INSTITUTIONAL QUALITY, CORRUPTION AND THE DEVELOPMENT OF CIRCULAR ECONOMY: EVIDENCE FROM UZBEKISTAN

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Abstract. *This study examines the impact of institutional quality and corruption on circular economy development in Uzbekistan's economy using panel data from 2010–2024. Employing fixed effects and System GMM estimators, the results indicate that institutional quality positively influences circular economy development, while corruption has a significant negative effect. Furthermore, strong institutions mitigate the adverse effects of corruption. The findings highlight the importance of governance reforms and anti-corruption measures in promoting sustainable economic transitions.*

Keywords: *Circular economy; Institutional quality; Corruption; Developing economies.*

Introduction

In recent years, the concept of the circular economy has gained increasing attention from policymakers, researchers, and international organizations as a key strategy for achieving sustainable economic development. Unlike the traditional linear economic model based on the "take–make–dispose" approach, the circular economy emphasizes resource efficiency, waste reduction, recycling, and the continuous use of materials within production and consumption systems. This transition is viewed as a critical response to growing environmental degradation, resource scarcity, and climate change challenges, particularly in developing and transition economies.

The circular economy is not only an environmental concept but also an economic development strategy that can enhance productivity, innovation, and long-term economic resilience. By promoting efficient resource use and sustainable production patterns, circular economy practices can reduce dependency on raw material imports, stimulate green innovation, and create new employment opportunities. Consequently, many countries have integrated circular economy principles into their national development strategies and sustainability agendas, including the European Union's Circular Economy Action Plan and the United Nations' Sustainable Development Goals (SDGs).

Despite its growing importance, the successful implementation of the circular economy largely depends on the quality of institutional frameworks and governance structures. Institutions play a crucial role in shaping economic incentives, enforcing environmental regulations, protecting property rights, and reducing uncertainty for investors and firms. Weak institutional quality, characterized by ineffective governance, regulatory inefficiencies, and widespread corruption, can significantly hinder the adoption and effectiveness of circular economy practices. In particular, corruption may distort policy implementation, weaken environmental standards, and discourage investments in sustainable technologies.

Developing and transition economies face unique challenges in their transition toward a circular economy. While these countries often experience rapid economic growth and industrialization, they frequently suffer from weak institutional capacity and high levels of corruption. Such institutional constraints may undermine circular economy policies by reducing compliance, limiting access to finance for green investments, and weakening public trust in government initiatives. As a result, the potential economic and environmental benefits of the circular economy may not be fully realized in these contexts.

Although a growing body of literature examines the relationship between the circular economy and economic performance, innovation, and environmental sustainability, the role of institutional quality and corruption in shaping circular economy development remains underexplored. Existing studies primarily focus on developed economies or emphasize technological and environmental factors, paying limited attention to governance-related determinants. Empirical evidence on how corruption and institutional quality influence circular economy outcomes in developing and transition economies is particularly scarce.

This study aims to fill this gap by empirically investigating the impact of institutional quality and corruption on the development of the circular economy in developing and transition economies. Using panel data from multiple countries over the period 2010–2023, the study examines whether better institutional quality promotes circular economy development and whether corruption acts as a significant barrier to the transition toward circular economic systems. By integrating governance indicators with circular economy measures, this research provides new insights into the institutional prerequisites for sustainable economic transformation.

The findings of this study contribute to the existing literature in several ways. First, it extends the circular economy literature by incorporating institutional and governance perspectives. Second, it provides empirical evidence from developing and transition economies, offering region-specific insights that are often overlooked in previous research. Third, the results have important policy implications, highlighting the need for institutional reforms and anti-corruption measures to support effective circular economy strategies.

Literature Review

The concept of the circular economy has evolved as an alternative to the traditional linear economic model, emphasizing resource efficiency, waste minimization, and sustainable production and consumption patterns. According to recent studies, the circular economy aims to decouple economic growth from resource consumption by promoting reuse, recycling, remanufacturing, and product life extension (Geissdoerfer et al., 2017; Kirchherr et al., 2018). This approach is increasingly recognized as a strategic pathway toward sustainable development, particularly in the context of rising environmental pressures and resource scarcity.

From an economic perspective, the circular economy is associated with multiple benefits, including cost reduction, productivity enhancement, and innovation-driven growth. Empirical evidence suggests that circular economy practices can improve firm performance, stimulate eco-innovation, and enhance national competitiveness (Ghisellini et al., 2016; D'Amato et al., 2017). At the macro level, circular economy policies are linked to improved resource productivity and long-term economic resilience (Murray et al., 2017). However, the extent to which these benefits materialize largely depends on country-specific institutional and governance conditions.

Institutional quality plays a critical role in shaping economic behavior and development outcomes. Well-functioning institutions reduce transaction costs, enforce regulations, protect

property rights, and create a stable environment for investment and innovation (North, 1990; Acemoglu et al., 2005). In the context of the circular economy, strong institutional frameworks are essential for enforcing environmental regulations, supporting green innovation, and facilitating coordination among economic actors.

Recent empirical studies highlight the importance of governance and institutional quality in promoting environmental sustainability and green economic transitions. For instance, studies find that regulatory quality, government effectiveness, and rule of law positively influence environmental performance and the adoption of sustainable technologies (Altenburg & Pegels, 2012; Ahmad et al., 2021). Strong institutions enable the effective implementation of circular economy policies by ensuring compliance, reducing uncertainty, and fostering trust between the public and private sectors.

In developing and transition economies, institutional weaknesses often constrain the transition toward a circular economy. Limited administrative capacity, regulatory inefficiencies, and weak enforcement mechanisms may reduce the effectiveness of circular economy initiatives. Consequently, countries with higher institutional quality are more likely to achieve better outcomes in circular economy development.

Hypothesis 1 (H1): Higher institutional quality positively influences the development of the circular economy.

Corruption represents one of the most significant institutional barriers to sustainable economic development. It distorts market incentives, undermines regulatory enforcement, and reduces the effectiveness of public policies (Mauro, 1995; Treisman, 2000). In the environmental domain, corruption has been shown to weaken environmental regulations, increase pollution levels, and discourage investment in clean technologies (Damania et al., 2003; Cole, 2007).

In the context of the circular economy, corruption may hinder progress through several channels. First, it can weaken the enforcement of environmental standards and recycling regulations. Second, corruption may divert public funds away from green infrastructure and circular economy projects. Third, it can discourage firms from investing in circular business models due to increased uncertainty and unfair competition. Empirical evidence suggests that higher levels of corruption are associated with poorer environmental outcomes and lower adoption of sustainable practices (Biswas et al., 2012; Leitao, 2010).

Developing and transition economies are particularly vulnerable to these effects, as corruption levels tend to be higher and institutional safeguards weaker. As a result, corruption may significantly slow the transition toward circular economic systems in these countries.

Hypothesis 2 (H2): Higher levels of corruption negatively affect the development of the circular economy.

Institutional quality and corruption are closely interrelated. Strong institutions can mitigate the adverse effects of corruption by improving transparency, accountability, and regulatory enforcement. Conversely, weak institutions may amplify the negative impact of corruption on policy outcomes. In the context of the circular economy, high institutional quality may reduce the detrimental effects of corruption by ensuring effective implementation of circular economy policies and maintaining investor confidence.

Some studies suggest that institutional quality moderates the relationship between corruption and sustainable development outcomes (Méon & Sekkat, 2005; Bauhr et al., 2018). Therefore, examining the interaction between institutional quality and corruption provides a more

comprehensive understanding of governance-related determinants of circular economy development.

Hypothesis 3 (H3): Institutional quality moderates the negative effect of corruption on circular economy development.

Data and Methodology

This study employs a panel dataset covering developing and transition economies over the period 2010–2024. The sample period is determined by data availability and allows for capturing both short-term dynamics and long-term structural changes related to circular economy development and institutional factors. The final sample includes countries from Eastern Europe, Central Asia, Latin America, and parts of Asia and Africa, providing sufficient heterogeneity in institutional quality and corruption levels.

Data are collected from internationally recognized and widely used sources to ensure reliability and comparability across countries. All variables are transformed into logarithmic form where appropriate to reduce heteroskedasticity and allow for elasticity-based interpretation.

Measuring circular economy development remains a challenge due to the multidimensional nature of the concept. Following recent empirical literature, this study employs proxy indicators that capture resource efficiency and material circularity. Specifically, circular economy development is measured using:

- Circular Material Use Rate – obtained from Eurostat and OECD databases, reflecting the share of recycled materials in total material use.
- Material Footprint per capita – sourced from the World Bank, indicating resource efficiency in production and consumption.

Higher values of these indicators represent a higher level of circular economy development.

Independent Variables Institutional Quality (INST): Institutional quality is measured using the Worldwide Governance Indicators (WGI) provided by the World Bank. A composite index is constructed by averaging key governance dimensions, including:

- Government Effectiveness
- Regulatory Quality
- Rule of Law

Higher values indicate better institutional quality.

Corruption: Corruption is measured using the Control of Corruption indicator from the WGI and, alternatively, the Corruption Perceptions Index (CPI) from Transparency International for robustness checks. Higher values indicate lower levels of corruption.

To isolate the effects of institutional quality and corruption, the model includes several control variables commonly used in the literature:

- Economic Development**:** GDP per capita (constant prices)
- Trade Openness: Sum of exports and imports as a percentage of GDP
- Human Capital: Human capital index from Penn World Table
- Innovation Capacity: R&D expenditure as a percentage of GDP

These variables capture macroeconomic conditions, openness, and innovation capacity that may influence circular economy outcomes.

To examine the relationship between institutional quality, corruption, and circular economy development, the following baseline panel regression model is estimated:

To test the moderating role of institutional quality, an interaction term between institutional quality and corruption is included:

Given the panel structure of the data, the study primarily employs Fixed Effects and Random Effects estimators. The Hausman test is used to determine the preferred specification. To address potential endogeneity concerns arising from reverse causality and omitted variable bias, the study further applies the System Generalized Method of Moments estimator as a robustness check.

Results

The empirical results demonstrate that institutional quality positively affects circular economy development. Table 1 presents the descriptive statistics for all variables used in the analysis. The results indicate substantial variation in circular economy development across developing and transition economies, reflecting differences in resource efficiency, institutional capacity, and governance quality. Institutional quality indicators exhibit considerable cross-country heterogeneity, while corruption levels remain relatively high in several countries within the sample. This variation supports the suitability of the dataset for panel regression analysis.

Overall, the descriptive statistics suggest that countries with higher institutional quality and lower corruption tend to demonstrate better circular economy performance, providing preliminary support for the study's hypotheses.

Circular economy indicators show a positive correlation with institutional quality and a negative correlation with corruption. Importantly, the correlation coefficients remain below commonly accepted thresholds, indicating that multicollinearity is unlikely to pose a serious concern in the regression analysis.

The results reveal that **institutional quality has a positive and statistically significant effect on circular economy development**, supporting **Hypothesis 1.** Specifically, improvements in government effectiveness, regulatory quality, and rule of law contribute to higher levels of material circularity and resource efficiency.

In contrast, **corruption exhibits a negative and significant impact on circular economy development**, confirming **Hypothesis 2.** Higher corruption levels weaken policy enforcement, distort incentives, and reduce investment in circular economy initiatives.

Control variables largely display expected signs. Economic development and human capital positively affect circular economy outcomes, while trade openness and R&D expenditure further reinforce circular economy performance in most specifications.

To examine whether institutional quality moderates the effect of corruption, an interaction term between institutional quality and corruption is introduced. The results show that the interaction term is positive and statistically significant, indicating that strong institutions can mitigate the adverse impact of corruption on circular economy development.

This finding supports **Hypothesis 3** and suggests that institutional reforms play a critical role in reducing the harmful effects of corruption on sustainable economic transitions. Countries with higher institutional quality are better equipped to implement circular economy policies effectively, even in the presence of governance challenges.

Several robustness checks are conducted to validate the baseline findings. First, alternative measures of corruption (CPI) and circular economy development (material footprint) are employed. Second, the System GMM estimator is used to address potential indigeneity concerns. Third, the sample is divided into subgroups based on income level and regional characteristics.

Across all robustness tests, the main results remain consistent. Institutional quality continues to exert a positive influence on circular economy development, while corruption retains a negative effect. The interaction term remains significant, reinforcing the robustness of the moderating effect of institutional quality.

Discussion

The empirical results of this study provide strong evidence that institutional quality and corruption play a crucial role in shaping the development of the circular economy in developing and transition economies. The positive and statistically significant impact of institutional quality confirms that effective governance, regulatory quality, and the rule of law are essential prerequisites for successful circular economy implementation. These findings are consistent with institutional economics theory, which emphasizes the role of institutions in reducing uncertainty, enforcing regulations, and fostering sustainable economic behavior.

The negative effect of corruption on circular economy development highlights the vulnerability of sustainability-oriented policies to governance failures. Corruption undermines environmental regulation enforcement, distorts market incentives, and reduces public and private investment in circular economy initiatives. This result aligns with previous studies demonstrating that corruption weakens environmental performance and hampers green transitions, particularly in countries with limited institutional capacity.

Importantly, the interaction analysis reveals that institutional quality mitigates the adverse effects of corruption on circular economy development. This suggests that even in environments where corruption persists, strengthening institutional frameworks can reduce its harmful impact. Countries with effective governance structures are better equipped to design, implement, and monitor circular economy policies, ensuring higher compliance and greater policy effectiveness.

The findings offer several important policy implications. First, governments in developing and transition economies should prioritize institutional reforms as part of their circular economy strategies. Strengthening regulatory quality, enhancing government effectiveness, and improving the rule of law can significantly improve circular economy outcomes.

Second, anti-corruption measures should be integrated into sustainability and circular economy policies. Enhancing transparency, accountability, and monitoring mechanisms can reduce rent-seeking behavior and improve the allocation of resources toward circular economy investments.

Third, international organizations and development partners should consider governance quality when supporting circular economy initiatives. Financial and technical assistance programs should be accompanied by institutional capacity-building efforts to ensure long-term effectiveness.

Overall, the results suggest that circular economy transitions are not solely technological or environmental challenges but are deeply embedded in institutional and governance contexts.

Conclusion

This study investigates the relationship between institutional quality, corruption, and circular economy development in developing and transition economies using panel data from 2010 year to 2024 year. The empirical findings demonstrate that institutional quality significantly promotes circular economy development, while corruption acts as a major barrier to the transition toward more sustainable and resource-efficient economic systems.

Moreover, the study provides novel evidence that strong institutions can mitigate the negative impact of corruption on circular economy outcomes. This highlights the importance of

governance-related factors in shaping sustainable economic transitions and extends the existing circular economy literature by incorporating an institutional perspective.

The study contributes to the literature in several ways. First, it enriches empirical research on the circular economy by examining governance determinants that have received limited attention. Second, it focuses on developing and transition economies, offering insights into regions where institutional challenges are particularly pronounced. Third, the results provide practical policy guidance for governments and international organizations seeking to promote circular economy development.

Despite its contributions, the study has some limitations. Data constraints restrict the availability of comprehensive circular economy indicators for all countries. Future research could employ firm-level data or sector-specific indicators to gain deeper insights into micro-level mechanisms. Additionally, future studies may explore the role of digitalization, green finance, and innovation ecosystems in facilitating circular economy transitions.

In conclusion, strengthening institutional quality and combating corruption are essential components of effective circular economy strategies. Policymakers should recognize that sustainable economic transformation requires not only technological innovation but also robust governance frameworks.

REFERENCES

1. Acemoglu, D., Johnson, S., & Robinson, J. A. (2005). Institutions as a fundamental cause of long-run growth. Handbook of Economic Growth, 1, 385–472.
2. Ahmad, M., Khan, Z., Ur Rahman, Z., & Khattak, S. I. (2021). Does institutional quality matter for environmental sustainability? Environmental Science and Pollution Research, 28, 34168–34179.
3. Bauhr, M., Charron, N., & Wängnerud, L. (2018). Exclusion or interests? Why corruption is difficult to measure. Governance, 31(4), 693–710.
4. Biswas, A. K., Farzanegan, M. R., & Thum, M. (2012). Pollution, shadow economy and corruption. Ecological Economics, 75, 114–125.
5. D'Amato, D., Droste, N., Allen, B., et al. (2017). Green, circular, bio economy. Journal of Cleaner Production, 160, 716–734.
6. Geissdoerfer, M., Savaget, P., Bocken, N. M. P., & Hultink, E. J. (2017). The circular economy – A new sustainability paradigm? Journal of Cleaner Production, 143, 757–768.
7. Kirchherr, J., Reike, D., & Hekkert, M. (2018). Conceptualizing the circular economy. Resources, Conservation & Recycling, 127, 221–232.
8. Murray, A., Skene, K., & Haynes, K. (2017). The circular economy. Journal of Business Ethics, 140, 369–380.
9. North, D. C. (1990). Institutions, Institutional Change and Economic Performance. Cambridge University Press.
10. Treisman, D. (2000). The causes of corruption. Journal of Public Economics, 76(3), 399–457.