

**Integrating Maqashid al-Syari'ah into Human Capital:
A Solow Growth Model Analysis of Real GDP per Capita
in OIC Member Countries**

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ABSTRACT

This study advances the augmented Solow growth framework by reconceptualising labour as value-based human capital through its interaction with a Maqashid al-Shari'ah index. Rather than treating labour as a homogeneous and exogenous input, the model introduces a labour-augmenting productivity mechanism in which ethical, social, and human-development dimensions determine the effectiveness of the workforce. Using panel data for 48 OIC countries over the period 2014–2023, the Maqashid index is constructed via principal component analysis based on the five objectives of Maqashid al-Shari'ah and is interacted with the labour force participation rate (LFPR) within a fixed-effects specification.

The results show that LFPR in its conventional quantitative form is not associated with income differences across countries, whereas its interaction with the Maqāṣid index is positive and robust across alternative estimators (PCSE, FGLS, and Driscoll–Kraay). This finding indicates that Maqashid-based human development operates as a labour-augmenting technology that raises total factor productivity rather than merely increasing factor accumulation.

By endogenising labour quality within the Solow framework, this study provides a new empirical growth mechanism that links value-oriented human development to long-run income differences. The results imply that growth strategies in OIC countries should shift from labour expansion toward the formation of value-embedded human capital to achieve inclusive and sustainable development.

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ملخص

طُوِّرَ هذه الدراسة إطار سولو (Solow) المعزّز للنمو الاقتصادي من خلال إعادة تصور عنصر العمل بوصفه رأس مال بشري قائم على القيم عبر تفاعله مع مؤشر مقاصد الشريعة. فبدلاً من التعامل مع العمل باعتباره عنصراً متجانساً وخارجياً (Exogenous)، يقدم النموذج آلية لتعزيز إنتاجية العمل، بحيث تحدد الأبعاد الأخلاقية والاجتماعية والتنموية البشرية مدى فعالية القوى العاملة. وباستخدام بيانات لوحية (Panel Data) لـ 48 بلداً عضواً في منظمة التعاون الإسلامي تغطي الفترة الممتدة بين عامي 2014 و 2023، تم بناء مؤشر مقاصد الشريعة من خلال تحليل المكونات الرئيسية (Principal Component Analysis - PCA) استناداً إلى المقاصد الخمسة للشريعة الإسلامية. كما أن هناك تفاعل بين هذا المؤشر ومعدل المشاركة في القوى العاملة (LFPR) ضمن نموذج ذي آثار ثابتة (Fixed Effects Specification). وتُظهر النتائج أن معدل المشاركة في القوى العاملة بصيغته الكمية التقليدية لا يرتبط بفروق الدخل بين البلدان، في حين أن تفاعله مع مؤشر مقاصد الشريعة يُظهر أثراً إيجابياً وقوياً عبر مجموعة من أساليب التقدير البديلة (PCSE, FGLS, and Driscoll–Kraay). وتشير هذه النتيجة إلى أن التنمية البشرية القائمة على مقاصد الشريعة تؤدي دور تقنية معززة للعمل لترفع مستوى الإنتاجية الكلية لعوامل الإنتاج (Total Factor Productivity)، بدلاً من أن تقتصر على زيادة تراكم عوامل الإنتاج فحسب. من خلال إدخال جودة العمل كمتغير داخلي ضمن إطار سولو، تقدم هذه الدراسة آلية جديدة للنمو الاقتصادي مدعومة بأدلة تجريبية، تربط بين التنمية البشرية الموجهة بالقيم والفروق في مستويات الدخل على المدى الطويل. وتوحي النتائج بأن استراتيجيات النمو في البلدان الأعضاء في منظمة التعاون الإسلامي ينبغي أن تتحول من التركيز على التوسع الكمي في القوى العاملة إلى تكوين رأس مال بشري متجذر في القيم، بما يساهم في تحقيق تنمية شاملة ومستدامة.

RÉSUMÉ

Cette étude développe le cadre de croissance de Solow élargi en redéfinissant le travail comme un capital humain fondé sur des valeurs, à travers son interaction avec un indice Maqashid al-Shari'ah. Plutôt que de considérer le travail comme un facteur de production homogène et exogène, le modèle introduit un mécanisme de productivité favorisant le travail, dans lequel les dimensions éthiques, sociales et liées au développement humain déterminent l'efficacité de la main-d'œuvre. À partir de données de panel pour 48 pays de l'OIC sur la période 2014-2023, l'indice Maqashid est construit par analyse en composantes principales sur la base des cinq objectifs de Maqashid al-Shari'ah et est mis en relation avec le taux d'activité (LFPR) dans le cadre d'une spécification à effets fixes. Les résultats montrent que le TLF, sous sa forme quantitative conventionnelle, n'est pas associé aux différences de revenus entre

les pays, tandis que son interaction avec l'indice Maqāsid est positive et robuste pour différents estimateurs (PCSE, FGLS et Driscoll–Kraay). Ce résultat indique que le développement humain fondé sur les Maqashid fonctionne comme une technologie d'augmentation de la main-d'œuvre qui accroît la productivité totale des facteurs plutôt que de se contenter d'augmenter l'accumulation des facteurs. En endogénéisant la qualité de la main-d'œuvre dans le cadre de Solow, cette étude propose un nouveau mécanisme de croissance empirique qui relie le développement humain axé sur les valeurs aux différences de revenus à long terme. Les résultats suggèrent que les stratégies de croissance dans les pays de l'OCI devraient passer d'une expansion de la main-d'œuvre à la formation d'un capital humain ancré dans des valeurs afin de parvenir à un développement inclusif et durable.

Keywords: GDP per Capita, Human Capital, Maqashid al-Shari'ah, Labour Force Participation, Principal Component Analysis, Panel Data, OIC Countries

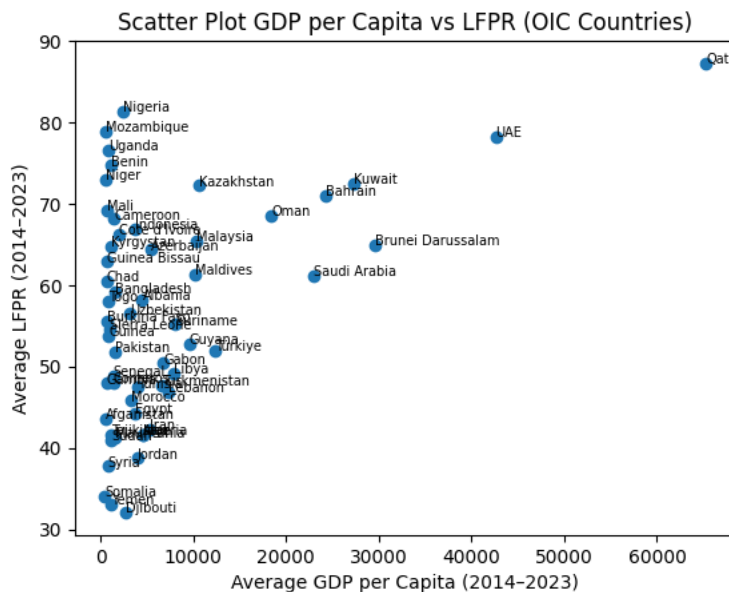
JEL Classification: O40, J24, F21, O43, Z12

I. Introduction

Despite possessing large working age populations, most member states of Organisation of Islamic Cooperation (OIC) remain characterised by substantial disparities in income per capita, labour productivity, and structural transformation. This pattern indicates that the central development challenge in OIC countries is not the shortage of labour supply, but the limited capacity of the economy to transform labour into productive human capital.

Gross Domestic Product (GDP) per capita is widely recognised as a primary indicator for measuring a country's level of prosperity and standard of living as it reflects the economy's capacity to generate income for its population. However, the dynamics of economic growth suggest that increases in GDP are not always accompanied by equitable improvement in the quality of human development. The condition is particularly evident among member countries of the Organisation of Islamic Cooperation (OIC), which collectively possess large populations and labour forces but continue to face substantial disparities in income per capita, labour productivity, educational attainment, access to healthcare, and structural economic transformation (UNDP, 2022; World Bank 2023).

Figure 1. Cross-Country Distribution of GDP per Capita and Labour Force Participation in OIC Countries (2014–2023)



The heterogeneity in income levels across OIC countries indicates that the sheer quantity of labour is insufficient to explain differences in economic performance. Many OIC member states remain in the low-and-middle income groups, reflecting gaps in human capital quality, technological capacity, and institutional effectiveness. Figure 1 illustrates the paradox by showing a weak and non linear relationship between labour force participation and GDP per capita, where many countries relatively high participation rates remain at low income levels. This stylised fact points to a fundamental quality gap in labour utilisation.

Descriptively, the relationship between income levels and labour force participation in OIC Countries is also non linear. High-income countries such as Qatar, the United Arab Emirates and Kuwait exhibit both high GDP per capita and high LFPR, reflecting strong economic capacity to absorb labour through robust labour demand and relatively advanced labour market structures. In contrast, most low-and middle-income countries cluster at lower income levels with wide variation in LFPR, indicating that higher labour participation in these economies is often driven by economic necessity and the dominance of the informal sector rather than by high productivity. Meanwhile, countries with both low GDP per capita and low LFPR reflect structural constraints in job creation and human capital

development. This pattern confirms that, in the context of OIC countries, prosperity is not solely associated with income accumulation but also with the ability of the economy to mobilise and utilise the working age population effectively and productively. Thus, LFPR becomes an important indicator for explaining the role of economic growth process (ILO, 2023; Altuzarra, et al., 2021).

These stylised facts suggest that the quality of human capital is more relevant than the mere quantity of labour in explaining cross-country differences in economic performance. The neoclassical Solow growth model posits that long-run economic output is determined by capital accumulation, labour, and technological progress. In its conventional formulation, however, labour is treated as homogeneous input and the model largely emphasises quantitative aspects, thereby failing to fully capture the role of human quality, including social, moral and institutional dimensions, in driving productivity (Mankiw et al., 1992; Jones, 2022). In the context of OIC countries, such an approach becomes less adequate because the development process is not only concerned with increasing economic output but also achieving welfare objectives aligned with Islamic value (Chapra, 2021).

The Maqashid al-shari'ah framework offers more comprehensive perspective for understanding human quality through its five essential dimensions: the protection of religion (hifz al-din), life (hifz al-nafs), intellect (hifz al-aql), lineage (hifz al-nasl), and wealth (hifz al-mal). Each of these dimension has tangible economic implication for labour productivity. The protection of life is reflected in improved health outcomes that enhance work capacity and long-term efficiency. The protection of intellect is associated with education and skill development, which determine innovation capacity and technology adoption. The protection of wealth contributes to economic stability and purchasing power that encourages labour force participation. Meanwhile, the protection of religion and lineage plays a role in shaping work ethics, social stability and sustainability of human development. In this study, labour force participation is positioned as a channel for human capital formation that reflects the outcome of value-based human development rooted in Maqashid al-shari'ah. Labour is therefore not merely understood as a quantitative production factor but as a representation of human quality shape by health, education, economic stability, and social values (Anto, 2011; Aydin, 2022; Bedoui & Mansour, 2020).

Although a growing body of literature has examined the relationship between human capital and economic growth, empirical studies that integrate Maqashid al-shari'ah into neoclassical growth framework, particularly in the context of OIC countries, remain limited. Most previous studies focus on education or health indicators separately and have not constructed human capital as a multidimensional value-based concept. Conceptually, this study extend the Solow growth model by incorporating value-based human quality through the integration of the Maqashid al-shari'ah index into the labour factor. Labour is therefore no longer treated as a homogeneous input but as the outcome of multidimensional human development process. The approach is crucial for development policy formulation in OIC countries, which has traditionally placed greater emphasis on expanding the quantity of labour rather than improving its quality (Islamic Development Bank, 2022); Khan & Bashar, 2021).

Empirically, this study analyses the role of Maqashid al-shari'ah elements in shaping human capital proxied by labour force participation, with Foreign Direct Investment (FDI) as a proxy for capital and internet access as proxy for technology, in influencing GDP per capita across OIC countries. This approach not only contributes to the literature on value-based economic growth but also offers policy implications that emphasise the importance of integrated human development combining material and spiritual dimensions to achieve inclusive and sustainable economic growth.

Based on this background, the research question addressed in this study is how do the elements of Maqashid al-shari'ah shape human capital through labour force participation within the Solow growth framework, and how they affect GDP per capita in OIC member countries.

2. Literature Review

2.1. Economic Growth, Income Disparities, and Convergence in OIC Countries

Modern economic growth literature emphasises that cross-country differences in GDP per capita are persistent and largely driven by capital accumulation, human capital quality, technological progress, and institutional performance. Recent empirical evidence provide robust evidence that institutional effectiveness and human capital quality are the main sources of sustained growth and conditional convergence in developing economies (Law et al., 2020; Nguyen et al., 2021; Slesman et al., 2023).

In the context of Organisation of Islamic Cooperation (OIC) member countries, income inequality remains a major structural challenge. Economic performance in these countries is often constrained by limited economic diversification, dependence on primary commodities, and weak intra-OIC development cooperation, which slows the income convergence process as documented by recent cross country panel studies (Khalfaoui, 2020; Zaman & Bibi, 2022). This structural condition is also consistent with empirical findings which show that productivity gaps, institutional asymmetry, and low levels of intra OIC trade integration significantly hinder the convergence process and reinforce heterogenous growth paths across member countries (Erçakar & Karagöl, 2019).

These conditions indicate that conventional growth models that emphasise physical capital accumulation alone are insufficient to comprehensively explain prosperity, dynamics in OIC economies without incorporating social and institutional dimensions.

Therefore, analysing economic growth in OIC countries requires an integrated framework that combines both material and non-material factors to provide a more holistic explanation of welfare differences.

2.2. Human Capital, Labour Force Participation and Growth Models

Human capital is a key determinant of productivity and long-term economic growth. Recent macro panel evidence confirms that improvements in education quality and health outcomes significantly raise GDP per capita through labour productivity and innovation capacity (Bloom et al., 2020. Hanusheck & Woessmann, 2021; Botev et al., 2022). However, labour in growth models is not solely determined by its quantity but also by the labour force rate (LFPR), which reflect the extent to which human capital is utilised in the production process. New empirical findings highlight that LFPR acts as a transmission channel between human capital and output, particularly in emerging and developing countries, and its impact is shaped by demographic structure, gender inclusion, and labour market institution (Tansel & Kan, 2021; Tsani et al., 2021; Klasen & Pieters, 2022). Furthermore, higher female labour force participation contributes to aggregate productivity and structural transformation (Altuzarra et al., 2019; Lechman & Kaur, 2022).

These findings imply that labour in Solow framework should be interpreted as representation of human capital quality shaped by education, health, and value system that influence economic behaviour.

2.3. Institutional Quality and Economic Development Performance

Institutional economics identifies institutional quality as a fundamental driver of economic growth. Good governance enhances resource allocation efficiency, promotes investment, and stimulates innovation (Acemoglu & Robinson, 2019; Kim & Loayza, 2019).

Recent empirical studies confirm that government effectiveness, corruption control, and regulatory quality significantly increase total factor productivity and facilitate the growth enhancing effect of FDI and human capital (Amin & Ul Haq, 2022; Nguyen et al., 2021). In OIC countries, institutional heterogeneity plays a decisive role in explaining welfare differences. Countries with better governance tend to exhibit higher labour productivity and are more capable of transforming FDI inflows into sustained economic growth.

2.4. Capital Accumulation, Digital Technology, and Growth

Within the neoclassical growth framework, capital accumulation and technological progress are the main drivers of long-run output. Foreign Direct Investment (FDI) acts as a channel for capital formation, technology transfer, and skill upgrading.

Empirical studies show that FDI positively affects economic growth, particularly in countries with sufficient human capital and strong institutional quality (Khan et al., 2020; Iamsirajoj & Ulubasoglu, 2020).

Digital technology, commonly proxied by internet penetration, also plays crucial role in enhancing productivity by reducing transaction costs, improving production efficiency, and expanding market access. New cross country evidence shows that digitalisation increases total factor productivity and accelerates structural transformation, especially in developing in OIC economies (Myovella et al., 2020; Vu, 2021). Thus, access to information technology is an important component of Total Factor Productivity in modern growth models.

2.5. Maqashid al-Shari'ah, Human Development, and Global Economic Stability

From the perspective of Islamic economics, development is not merely defined by output growth but by the attainment of comprehensive human well being (falah). The Maqashid al-Shari'ah framework-protection of religion, life, intellect, lineage, and wealth-provides a conceptual foundation for building holistic human capital. Within the economic growth framework, these dimensions become analytically relevant when they influence the efficiency of factor utilisation, particularly labour productivity, human capital accumulation, and total factor productivity.

Recent empirical studies show that Islamic-based and Maqashid-oriented development indicators are positively associated with inclusive growth, macroeconomic stability and social welfare outcomes (Jan et al., 2021; Ascarya & Yumanita, 2022). Islamic ethical principles also contribute to global economic stability through distributive justice, transparency, and accountability in economic activities (Khan, 2021; Haneef et al., 2021). These principles shape economic behaviour by strengthening work ethic, reducing opportunistic behaviour, enhancing trust, and lowering transaction costs, which in turn improve organisational efficiency and productivity. In these sense, the Maqashid framework operates not only as a normative objective of development but also as a behavioural and institutional mechanism that affects economic performance.

From a production perspective, each Maqashid dimension has a specific transmission channel to labour productivity. The protection of life (hifz al-nafs) is reflected in better health outcomes that increase effective working time and reduce absenteeism. The protection of intellect (hifz al-aql) enhances education quality, cognitive skills, and innovation capacity, which are central to technological adoption. The protection of wealth (hifz al-mal) promotes macroeconomic stability and preserves real income, thereby strengthening labour market incentives and participation. Meanwhile, the protection of religion (hifz al-din) and lineage (hifz al-nasl) influence productivity through intergenerational human capital formation, social cohesion, and ethical work behaviour. Collectively, these channels indicate that Maqashid based development augments the quality and effectiveness of labour rather than merely increasing its quantity.

Despite this growing empirical strand, the existing literature predominantly treats Maqashid as a welfare or performance index and does not explicitly model it as a productivity-enhancing factor within the neoclassical growth framework. Empirical integration through labour force participation as a channel of effective human capital utilisation remains largely unexplored in cross country growth analysis. Consequently, the role of Maqashid in the growth process remains theoretically underexplored, particularly in its function as a labour augmenting human capital factor within the augmented Solow framework. By linking the Maqashid dimensions to labour force participation as a channel of productive human capital utilisation, this study positions value based human development as an endogenous driver of productivity and long run economic growth rather than as a purely distributive or welfare outcome.

2.6. Research Gap and Contribution

The literature review reveals several research gaps:

1. Cross-country growth studies measure human capital using education and health indicators without incorporating value-based and ethical dimensions that influence labour productivity.
2. Studies on OIC countries focus mainly on income convergence, trade cooperation, and institutional quality, without empirically integrating the Islamic development framework into growth models.
3. Maqashid al-Shari'ah research remains largely conceptual or limited to welfare index analysis.

This study contributes by integrating the Maqashid index into Solow growth model as a determinant of human capital quality that interacts with labour force participation in influencing real GDP per capita in OIC countries. This approach extends the neoclassical growth model by incorporating a value-based dimension and provides a new empirical framework for explaining development dynamics in OIC economies.

2.7. Conceptual Framework

This study adopts the augmented Solow growth model by incorporating value-based human capital, institutional quality, and digital technology.

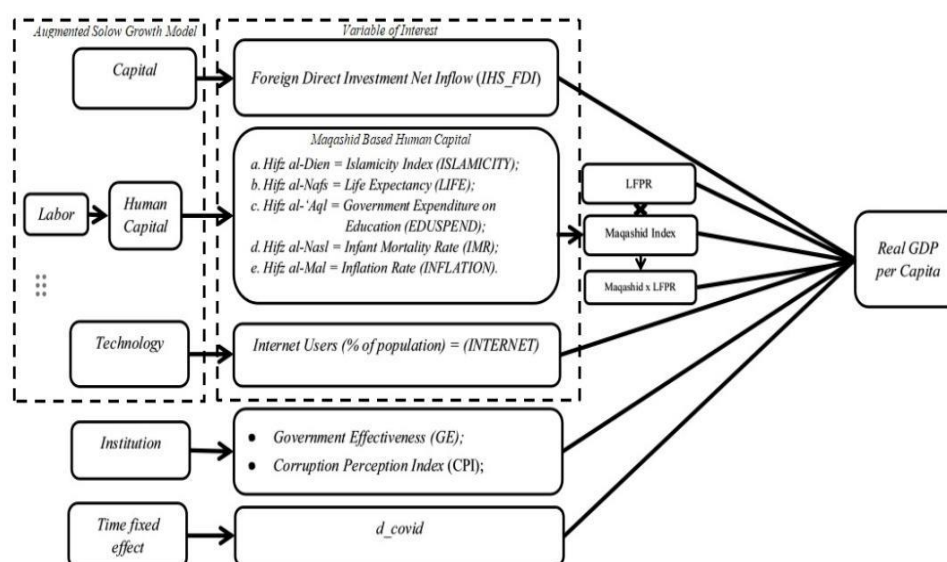
1. Capital is proxied by FDI inflows, representing not only physical

capital accumulation but also technology transfer, skill upgrading, and global production integration.

2. Labour is conceptualised as human capital whose quality is shaped by the Maqashid al-Shari'ah index. The Maqashid index influences economic output through LFPR, and its interaction with LFPR captures the moderating role of value-based human development.
3. Technology is proxied by internet users (% of population), reflecting digital adoption and productivity enhancement.
4. Institutional quality-measured by government effectiveness and corruption perception-acts as an enabling environment for efficient resource allocation and investment.
5. A time fixed effect, represented by the Covid-19 dummy, controls for global economic shocks.

Overall, this framework demonstrates that economic growth in OIC countries is determined not only by capital and technology but also by value-based human capital and institutional quality.

Figure 2. Theoretical Framework



3. Data and Methodology

3.1 Type and Source of Data

This study employs secondary data collected from various official sources, covering the observation period from 2014 to 2023. The data used are panel data, with 48 OIC member states as the units of analysis, selected based on data availability. The secondary data were obtained from institutions such as the World Bank, UNCTAD, Transparency International, the International Telecommunication Union (ITU), Worldwide Governance Indicators (WGI), and the Economist Intelligence Unit (EIU). Annual data are used for each variable. The dependent variable is real GDP per capita at constant 2015 national prices, obtained from the World Bank. The use of real GDP per capita as a proxy for prosperity is consistent with the empirical growth literature, which emphasises real income-based measures of welfare (Aghion et al., 2021).

The study adopts the augmented Solow growth framework in which economic growth is determined by capital accumulation, labour, and technological process, while institutional quality affects the efficiency of the production process (Acemoglu & Robinson, 2019; Eberhardt & Teal, 2020). In the context of OIC countries, the framework is extended by incorporating a Maqashid al-Shari'ah based approach to reconstruct human capital in a more comprehensive manner.

3.2 Operationalisation of Maqashid al-Shari'ah

Maqashid al-Shari'ah is represented by five core dimensions:

1. *Ḥifẓ al-dīn* proxied by the Islamicity Index;
2. *Ḥifẓ al-nafs* proxied by life expectancy;
3. *Ḥifẓ al-ʿaql* proxied by the ratio of government expenditure on education to GDP;
4. *Ḥifẓ al-nasl* proxied by the infant mortality rate;
5. *Ḥifẓ al-māl* proxied by the inflation rate.

The selection of these indicators is grounded in empirical literature linking Maqashid dimensions with human development and economic performance (Anto, 2011; Bedoui, 2012; Rama & Yusuf, 2019).

3.3 Construction of the Maqashid al-Shari'ah Index Using Principal Component Analysis (PCA)

3.3.1 Rationale for Using PCA

The indicators representing Maqashid al-Shari'ah are multidimensional and potentially highly correlated, which may lead to multicollinearity if entered simultaneously into regression model. Therefore, this study employs Principal Component Analysis (PCA) to construct a composite index that is data driven and objective.

PCA is widely used in multidimensional index construction because it extract the common variation from correlated indicators while reducing dimensionality (Jolliffe & Cadima, 2016; Nicoletti et al., 2020; Hsu et al., 2022). In this study, PCA is used to obtain a Maqashid-based human capital measure that captures the latent structure of its underlying indicators.

3.3.2 PCA Estimation Procedure

The index is constructed through the following steps:

1. Normalising all variables into z-score to eliminate differences in measurement units.
2. Extracting principal components based on eigenvalue greater than one criterion and cumulative explained variance.
3. Examining factor loadings to ensure that all Maqashid dimensions are adequately represented in the selected component.

3.4. Empirical Model

Based on the theoretical framework and prior empirical studies, the economic growth model is specified by extending the Solow model as follows:

4. FDI inflow (in Inverse Hyperbolic Sine (IHS) form) serves as the determinant of capital (K);
5. Labor Force Participation Rate (LFPR), the Maqashid index, and their interaction serve as determinants of labor (L);
6. Internet penetration within the population serves as the determinant of technology (A);

7. Government effectiveness, Corruption Perception Index, and Democracy Index are included as institutional controls.

In the robustness specification, the Maqashid index and LFPR are also introduced in their one period lagged form to address potential reverse causality between economic growth and human capital development.

Model 1:

$$\log_gdppc_{it} = \alpha_0 + \beta_1 lfpr_{it} + \beta_2 ihs_fdi_{it} + \beta_3 internet_{it} + \beta_4 ge_{it} + \beta_5 cpi_{it} + \beta_6 dem_{it} + \beta_7 d_covid_{it} + \gamma_{it} + \varepsilon_{it} \quad (3.1)$$

Model 2:

$$\log_gdppc_{it} = \alpha_0 + \beta_1 index_maqashid_{it} + \beta_2 ihs_fdi_{it} + \beta_3 internet_{it} + \beta_4 ge_{it} + \beta_5 cpi_{it} + \beta_6 dem_{it} + \beta_7 d_covid_{it} + \gamma_{it} + \varepsilon_{it} \quad (3.2)$$

Model 3:

$$\log_gdppc_{it} = \alpha_0 + \beta_1 (index_maqashid_{it} \times lfpr_{it}) + \beta_2 ihs_fdi_{it} + \beta_3 internet_{it} + \beta_4 ge_{it} + \beta_5 cpi_{it} + \beta_6 dem_{it} + \beta_7 d_covid_{it} + \gamma_{it} + \varepsilon_{it} \quad (3.3)$$

where: $\log_gdppc_{it}$: Real GDP per capita in country i at time t (in logarithmic form).

$lfpr_{it}$: Labor Force Participation Rate in country i at time t.

$index_Maqashid_{it}$: Value of the maqāshid al-syarī'ah index in country i at time t, constructed as a composite index using Principal Component Analysis (PCA).

ihs_fdi_{it} : Inflow of Foreign Direct Investment (FDI) into country i at time t, measured using the Inverse Hyperbolic Sine (IHS) transformation.

$internet_{it}$: Internet access rate within the population of country i at time t.

ge_{it} : Government effectiveness score in country i at time t.

cpi_{it} : *Corruption Perception Index* in country i at time t.

dem_{it} : *Democracy Index* in country i at time t.

d_covid_{it} : Time fixed effect for the COVID-19 pandemic period (1 = pandemic years 2020–2021; 0 = non-pandemic years).

γ_{it} : Fixed effects for unit i (country) and t (year).

ε_{it} : Error term (disturbance term).

3.5 Panel Data Estimation

Panel regression is employed because it accounts for unobserved heterogeneity across countries and time dynamics (Baltagi, 2021). The Hausman test serves as the primary diagnostic tool for determining the suitability of either the Fixed Effect (FE) or Random Effect (RE) estimator. Specifically, it evaluates the null hypothesis of orthogonality between the unobserved country specific effect and the explanatory variables.

Diagnostic tests reveal the presence of heteroskedasticity based on the modified Wald Test. Therefore, the model is estimated using Fixed Effect with robust standard errors to obtain consistent estimates (Baltagi, 2021; Greene, 2018).

3.6 Robustness Check

To ensure the reliability of the baseline fixed-effect estimates and to address potential complexities in the error structure of cross country panel data, this study employs a set of complementary robustness estimators. In addition to heteroskedasticity robust fixed effect, the model is re-estimated using Panel Corrected Standard Errors (PCSE), Feasible Generalized Least Squares (FGLS), and Driscoll-Kraay standard errors.

PCSE is applied to account for contemporaneous cross sectional dependence and panel specific heteroskedasticity without imposing strong assumptions on the variance-covariance structure, which is particularly suitable for macro panels with relatively large cross sectional units and moderate time dimensions (Beck & Katz, 1995). FGLS is further employed to improve estimation efficiency under heteroskedastic panels and AR(1) serial correlation by explicitly modeling the error structure (Parks, 1967). Although FGLS relies on stronger assumptions, it provides a useful comparison for evaluating the stability of coefficient magnitudes and signs.

To address the possibility of more general forms of cross sectional dependence arising from common shocks, such as global financial cycles, oil price fluctuations, and the Covid-19 pandemic, the study also implements Driscoll-Kraay standard errors. The estimator is robust to heteroskedasticity, autocorrelation, and cross sectional dependence, and it is therefore well suited for macroeconomic panel data with relatively

small time dimensions (Driscoll & Kraay, 1998; Hoechle, 2007).

To mitigate potential endogeneity arising from reverse causality between economic growth and Maqashid based human capital, an additional robustness specification is conducted by employing one-period lagged values of the Maqashid index and the LFPR. This temporal ordering ensures that the explanatory variables precede the dependent variable, thereby reducing simultaneity bias and strengthening the causal interpretation of the estimates. The lagged specification is widely used in macro panel growth studies when external instruments are not available. The results from this one-period lagged specification remain qualitatively consistent with the baseline model, confirming that the main findings are not driven by reverse causality.

The use of these alternative estimators allows the analysis to verify whether the significance and direction of the key variables, particularly the Maqashid-based human capital interaction term-remain consistent across different assumptions about the error structure. The consistency of result across fixed effect, PCSE, FGLS and Driscoll-Kraay estimators indicates that the findings are not driven by estimator specific biases but reflect a robust empirical relationship.

4. Empirical Result

4.1 Descriptive Analysis

This study observes 48 out of 57 OIC member countries over a 10-year period from 2014 to 2023. Descriptive statistics provide an initial overview of cross-country heterogeneity in economic performance, institutional quality, human capital, Maqashid related indicators. The results reveal a substantial disparity in real GDP per capita, with a standard deviation of USD 11,862.48, indicating a highly uneven distribution of economic prosperity across OIC countries. This large variation suggest that the growth process in OIC economies is structurally and strongly shaped by differences in institutional capacity, economic structure, and human capital quality.

This dispersion also implies that transmission mechanism of Maqashid-based human capital is unlikely to be uniform across countries. In high income OIC economies, stronger fiscal capacity, deeper financial markets, and more effective public administration enable health,

education, and macroeconomic stability to be translated more efficiently into productivity gain. In contrast, in lower income countries, limited institutional capacity weakens this conversion process, so that improvements in Maqashid related indicators generate smaller output effect. Thus, the large standard deviation in GDP per capita is not merely a statistical feature but reflects heterogeneous institutional absorptive capacity that conditions the growth impact of value based human capital.

To provide a clearer picture of this cross country heterogeneity, Table 1 reports the summary statistics of all variables used in the analysis. The table highlights not only the large dispersion in real GDP per capita but also the substantial variation in institutional quality, labour participation, and Maqashid related indicators across OIC countries.

Table 1. Summary of Descriptive Analysis

Variable	Obs	Mean	Std. Dev.	Min	Max	Unit
<i>gdppc</i>	480	7.307,35	11.862,48	377,66	71.756,06	US\$
<i>islamicity</i>	432	3,69	1,21	1,07	6,76	Index
<i>life</i>	480	68,75	7,58	51,20	82,91	Year
<i>eduspend</i>	452	3,74	1,64	0,33	9,44	%
<i>imr</i>	480	31,45	22,39	4,30	95,8	Per 1.000 live births
<i>inflation</i>	478	9,66	27,65	-3,75	359,09	%
<i>lfpr</i>	478	58,39	12,70	36,22	87,57	%
<i>fdi</i>	476	2,54e+09	5,15e+09	- 1,02e+10	2,81e+10	US\$
<i>intenet</i>	434	48,93	30,84	1,25	100	%
<i>ge</i>	480	-0,52	0,68	-1,99	1,60	Index
<i>cpi</i>	480	33,41	11,52	11	71	Index
<i>dem</i>	480	3,85	1,49	0,26	7,3	Index
<i>d_covid</i>	480	0,19	0,40	0	1	<i>dummy</i>

Source: Stata 19, processed data

Such disparity implies that the economics return to Maqashid-based human capital is income cluster specific and institutionally conditioned rather than structurally uniform. High income OIC countries possess greater absorptive capacity to transform multidimensional human development into productivity gains, while lower income countries face structural constraints in the form of weaker policy implementation capacity, limited fiscal space and lower bureaucratic effectiveness. This pattern provides an ex-ante explanation for why the coefficient of government effectiveness become larger under efficiency oriented

estimators, as these techniques give greater weight to cross country variation and therefore capture the stronger marginal impact of institution in countries that are able to internalize Maqashid improvements into sustained output growth.

The finding is consistent with recent cross-country panel evidence showing that institutional quality conditions the growth, enhancing effects of human capital (Nguyen et al., 2021; Law et al., 2020; Botev et al., 2019).

4.2. Constructing the Maqāshid al-Syarī'ah Index Using Principal Component Analysis (PCA)

To capture the multidimensional nature of Maqashid al-Shari'ah within the human capital framework, this study constructs a composite index using Principal Component Analysis (PCA). This approach is widely applied in multidimensional development measurement because it reduces dimensionality while preserving the maximum common variation across correlated indicators (Jolliffe & Cadima, 2016; Hsu et al., 2022).

In this study, PCA is applied to five indicators associated with the five core dimensions of maqāshid al-syarī'ah: Islamicity Index (proxy for *ḥifẓ al-dīn* – protection of religion), life expectancy (proxy for *ḥifẓ al-nafs* – protection of life), ratio of government expenditure on education to GDP (proxy for *ḥifẓ al-'aql* – protection of intellect), infant mortality rate (proxy for *ḥifẓ al-nasl* – protection of lineage), and inflation rate (proxy for *ḥifẓ al-māl* – protection of wealth).

The first principal component (PC1) has the largest eigenvalue (2.4423) and explains 48.85% of the total variance, indicating that it captures the dominant common structure across all indicators. Retaining only PC1 follows standard practice in composite index construction when a single component sufficiently represents the latent construct. Although PC2 also has an eigenvalue greater than one, its loading structure is overwhelmingly dominated by inflation (0.8203), indicating that it primarily reflects short term macroeconomic stabilisation rather than the integrated Maqashid-based human development construct. Similarly, PC3 is driven almost exclusively by education expenditure (0.8808), capturing policy input variation rather than the realised outcome of intellectual development. Therefore, these components represent dimension-specific variations rather than the common latent structure

shared across all Maqashid indicators. The eigenvalue structure and the proportion of explained variance are reported in Table 2 to determine the number of components that should be retained for constructing the composite Maqashid index.

Table 2. PCA Results for Constructing the Maqashid al-Syarī‘ah Index

Component	Eigenvalue	Variance Proportion (%)	Cumulative Variance (%)
PC1	2.4423	48.85	48.85
PC2	1.1402	22.80	71.65
PC3	0.8612	17.23	88.88
PC4	0.4846	9.69	98.57
PC5	0.0715	1.43	100

Source: Stata 19, processed data

The loading structure is theoretically consistent. Islamicity index and life expectancy and exhibit strong positive loadings, highlighting the central role of human well-being and ethical-institutional foundations in Maqashid-oriented development. Education expenditure contributes positively, reflecting the accumulation of cognitive human capital. In contrast, infant mortality and inflation rate load negatively, indicating that weak health protection and macroeconomic instability undermine the realization of Maqashid, particularly in safeguarding lineage and wealth. Importantly, the indicators representing the protection of intellect and the protection of wealth remain embedded in PC1 with theoretically consistent sign, confirming that these dimensions are not excluded but form an integral part of the shared variance captured by the composite index.

To understand how each indicator contributes to the latent Maqashid construct, the factor loadings for all principal components are presented in Table 3.

Table 3. Factor Loadings for Principal Components

Variable	PC1	PC2	PC3	PC4	PC5
z_islamicity	0.4856	-0.2350	-0.2187	0.8125	-0.0326
z_life	0.5955	0.2274	-0.0450	-0.2734	0.7190
z_eduspend	0.2441	-0.4037	0.8808	-0.0267	-0.0296
z_imr	-0.5866	-0.2393	0.0863	0.3324	0.6933
z_inflation	-0.0770	0.8203	0.4084	0.3924	-0.0210

Source: Stata 19, processed data

Accordingly, the Maqāshid Index is constructed as:

$$\begin{aligned}
 MaqashidIndex_{it} = & 0,4856. z_islamicity_{it} + 0,5955. z_life_{it} + 0,2441. z_eduspend_{it} - 0,5866. z_imr_{it} \\
 & - 0,0770. z_inflation_{it}
 \end{aligned}
 \tag{4.1}$$

By construction, PC1 is the only component that jointly loads on all five Maqashid dimensions with coherent theoretical signs, indicating that it represent the integrated and outcome based measure of value oriented human capital. This justifies its use as a single composite index in the growth model, as the objective of the analysis is to capture the common development structure rather than dimension specific fluctuation. This index preserves both the statistical structure of the data and the normative coherence of the Maqashid framework, making suitable for growth regressions.

To examine the labour channel mechanism, an interaction term between the Maqashid index and the Labour Force Participation Rate (LFPR) is introduced. This specification allows the analysis to identify wheter Maqashid-based human capital enhances economic prosperity through the effective utilization of labour.

4.3 Estimation Result

4.3.1 Model Selection and Diagnostic Test

The choice between the Fixed Effect (FE) and Random Effect (RE) estimators was based on the Hausman Test. The test strongly rejects the null hypothesis ($\chi^2 = 104.97$; $p < 0.01$), indicating that the individual effect are correlated with the regressors. Therefore, the FE estimator is

preferred as it provides consistent estimates in the presence of unobserved country-specific heterogeneity (Baltagi, 2021). The statistical basis for selecting the appropriate panel estimator is reported in Table 4.

Table 4. Hausman Test Result

chi ²	=	104.97
Prob > chi ²	=	0.0000

Source: Stata 19, processed data

The modified Wald test confirms the presence of heteroskedasticity across countries ($\chi^2 = 22,394.46$; $p < 0.01$). Accordingly, robust standard errors are employed in the baseline FE estimations. Table 5 presents the modified Wald test for groupwise heteroskedasticity in the fixed effects model.

Table 5. Modified Wald Test Result

chi ²	=	22.394,46
Prob > chi ²	=	0.0000

Source: Stata 19, processed data

To explicitly examine the cross sectional dependence structure, this study applies the bias-adjusted Pesaran CD test for unbalanced panel using the residuals from FE estimation. The result show that the CD ($p=0.646$), CDw ($p=0.903$), and CD* ($p=0.757$) statistic fail to reject the null hypothesis of weak cross sectional dependence. Although the power enhancednCDw+ statistic is statistically significant, this result is not used as the primary decision criterion because the test is known to over reject in small T macro panels. Overall, these findings indicate that strong cross sectional dependence is not present and does not bias the fixed effect estimator. To evaluate wheter cross sectional dependence biased the fixed effects estimator, the result of the bias adjusted Pesaran CD test are reported in Table 6.

Table 6. Pesaran Cross Sectional Dependence Test

Test	Statistic	P-value
CD	0.46	0.646
CDw	-0.12	0.903
CDw+	1102.97	0.000
CD*	-0.31	0.757

Source: Stata 19, processed data

Taken together, the presence of heteroskedasticity and the absence of strong cross-sectional dependence provide a technical justification for employing the Fixed Effects model with robust standard errors as the baseline specification. To further assess the consistency of the panel structure, the estimations are compared with Panel Corrected Standard Errors (PCSE) and Feasible Generalized Least Squares (FGLS).

4.3.2 Comparative Estimation Result

Table 7 reports the comparative estimation result across Fixed Effects, PCSE, and FGLS estimators. The table allows a direct assessments of coefficient stability, changes in magnitude after correcting for panel error structures, and the robustness of the Maqashid labour interaction across alternative specifications.

This finding indicates that the growth process is quality-driven rather than quantity-driven, in line with recent cross-country evidence emphasizing the role of human capital quality in productivity dynamics (Sunde & Vischer, 2022; Dieppe, 2021).

To ensure that the baseline results are not driven by extreme income observations, a sensitivity analysis is conducted by excluding countries with the top and bottom 5 percent of GDP per capita. The re-estimated fixed-effects model produces a Maqashid–LFPR interaction coefficient of 0.00137 ($p < 0.05$), which remains positive and statistically significant. The magnitude and significance of government effectiveness (0.1457; $p < 0.01$) and the negative impact of the Covid-19 shock (-0.0319 ; $p < 0.01$) are also preserved. This confirms that the main findings are representative of the overall OIC sample rather than being driven by high-income or low-income outliers.

Table 7. Comparison of Panel Data Regression Output Estimates

<i>Variable</i>	<i>FE_1</i>	<i>FE_2</i>	<i>FE_3</i>	<i>PCSE</i>	<i>FGLS</i>
Dependent Variable					
<i>log_gdppc</i>					
Independent Variable					
<i>lfpr</i>	-0.00174 (0.00662)				
<i>index_Maqashid</i>		0.0876* (0.0321)			
<i>Maqashid_lfpr</i>			0.00120** (0.000548)	0.00477* (0.000630)	0.00522* (0.000368)
<i>ihf_fdi</i>	0.000779 (0.000537)	0.00109*** (0.000587)	0.00110*** (0.000591)	-0.000230 (0.00102)	0.000617 (0.000702)
<i>internet</i>	0.00284** (0.00126)	0.00272*** (0.00155)	0.00269*** (0.00158)	0.0141* (0.00325)	0.00819* (0.000965)
<i>ge</i>	0.151* (0.0441)	0.125* (0.0366)	0.138* (0.0381)	0.138*** (0.0827)	0.236* (0.0436)
<i>cpi</i>	0.00307 (0.00279)	0.00138 (0.00339)	0.00139 (0.00352)	0.0120* (0.00287)	0.00888* (0.00241)
<i>dem</i>	0.00436 (0.0179)	0.00818 (0.0189)	0.0111 (0.0188)	-0.0622* (0.0196)	-0.0767* (0.0161)
<i>d_covid</i>	-0.0359* (0.0114)	-0.0312* (0.00945)	-0.0313* (0.00961)	-0.0403 (0.0430)	-0.0325* (0.0115)
<i>konstanta</i>	8.014* (0.364)	7.863* (0.220)	7.859* (0.224)	7.270* (0.247)	7.725* (0.129)
<i>N</i>	430	362	362	362	362
<i>R² overall</i>	0.7036	0.7242	0.7247	0.9752	-

Source: Stata 19, processed data, *** $p < 0.10$, ** $p < 0.05$, * $p < 0.01$

When the Maqashid al-Shari'ah index is introduced (FE 2), its coefficient becomes positive and significant, suggesting that value-based human development contributes to economic performance. The most important result emerges in FE_3, where the interaction between Maqashid index and LFPR is positive and significant across all estimators (FE, PCSE, and FGLS). The magnitude of the coefficient increases after correcting for panel error structures, confirming that Maqashid-based labor utilization is a robust driver of real GDP per capita.

The result implies that Maqashid does not affect growth directly through labor expansion but through the productivity, enhancing channel of value, embedded human capital. Improvements in health, education, and macroeconomic stability increase the effective working life, reduce productivity losses, and strengthen long term labour efficiency, consistent with the modern human capital growth literature (Botev et al., 2019; Liu & Peng, 2021).

Among the control variables, internet penetration remains positive and significant, reflecting the role of technological diffusion. However, the smaller magnitude under FGLS suggest that this proxy captures digital transformation mainly relatively advanced economies and may underestimate productivity gains in structurally agrarian countries (Myovella et al., 2020). The result should be interpreted with caution because internet penetration is an imperfect proxy for Total Factor Productivity. In several lower income OIC economies, digital adoption is concentrated in consumption oriented activities rather than production enhancing sectors, so that its measured contribution to output appears smaller despite ongoing structural transformation. Conversely, in more advanced OIC countries, higher internet diffusion is more closely integrated with financial systems, industrial upgrading, and knowledge intensive services, allowing digital infrastructure to translate more directly into productivity gains. This measurement limitation explains the change in magnitude across estimators without altering the positive and robust growth enhancing role of technology in the model.

Government effectiveness is consistently positive and become larger under FGLS, indicating that institutional quality not only has a direct growth effect but also moderates the productivity return of Maqashid based human capital across different income levels. In higher income OIC countries, effective governance accelerates the conversion of health, education and macroeconomic stability into labour efficiency and capital deepening. In lower countries, however, weaker administrative capacity reduces this transmission, so that similar improvements in Maqashid indicators yield smaller income gains. This result confirms that the large cross country dispersion in GDP per capita reflects heterogeneous institutional amplification rather than purely structural economic differences (Acemoglu et al., 2001; Hanushek & Woessmann, 2008).

By contrast, democracy appears negative and significant in PCSE and FGLS estimations, which may reflect transitional institutional cost or the mismatch between political reforms and economic capacity in several OIC countries. This is consistent with the view that institutional effectiveness matters more than institutional form for economic performance (Law et al., 2020). The Covid-19 dummy is negative and significant in the baseline estimations, confirming the adverse short-run effect of the pandemic on economic activity.

4.3.3 Economic Interpretation within the Augmented Solow Framework

The economic interpretation of Maqashid-growth nexus must be read in conjunction with two empirical foundation: (i) the principal component structure from which the Maqashid index is constructed, and (ii) the fixed effect estimations (FE_1, FE_2, and FE_3). The first principal component (PC1) assigns the largest positive weights to life expectancy (0.5955), Islamicity (0.4856), and education expenditure (0.2441), while infant mortality (-0.5866) and inflation rate (-0.0770) enter with negative loadings. This structure implies that the composite index is fundamentally a quality of human capital and institutional stability measure, rather than a simple aggregation of social indicators.

The PCA configuration provides a clear theoretical mapping into the augmented Solow production function. Improvements in life expectancy and reductions in infant mortality represent the health based human capital channel, which enhances cohort quality, cognitive capacity, and lifetime labour productivity. Early life health conditions have been shown to generate persistent macroeconomic productivity effects through education, physical capacity and labour market performance, thereby increasing the efficiency of both labour and capital in the long run. Recent cross-country evidence confirms that health investment is a key determinant of human capital quality and long term economic performance, particularly in developing economies where demographic dynamics are still active (Balani et al., 2023; Sethi et al., 2024).

In practical macroeconomic terms, an improvement in the protection of life through better healthcare increases the effective working horizon of individuals, reduces premature labour market exit, and raises the return to education and on-the-job training. Firms face lower worker replacement costs and experience more stable skill accumulation, while governments benefit from a reduced burden of preventable disease. Over time, this extends the period during which human capital generates output, thereby shifting the steady-state income level upward through a higher efficiency of labour rather than through labour expansion. This transmission mechanism illustrates how the Maqashid dimension of *hifz al-nafs* operates not only as a social objective but as a long-term productivity enhancing economic process.

Education expenditure, although receiving a smaller loading, represents the cognitive and adaptability channel through which human capital

contributes to technological absorbtion and structural transformation. In the Solow framework, this mechanism does not merely increase the stock of labour but raises the efficiency parameter of labour, allowing countries to move toward a higher steady state income level through faster knowledge diffusion and better resource allocation.

The positive loading of the Islamicity Index indicates that the Maqashid composite also captures an institutional-ethical productivity channel. Value based governance-through rule of law, corruption control, and social trust-reduces transaction costs, improves allocative efficiency, and strengthens incentives for investment and innovation. Recent empirical studies demonstrate that institutional quality significantly increases Total Factor Productivity (TFP) by enhancing firm level efficiency and improving the macroeconomics environment for capital accumulation and technological upgrading. Within Maqashid framework, this dimension represents the preservation of religion and moral order (*hifz al-din*) as an economic mechanism that supports productivity rather than merely normative objective.

Price stability, reflected in the negative loading of inflation, operates as the wealth preservation channel (*hifz al-mal*). Stable prices protect real wages, reduce uncertainty, and strengthen long term labour market participation, thereby increasing the effective utilisation of human capital. This mechanism links macroeconomic stability directly to labour productivity and capital deepening.

These PCA based channels are fully consistent with the regression result. The empirical results show that LFPR in its conventional form is not statistically significant (FE_1), indicating that labor quantity alone does not explain cross-country income differences among OIC members. This finding is consistent with the augmented Solow argument that labor contributes to growth only when it embodies productivity-enhancing characteristic rather than functioning as a purely demographic input.

In the FE_2, the Maqashid index enters the model as composite human capital variable and shows a positive and statistically significant coefficient. This result confirms that improvements in value based human development, capturing health, education, price stability, religiousity and demographic quality are directly associated with higher steady state income.

The most important specification is FE_3, where the interaction between Maqashid index and LFPR is introduced. The interaction term is positive and statistically significant, indicating that Maqashid based human capital operates as a labour-augmenting mechanism. In other words, labour participation contributes to economic growth only when it is complemented by improvements in the quality of human capital rooted in Maqashid dimensions. This finding provides empirical support for the quality driven growth mechanism within the augmented Solow framework.

The robustness of this labour-augmenting mechanism is further confirmed by the outlier exclusion exercise, where the interaction term remains positive and significant. This indicates that the productivity-enhancing role of Maqashid-based human capital is a structural characteristic of OIC economies rather than a feature of a small group of high-income countries.

Across all FE specifications, internet penetration and government effectiveness remain positive and significant, highlighting the complementary role of technological diffusion and institutional capacity in enhancing productivity. The Covid-19 dummy consistently shows a negative sign, reflecting the contractionary impact of the global pandemic.

The heterogeneous institutional amplification is fully consistent with the large standard deviation of GDP per capita observed in the descriptive statistic. The Maqashid labour interaction represents a common productivity mechanism, but its realised magnitude depends on the country's position in the income distribution and its governance capacity. In this sense, institutional quality acts as a convergence accelerator for middle and high income OIC countries and as a binding constraint for lower income ones.

Taken together, these results imply a structural modification of the neoclassical Solow model. Labour can no longer be treated as a homogeneous input. Instead, value embedded human capital becomes an endogenous driver of TFP, shifting the production function from quantity based accumulation toward quality based efficiency. The Maqashid index therefore captures both the stock of human development and the mechanism through which that stock is translated into higher output.

These findings go beyond a standard augmentation of the Solow growth

model and point to a structural limitation of the traditional neoclassical framework. In the conventional Solow specification, Total Factor Productivity is treated as an exogenous residual and non material dimensions of development remain outside the production function. The empirical result of this study suggests the opposite mechanism; value-embedded human capital rooted in the Maqashid framework systematically enhances labour efficiency and therefore operates as an endogenous source of productivity growth. The significant interaction between the Maqashid index and LFPR indicates that ethical governance, social trust, demographic quality, and spiritual-institutional coherence are not merely normative attributes but measurable economic forces that shape the efficiency parameter of labour. In this sense, the production function is no longer driven solely by physical accumulation and exogenous technology, but by a multidimensional human development process in which non material well being becomes a core determinant of long run income. This result challenges the homogeneity assumption of labour in the neoclassical Solow model and supports a value augmented growth framework where productivity is endogenously formed through the interaction between moral institutional quality and human capital utilization.

4.4. Robustness Result

To verify that the baseline findings are not driven by estimator specific assumptions, the model is re-estimated using Panel Corrected Standard Errors (PCSE), Feasible Generalized Least Squares (FGLS), and Driscoll-Kraay standard errors, all of which are designed to handle the complex error structure typical of macro panel data, including heteroskedasticity, serial correlation, and cross sectional dependence (Beck & Katz, 1995; Hoechle, 2007). The results show a high degree of consistency across estimators.

The coefficient of the core variable, the interaction between the Maqashid index and labour force participation, remains positive and statistically significant in all specifications. This confirms that the growth enhancing role of Maqashid based productive capacity is not sensitive to alternative treatments of the variance-covariance structure. In other words, the integration of value based human development and labor utilization operates as a structurally robust driver of real GDP per capita in OIC countries.

Most control variables also exhibit stable sign across models. Internet penetration and government effectiveness consistently maintain positive and significant effects, indicating that digital infrastructure and institutional quality are robust determinants of long run economic performance. The Covid-19 dummy remains negative and significant in all specification, confirming the persistence of the pandemic shock. Some variables, such as FDI, inflation, and democracy, show estimator dependent significance, which is expected given the efficiency oriented nature of FGLS and the contemporaneous correlation correction in PCSE. Importantly, these variations do not alter the substantive conclusion of the study. The robustness of the baseline findings to alternative variance covariance estimators is summarized in Table 8. The table enables a direct comparison of coefficient stability across FE-robust, PCSE, FGLS, and Driscoll-Kraay specifications.

Table 8. Robustness Test in FE, PCSE FGLS and Driscoll-Kraay Specification

<i>Variable</i>	FE VCE (ROBUST)	PCSE	FGLS	FE DK-SE
Dependent Variable				
<i>log_gdppc</i>				
Independent Variable				
<i>Maqashid_lfpr</i>	0.00120** (0.000548)	0.00477* (0.000630)	0.00522* (0.000368)	0.00120* (0.000220)
<i>ihs_fdi</i>	0.00110*** (0.000591)	-0.000230 (0.00102)	0.000617 (0.000702)	0.00110* (0.000249)
<i>internet</i>	0.00269*** (0.00158)	0.0141* (0.00325)	0.00819* (0.000965)	0.00269* (0.000517)
<i>ge</i>	0.138* (0.0381)	0.138*** (0.0827)	0.236* (0.0436)	0.138* (0.0166)
<i>cpi</i>	0.00139 (0.00352)	0.0120* (0.00287)	0.00888* (0.00241)	0.00139 (0.00128)
<i>dem</i>	0.0111 (0.0188)	-0.0622* (0.0196)	-0.0767* (0.0161)	0.0111 (0.0146)
<i>d_covid</i>	-0.0313* (0.00961)	-0.0403 (0.0430)	-0.0325* (0.0115)	-0.0313* (0.00314)
<i>konstanta</i>	7.859* (0.224)	7.270* (0.247)	7.725* (0.129)	7.859* (0.0875)
<i>N</i>	362	362	362	362
<i>R² overall</i>	0.7247	0.9752	-	-

Source: Stata 19, processed data, *** $p < 0.10$, ** $p < 0.05$, * $p < 0.01$

To further address potential endogeneity arising from reverse causality between economic growth and human capital development, a temporal robustness check is conducted by introducing the one-period lag of the core explanatory variable, as reported in Table 8. The lagged specification shows that the coefficient of the Maqashid–LFPR interaction remains positive and statistically significant across the FE, PCSE, and FGLS estimators. This finding confirms that the positive relationship is not driven by contemporaneous feedback from economic growth but reflects a dynamic and temporally ordered effect.

Table 9. Robustness Check Lagged Specification

<i>Variable</i>	FE	PCSE	FGLS
Dependent Variable			
<i>log_gdppc</i>			
Independent Variable			
<i>L. Maqashid_lfpr</i>	0.00104** (0.000477)	0.00474* (0.000636)	0.00558* (0.000360)
<i>ihs_fdi</i>	0.00104 (0.000655)	-0.000535 (0.00109)	0.000695 (0.000830)
<i>internet</i>	0.00273 (0.00184)	0.0145* (0.00333)	0.00739* (0.000854)
<i>ge</i>	0.159* (0.0482)	0.118 (0.0880)	0.210* (0.0399)
<i>cpi</i>	-0.000538 (0.00370)	0.0137* (0.00394)	0.0105* (0.00230)
<i>dem</i>	0.0128 (0.0186)	-0.0554* (0.0166)	-0.0746* (0.0151)
<i>d_covid</i>	-0.0386* (0.00900)	-0.0663 (0.0454)	-0.0690* (0.00975)
<i>konstanta</i>	7.944* (0.240)	7.152* (0.261)	7.704* (0.121)
<i>N</i>	320	320	320

Source: Stata 19, processed data, *** $p < 0.10$, ** $p < 0.05$, * $p < 0.01$

The use of lagged variables also provides an important substantive interpretation. Improvements in Maqashid-oriented human development and labour force participation require a gestation period before translating into higher output. This intertemporal transmission mechanism is fully consistent with the augmented Solow framework, where human capital accumulation affects economic performance through gradual productivity enhancement rather than immediate short-run adjustments.

In terms of control variables, the lagged model produces broadly similar patterns to the baseline robustness estimations. Digitalization and institutional quality continue to exhibit a positive contribution to growth, while the Covid-19 shock remains negative. Although some variations in statistical significance are observed, the direction and economic meaning of the relationships remain unchanged, reinforcing the stability of the empirical results.

Overall, the convergence of magnitude, sign, and significance of the key variable across fixed effect, PCSE, FGLS, and Driscoll-Kraay robust and not an artifact of a particular estimation method. This multi estimator validation strategy follows recent best practices in macro panel growth studies and strengthens the credibility of the Maqashid based augmented Solow framework.

Table 10. Robustness Test: Excluding Outlier Countries

<i>Variable</i>	Baseline FE	FE Without Outlier
Dependent Variable		
<i>log_gdppc</i>		
Independent Variable		
<i>Maqashid_lfpr</i>	0.00120** (0.000548)	0.00137** (0.000596)
<i>ihs_fdi</i>	0.00110*** (0.000591)	0.00129* (0.000709)
<i>internet</i>	0.00269*** (0.00158)	0.00281* (0.00160)
<i>ge</i>	0.138* (0.0381)	0.146* (0.0393)
<i>cpi</i>	0.00139 (0.00352)	0.00139 (0.00395)
<i>dem</i>	0.0111 (0.0188)	0.0102 (0.0193)
<i>d_covid</i>	-0.0313* (0.00961)	-0.0319* (0.0104)
<i>konstanta</i>	7.859* (0.224)	7.823* (0.237)
<i>Observation</i>	362	320
<i>Bumber of countries</i>	47	41
<i>R² (within)</i>	0.2435	0.2658

Source: Stata 19, processed data, *** $p < 0.10$, ** $p < 0.05$, * $p < 0.01$

Furhermore, to ensure that the baseline findings are not driven by extreme income observations, the model is re-estimated after excluding countries in the top and bottom 5 percent of the GDP per capita distribution, namely Qatar, Kuwait, the United Arab Emirates, Afghanistan, Mozambique, and Niger. This procedure reduces the sample from 47 to 41 countries while preserving the time dimension of the panel.

The results remain qualitatively unchanged. The coefficient of the Maqashid–labour force participation interaction term stays positive and statistically significant ($\beta = 0.00137$, $p < 0.05$), and its magnitude slightly increases compared to the baseline fixed-effects estimation. This indicates that the growth-enhancing role of Maqashid-based productive capacity is not driven by either high-income oil-rich economies or very low-income fragile states, but rather reflects a structural relationship that characterizes the broader group of OIC countries.

The control variables also display a high degree of stability. Government effectiveness and internet penetration continue to exert positive effects, while the Covid-19 dummy remains negative and significant. The overall consistency of the estimates confirms that the main findings are not sensitive to the exclusion of extreme observations and supports the representativeness of the model for the OIC as a whole.

Conclusion

This study provides robust empirical evidence that the shift from a conventional labour framework toward a Maqashid al-Shari'ah based human capital formulation constitutes a critical mechanism in explaining cross country income disparities among OIC economies. The baseline, fixed effect estimates show that labour force participation in its purely quantitative form does not have a stable and significant association with GDP per capita. However, once the Maqashid index is incorporated, particularly through its interaction with LFPR, the coefficient becomes positive, statistically significant, and economically meaningful across all specifications and robustness estimators (FE, PCSE, FGLS, and Driscoll-Kraay). This pattern confirms that Maqashid does not operate as a separate growth factor, but as a labour augmenting mechanism that increases the productivity of the active workforce.

The PCA based Maqashid index is empirically driven primarily by improvement in human survival and health capability, captured by life

expectancy and infant mortality, followed by the ethical-institutional environment proxied by the Islamicity Index, while education spending plays a complementary long run role and macroeconomic stability contributes only marginally to the first principal component. Nevertheless, the wealth protection dimension reflected in price stability plays a critical behavioural role by preserving real wages, reducing income uncertainty, and strengthening the expected return to labour market participation, particularly for low and middle income workers who are most vulnerable to inflation shocks. This structure indicates that the index predominantly reflects the quality of human capability rather than a simple aggregation of normative dimensions.

The result also demonstrate that institutional quality, proxied by government effectiveness, plays an enabling role model in transforming Maqashid based human development into higher economic output. Countries with stronger governance structures are more capable of converting gains in health, education, and macroeconomic stability into sustained productivity growth. Meanwhile, the positive effect of digital access reflects the complementary role of technology, although its magnitude should be interpreted cautiously given the structural heterogeneity of OIC economies, many of which remain partially agrarian and unevenly digitalized.

Conceptually, the findings challenge the neoclassical assumption that labour is homogeneous and exogenous. The evidence instead supports a quality based growth mechanism in which ethical, institutional, and welfare enhancing dimensions embedded in Maqashid function as endogenous determinants of total factor productivity. By demonstrating that Islamic human capital increases output primarily through its interaction with labour utilization and through efficiency enhancing channels, this study proposes an extension of the augmented Solow model in which value based human development becomes the central driver of long run economic growth.

These findings carry a fundamental implication for development strategy in OIC economies. Growth policies that rely predominantly on physical capital accumulation, natural resource expansion, or short-term macroeconomic stimulus are unlikely to generate persistent income convergence unless they are accompanied by a systematic strengthening of Maqashid based human capability. In this framework, investments in health protection, knowledge formation, ethical governance, and price

stability are not merely social expenditure but constitute the core productive assets of the economy. This study therefore provides an empirical foundation for a paradigm shift from input driven growth toward a human centred and value oriented development model, in which Islamic principles function as an endogenous engine of long run productivity and structural transformation.

Policy Implication

The empirical findings indicate that economic growth in OIC countries is less responsive to the expansion of labour in purely quantitative terms and more strongly associated with the quality enhancing dimension of labour embodied in the Maqashid-based human capital framework. This suggests that growth strategies should move beyond policies that merely increase labour force participation toward those that strengthen the productivity content of human capital through improvements in education, health, institutional trust, and ethical economic orientation. Such a shift is consistent with the broader growth literature that emphasises human capital quality as a key driver of long run income convergence.

In this context, maintaining price stability becomes a labour market policy as much as a macroeconomic objective. Low and predictable inflation protects the purchasing power of wages, increases the real return to work and reduces the need for precautionary informal employment, thereby encouraging more stable and productive labour force participation. For OIC countries with large shares of vulnerable and self-employed workers, inflation control also supports long term human capital investment by stabilising household consumption, education spending, and health expenditure.

In practical terms, this requires the adoption of an integrated value human capital framework in which education policy is designed not only to expand years of schooling but to enhance productive capability. A Maqashid oriented education model can be operationalised through three mutually reinforcing pillars. First, a lifecycle based health education strategy that links early life nutrition, preventive healthcare, and cognitive development to learning outcomes, thereby increasing the effective working life and long term labour productivity. Second, the integration of technical and vocational education and training with ethical and institutional learning to produce a workforce that is both skill incentive and productivity oriented, rather than merely credential oriented. This

framework directly reflects the empirical finding that labour contributes to growth only when it embodies productivity enhancing human capital rooted in Maqashid dimensions.

The results also highlight the conditioning of institutional quality. The positive and robust effect of Maqashid-integrated labour becomes stronger in countries with more effective governance, implying that public sector capacity is crucial for transforming value based human development into measurable economic performance. In this context, institutional reforms that enhance government effectiveness, regulatory quality, and policy implementation capacity are likely to amplify the growth returns of human capital investment.

Furthermore, the continued significance of digital access suggest that technological diffusion remains an important complementary factor. However, given the structural heterogeneity across OIC economies, digital expansion policies should be aligned with sectoral composition of the economy to ensure that technology adoption translates into productivity gains rather than merely reflecting consumption-based connectivity.

Taken together, these findings imply that a growth framework centred on productivity-oriented human capital, supported by effective institutions and context-sensitive technological development, is more likely to generate sustainable income growth than strategies based solely on labour expansion.

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