Group Name: Causal Thinkers

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Objective of the SFD Model:

The model illustrates how demographic trends and government investment decisions shape economic outcomes, particularly focusing on the potential **youth demographic dividend** (economic growth from a productive workforce) versus a **youth demographic disaster** (economic stagnation due to a poorly skilled workforce and high dependency rates).

The key control parameter, **"some_fraction"**, determines how government revenue is allocated:

- **High values (closer to 1):** More funds go into **education and infrastructure**, boosting the skilled workforce and long-term economic growth.
- **Low values (closer to 0):** More funds are lost to **corruption**, reducing investments in skill development and infrastructure, leading to economic stagnation and higher dependency burdens.

Key Dynamics in the Model:

Youth Population Flow

- Birth rate determines the number of **Children** entering the system.
- As children grow, they transition into either **Skilled Youth** (if there's enough investment in education) or **Unskilled Youth** (if education investment is low).

- Skilled and Unskilled Youth eventually age into **Senior Citizens**, increasing the dependency ratio over time.
- High dependency with a low-skilled workforce leads to an economic burden, signifying a **demographic disaster**.

Economic Contributions & Government Role

- **Skilled Youth** earn higher wages, contributing more to **income tax** and boosting **government revenue**.
- **Unskilled Youth** earn lower wages, leading to lower tax contributions and economic inefficiencies.
- The government's expenditure depends on **"some_fraction"**:
  - A **higher fraction** ensures more money is invested in **education (skill development) and infrastructure**, increasing productivity and economic stability.
  - A **lower fraction** leads to more **corruption**, reducing effective investments and causing a **demographic disaster** with high unemployment and low economic growth.

Feedback Loops

- High investment in education creates more **Skilled Youth**, increasing national income and tax revenue, leading to sustainable economic growth (**demographic dividend**).
- Low investment results in a larger **Unskilled Youth** population, low productivity, and higher dependency on social spending, pushing the economy towards **demographic disaster**.
- **Elderly care costs** increase over time, adding financial strain if the workforce is not productive enough to support them.

Takeaways:

The **"some_fraction"** parameter serves as a policy lever:

- **Towards 1** → Sustainable growth via skill development and infrastructure.
- **Towards 0** → Economic stagnation due to corruption and a poorly skilled workforce.

The model can help analyze **policy decisions**, showing how investments (or lack thereof) determine whether a country experiences a **youth-driven economic boom (dividend) or a disaster**.

SFD Model Variable Details:

SL No.	Variable Names	Meanings	Units
1	Government_Revenue	Revenue generated by the government	Rupees
2	#Companies	Number of companies	Company
3	Adulting_Rate_1	Rate of adulting for skilled youth	People/Year
4	Adulting_Rate_2	Rate of adulting for unskilled youth	People/Year
5	Avg_Company_Investments	Average investments by each company	Rupees/(Company*Year)
6	Avg_Income_of_Skilled_Youth	Average income of skilled youth	Rupees/People
7	Avg_Income_of_Unskilled_Youth	Average income of unskilled youth	Rupees/People
8	Avg_Spending_on_Elderly_Care	Average spending on elderly care	Rupees/(People*Year)
9	Birth_Rate	Birth rate of the population	People/Year
10	Children	Number of children	People
11	Corruption	Amount of corruption in government	Rupees/Year
12	Death_Rate	Death rate in the population	People/Year
13	Expenditure	Total government expenditure	Rupees/Year
14	Govt._Investments	Government investments	Rupees/Year
15	Income	Total income generated	Rupees/Year
16	Old_Fraction	Fraction of elderly in the population	1/Year
17	Old_Rate_1	Rate of aging for skilled youth	People/Year
18	Old_Rate_2	Rate of aging for unskilled youth	People/Year
19	Senior_Citizens	Number of senior citizens	People

20	Skill_Fraction	Fraction of skilled youth	1/Year
21	Skilled_Youth	Number of skilled youth	People
22	Some_Fraction	Controller Variable which will decide demographic disaster or dividend	1/Year
23	Total_Company_Investments	Total investments from companies	Rupees/Year
24	Total_Income_Tax	Total income tax collected	Rupees/Year
25	Total_Spending_on_Elderly_Care	Total spending on elderly care	Rupees/Year
26	Total_Youth_Population	Total youth population	People
27	Unskilled_Youth	Number of unskilled youth	People
28	Upskill	Rate of upskilling	People/Year
29	Death_Fraction	Fraction of death among elderly	1/Year
30	Education_Investment_Fraction	Fraction of investment in education	(No unit)
31	Fertility_Rate	Fertility rate of the population	1/Year
32	Infrastructure_Investment_Fraction	Fraction of investment in infrastructure	(No unit)
33	Tax_Rate_for_Skilled_Youth	Tax rate for skilled youth	1/Year
34	Tax_Rate_for_Unskilled_Youth	Tax rate for unskilled youth	1/Year

Future Work:

- Finish the formulas associated with the variables.
- Add the Healthcare Investment factor to showcase the relation between citizens' health and productivity of a country.
- Additionally also include the poverty factor when job availability is low.
- Do some simulation and gather different results based on the control parameter **‘some_fraction’**.

New Papers:

[1] Hans, V., 2023. India's Demographic Dividend: Opportunities and Policies. *India's Demographic Dividend: Opportunities and Policies (October 22, 2023)*.
[2] Jain, N. and Goli, S., 2022. Potential demographic dividend for India, 2001 to 2061: a macro-simulation projection using the spectrum model. *SN Social Sciences*, *2*(9), p.171.
[3] Nejat, E.R.K., Çabuk, H.A. and Sanlı, A.T.E.Ş., Long-Run Growth and Physical Capital-Human Capital Concentration.

Appendix

Problem Statement

India has one of the largest youth populations in the world, offering a significant opportunity for growth and development. However, despite this potential, the country faces challenges in fully utilizing its youth demographic. Factors such as unemployment, lack of quality education, skills mismatch, and underdeveloped infrastructure hinder the ability of young people to contribute meaningfully to the economy and society. In order to tap into this potential, it is crucial to understand the underlying factors that affect youth development and how they interact with each other. A System Dynamics approach can help map these complex relationships and provide insights on how to harness the full potential of India's youth for sustainable growth.

Background / Literature Survey

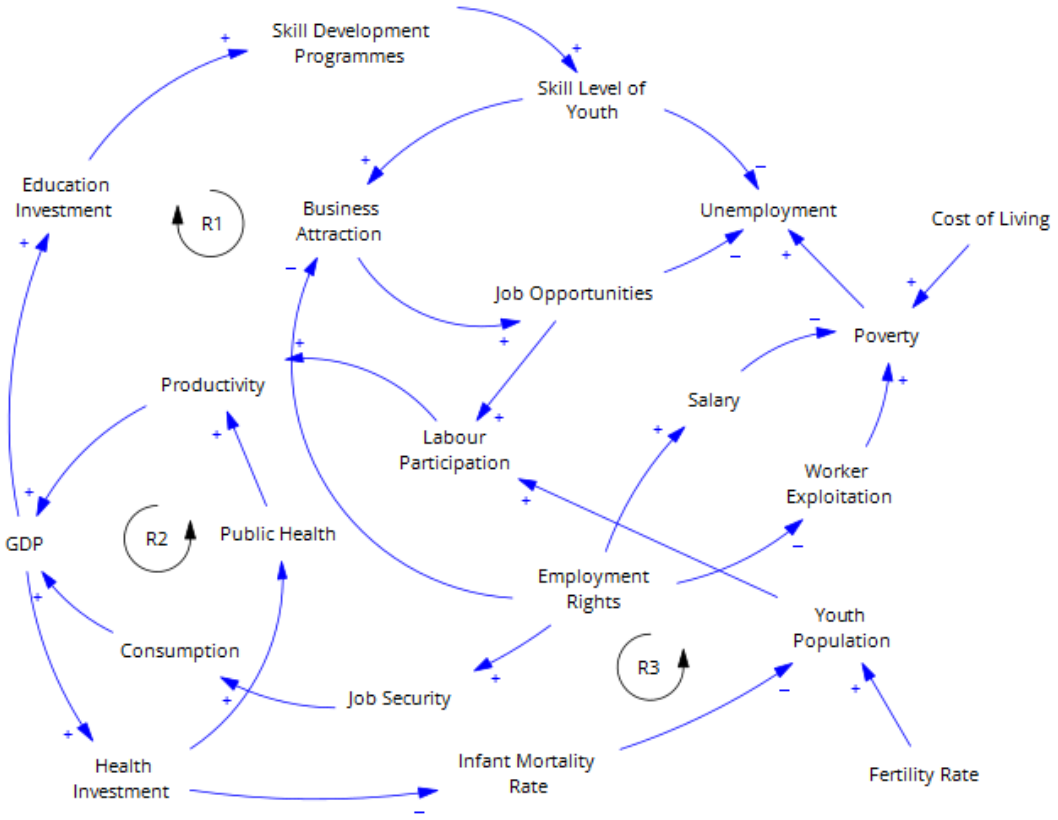
In [4] it has been discussed that India is experiencing a significant demographic shift, where the working-age population is increasing, presenting an opportunity for economic growth. This shift occurs when a country transitions from high fertility and mortality rates to lower levels, creating a demographic window of opportunity. Many economists predict that India will benefit from this youthful population. India's average age of 29 could contribute an additional 2% to its GDP annually and account for 25% of the global increase in the working-age population until 2040.

Despite this potential, India faces several obstacles that may hinder its ability to reap the benefits of its demographic dividend. The labour market has an imbalance, with some skills in surplus and others in shortage, limiting economic efficiency. Poverty remains a significant issue, as lower-income households struggle with access to quality education, healthcare, and nourishment, negatively impacting youth productivity. Many young workers accept jobs with poor working conditions due to economic insecurity, leading to long hours, low wages, and job instability. Employment rights are often overlooked, with workers facing termination without notice and a lack of benefits, contributing to a growing number of working poor.

Furthermore, job insecurity prevents employees from planning their futures, while the education system fails to meet market demands. The high cost and limited availability of vocational training restrict opportunities for many young individuals. Without adequate skill development, the workforce remains underprepared for industry needs, limiting the overall productivity of the economy. Addressing these challenges through effective policies in education, employment rights, and economic inclusion is crucial to ensuring that India's growing youth population contributes meaningfully to national development rather than becoming a burden on the economy.

In [2], it has been argued that the transformation of demographic potential into demographic dividend depends on the adoption of a state-sponsored socio-economic policy regime. This should focus on public health and education to equip youth with skills required for the twenty-first century and ensure macroeconomic policies that optimize human resource utilization. Without such interventions, the demographic dividend will remain an unfulfilled promise and may turn into a demographic burden instead of an advantage.

Based on the papers we came up with CLD mentioned below.



References

[1] Singh, Paramjit, and Surinder Kumar. "Demographic dividend in the age of neoliberal capitalism: an analysis of employment and employability in India." The Indian Journal of Labour Economics 64.3 (2021): 595-619.
[2] Parida, Jajati Keshari, and S. Madheswaran. "Harnessing demographic dividend before it is lost forever in India." The Indian Journal of Labour Economics 66.1 (2023): 61-79.
[3] Oghenekohwo, Jonathan E., and Ekima A. Frank-Oputu. "Literacy education and sustainable development in developing societies." International Journal of Education and Literacy Studies 5.2 (2017): 126-131.
[4] Naik, Kasturi, and Anita Bobade. "Youth in India: Demographic Dividend or Demographic Disaster." 9th Annual Conference of the EuroMed Academy of Business. 2016.