

Knowledge, Society and the Global Order

A development perspective

JNU

24th September, 2014



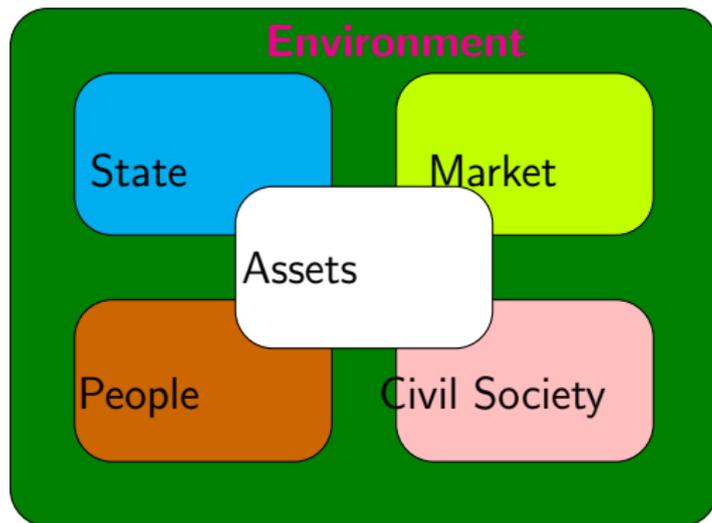
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Agenda

- Knowledge, Society and the Development Question.
- The elite university and the IIT case-study.
- The easy problems and the hard nut: *legitimization*.
- Meritocracy and the the One-Science hypothesis.
- What to do.

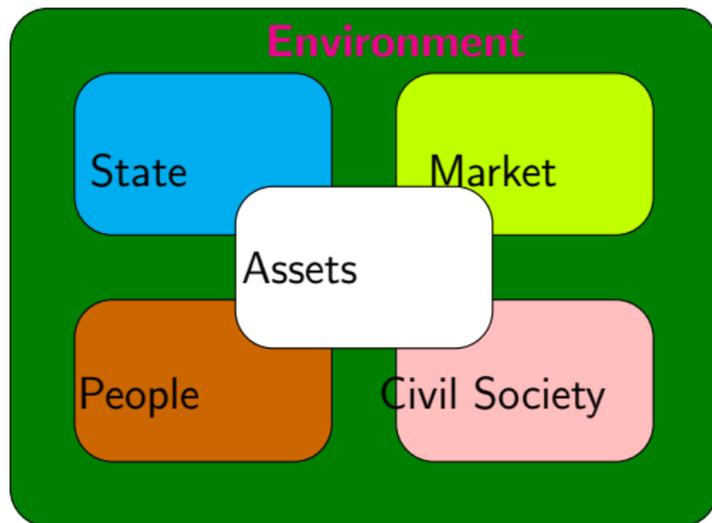


Stylized Structure of Society



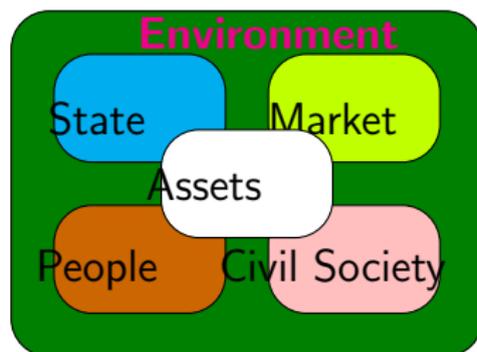
- **Key Sectors:** People, Civil or *Cultural* Society, the Environment.
- **Key Transaction:** Agents seeking Biological, Cultural and Environmental value.

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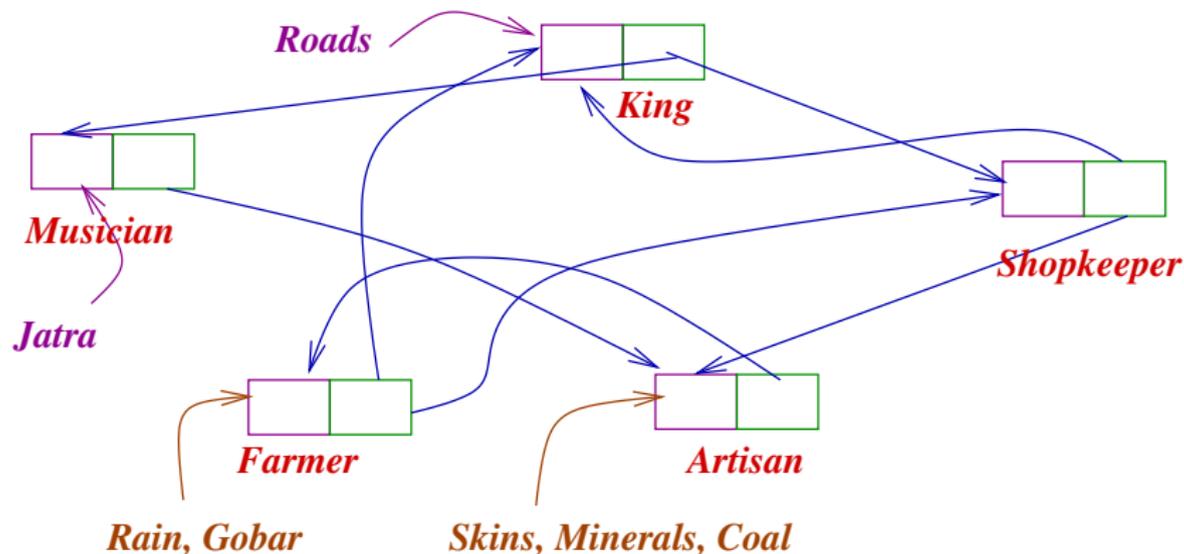
- **Key Sectors:** People, Civil or *Cultural* Society, the Environment.
- **Key Transaction:** Agents seeking Biological, Cultural and Environmental value.
- **Auxillary Sectors:** Market, State and Assets, i.e., historical accumulation.

More Pop Structure of Society



- **Cultural Transactions:** based on identity, class, prestige. Usually collective and historical.
- **Market and State:** e.g., mediated by Power and Money.
- **Intricate competition and a dynamic equilibrium between sectors.**

Web of agents



- The web of interactions: individuals in many roles.
- *Fundamentally*: Agents deliver value. This may be cultural, financial, security, and so on.

Pop Knowledge

Broad classification of knowledge:

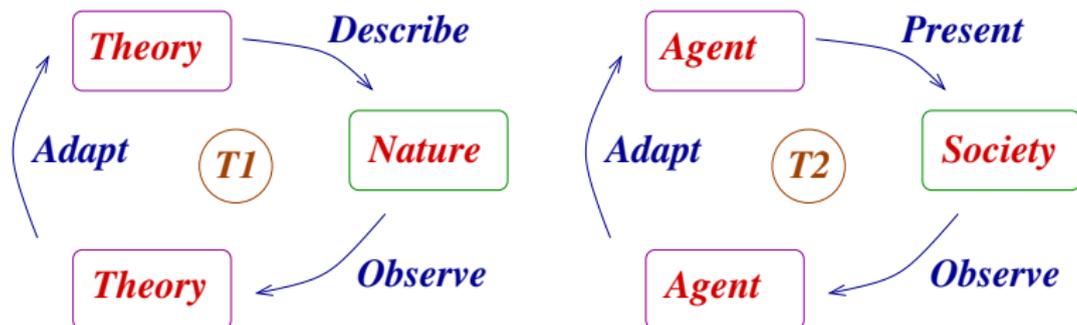
T1 Scientific or “Rigorous” knowledge

- ▶ Data-gathering, theorization, verification, *falsifiable*.
- ▶ **Output**: Theory, language, laboratory methods \Rightarrow Technology

T2 Knowledge of Good Practices

- ▶ **Agent** driven loops: *serve/present, observe and adapt* . Seek to deliver **value** (cultural, economic, prestige)
- ▶ Empirical models and analysis. Borrow from other disciplines.
- ▶ **Governmental**: *sadak, bijli, paani*, or **Para-statal**: Urban administration, or **Private**: music, cars, *chulhas*
- ▶ **Key activity**: Empirical systems, i.e., data-gathering and memory.

The Two Loops



The usual method vs. output conundrum

The *process of accumulation* vs. *the accumulate itself*.

- In Science, it is usually the output which is taught and tested.

Motivation-The *concrete* development challenge



Superficially -poor Human Development Indices

- Extensive governance structure, cultural institutions, democracy
- asset poverty and social and asset inequality
- poor penetration of infrastructure
- malfunctioning markets and state
- large informal sector, unstructured, poor technical content

Practices...



- Poor process of accumulation of new practices
- Poor knowledge content in existing practices

Economically speaking

- Stagnant formal sector. Little job growth. Poor R&D
- Dropping share of industrial/manufacturing.
- Absence in strategic sectors such as Defence, Electronics/Telecom.
- Few technology and policy professionals.
- Poor participation of industry in core sectors such as water.
- Poor governance.
- Disconnect between knowledge systems and economy.

For example-Water

Sufficient Drinking Water year-round

Year	Rural	Urban
2012 (69th NSSO), per 1000	858	896
Maharashtra	745	931
2008	862	911

- Old designs, technically unsound schemes, uneven service
- Groundwater failure, ill-managed surface water sources.
- Poor capacity of community to manage, mis-alignment between community expectations and government
- Poor monitoring and evaluation frameworks by state
- *Policy-fication* and NGO-fication of a key bio-physical sector.
- *Retreat of regional socio-technical agencies.*
- *Rise of international economists, sociologists, WB etc.*

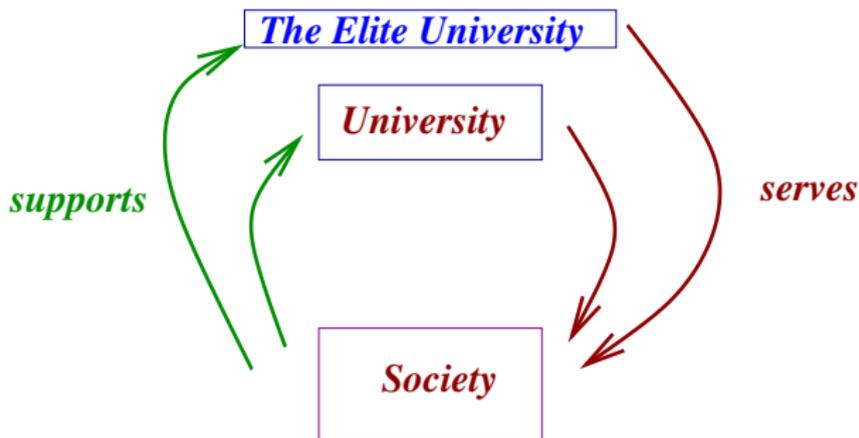
Other areas...



Cooking energy: *similar*.

Question: : How do we understand this *knowledge failure*?

Society and the University-*a virtuous loop*



- **The University**
 - ▶ repository of knowledge and practices
 - ▶ training agents who deliver value
- **The Elite University**
 - ▶ thought leadership, the arts, long-term research, *destiny*
 - ▶ *symbolic of what a society values!*

The Indian Elite University

- Long history-right after independence
- The IITs, IISc, ISIs, IIMs, TIFR, JNU, Delhi School of Economics
 - ▶ the new *IISERs*, new IITs

Typical features:

- *Key areas*: Science, Technology, Engineering, Economics, Mathematics
- Centrally funded, autonomous
- Research orientation, international faculty
- transparent and highly selective admissions
- focus on excellence and global standing

Just how elite are these? - *IITs*

Why only the IITs

- because we are here.
- **Engineering and Technology** key to development outcomes.

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Rough numbers (in Rs. crores)

Total	Central	CFI	IITs
200K	60K	3K	2K

- i.e., about Rs. 10-15 lakhs per student.
- Besides this, roughly equivalent funding from DST, DBT and other agencies.
- **Mangalyaan**: about Rs. 400 crores. **ISRO**: Rs. 5000 crores.
- **Maharashtra Water Supply and Sanitation** : Rs. 1000 crores.
Mumbai University: 400 crores.

More than money-*intellectual space*

- JEE and GATE: define engineering in the country.
- TEQIP II: Project document, Chapter 1, page 1: ... gap between other colleges and IIT which needs to be bridged... IITs to act as a catalyst ...
- Domination in research agenda and allocation.
- Curriculum: NCERT, Andhra Pradesh. What is science for schools.
- Bragging rights in a poor developing society.

The Input side

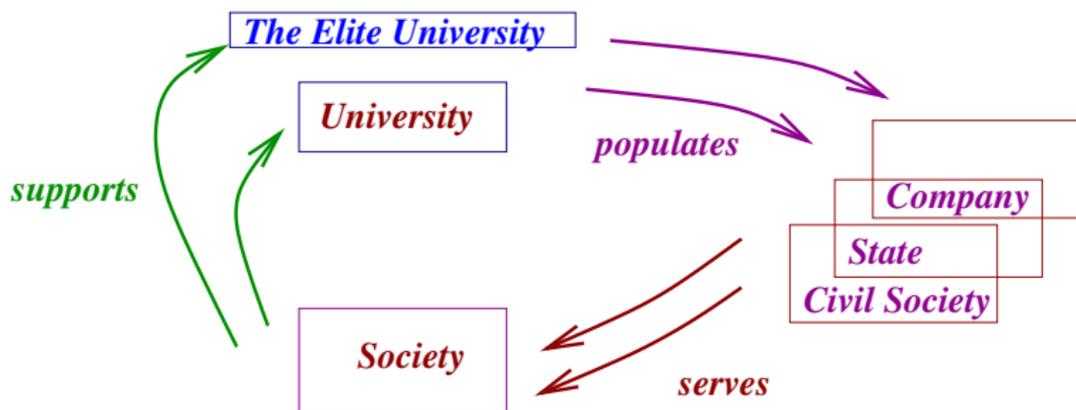
At the UG level:

- Two layer process-JEE and advanced JEE.
- In 2013, 12 lakh students sat for JEE of which 1.5 lakh were allowed to write advance JEE.
- JEE admits to NITs (roughly 7000 seats)
- advanced JEE admits into IIT (another 7000 seats) JEE and GATE data
- odds of roughly 1 in 200. Selectivity varies dramatically with discipline.

At the PG level:

- Disciplinary GATE exams. Separate admissions.
- Roughly 10 lakh sat for about 5000 seats. Selectivity roughly *more constant*.

The Output side-*the intermediaries*



Analysis.

- **Placements:** The allocation of graduating students to jobs.
- **Sectors:** Which sectors of the economy.
- **Companies:** Who owns these companies and which society do they serve.

Research Objective-who joins where?

- This is done by looking at placement data of IIT Bombay for 2013 (upto April 90% of placements over)

Aeronautical & Aerospace (A)
Chemical (CHE)
Civil (C)
Computer Science and Engg.
(CSE)
Electrical (EE)
Mechanical (Mech.)
Metallurgical (Met.)

3 Programs

B.Tech

DD

M.Tech

- Excluded - 5 yr & 2 yr M.Sc., M.Des & Phd
- Energy Science, Environmental Science, etc.

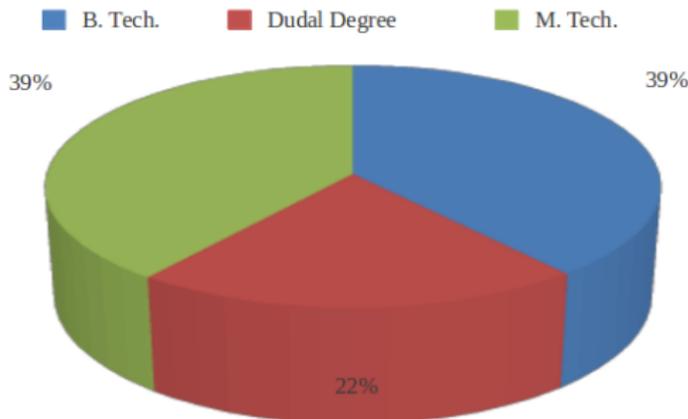
Data-Sample

Sample:

833 out of 1066 done (81% approx)

TOTAL APPLIED - 1421

- 324 B.Tech Students
- 180 Dual Degree Students
- 329 M.Tech Students



Detailed number-wise break-up and average annual salary in Rs. lakhs.

Program	Aero	Chem	Civil	CSE	EE	Mech	Meta
B.Tech.	9(8.6)	45(9.5)	57(7.6)	65(33.4)	48(15.5)	65(10.2)	35(7.4)
DD	21(11.6)	32(11.0)	11(8.4)	-	44(16.4)	46(11.2)	26(8.3)
M.Tech	11(5.9)	17(6.7)	28(4.8)	93(14.8)	98(9.7)	50(8.0)	32(7.3)

Av. Salary highest for CSE be it B.Tech or M.Tech (100 and 50% more than next category).

For DD, it is EE (>33% higher then next category - Aero)

Table 2: % of students in different Sectors for 3 programs and Av. Annual Salary (Rs. Lakhs)

Sector	ET	Fin	Consulting	IT	FMCG	non-IT	Edun
B.Tech	22(10.2)	24(13.0)	21(13.2)	24(23.2)	6(10.0)	2(15.0)	1(6.7)
DD	24(10.0)	24(13.2)	26(11.6)	14(12.9)	9(12.1)	3(16.4)	1(6.2)
M.Tech.	51(8.6)	4(9.4)	10(5.6)	29(15.0)	2(6.2)	1(11.0)	5(4.5)

Table 3: Job and Company Profile Label

Name	Description	Location	Example
Super-GG	Globally owned, Global revenues	Abroad	Sony, Japan
GG	Globally owned, Global revenues	India	Goldman Sachs
IG	Indian owned, Global revenues	India	Infosys
GI	Globally owned, Indian revenues	India	Proctor-Gamble
II	Indian owned, Indian revenues	India	Tata Motors

Table 4: Profile-wise allocations (in %) for the 3 programs and Av. Annual Salary (Rs. Lakhs)

Profile	Super-GG	GG	IG	GI	II
B. Tech	15(46.8)	41(10.8)	14(7.1)	9(10.6)	21(7.3)
DD	8(34.7)	57(10.4)	7(6.8)	9(11.0)	19(8.7)
M.Tech.	7(38.7)	56(8.8)	16(6.4)	7(8.2)	15(6.1)

CPI as measure of Training

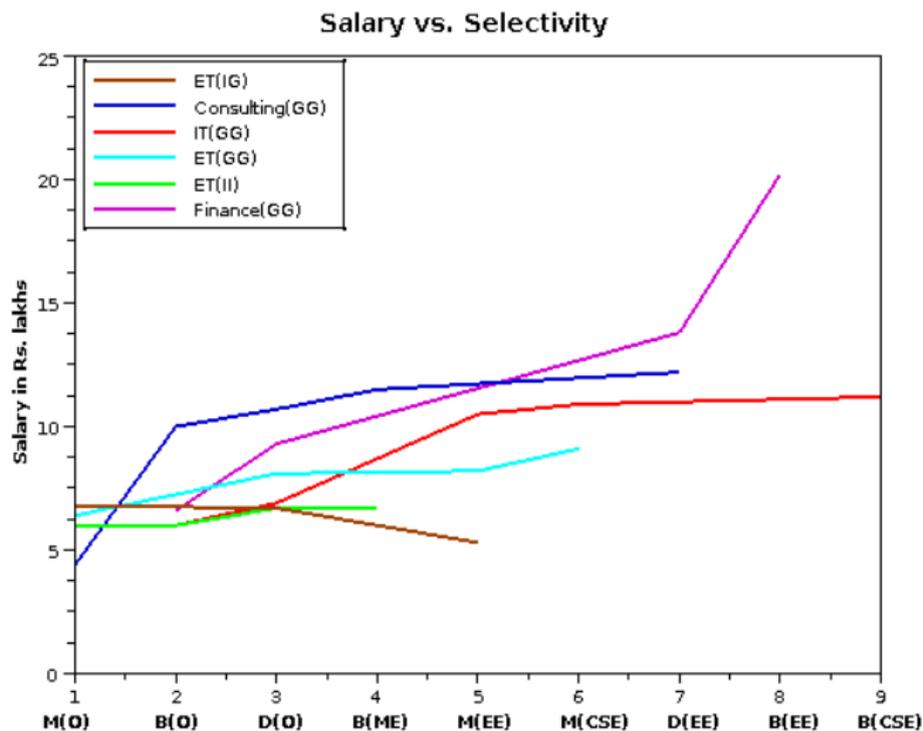
Profile	Sector	slope(vs. CPI)	p-value	Gini
Super-GG	finance	0.013	0.311	0.209
Super-GG	IT	0.056	0	0.116
II	consulting	1.187	0	0.169
II	finance	0.768	0.11	0.086
II	FMCG	2.189	0	0.198
IG	consulting	1.053	0.08	0.213
GG	finance	4.287	0	0.311
GG	IT	1.566	0	0.18
Super-GG	ET	0.006	0.805	0.23
GG	ET	0.135	0.402	0.109
IG	ET	0.55	0.011	0.165
GI	ET	0.006	0.991	0.119
II	ET	0.051	0.826	0.108

Engineering Placements 2013 (IIT Bombay)

Sector	Engg.	Finance	Consulting	IT
Super-GG	25 (27.7)	10 (35.0)	8 (49.6)	41 (52.1)
GG	116 (7.9)	82 (11.7)	110 (9.6)	102 (10.0)
IG	52 (6.5)	19 (7.2)	11 (5.8)	28 (7.2)
GI	24 (9.3)	10 (14.2)	10 (5.2)	5 (9.3)
II	64 (6.5)	13 (9.5)	8 (5.8)	22 (7.9)

Table: Numbers by sector and profile and average annual salary in Rs. lakhs

The Wage-Curves



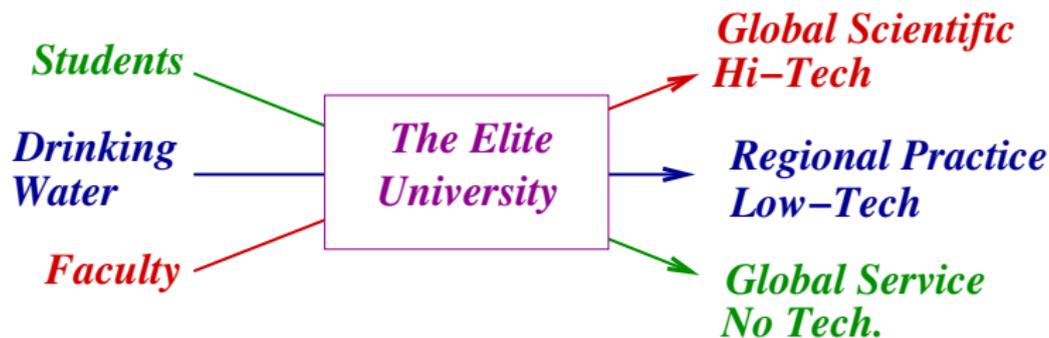
IIT Placements -Key findings

- Global companies serving global consumers is the biggest winner. Super-GG, an increasing trend.
- Engineering is least paying among all major sectors. Service sector most paying. Indian Engineering least among Engineering.
- Most profiles do not need the engineering training that we claim to give.

IIT Placements -Key findings

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-
- **mis-allocation**. Away from engineering and away from the Indian economy.
 - **irrelevance of training**. The IIT training does not seem to (i) help Indian engineering, and (ii) lead to better salaries.

The essential conundrum!



Key Stake-holders at Cross-Purposes!

Hyper-selectivity one of the causes.

The process of elitization itself is causing the problem.

The Three Questions

- Disconnect with the field and with practice.
 - ▶ *Do we have a solution?*
- Insufficient agency with State and Market.
 - ▶ *Will they adopt it?*
- **The role of the Elite University in a developing society.**
 - ▶ Global T1 *rigorous* knowledge and regional T2 *agent-driven* knowledge.



Problem 1: Loss of practice

- Much of engineering comes from *Practice*.
- *IIT Brand ignores practice and field-work* . Depends too much on the *Science of Engineering*.
- This brand is too narrow for others to follow. IIT controls JEE and GATE. *Makes IIT the leader*. *De-legitimizes practice by others*.
- Entrance exams designed for ease of testability rather than for relevance to engineering.
- Vicious cycle of elite engineering colleges becoming recruiting grounds for non-engineering and global jobs.

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- Vicious cycle of elite engineering colleges becoming recruiting grounds for non-engineering and global jobs.
- **Technical inability to provide a DW solution.**

The Solution: Broaden engineering

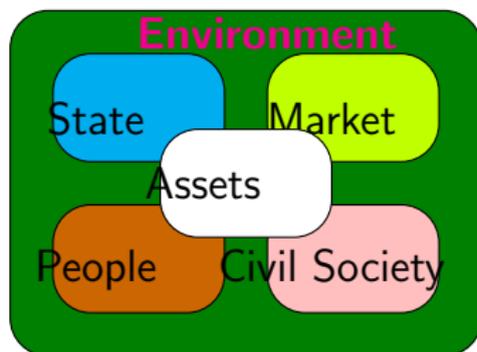
10 year program to transform engineering.

- **Inclusion:** Greater common programs which are teachable at all levels.
- **Practices:** Each college to develop key areas of *regional interest*.



Problem 2: How to embed the solution within the State or the Market

- Poor understanding of the processes of the State and Market.
- What is an innovation? What is a public good? **What is economic efficiency?**
- What is value and how is it delivered? How to define a new job profile?
- **What is sustainability? What is equity?**



OK, so we learn the structure of society



In summary—Steps I and II

Robust Trans-disciplinarity!

- Broader engineering curriculum which interfaces with society.
- *Strengthen Practice. Strengthen social science training.*
- Institutional skills of interacting with the state and the market.
- *A more robust role for the university.*

In summary—Steps I and II

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But this requires the concurrence of the Elite University!

- What is the philosophical basis for this transition? *Is it rigorous?*
- Is this on the road to global excellence? Does the state want it?
- *Is DW really a Science and Technology Issue?*

Fear of De-elitization. **Questions of Merit and Knowledge.**

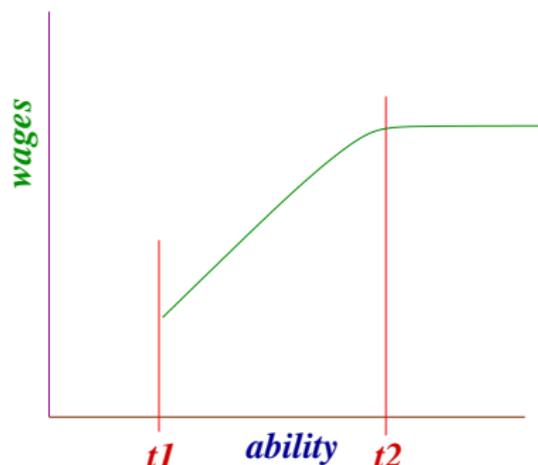
The *global* theory of commodity production?

Biscuits

Machine (Facility)	Production tons/day	Operator Ability	Other costs
M1	10	0.3	low maintenance
M2	50	0.4	good overall support
M3	200	0.6	imported

- 0.6 is that the person should be in the top 40%.
- similar analysis for service sectors as well.
- may be aggregated for a segment, e.g., cycles.
- **wages**: depend on taxes, rents, training costs etc.

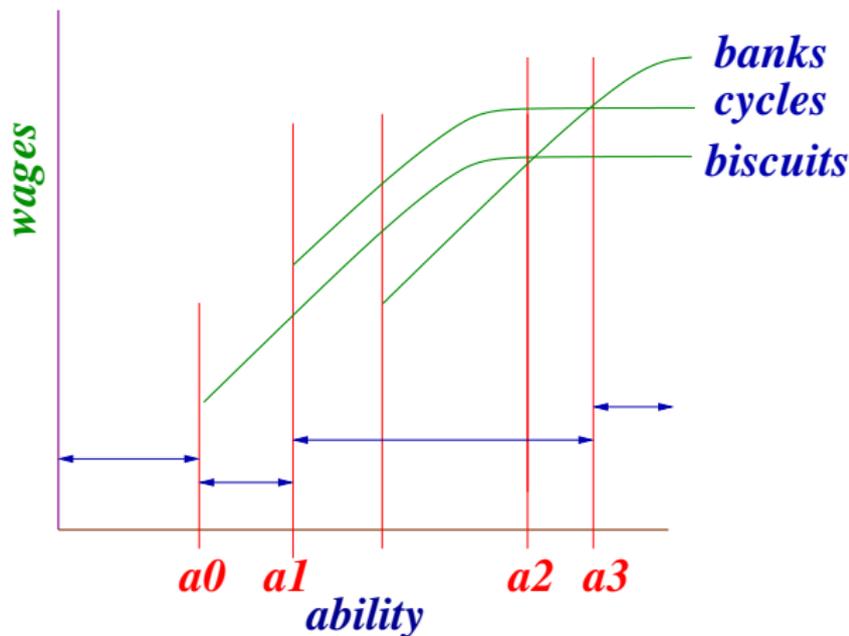
The Wages curves



Sorting and labelling

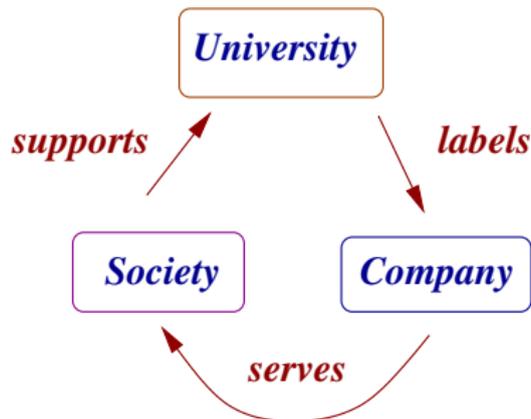
- Allocates the *better* to sophisticated machines.
- Improves social output.
- **But there are losers too.**

The Composite Wages curves



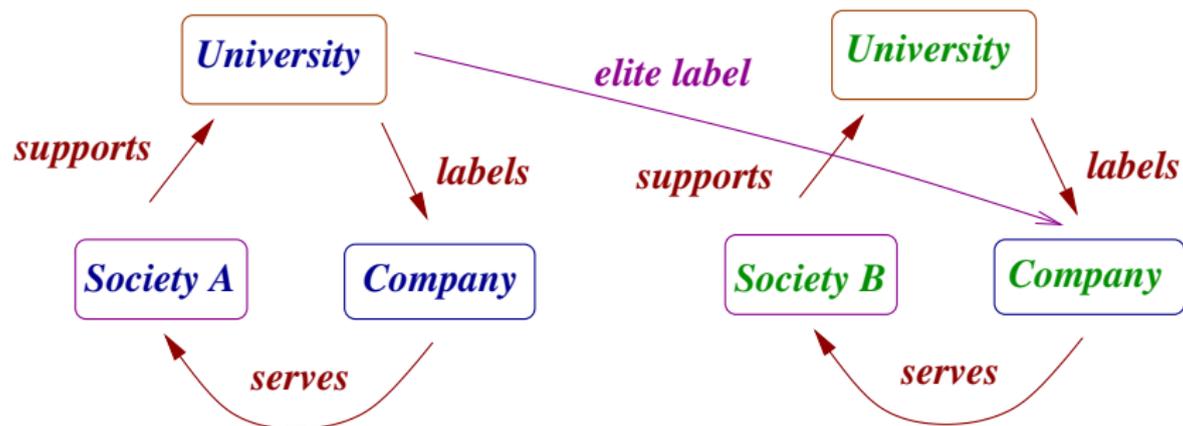
- Talent allocated by productivity in sector.

Meritocracy



- **Sorting:** The university *correctly* sorts and labels.
- **Production:** The state and the company utilizes these labels to improve outputs for the society.
- **Taxation:** Wages are redistributed so that everyone is better off.
- **Popular Support:** People make an informed judgement to support the university.

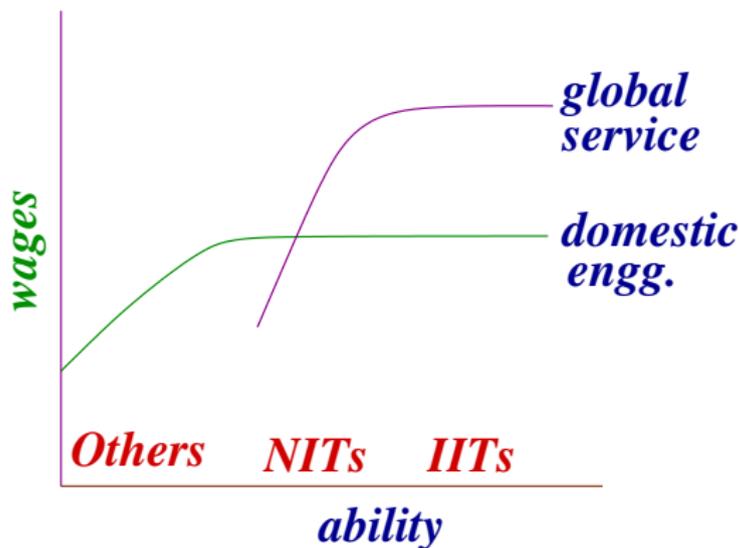
Hold On-Transfer of productive assets!



- In effect, meritocracy in the presence of another society is a bit complicated!

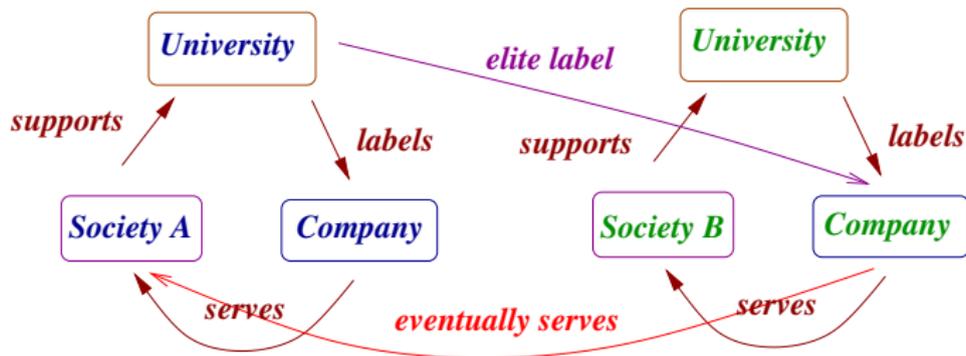
Globalization \Rightarrow The single scale

- There is a roughly **universal** scale of measuring skills which are economically useful.
- Job allocations happen globally based on your being identified on this scale.
- **There is no option.** *Have more global Indian companies!*



Deeper still...Knowledge in Globalization

- **Convergence.** Societies of the world will converge into a *global society*.
- **One Science.** There is one science, one economics and one knowledge system. It is the science of the global society.
- **Efficiency.** This system is a meritocracy and will be just and bountiful. It will eventually benefit all.

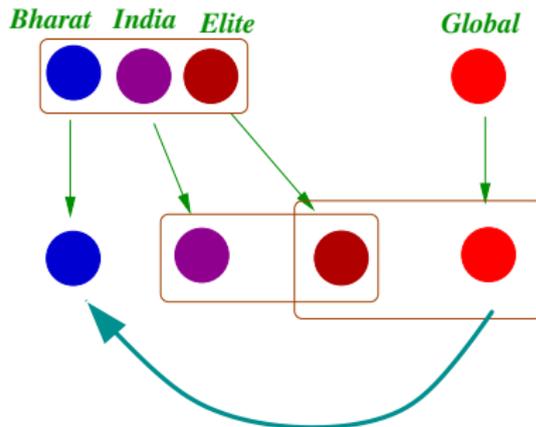


Our hyper-selective Meritocracy-an open loop!



- A **merit** of coaching classes, objective questions which must be *fair*, i.e., without context, entrance exams of fantastic odds.
- A job-allocation process which is at best a *fair* lottery. In reality, negative sum game.
- An education system of english-speaking courses and the testing of science through multiple-choice questions.
- Aspirational dysfunction. Loss of scientific temper and culture.

The Policy-fication



Drinking Water	Kurukshetra University	Civil Engg.	T2
Drinking Water	MIT, Harvard, WB	Poverty Studies	T1

- Delegitimization of local knowledge institutions
- Poor development outcomes

But do our elite buy this argument?

YES! *And they benefit from it .*

- Design of IITs. MIT, Manchester as role models. Same situation with economics, sciences and even high school education.
- Increasing use of global indices for measuring progress. Acceptance of elite agencies as arbiters of knowledge.
- Increasing use of a common global abstraction to justify policy. *A new objectivity.*
- **The theory of World Class Institutions!**

What to do?

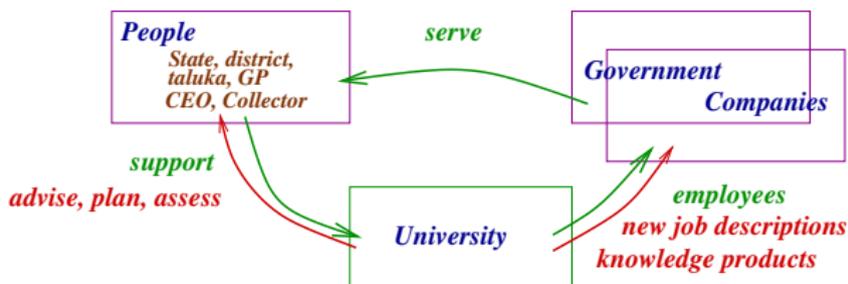
What to do?-As Thinkers-The Research Agenda

- Cultural and politics of production of T1.
 - ▶ The Social Imagination of natural and social sciences.
 - ▶ The Science loop as a political process. "Advanced" science.
 - ▶ The global knowledge elite and One-Science.
 - ▶ Cultural views and cultural diversity.
- The Question of Rigour. T1 vs. T2.
 - ▶ Global rigour vs. a plural and democratic science.
 - ▶ *Practical Rigour* and its features.
 - ▶ History of Practices and its institutionalization within/without the university.
- Economics-Elitization and Rents. The processes of production and wages
 - ▶ Must we make biscuits this way? Is French wine valued similarly? *Whats wrong with cultural production?*
 - ▶ Intrinsic inefficiency of a converged system.
 - ▶ Can there really be an equitable outcome?

More research on the Indian knowledge systems

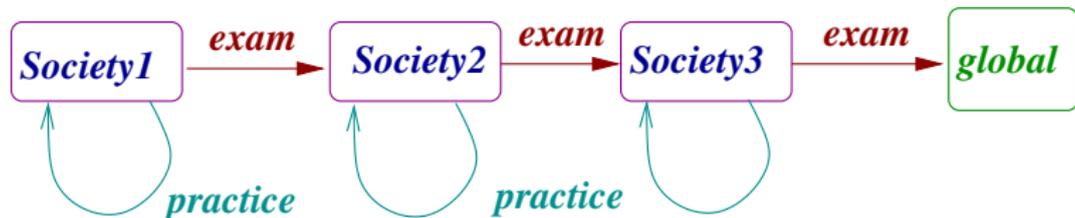
- The input, the output and the conduct of research.
 - ▶ The situation of the university, T1 vs. T2.
 - ▶ Elite institutions and their impact.
 - ▶ MHRD, UGC and other bodies. Accreditation.
- The Competitive Exam and the *social imagination* of knowledge
 - ▶ The definition of basic sciences and social sciences.
 - ▶ The race to the bottom. The gender, the urban-rural divide.
 - ▶ The impact on wider knowledge formation.
- An institutional analysis. Public Sector and its practices.
 - ▶ The appropriate size and roles for the public sector.
 - ▶ Sites for good practices, their codification and adaptability.
 - ▶ Jobs, new professions and job descriptions and institutional capacity.

Situating the University for a developing society



- **CENTRAL** to the counter-view which legitimizes local knowledge production.
- as a nurturer of *civil society* and a steward of the development agenda and its outcomes.
- Rehabilitation of the vernacular and also the *modern* and *humanist*. Culture and Society as a back-drop to the pursuit of Science.

And As Doers-Development, pedagogically the simplest!



- Re-legitimize practice and **agency** at all levels.
- Develop case-studies and new job-definitions.
- Examine the public sector and its institutional practices.
- Open up assessment and evaluations as legitimate research.
- **The CTARA agenda**

In conclusion...

- Knowledge is once more a battle-ground for contestation.
- Global knowledge frameworks, though appealing and possibly highly productive, have grave dangers.
- Our elite institutions will be ambivalent to this danger.
- Broader knowledge formation and its legitimacy is developmentally important. The University should be a key agent.

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- *However, there is much to be travelled!*

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Thanks

