasi Terhadap Volume Ekspor Crude Palm Oil (CPO) Selama Masa Pandemi. *Jurnal Akuntansi, Ekonomi Dan Manajemen Bisnis*, 11(1), 106–113.
- Jayadi, A., & Retnosari, V. A. (2020). Analysis of the determinants of Indonesia's exports with ASEAN countries and seven trading partner countries using the gravity model. *Assosiation Cuadernos de Economia*, 391–400. <https://doi.org/https://doi.org/10.32826/cude.v4i123.401>
- Kaufmann, D., Kraay, A. C., & Mastruzzi, M. (2008). Governance matters VII: aggregate and individual governance indicators 1996-2007. World Bank Policy Research. <https://documents.worldbank.org/en/publication/documents-reports/documentdetail/810501468338351727/governance-matters-vii-aggregate-and-individual-governance-indicators-1996-2007>
- Kementerian Luar Negeri Republik Indonesia. (2022). Developing Eight (D-8). Kementerian Luar Negeri Republik Indonesia. https://kemlu.go.id/portal/id/read/143/halaman_list_lainnya/developing-eight-d-8
- KPPN Pangkal Pinang. (2023). Pengendalian inflasi menjaga kesejahteraan masyarakat Bangka Belitung. Ditjen Perbendaharaan Kemenkeu RI KPPN Pangkal Pinang. <https://djpb.kemenkeu.go.id/kppn/pangkalpinang/id/data->

publikasi/berita-terbaru/2903-pengendalian-inflasi-menjaga-kesejahteraan-masyarakat-bangka-belitung.html#:~:text=Dalam perekonomian inflasi tidak bisa,masyarakat tetap terjaga dan meningkat

- Kusuma, M. E., & Muta'ali, L. (2019). Hubungan pembangunan infrastruktur dan perkembangan ekonomi wilayah Indonesia. *Jurnal Bumi Indonesia*. <https://api.core.ac.uk/oai/oai:ois.lib.geo.ugm.ac.id:article/1083>
- Luky. (2023, April 11). Mengenal perbedaan internet mobile broadband dan fixed broadband. *Fortune Indonesia*. <https://www.fortuneidn.com/tech/luky/mengenal-perbedaan-internet-mobile-broadband-dan-fixed-broadband>
- M. Gaffar, J. (2016). Sikap kritis negara berkembang terhadap hukum internasional. *Jurnal Konstitusi*, 10(2), 205. <https://doi.org/10.31078/jk1021>
- Manilet, M. S., Kumenaung, A. G., & Rompas, W. F. . (2023). Analisis pengaruh produk domestik regional bruto per kapita, investasi, dan inflasi terhadap total ekspor di provinsi Sulawesi Utara tahun 2008-2022. *Jurnal Berkala Ilmiah Efisiensi*, 23(8). <https://ejournal.unsrat.ac.id/v3/index.php/jbie/article/view/50308>
- Maza, A., & Gutiérrez-Portilla, P. (2022). Outward FDI and exports relation: A heterogeneous panel approach dealing with cross-sectional dependence. *International Economics*, 170, 174–189. <https://doi.org/10.1016/j.inteco.2022.04.002>
- McCloud, N., & Taylor, A. (2022). Does inflation targeting matter for international trade? A synthetic control analysis. *Empirical Economics*, 63(5), 2427–2478. <https://doi.org/10.1007/s00181-022-02221-9>
- Montobbio, F., & Rampa, F. (2005). The impact of technology and structural change on export performance in nine developing countries. *World Development*, 33(4), 527–547. <https://doi.org/10.1016/j.worlddev.2005.01.001>
- Mukhtarov, Alalawneh, Ibadov, & Huseynli. (2019). The impact of foreign direct investment on exports in Jordan: Empirical analysis. *International Study Journal*, 12(3), 38 – 47. <https://doi.org/10.14254/2071-8330.2019/12-3/4>
- Najih, M. W. F. (2019). Hubungan Foreign Direct Investmen (FDI) dan Ekspor: Studi Kasus Peran Indeks Ease of Doing Business (EODB) di ASEAN 5. Universitas Brawijaya.
- Nugraheni, P. P., Kumaat, R. J., & Mandeiij, D. (2021). Analisis determinan ekspor Sulawesi Utara ke negara-negara tujuan ekspor periode 2012-2018. *Jurnal EMBA*, 9(2), 176–188. <https://doi.org/https://doi.org/10.35794/emba.v9i2.33335>
- Nurhadi, M. (2022, July 5). 10 Komoditas ekspor terbesar dari Turki, otomotif hingga perhiasan. *Suara.Com*. <https://www.suara.com/bisnis/2022/07/05/183917/10-komoditas-ekspor-terbesar-dari-turki-dari-otomotif-hingga-perhiasan?page=all>
- Nwosa, P. I. (2019). Inflation and non-oil export in Nigeria. *Journal of Behavioural Studies*, 1(1).
- Pavel, M. S., Burhan, S. R., & Papiya, T. (2019). Should Bangladesh export to countries with better institutional or comparatively similar institutional form? *International Economic Journal*, 33(1), 9–26. <https://doi.org/10.1080/10168737.2019.1570299>
- Putri, O. P., & Jayadi, A. J. (2023). Pengaruh inflasi, tingkat suku bunga, dan nilai tukar terhadap ekspor non-migas Indonesia tahun 2010-2019. *MUC Tax Journal*, 1(1), 61–69. <https://doi.org/10.61261/muctj.v1i1.24>
- Rahajeng, L. R. M. (2016). Analisis Faktor Yang Mempengaruhi Masuknya Foreign Direct Investment (FDI) Negara Berkembang di Kawasan ASEAN (Indonesia, Malaysia, Thailand, Kamboja dan Vietnam) Periode 1995-2014. *Jurnal Ilmiah Mahasiswa Fakultas Ekonomi Dan Bisnis*, 4(2).
- Rehman, F. U., Ding, Y., Noman, A. A., & Khan, M. A. (2020). The nexus between infrastructure and export: An empirical evidence from Pakistan. *Global Journal of Emerging Market Economies*, 12(2), 141–157. <https://doi.org/10.1177/0974910120930529>
- Sahoo, P., & Dash, R. K. (2022). Does FDI have differential impacts on exports? Evidence from developing countries. *International Economics*, 172, 227–237. <https://doi.org/10.1016/j.inteco.2022.10.002>
- Siagian, R. A., & Suhariato, J. (2025). Pengaruh Nilai Tukar Rupiah dan Inflasi terhadap Nilai Ekspor Sumatera Utara. *Jurnal Akademik Ekonomi Dan Manajemen*, 2(2). <https://doi.org/https://doi.org/10.61722/jssr.v3i4.5297>

- Sovia Zahrianti, E., & Wirawan Fadly. (2022). Pengaruh inflasi dan nilai tukar terhadap ekspor produk halal Indonesia periode 2016-2020. *Journal of Economics, Law, and Humanities*, 1(2), 1–15. <https://doi.org/10.21154/jelhum.v1i2.832>
- Speedtest Global Index. (2024). Median country speeds april 2024. Speedtest Global Index. <https://www.speedtest.net/global-index#mobile>
- Sugiyono. (2017). Metode penelitian kuantitatif, kualitatif, dan R&D. Alfabeta.
- Suryanto, S., & Kurniati, P. S. (2022). Analisis perdagangan internasional Indonesia dan faktor-faktor yang mempengaruhinya. *Intermestic: Journal of International Studies*, 7(1), 104. <https://doi.org/10.24198/intermestic.v7n1.6>
- The Observatory of Economic Complexity. (2022). New multidimensional economic complexity rankings. OEC.
- Tito, T. W., & Niniek Imaningsih. (2023). Analisis pengaruh jumlah produksi furniture indonesia, kurs, pendapatan perkapita Amerika Serikat terhadap ekspor furniture Amerika Serikat. *JEMSI (Jurnal Ekonomi, Manajemen, Dan Akuntansi)*, 9(5), 1808–1812. <https://doi.org/10.35870/jemsi.v9i5.1405>
- Tricontinental. (2023). How the international monetary fund is squeezing Pakistan. Tricontinental. https://thetricontinental-org.translate.goog/dossier-69-how-the-international-monetary-fund-is-squeezing-pakistan/?x_tr_sl=en&x_tr_tl=id&x_tr_hl=id&x_tr_pto=tc#toc-section-2
- Welle, D. (2022, June). Mengapa inflasi di Turki meroket sampai lebih 70 persen? Detiknews. <https://news.detik.com/dw/d-6131777/mengapa-inflasi-di-turki-meroket-sampai-lebih-70-persen>
- Wepo. (2023, April 3). Kajian ekonomi: Teori ekonomi institusional. Program Studi Ekonomi Syariah. <https://an-nur.ac.id/esy/kajian-ekonomi-teori-ekonomi-institusional.html>
- Yasin, M. Z., & Purwono, R. (2024). Scrutinizing the FDI Spillovers Model: Do Foreign Firms Motivate Local Firms to Export? *Jurnal Ekonomi Indonesia*, 13(2), 101–113. <https://doi.org/10.52813/jei.v13i2.252>
- Yu, C., & Hu, X. (2015). Sophistication of China's manufactured exports and determinants. *Transnational Corporations Review*, 7(2), 169–189. <https://doi.org/https://doi.org/10.5148/tncr.2015.7204>
- Yushi, J., & Borojo, D. G. (2019). The impacts of institutional quality and infrastructure on overall and intra-Africa trade. *Economics*, 13(1). <https://doi.org/10.5018/economics-ejournal.ja.2019-10>
- Zhou, F., Wen, H., & Lee, C.-C. (2022). Broadband infrastructure and export growth. *Telecommunications Policy*, 46(5), 102347. <https://doi.org/10.1016/j.telpol.2022.102347>