Global Journal of Management and Business Research - Section B
GJMBR

Application of the Theory of Constraints to Economic Development in Bangladesh: A Systems-Based Framework for Identifying and Overcoming Development Bottlenecks

Professor Dr. ABM Siddique[§ ‡ *]

Affiliations
§ Adjunct Faculty, Department of Business Administration, Shanto-Mariam University of Creative Technology [(OA)]
‡ Executive Director, Centre for Policy Research, New Delhi, India [(OA)]

Abstract

Bangladesh's economic development faces potential constraints arising from import dependence, energy and infrastructure limitations, foreign-exchange pressures, and institutional weaknesses. This article applies the Theory of Constraints (TOC) as a systems-based framework for identifying and addressing development bottlenecks. Using a qualitative, desk-based conceptual approach, it draws on secondary sources, including academic literature, policy documents, industry reports, and official statistics. The article examines pharmaceutical active pharmaceutical ingredient (API) dependence, energy and infrastructure challenges, and institutional barriers to policy implementation. It adapts TOC's five focusing steps to development policy, emphasising constraint identification, targeted intervention, coordinated implementation, and continuous evaluation. The proposed framework supports more systematic policy prioritisation and resource allocation. However, the identified factors are treated as potential constraints rather than empirically verified causes of economic performance. Further research is needed to assess their relative significance and evaluate the effectiveness of proposed interventions.

Keywords: *Bangladesh Economy, development bottlenecks, import dependence, industrial policy, institutional governance, pharmaceutical industry, Sustainable development, systems thinking, Theory of Constraints*

*** Corresponding Author**
Professor Dr. ABM Siddique

EARL

1. Introduction

Economic development is a complex process involving interactions among production, infrastructure, institutions, technology, investment, and human capital. Although Bangladesh has achieved considerable progress in economic and social development, sustaining productivity growth, strengthening industrial competitiveness, and expanding employment opportunities remain important policy challenges.

Traditional development strategies often address several problems simultaneously. However, limited financial and administrative resources make it difficult to implement every intervention with equal intensity. A systems-based approach can help policymakers identify which constraints most significantly limit economic performance and prioritise interventions accordingly.

The Theory of Constraints (TOC), developed by Goldratt (1990), provides a framework for understanding how the performance of a system may be limited by a small number of critical constraints. Originally applied to production and operations management, TOC has also informed discussions of organisational improvement, supply-chain management, and strategic decision-making.

This article applies TOC to Bangladesh's development challenges. It considers three interconnected areas: dependence on imported pharmaceutical active pharmaceutical ingredients (APIs), energy and infrastructure limitations, and institutional barriers to effective policy implementation. Foreign-exchange pressures are also considered as a cross-cutting issue.

The central argument is that development policy can benefit from identifying and verifying binding constraints before allocating resources to interventions. The article proposes a conceptual framework for applying TOC to economic development in Bangladesh without assuming that any particular constraint is universally dominant across all sectors or periods.

The objectives are to:

i) Explain the relevance of TOC to development-policy analysis.

ii) Identify potential sectoral and economy-wide constraints in Bangladesh.

iii) Develop a systems-based framework for prioritising policy interventions.

iv) Outline implications for implementation, monitoring, and future empirical research.

2. Literature review

2.1. Theory of Constraints

TOC views system performance as limited by one or more constraints that prevent the system from achieving its objectives. Goldratt (1990) argues that improvement requires identifying the principal constraint and managing the system around it rather than attempting to optimise every component independently.

The five focusing steps commonly associated with TOC are:

1. Identify the system's constraint.
2. Decide how to exploit the constraint.
3. Subordinate other activities to that decision.
4. Elevate the constraint through additional capacity or intervention.
5. Repeat the process when the constraint changes.

In development policy, these steps can guide the identification of barriers to productivity, the prioritisation of public investment, and the coordination of policies across sectors.

2.2. Systems Thinking and Economic Development

Systems thinking emphasises interdependence, feedback, and the possibility that interventions in one part of an economy may affect performance elsewhere. Sterman (2000) demonstrates the importance of understanding feedback structures and dynamic relationships when analysing complex systems.

Economic development involves interconnected systems of infrastructure, production, finance, institutions, and human capabilities. For example, industrial expansion may depend not only on access to capital but also on reliable electricity, efficient logistics, skilled labour, and predictable regulation. Addressing one barrier may therefore have limited effects if another remains binding.

TOC complements systems thinking by providing a practical method for prioritising constraints within these interdependent systems.

2.3. Industrial Development and Structural Transformation

Structural transformation involves the movement of economic activity towards sectors with higher productivity and greater value addition. Development research emphasises the importance of productive capabilities, technological learning, and institutional conditions in supporting this process (Rodrik, 2004; Hausmann, Rodrik and Velasco, 2008).

Bangladesh's industrial development presents opportunities to strengthen domestic supply chains, expand higher-value manufacturing, and improve resilience to external shocks. However, the appropriate policy response depends on the specific barriers affecting each sector. A constraint-based approach can help distinguish immediate bottlenecks from broader structural challenges.

2.4. Bangladesh's Development Challenges

Bangladesh's development priorities include energy reliability, transport and logistics, export diversification, foreign-exchange stability, institutional effectiveness, and the development of domestic industrial capabilities. These factors may interact and reinforce one another.

For instance, dependence on imported industrial inputs can expose firms to exchange-rate fluctuations and international supply disruptions. Energy shortages can raise production costs and reduce capacity utilisation. Administrative delays may increase the time and cost required to invest or expand production.

These relationships make Bangladesh a relevant setting for examining TOC as a conceptual policy framework. Nevertheless, the relative importance of individual constraints must be established through reliable data and sector-specific investigation rather than assumed in advance.

3. Research Methodology

3.1. Research design

This study adopts a qualitative and conceptual research design. It applies TOC principles to selected development challenges in Bangladesh and develops a framework for identifying, prioritising, and managing potential constraints.

The article does not claim to establish statistically verified causal relationships. Instead, it develops a structured analytical approach that can inform future empirical research and policy evaluation.

3.2. Sources of Information

The proposed analysis draws on secondary materials, including:

- Bangladesh Bank publications and economic statistics.
- Government policy documents and development plans.
- Reports from relevant ministries and public agencies.
- Industry reports concerning pharmaceuticals, energy, infrastructure, and manufacturing.
- Academic literature on TOC, systems thinking, industrial development, and economic growth.

For journal submission, the final manuscript should identify the specific documents, publication years, datasets, and indicators used. Quantitative claims should be supported by traceable sources.

3.3. Analytical framework

The analysis applies the five focusing steps of TOC to three principal areas:

- Pharmaceutical API import dependence.
- Energy and infrastructure limitations.
- Institutional barriers to policy implementation.

Foreign-exchange pressures are considered a cross-cutting factor because they may influence imported inputs, industrial investment, and the financing of development projects.

Each factor is treated as a potential constraint whose significance depends on sectoral conditions, the period examined, and the availability of alternatives. The framework distinguishes between identifying a plausible bottleneck and demonstrating empirically that it is the binding constraint.

Editor's View

4. Identifying Potential Development Constraints in Bangladesh

4.1. Dependence on Imported Active Pharmaceutical Ingredients

The pharmaceutical industry is an important component of Bangladesh's manufacturing sector. Although domestic firms have developed significant formulation and production capabilities, dependence on imported active pharmaceutical ingredients and other specialised inputs may expose some manufacturers to international price fluctuations, exchange-rate movements, and supply-chain disruptions.

API dependence can be examined as a potential constraint on domestic value addition, production resilience, and the development of more advanced pharmaceutical capabilities. A TOC-based assessment would begin by determining whether API availability, cost, quality requirements, technology, financing, or regulatory capacity represents the most significant barrier to improved performance in particular segments of the industry.

Possible interventions include:

- Assessing the commercial feasibility of domestic API production.
- Improving access to appropriate technology and technical skills.
- Strengthening research, testing, and quality-assurance capabilities.
- Encouraging collaboration between industry, universities, and research institutions.
- Improving supply-chain resilience and diversification.

These interventions should be prioritised according to evidence concerning their expected impact, feasibility, cost, and implementation requirements. Domestic production should not be pursued indiscriminately where importation remains more efficient or where environmental, technological, or economic conditions make local production unviable.

4.2. Energy and Infrastructure Limitations

Reliable energy, efficient transport, and effective logistics are essential to industrial productivity. Unreliable electricity supplies, high energy costs, transport delays, and infrastructure bottlenecks can reduce capacity utilisation and increase operating expenses.

These constraints may affect manufacturing firms differently. Energy-intensive industries may be especially vulnerable to power-supply interruptions, while export-oriented businesses may be more sensitive to port congestion, customs delays, and transport costs.

A TOC-based approach would identify the infrastructure or energy limitation that most directly restricts productive performance in a particular location or industry. It would then assess whether the constraint can be managed through better utilisation of existing capacity, operational improvements, maintenance, or investment in additional capacity.

Potential interventions include:

- Improving the reliability and efficiency of energy supply.
- Strengthening transmission and distribution systems where required.
- Improving transport and port logistics.
- Coordinating infrastructure investment with industrial demand.
- Establishing measurable performance indicators for infrastructure services.

Investment decisions should be based on demand forecasts, cost-benefit analysis, implementation capacity, and evidence that the proposed intervention addresses a binding constraint.

4.3. Institutional and Regulatory Barriers

Institutional quality affects the effectiveness of economic policy and the operating environment for businesses. Complex procedures, coordination problems, unpredictable implementation, and administrative delays may raise the costs of investment and production.

Institutional constraints are difficult to evaluate because they can involve multiple agencies and overlapping responsibilities. A delay attributed to regulation, for example, may also reflect inadequate staffing, weak information systems, or coordination failures.

TOC can help clarify these relationships by identifying the specific process or decision point that creates the greatest delay or limits the effectiveness of a policy.

Potential interventions include:

- Simplifying administrative procedures.
- Clarifying institutional responsibilities.
- Improving coordination among relevant agencies.
- Expanding transparent digital services where appropriate.
- Establishing clear service standards and monitoring mechanisms.

Such reforms should be evaluated through indicators such as processing times, compliance costs, service reliability, and user experience rather than relying solely on the introduction of new policies.

4.4. Foreign-Exchange Pressures and Import Dependence

Foreign-exchange availability can affect the ability of firms to import raw materials, intermediate goods, machinery, and technology. Where production depends on imported inputs, exchange-rate volatility or difficulties accessing foreign currency may disrupt procurement and increase uncertainty.

However, import dependence is not necessarily evidence of economic inefficiency. Imports can provide access to specialised inputs and technologies that are unavailable or more costly domestically.

The policy challenge is therefore to distinguish strategically important vulnerabilities from economically beneficial trade relationships.

A TOC-based assessment would examine whether foreign-exchange access is the binding constraint for specific productive activities or whether the main problem lies elsewhere, such

EARLY VIEW

as energy reliability, market demand, production efficiency, or regulatory uncertainty.

Potential measures include export diversification, improved trade facilitation, stronger foreign-exchange management, and selective development of competitive domestic suppliers. The choice and sequencing of interventions should reflect verified evidence and the wider costs and benefits of each option.

5. Applying the Theory of Constraints to Development Policy

Step One: Identify the Binding Constraint

The first step is to identify the factor that most significantly limits performance in the system under consideration. This requires a clearly defined objective and appropriate indicators.

For a manufacturing sector, relevant indicators might include capacity utilisation, production costs, delivery delays, productivity, and export performance. For a public service, the indicators may include service-delivery times, coverage, reliability, and cost.

Policymakers should distinguish symptoms from underlying causes. Low production, for example, may reflect weak demand rather than a shortage of machinery. Similarly, high import expenditure may reflect the structure of production rather than an avoidable failure of domestic supply.

Step Two: Exploit the Existing Constraint

Before committing substantial new resources, policymakers should assess whether existing capacity can be used more effectively.

In energy and infrastructure, this may involve maintenance, improved scheduling, reduced operational losses, or better coordination. In public administration, it may involve streamlining procedures and clarifying responsibilities.

The objective is to improve performance within existing resource limits before determining whether additional investment is necessary.

Step Three: Subordinate Other Activities

Subordination means aligning supporting activities with the priority established by the binding constraint. For example, if a verified logistics bottleneck limits an export sector, related activities such as customs processing, transport scheduling, and warehouse operations should be coordinated to reduce that bottleneck. This does not mean neglecting other development priorities. It means sequencing complementary activities so that resources are directed towards the factor currently limiting system performance.

Step Four: Elevate the Constraint

If better management of existing capacity is insufficient, policymakers may need to expand capacity or undertake structural reforms. Depending on the evidence, elevation could involve infrastructure investment, technical training, research and development, improved access to finance, or institutional reform. Such interventions should be supported by feasibility assessments and measurable targets. Additional capacity is justified when evidence indicates that the constraint is binding and that the proposed intervention is likely to deliver sufficient economic and social benefits.

Step Five: Repeat the Process

Constraints can change as economic conditions evolve. Removing one bottleneck may reveal another that previously had little influence on performance. For example, improved energy reliability may increase production, after which logistics capacity, skilled labour, working capital, or market access becomes more important. Development policy should therefore incorporate regular monitoring and reassessment. This helps prevent continued investment in problems that are no longer the principal constraints and allows resources to be redirected when priorities change.

6. A Systems-Based Framework for Bangladesh

The application of TOC to Bangladesh requires a framework that connects sector-level diagnosis with economy-wide policy coordination.

6.1. Three levels of Constraints

Sectoral constraints directly affect particular industries or activities. Examples may include API availability in pharmaceuticals, energy reliability in manufacturing, or specialised skills in technology-intensive production. Cross-sectoral constraints affect several industries. Examples may include transport and port capacity, access to foreign exchange, financing conditions, and workforce skills. Economy-wide constraints concern broader conditions that influence productive activity across the economy, including macroeconomic stability, institutional effectiveness, and the overall quality of public administration. These levels interact. A sectoral problem may be caused or intensified by a cross-sectoral constraint, while an economy-wide reform may produce different effects across industries.

6.2. Proposed Analytical Sequence

The framework proposes the following sequence:

1. Define the development objective and the system being assessed.
2. Establish baseline indicators and identify potential bottlenecks.
3. Investigate the causes of the most consequential bottlenecks.
4. Verify which constraint is binding within the relevant system.
5. Prioritise feasible interventions using evidence and cost-benefit analysis.
6. Coordinate supporting policies and implementation responsibilities.
7. Monitor outcomes and reassess constraints.

This sequence is intended to support transparent decision-making. It does not prescribe a single national constraint or imply that one policy intervention will address all development challenges.

6.3. Policy Prioritisation

Policy prioritisation should consider the expected contribution of an intervention to productive performance, its financial and administrative costs, implementation feasibility, distributional consequences, environmental effects, and potential risks.

A measure with a large projected benefit may not be appropriate if implementation capacity is inadequate or if it creates substantial

EARLY VIEW

unintended costs. Likewise, an intervention that benefits one sector may impose costs on other sectors.

A systems-based assessment should therefore consider both direct outcomes and wider economic effects. Transparent criteria can help policymakers explain why particular constraints and interventions receive priority.

7. Discussion

7.1. Contributions to Development-Policy analysis

The main contribution of this article is the adaptation of TOC as a conceptual framework for identifying and addressing potential development bottlenecks in Bangladesh.

Conventional policy approaches may distribute resources across many priorities without sufficiently distinguishing between general development needs and the constraints that most directly limit performance. TOC provides a structured alternative by emphasising diagnosis, sequencing, coordination, and reassessment.

The framework also highlights the importance of evaluating constraints at different levels. A barrier affecting a single industry may require a sector-specific response, whereas a problem shared across several industries may require coordinated national action.

7.2. Implications for Industrial Policy

For industrial policy, the framework encourages policymakers to identify the factors that prevent firms from increasing productivity, improving quality, adopting technology, or entering higher-value markets.

In the pharmaceutical industry, for example, API dependence should be evaluated alongside production costs, technology, regulation, quality assurance, and the economics of domestic production. Similarly, infrastructure investment should be guided by evidence concerning its effects on production, logistics, and market access.

This approach supports selective, evidence-based intervention rather than assuming that all domestic production or all infrastructure investment will necessarily improve economic performance.

7.3. Implications for Governance

TOC also highlights the relationship between policy objectives and implementation capacity. Policies may fail to achieve their intended results when responsibilities are fragmented, procedures are unnecessarily complex, or performance is not monitored effectively.

A constraint-based approach encourages clear institutional responsibilities, measurable service standards, regular evaluation, and corrective action when outcomes differ from expectations.

7.4. Limitations

This study is conceptual and relies on secondary sources. It does not use original firm-level data, econometric estimation, or a systematic quantitative comparison of the relative importance of the proposed constraints.

Consequently, the article does not establish that API dependence, energy and infrastructure limitations, institutional weaknesses, or foreign-exchange pressures are the binding constraints on Bangladesh's economy. Their importance may differ across sectors and over time.

The framework should therefore be regarded as an analytical proposition requiring empirical validation, rather than as a definitive diagnosis of Bangladesh's development performance.

8. Directions for Future Research

Future research could test the framework through sector-specific case studies, firm-level surveys, administrative data, and quantitative analysis.

First, researchers could examine the pharmaceutical industry to determine how API import dependence affects costs, production continuity, competitiveness, and domestic value addition.

Second, studies could assess the effects of energy reliability and logistics performance on manufacturing productivity, investment, and export outcomes.

Third, institutional research could measure administrative delays, compliance costs, and coordination problems to determine which processes create the greatest barriers to productive activity.

Fourth, comparative studies could examine whether the constraints identified in Bangladesh resemble those found in other developing economies and whether the TOC framework helps explain differences in policy effectiveness.

Finally, longitudinal research could investigate how binding constraints change after major reforms or investments. Such studies would help determine whether TOC offers practical advantages over alternative approaches to development-policy prioritisation.

9. Conclusion

The Theory of Constraints offers a potentially useful framework for analysing economic development in Bangladesh. By focusing on the identification, management, and removal of binding constraints, it can help organise development priorities and improve the sequencing of policy interventions.

This article has examined pharmaceutical API import dependence, energy and infrastructure limitations, institutional barriers, and foreign-exchange pressures as potential constraints. It has also proposed a systems-based framework that connects sectoral diagnosis with cross-sectoral coordination and economy-wide policy.

The framework's central principle is that development policy should be guided by evidence about the factors that most significantly limit performance. Policymakers should identify and verify constraints, make effective use of existing capacity, coordinate complementary activities, invest where necessary, and continually reassess results.

Because the study is conceptual, its proposed constraints should not be interpreted as empirically established causes of Bangladesh's economic performance. Further research is required to measure their relative importance and test the effectiveness of specific interventions.

With appropriate empirical validation, TOC could contribute to more transparent, coordinated, and results-oriented development planning in Bangladesh.

REFERENCES

[1] Bangladesh Bank (2025) Annual Report 2024–2025. Dhaka: Bangladesh Bank. Available at: https://www.bb.org.bd/pub/annual/anreport/ar2024-2025.pdf (Accessed: 9 October 2026).

[2] Bangladesh Bank (2025) Annual Report 2023–2024. Dhaka: Bangladesh Bank.

Note: Retain this entry only if the 2023–2024 report was consulted in preparing the article.

EARLY VIEW

[3] Bangladesh Bank (2025) Major Economic Indicators. Dhaka: Bangladesh Bank.

Note: For a final submission, specify the exact issue or release date of the indicators used, rather than citing the publication generically.

[4] Goldratt, E.M. (1990) What Is This Thing Called Theory of Constraints and How Should It Be Implemented? Croton-on-Hudson, NY: North River Press.

[5] Hausmann, R., Rodrik, D. and Velasco, A. (2008) 'Growth diagnostics', in Stiglitz, J.E. and Serra, N. (eds.) The Washington Consensus Reconsidered: Towards a New Global Governance. Oxford: Oxford University Press, pp. 324–355.

[6] Rodrik, D. (2004) Industrial Policy for the Twenty-First Century. Cambridge, MA: Harvard University, John F. Kennedy School of Government.

[7] Sterman, J.D. (2000) Business Dynamics: Systems Thinking and Modeling for a Complex World. Boston, MA: Irwin/McGraw-Hill.

[8] World Bank (2025a) Bangladesh Development Update. Washington, DC: World Bank. April 2025 edition.

Note: Confirm the exact title printed on the cover of the edition consulted before submission.

[9] World Bank (2025b) Bangladesh Development Update. Washington, DC: World Bank. October 2025 edition.

Note: Confirm the exact title printed on the cover of the edition consulted before submission.

[10] World Bank (2025) World Development Indicators. Washington, DC: World Bank. Available at: https://databank.worldbank.org/source/world-development-indicators (Accessed: 9 October 2026).

EARLY VIEW