



## Systems Thinking in Investigating the Youth Unemployment Problem in Iran

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### ABSTRACT

Youth unemployment in Iran is a long-standing and complex issue. It results from the interaction among structural barriers, behavioral patterns, and economic shocks, which reinforce one another over time. This study employs a qualitative system dynamics (SD) model to examine how these mechanisms sustain high unemployment among young people. The model is presented through a Causal Loop Diagram (CLD). It draws on evidence from research, policy reports, and theory to map key feedback loops in the labor market. The analysis identifies several reinforcing loops. These include educational inflation, skill mismatch, informal employment traps, and economic contraction due to sanctions. Each loop intensifies unemployment. In contrast, balancing loops, such as public-sector hiring and vocational training, offer only short-term relief. These feedbacks explain why isolated policies often fail to produce lasting change. The findings highlight key leverage points. These include better alignment between education and employment, stronger labor-demand policies, and improved labor-market information systems. While qualitative, the model offers a solid foundation for future simulations and for designing feedback-aware strategies to reduce youth unemployment in Iran and similar contexts.

### Keywords

Youth unemployment, System dynamics, Causal loop diagram, Labor market policy, Skill mismatch

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## 1. Introduction

Youth unemployment is one of the most persistent socioeconomic challenges worldwide. In most countries, unemployment rates among young people are more than double those of adults (Fergusson, 2021). This pattern indicates that young entrants encounter structural barriers, including limited work experience, skill mismatches, and institutional inflexibility. Unemployment also has lasting social and psychological effects. It lowers happiness, life satisfaction, and mental health, even when controlling for income or education. These negative outcomes often persist after re-employment, producing what is known as the scarring effect, a long-term loss of motivation, skills, and earnings potential (Clark et al., 2001; Arulampalam, 2001; Gregg and Tominey, 2005).

The causes of youth unemployment extend beyond short-term economic shocks. They emerge from the interaction of economic, institutional, and behavioral mechanisms that evolve over time. Traditional labor-market models typically view unemployment as a static imbalance between labor supply and demand. However, empirical research increasingly highlights the role of feedback loops, i.e., self-reinforcing processes linking educational choices, labor-market expectations, and employment outcomes (Yokoyama et al., 2024). For instance, when graduates face limited job opportunities, many remain in education or pursue additional degrees, further increasing labor-market pressure. Similarly, discouraged workers may withdraw from the labor force, thereby masking the true level of unemployment. Such feedbacks create nonlinear and path-dependent dynamics that standard models fail to capture.

In Iran, youth unemployment reflects these global mechanisms but is intensified by domestic conditions. A large youth cohort, rapid expansion of higher education, and weak alignment between academic programs and industrial needs have produced an oversupply of graduates. Economic sanctions and structural inefficiencies have constrained job creation, reduced investment, and encouraged informal employment (Salehi-Isfahani, 2011; Kelishomi and Nisticò, 2024). Many young people now work in low-productivity or insecure positions with limited upward mobility. These patterns reinforce each other, creating a self-sustaining cycle of educational inflation, underemployment, and human-capital erosion.

Most existing Iranian studies on youth unemployment rely on statistical or econometric analyses that treat causal relationships as linear and unidirectional. These methods cannot fully capture the delayed and feedback-driven nature of unemployment dynamics. This study addresses this gap by employing system dynamics (SD) to model youth unemployment as a feedback system linking education, labor demand, and macroeconomic constraints. The SD

approach enables exploration of how structural and behavioral factors interact, how delays influence outcomes, and where the most effective intervention points lie.

The study's innovation lies in developing a qualitative SD model that integrates endogenous behavioral responses with exogenous labor-market shocks specific to Iran. Unlike traditional econometric or structural models, SD explicitly represents feedback loops, accumulation processes, and time delays. This allows analysis of policy resistance and unintended consequences, especially under conditions such as international sanctions. The resulting Causal Loop Diagram (CLD) identifies both reinforcing and balancing structures and provides theoretical insight into why youth unemployment persists despite repeated policy efforts.

The remainder of the paper proceeds as follows. Section 2 reviews prior research on youth unemployment and summarizes key findings relevant to the Iranian context. Section 3 presents the methodological framework and outlines the process of constructing the SD model. Section 4 describes the feedback structure and explains the main reinforcing and balancing loops. Section 5 discusses the policy implications and leverage points, and Section 6 concludes with the main findings, limitations, and directions for future simulation research.

## 2. Literature review

Youth unemployment is a long-standing and multifaceted problem that affects both individuals and societies. It reduces productivity, slows economic growth, and increases social and political pressures. Researchers have examined its causes and consequences from many perspectives, including economic, demographic, institutional, and behavioral. This section summarizes key insights from these studies and highlights the gaps that motivate the present system dynamics approach.

Many studies link youth unemployment to the changes in macroeconomic conditions, labor demand, and institutional arrangements. In the Euro Area, shifts in aggregate demand and in wage-setting mechanisms account for much of the variation in unemployment rates, particularly during economic crises ([Charalampidis, 2020](#)). Labor-market rigidities, such as high minimum wages or strong employment protection for older workers, can impede the entry of young people into the workforce ([Speckesser et al., 2019](#)).

Personal characteristics also influence employment outcomes. Research shows that lower self-esteem, weak motivation, or an external locus of control during adolescence increase the risk of early school leaving and unemployment ([Mendolia, 2015](#)). Similarly, employers' hiring preferences are shaped by applicants' work histories. Long unemployment spells reduce

interview callbacks, and younger or much older candidates often face implicit age bias (Farber, 2019). The same study showed that both younger and older applicants were less likely to be called back than those in middle age. Interestingly, even applicants who were already employed received fewer callbacks, possibly because employers assumed they would be harder or more expensive to hire.

Technological change adds another layer of complexity. Automation and artificial intelligence are replacing routine tasks and reshaping job structures. Workers in highly automatable occupations experience longer unemployment spells and wage penalties when re-employed (Schmidpeter and Winter-Ebmer, 2021; Nazareno, 2021). These long-term trends increase the need for flexible training and re-skilling programs.

The connection between education systems and labor-market outcomes is central to understanding youth unemployment. Skill mismatch and overqualification are recurring themes in both developed and developing economies. When education systems expand without aligning programs with market needs, graduates often struggle to find suitable employment. This educational inflation creates a cycle in which young people pursue more degrees to improve their chances, even when labor demand is stagnant (Vedder et al., 2013; Yokoyama et al., 2024).

Cross-country evidence shows that countries with stronger vocational and work-based training systems tend to have lower youth unemployment rates. For example, apprenticeship programs in Germany and Austria improve school-to-work transitions by combining academic and practical training (Cahuc and Hervein, 2024; Cefalo, 2024). In contrast, systems with weak vocational pathways, such as in the United Kingdom, experience persistent youth unemployment and underemployment (Maguire, 2020).

In Iran, the mismatch between education and employment is a major driver of youth joblessness. Rapid expansion of universities since the 1990s has produced many graduates, but the labor market has not generated enough high-skill jobs to absorb them (Salehi-Isfahani, 2011). Studies also show that fields of study are often poorly aligned with industry demand, leading to both unemployment and underemployment among educated youth (Rafiei and Van Dijk, 2025). These patterns demonstrate that education policy and labor-market structure must be analyzed as interconnected systems.

Governments and international organizations have tested many policy tools to reduce youth unemployment. Active Labor Market Policies (ALMPs), such as job training, wage subsidies, and job creation programs, aim to increase employability and stimulate hiring. Evidence from European countries suggests that wage subsidies are often the most effective for young workers,

while training programs produce mixed results ([Speckesser et al., 2019](#)). Similarly, unemployment insurance and income-support schemes can stabilize consumption during downturns, indirectly supporting job creation ([Kekre, 2023](#)).

In developing economies, policies must also address structural constraints, including informality and limited fiscal space. In Iran, international sanctions have reduced foreign investment, weakened private-sector growth, and increased reliance on informal employment ([Kelishomi and Nisticò, 2022](#); [Kelishomi and Nisticò, 2024](#)). Government programs to promote youth employment, such as subsidized public hiring or entrepreneurship initiatives, have provided temporary benefits but have not altered the underlying structure of the labor market. As a result, informal employment continues to serve as an absorbing buffer, providing income without long-term security or productivity gains.

Much of the youth unemployment literature focuses on Europe and North America, leaving fewer studies on the Middle East and North Africa (MENA). Yet the problem is particularly severe in this region, where demographic pressures and limited private-sector diversification restrict job creation. Regional studies by the International Labor Organization ([ILO, 2022](#)) highlight persistent skill mismatches, informal employment, and gender disparities in labor participation. For example, Egypt, Jordan, and Tunisia face similar patterns of educational expansion without corresponding labor-market absorption. Comparing these contexts with Iran helps to understand how structural and behavioral feedback can lead to persistent unemployment across the Global South.

Researchers have applied several analytical methods to study the dynamics of unemployment. Econometric and time-series models are commonly used to quantify relationships among macroeconomic indicators such as GDP, inflation, and unemployment ([Charalampidis, 2020](#)). Micro-level studies rely on surveys and audits to analyze individual job-search behavior and employer decisions ([Farber, 2019](#)). While these methods provide valuable evidence, they often assume linear and one-directional causality, overlooking delayed or feedback-driven interactions.

SD offers an alternative approach. It emphasizes circular causality and captures the effects of feedback loops and time delays. SD has been widely used in economics, education, and health to understand complex social problems ([Jo et al., 2023](#); [Sterman, 2002](#)). However, few studies apply SD to labor-market analysis in developing countries. The existing literature, therefore, provides rich empirical insights but lacks an integrated framework that connects structural and behavioral mechanisms within a dynamic system.

Despite the breadth of research, most studies analyze youth unemployment using partial or static models that cannot capture its cumulative and feedback-driven nature. These approaches underestimate how education policies, labor-market structures, and macroeconomic conditions interact over time. They also pay limited attention to informal employment and sanctions, which are critical in Iran's case. This study fills these gaps by developing a qualitative system dynamics model that integrates endogenous feedbacks and exogenous shocks into a single conceptual framework. The model explains why conventional interventions often produce short-term improvements but fail to alter long-term trends in unemployment, and identifies leverage points at which policy changes can achieve more sustainable results.

### **3. Methodological framework**

SD provides a powerful approach for analyzing how complex social and economic systems evolve over time. It has been widely applied to problems that involve feedback, delay, and policy resistance. Unlike econometric models that estimate static cause-and-effect relationships, SD represents circular causality, the idea that cause and effect reinforce or balance each other through feedback loops and time delays. This feature allows researchers to investigate how structures within a system generate observed patterns of behavior rather than simply correlating variables. It can also explain why well-intentioned policies sometimes produce counterintuitive or temporary outcomes.

#### ***3.1. The system dynamics perspective and its relevance***

Youth unemployment exhibits the type of complexity that SD is designed to address. It is shaped by multiple interacting subsystems that evolve together over time. These subsystems include reinforcing mechanisms, such as educational expansion and job-seeking behavior, as well as balancing mechanisms, such as policy interventions or demographic shifts. Simple regression or equilibrium models cannot adequately capture these processes, because they ignore how changes in one part of the system propagate through feedback channels and produce delayed or counterintuitive outcomes. The SD approach provides a structured way to represent these interconnections, trace their implications, and identify points where targeted interventions can produce systemic change.

#### ***3.2. Formulation of the dynamic hypothesis***

Formulating a dynamic hypothesis is a central step in developing a system dynamics model. It

serves as a working theory that explains how the system structure generates its observed behavior over time. In this study, the dynamic hypotheses describe the feedback mechanisms that sustain high youth unemployment in Iran despite recurrent policy interventions. Each hypothesis is grounded in empirical evidence, theoretical reasoning, and expert insight, and together they guide the construction of the CLD presented in Section 4.

In this study, the CLD was developed around three interrelated dynamic hypotheses that together explain the persistence of youth unemployment in Iran.

#### *Hypothesis 1 – Skill mismatch and educational inflation*

A reinforcing feedback mechanism connects the rapid expansion of university education with the labor market's limited ability to absorb graduates. As the number of graduates grows faster than job creation in the formal sector, the mismatch between qualifications and available employment opportunities widens. Over time, the declining labor-market value of academic credentials encourages even more young people to remain in higher education or to pursue additional degrees, further delaying their entry into the workforce. This behavior intensifies educational inflation, increases the pool of job seekers, and strengthens the feedback loop between unemployment and higher education enrollment. The result is a self-reinforcing dynamic that perpetuates youth unemployment despite rising educational attainment.

#### *Hypothesis 2 – Labor-force exit and hidden unemployment*

Persistent job search failure and repeated rejection discourage many young job seekers, leading them to withdraw from active participation in the labor market. Some stop looking for work altogether, while others seek opportunities abroad. These behaviors reduce the official unemployment rate statistically but conceal a growing pool of underutilized human capital. The apparent short-term improvement in unemployment figures thus masks deeper structural weaknesses in labor-force participation. Over time, this process creates a hidden unemployment problem, weakens domestic productivity, and erodes economic resilience. The loop reflects a balancing mechanism that appears stabilizing on the surface but actually contributes to long-term economic stagnation.

#### *Hypothesis 3 – Sanctions and labor-market segmentation*

External shocks, particularly international sanctions, exert a strong exogenous influence on Iran's economic system. Sanctions restrict access to foreign investment, limit export revenues,

and suppress aggregate demand. Reduced business activity lowers the need for labor, constraining formal job creation and widening the gap between labor supply and demand. Consequently, many young people are pushed into informal and insecure employment, thereby weakening overall productivity and perpetuating labor-market segmentation. This process interacts with the other two feedback structures: it reinforces the skill-mismatch loop by reducing demand for skilled labor and amplifies the labor-force exit mechanism by discouraging job seekers. The combined effect deepens the structural persistence of youth unemployment.

These three dynamic hypotheses form the conceptual backbone of the model. Together, they portray youth unemployment in Iran as a path-dependent system shaped by reinforcing and balancing feedback loops, delayed effects, and strong interactions between endogenous behavior and exogenous shocks. The hypotheses collectively illustrate why simple or isolated policy actions are insufficient to resolve the issue. Section 4 presents the CLD, which visually represents these interconnections and clarifies how the identified feedback mechanisms interact over time.

### ***3.3. Definition of variables and relationships***

The development of the qualitative system dynamics model began with the identification and definition of the key variables, system boundaries, and causal relationships. The variables were classified either as endogenous, those shaped by internal system behavior, or exogenous, representing external forces that influence the system. Each variable was selected through an iterative process that triangulated evidence from three sources: empirical studies and policy reports, theoretical reasoning from labor economics and human capital theory, and expert consultations to ensure contextual relevance and logical coherence.

To enhance clarity and support future simulation work, Table 1 presents each variable alongside its classification, conceptual definition, associated feedback loops within the CLD, and suggested operational indicators. The inclusion of loop references helps readers trace how each variable functions dynamically within the model. Operationalization notes offer guidance on how these variables might be measured or approximated in future quantitative models, thereby bridging the qualitative framework with empirical analysis.

Table 1. Principal variables of the qualitative system dynamics model and their classifications

| Variable                                | Type | Description                                                    | Loop Ref. | Operationalization                                      |
|-----------------------------------------|------|----------------------------------------------------------------|-----------|---------------------------------------------------------|
| Youth Unemployment Rate                 | E    | Share of youth (15–24) in the labor force who are unemployed.  | All loops | Labor force survey data; ILO definitions                |
| Youth Labor Supply                      | E    | Number of youth actively seeking employment.                   | R1, R3    | Labor force participation rate; census data             |
| Job Creation Rate (Youth)               | E    | Rate of new job openings for youth.                            | R3, B3    | Employment statistics; firm-level hiring data           |
| Number of Unemployed Youth              | E    | Total unemployed youth aged 15–24.                             | R1, R4    | National unemployment registry; survey data             |
| Formal Employment Capacity              | E    | Ability of the formal sector to absorb youth labor.            | R3, B3    | Public/private sector employment data                   |
| Informal Employment Capacity            | E    | Extent of informal sector absorption of youth labor.           | R2, B4    | Informal employment share: household surveys            |
| Higher Education Enrollment             | E    | Rate of youth entering post-secondary education.               | R1, R5    | Enrollment statistics; Ministry of Education reports    |
| Deferred Labor Market Entry             | E    | Delay in job search due to continued education.                | R1        | Age at first job; average graduation-to-employment gap  |
| Overqualification                       | E    | Holding credentials exceeding job requirements.                | R5        | Qualification-job match surveys; employer feedback      |
| Emigration of Skilled Youth             | E    | Migration of educated youth seeking better jobs abroad.        | R6        | Emigration records; visa application data               |
| Household Consumption                   | E    | Aggregate household spending affecting labor demand.           | R3, R7    | Household expenditure surveys; GDP components           |
| Human Capital                           | E    | Accumulated skills and experience of youth.                    | R2, R4    | Education level; work experience; skill assessments     |
| Skill Mismatch                          | E    | Misalignment between youth skills and job requirements.        | R1, R5    | Employer surveys; job vacancy analysis                  |
| Job Search Frustration                  | E    | Discouragement from repeated job search failures.              | B1        | Survey data on job search duration and dropout rates    |
| Informal Job Acceptance                 | E    | Youth willingness to accept informal work.                     | R2, B4    | Informal employment entry rates; survey responses       |
| Education Attainment Level              | X    | Highest formal education level completed.                      | R1, R5    | Census data; education ministry records                 |
| Vocational/Technical Training           | X    | Access to skill-based non-academic training.                   | B5        | Enrollment in vocational programs; training completion  |
| Youth Labor Size                        | X    | Total number of youth entering the labor force.                | R1, R3    | Demographic data; labor force projections               |
| Economic Growth (GDP per capita)        | X    | Overall economic performance affects job creation.             | R3        | National accounts; GDP growth rate                      |
| Government Spending on Youth Employment | X    | Fiscal allocation to youth employment programs.                | B3, B5    | Budget reports; program evaluations                     |
| Labor Market Regulations                | X    | Rules governing hiring, firing, and wages.                     | B6        | Labor law indices; World Bank Doing Business reports    |
| Wage Subsidies / Employment Incentives  | X    | Financial incentives to promote youth hiring.                  | B5        | Subsidy program data; employer uptake rates             |
| Public Sector Hiring Capacity           | X    | The public sector's ability to absorb unemployed youth.        | B3        | Government employment statistics                        |
| International Sanctions                 | X    | External constraints are reducing investment and job creation. | R3, R6    | Sanctions database; trade and investment indicators     |
| Political and Social Pressure           | X    | Public demand for job creation or education reform.            | B2, B6    | Media analysis; protest frequency; policy response data |

#### 4. Causal loop diagram and feedback structure

To facilitate a deeper understanding of youth unemployment, a high-level conceptual model was developed to define the system's scope and structure. This model helps define the system's scope and structure. It makes the problem easier to grasp, particularly for readers unfamiliar with feedback systems. By focusing on key areas instead of detailed loops, the model simplifies complex ideas and improves clarity.

The model divides the system into three connected parts: structural drivers, behavioral mechanisms, and system outcomes. Structural drivers include broader conditions such as education policies, population trends, and labor market changes. These factors shape the contextual framework for school-to-work transitions among youth. Behavioral mechanisms are how individuals respond to these conditions. They include options such as continuing education, actively seeking employment, or informal work. These behaviors influence the overall system. The primary outcome is the youth unemployment rate, which indicates how well the system is functioning.

Overall, the conceptual model offers a strategic foundation for the CLD. Figure 1 illustrates this model.

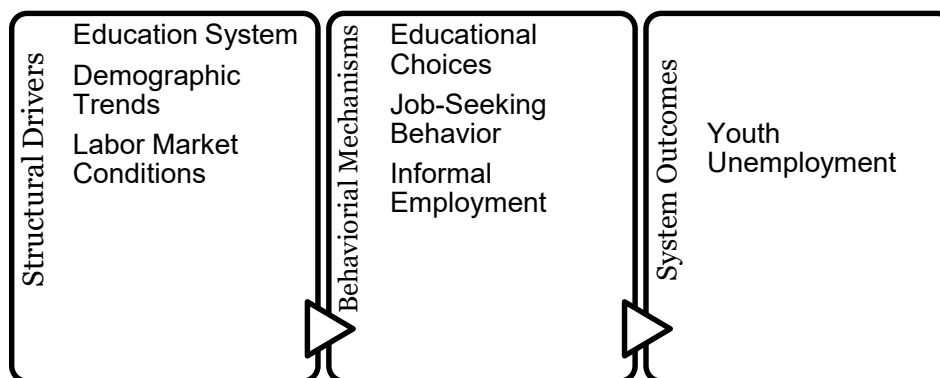


Figure 1. The conceptual model of youth unemployment dynamics

##### 4.1. Diagram overview

Figure 2 depicts the CLD, which captures how different components of Iran's youth unemployment system are connected and influence one another over time. The diagram begins with external and structural factors, such as population pressure, education policies, and international sanctions, and traces how these forces affect job creation, informal work, and other labor-market behaviors.

For clarity, the CLD is divided into two visual components: reinforcing feedback loops (Figure 3) and balancing feedback loops (Figure 4). This separation improves readability while

preserving the model's integrity and enables readers to follow the dynamic relationships described in the text.

At the center of the diagram is the youth unemployment rate, which both affects and is affected by multiple feedback loops. These loops illustrate how challenges such as an oversupply of university graduates, limited job opportunities, or skill mismatch can persist and even intensify unless systemic change occurs.

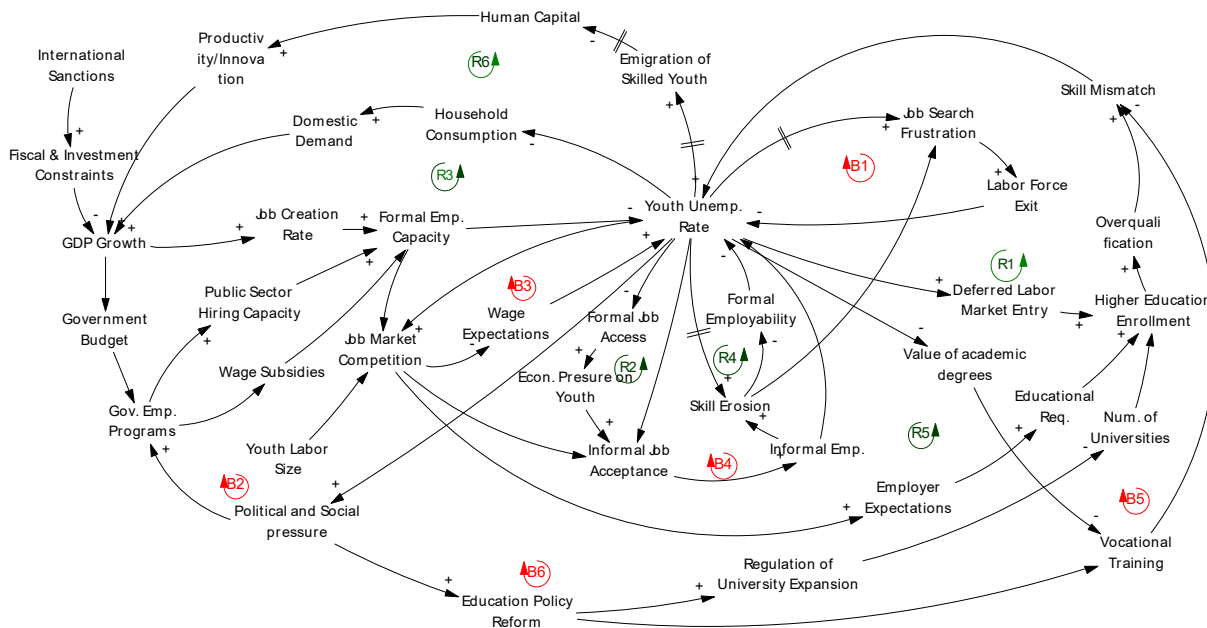


Figure 2. Overall causal loop diagram representing the feedback structure of youth unemployment in Iran

#### 4.2. Reinforcing loops

The CLD includes several reinforcing feedback loops (labeled R1 to R6) that explain how youth unemployment can grow and persist over time. These loops demonstrate how certain problems, such as educational mismatch, informal employment, or economic stagnation, tend to feed back on themselves, exacerbating the situation unless disrupted by strong interventions.

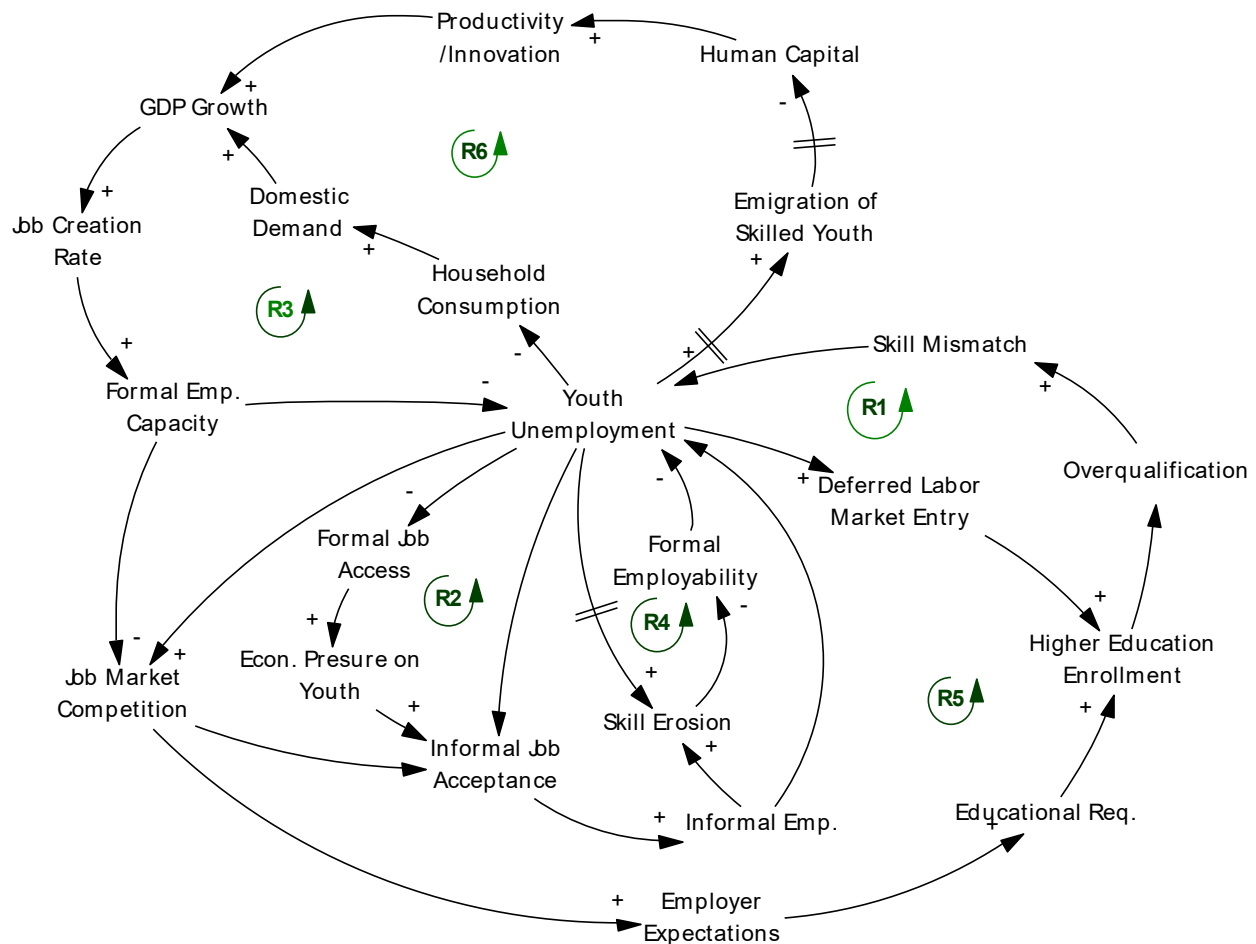


Figure 3. Reinforcing feedback loops corresponding to the mechanisms described in hypotheses 1–3.

**R1 – Educational inflation loop:** Many young people are encouraged to go to university, but the job market cannot absorb all the graduates. Because there aren't enough suitable jobs, their degrees often don't help them get employed. As a result, more youth decide to stay in school longer or get more degrees, hoping this will improve their chances, yet this only increases the number of unemployed graduates over time.

**R2 – Informal employment trap loop:** When formal jobs are scarce, many young people take informal or low-quality work. These jobs often lack security and do not build useful skills. This hurts their chances of finding better jobs later, making it harder to move into stable employment. As a result, they remain excluded from the formal economy.

**R3 – Sanction-Driven economic contraction loop:** International sanctions reduce foreign investment and government revenues, slowing economic growth. This weakens job creation, especially in the formal sector. As unemployment rises, household spending drops, which further reduces demand and job opportunities, creating a downward spiral.

**R4 – Human capital erosion loop:** Long periods of unemployment can cause young people to lose motivation and relevant skills. The longer they remain out of work, the harder it becomes to get hired. Over time, they become more disconnected from the job market.

**R5 – Credentialism loop:** When many people apply for the same job, employers raise degree requirements—even for basic roles. This pushes more young people to get extra qualifications, even when they are not needed. As a result, overqualification increases. The gap between skills and job needs grows wider.

**R6 – Migration disincentive loop:** Because jobs are limited, many skilled young people move abroad to find better opportunities. This reduces the country’s human capital. With fewer skilled workers, it becomes harder to create new jobs at home. As a result, unemployment gets worse for those who stay.

#### 4.3. Balancing feedback loops

Besides the reinforcing loops that worsen unemployment, the system also includes several balancing loops (B1 to B6). These loops can reduce unemployment or slow it down, but many of them only offer temporary solutions or hide deeper problems.

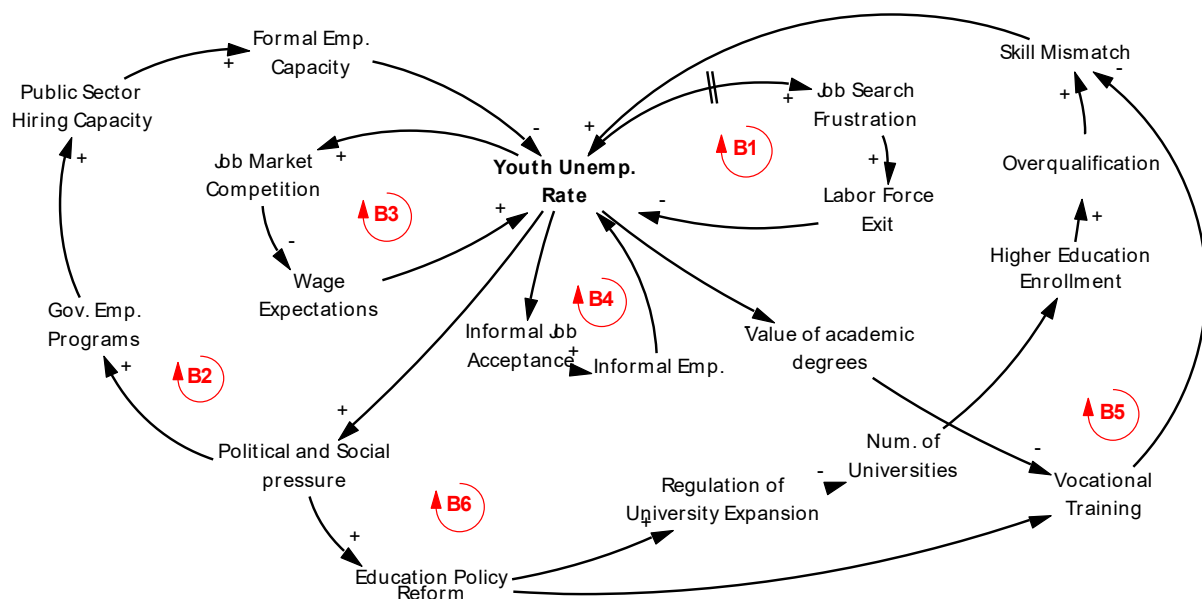


Figure 4. Balancing feedback loops, illustrating stabilizing mechanisms, and short-term adjustments.

**B1 – Discouraged worker loop:** When young people cannot find jobs for a long time, some stop looking. This means they are no longer counted as unemployed. But the problem still exists—it is just less visible. Over time, repeated rejections lead to discouragement. This delay makes it even harder to rejoin the job market.

**B2 – Public sector employment buffer loop:** As youth unemployment rises, people expect the government to create more public jobs. This may reduce unemployment in the short term, but due to budget limits and slow processes, it often cannot continue for long and solve the core problems.

**B3 – Wage adjustment loop:** In theory, when there are many unemployed people, they may lower their wage expectations to find work. This could help employers hire more youth. But in Iran, this loop is weak due to wage laws, labor market rules, and cultural customs that protect older workers.

**B4 – Informal employment adjustment loop:** Some unemployed youth turn to informal jobs, which helps reduce the number of officially unemployed. However, these jobs often have low pay and no security. While it looks like a short-term solution, it keeps people in unstable situations.

**B5 – Vocational realignment loop:** As more graduates remain unemployed, some young people may choose technical or vocational training rather than university degrees. This can help match their skills with real job needs and improve employability. However, this shift is often slow due to cultural preferences for academic education. In Iran, cultural bias toward academic credentials delays this shift.

**B6 - Political feedback into education reform:** When youth unemployment stays high for a long time, it creates public and political pressure for education reform. This may lead to changes in university policies, better training programs, or limits on unnecessary degree expansion. These changes take time but can help reduce the mismatch between education and jobs in the long run. Although the effects of this loop are often delayed, due to bureaucratic inertia and the cyclical nature of political processes, it plays a crucial role in driving long-term structural adjustments within the education system. Furthermore, this balancing mechanism helps mitigate the reinforcing dynamics of educational inflation (R1) and credentialism (R5), which might otherwise persist unchecked in the absence of robust regulatory intervention.

## 5. Discussion and policy implications

The CLD offers more than just an explanation. It helps identify where and how to intervene in the system. By understanding the feedback loops, we can see why youth unemployment in Iran remains high and why many policies fail to make lasting change.

This section analyzes the dynamic behavior captured in the CLD by interpreting systemic feedback mechanisms and identifying high-leverage intervention points. The goal is to bridge

the gap between conceptual insights and practical policy design by examining how reinforcing and balancing loops interact under various structural and behavioral conditions. The implications are intended to guide policymakers toward comprehensive strategies that are robust under constraints such as economic sanctions.

### ***5.1. Interpretation of system behavior***

The CLD illustrates a structurally persistent system in which youth unemployment in Iran is driven by reinforcing feedback loops that dominate over balancing mechanisms. These dynamics involve nonlinear relationships, time delays, and self-reinforcing cycles that sustain high unemployment levels despite policy efforts.

The main reinforcing loops—R1 (Educational Inflation), R2 (Informal Employment Trap), R3 (Sanction-Driven Contraction), and R5 (Credentialism)—create a system with strong path dependency. In loop R1, the expansion of higher education, combined with the labor market's limited capacity to absorb graduates, leads to overqualification and delays in entering the workforce. This effect is reinforced by R5, where employers increase academic requirements, raising the demand for formal credentials without improving job matching. At the same time, R2 pushes young job seekers into informal employment, which offers little stability or opportunity for advancement. The longer youth remain in this sector, the more their skills deteriorate, reducing their future employability, as captured in R4.

External constraints, particularly economic sanctions (R3), further reduce labor demand by discouraging investment, limiting government spending, and restricting private sector growth. These factors reduce formal job opportunities, forcing many young people into unstable employment and reinforcing the unemployment cycle.

Although balancing loops, such as B2 (Public Sector Employment) and B5 (Vocational Realignment), provide some counteracting forces, their effects are often limited by institutional inertia, budgetary constraints, and a strong social preference for academic rather than vocational education. Other balancing mechanisms, like B1 (Discouraged Worker Effect) and B4 (Informal Employment Adjustment), reduce the visible rate of unemployment but conceal deeper structural issues by encouraging labor market withdrawal or informal absorption.

As a result, the system shows strong resistance to simple or isolated policy interventions. Policy measures that do not address the structural links, particularly those between education and employment, and on the demand side of the labor market, tend to be absorbed by the system without lasting impact. Therefore, long-term behavioral changes and comprehensive structural

reforms are necessary to weaken the reinforcing loops and move the system toward a more balanced state.

### ***5.2. Policy implications***

Addressing youth unemployment in Iran, therefore, requires system-oriented policies that consider the feedback effects and time delays embedded in the system. Based on the model's insights, several policy implications emerge.

First, education policy should prioritize skill alignment rather than expansion alone. Developing stronger connections between universities, vocational institutions, and industry can reduce the skill mismatch. Encouraging technical and applied education, internships, and cooperative programs would also help balance the reinforcing loop that links educational expansion with unemployment.

Second, labor-market policies should aim to enhance employability and encourage active participation. Programs that improve job-search support, career counseling, and training for high-demand skills can prevent discouragement and labor-force withdrawal. Policies that target hidden unemployment should recognize that inactivity or informal work often results from structural barriers rather than a lack of motivation.

Third, macroeconomic and industrial policies must strengthen formal job creation. Stimulating private-sector investment, supporting small and medium-sized enterprises, and improving business conditions are essential for expanding productive employment. Under conditions of external constraint, such as sanctions, domestic diversification and import substitution can partially offset the loss of external demand. Policies designed to stabilize aggregate demand, such as targeted fiscal spending and local procurement, can reduce the reinforcing effects of macroeconomic contraction.

Fourth, public-sector employment policies should be redesigned to avoid short-term balancing effects that ultimately reinforce structural problems. Instead of relying on temporary hiring as a buffer against unemployment, the public sector should focus on facilitating entrepreneurship, labor-market transparency, and skill matching through better information systems.

Finally, proactive strategies for migration management and diaspora engagement can mitigate the long-term negative impacts of skilled emigration. By facilitating knowledge transfer, remote collaboration, and investment channels, states can partially compensate for domestic human capital losses and foster continued innovation.

### ***5.3. Identifying leverage points***

The CLD also helps identify potential leverage points, areas where interventions can produce the largest systemic impact. Strengthening the connection between education and labor demand can weaken the reinforcing loop of educational inflation. Policies that improve the efficiency of labor-market information systems can shorten the delay between job creation and job matching, reducing policy resistance. At the macro level, stabilizing aggregate demand through consistent fiscal and monetary coordination can dampen the reinforcing impact of sanctions-related contractions.

These leverage points correspond to structural rather than symptomatic interventions, meaning that they target the feedbacks generating the problem rather than its outcomes. Effective policies, therefore, require simultaneous coordination across education, labor-market, and macroeconomic domains, supported by continuous monitoring and adaptive learning.

### ***5.4. Directions for future research***

To enhance the policy relevance and analytical rigor of the model, future research should pursue several important extensions. First, translating the current CLD into a quantitative stock-and-flow simulation model would enable scenario analysis, parameter sensitivity testing, and forecasting of policy impacts. Such a model should pay particular attention to incorporating time delays in transitions from education to employment, as well as the lagged effects of macroeconomic adjustments, especially under conditions of international sanctions.

Second, introducing disaggregation and behavioral microfoundations would significantly improve the model's realism. Incorporating demographic and sectoral heterogeneity, such as distinctions by gender, region, and industry, would allow for a more nuanced understanding of how different groups are affected by policy interventions. Additionally, embedding behavioral sub-models that account for individual expectations, risk tolerance, and cultural norms, particularly in relation to vocational training and informal employment, would enhance the explanatory capacity of the model.

Third, empirical calibration and validation are essential for improving credibility and practical application. Despite constraints on data availability, existing sources, such as historical labor market statistics, panel surveys, and administrative datasets, can support parameter estimation. Engaging in participatory modeling with key stakeholders, including government

agencies, employers, and youth, would further enhance the model's accuracy and relevance by ensuring that it reflects on-the-ground realities and institutional perspectives.

By extending the current framework in these directions, researchers can move beyond conceptual analysis toward the development of simulation-based decision support tools. Such tools would offer greater precision and credibility in guiding the design and evaluation of youth labor market policies in Iran.

## 6. Conclusion

This study explored the problem of youth unemployment in Iran using a qualitative SD approach. It identified how education, labor market behavior, and economic conditions interact through feedback mechanisms. These interactions explain why youth unemployment remains high despite many policy attempts.

The CLD identified six reinforcing feedback loops that fall into three main groups: skill mismatch and educational inflation; labor-force exit and hidden unemployment; and Sanctions and labor-market segmentation. Together, these loops create a cycle that perpetuates youth unemployment. They also explain why simple, one-dimensional policies have not produced lasting results.

From a policy perspective, the findings identify that real progress requires addressing the system's feedback structures. Short-term solutions, such as temporary government hiring or wage subsidies, may provide quick relief but do not change the system's long-term behavior. Sustainable improvement needs coordinated actions that target the root causes of these feedbacks.

Policies should better connect education with labor market needs, encourage private-sector job creation, and reduce the impact of external shocks. Over time, such coordinated strategies can reshape the system and lower resistance to policy changes.

The qualitative model developed in this study also serves as a foundation for future quantitative work. Using real data to calibrate the model would allow simulations of different policy options and help predict their long-term effects. Future studies could also integrate factors such as gender differences, technological change, and regional inequality to improve the model's relevance.

## Disclosure statement

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