EEE 452 / L-10 / 18.03.2024 /

Leveraging of Ideas:

major sources are:

- Grassroots level innovation
- Corporate operational innovation
- public service innovation
- Production process enhancement and capital mechinery innovation through ideas.
- Incremental Advancement of product
- Reinvention for lateral entry in the innovation race of existing product.
- startups and disruptive innovation
- scientific discovery and technology invention

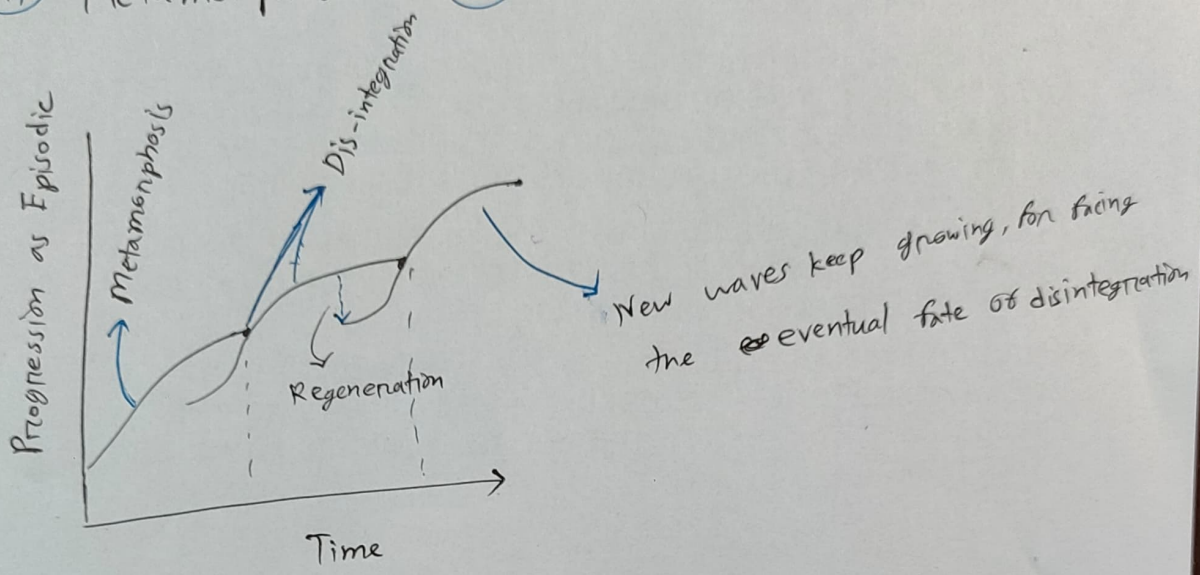
Episodic Market value of Ideas (Inventions)

- Invention don't keep growing by following a continuous path out of the flow of ideas from human capital, and R&D investment.
- Instead, they keep growing for a specific ~~inve~~ interval of time through the cumulative effect of incremental ideas... ~~flowed~~ followed by ~~dist~~ disintegration and the rise of the next wave.

- There are three distinct phases

(i) The formation, either through invention or regeneration.
or reinvention.

(ii) Metamorphosis (iii) Dis-integration



(iv) New Product Failure Rates:

- 1 of 3 launched products fail despite research and planning
- 1 out of 4 project that enter development make it to the market.
- 46%. of all resources allocated to new products by U.S. firms is spent on failed products.

(v) Inappropriate Belief About Ideas: leading to ~~want~~ wrong culture and decisions:

⇒ Innovation is a solo activity: *

- No, in reality innovation requires systematic engagement of a group of people (hundreads or thousands) even over decades for turning ideas into profit.

⇒ Innovation can't be taught!

- it's not like teaching math or physics etc. its a natural curiosity.

⇒ Innovation isn't for everyone!

- innovative thinking is contagious, anyone can think of it. But challenge is to help them finding discipline in unfolding innovation dynamics.

⇒ Innovation is about the newest thing!

- newest thing begins the journey in primitive form, and keep progressing in an incremental manner, even over decades and centuries.

⇒ Change is always good!

- not always - synchronization is a key.

⇒ You can't force innovation!

- for responding to competition, consistent innovation is must. We cannot rely on sudden creative spark.

- Apple publish upgradded product every year once.

⇒ Innovation is top-down!

- but many ideas originate from operation.

* 5 common innovation Myths:

(i) Only specific people with specific creative talents can innovate

(ii) Innovation is about new technology.

(iii) Innovation requires a lot of brainstorming

(iv) Innovation is about being random and spontaneous.

(v) You must choose either bottom-up on top-down innovation.

* Creating economic value out of human capital & ideas:

- the role of technology in reducing the demand for labor and also certain natural resources poses a threat of slowing down in saving and technology import - leading to ceasing development progression. Hence, the focus should be on the production and trading of technology ideas.

* Dynamics in the Career of ECE Graduates: idea trade is gaining ~~traction~~ traction:

⇒ ECE graduates can engage them in three different forms:

(i) in-house employee:

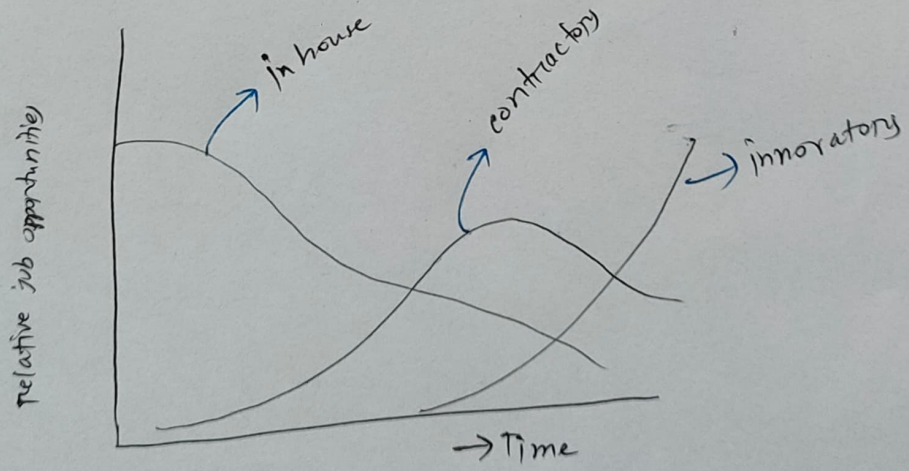
- need to acquire ECE competence, and qualify to get a job. Upon getting the job, in-house engineers keep working on technology-based service delivery and also maintaining and developing customized solutions. Salary is assured.

(ii) contractors:

- They face challeges in winning bids and delivering solutions at profit to earn salary. They also need to be good in communication and project management.

(iii) innovators:

- need to risk time and investment to envision customers requirements, develop the product and make it available for the customers to decide. The perceived value and competition will determine the price that could charged and units could be sold. If that exercise generates profit, innovators get paid.



Dynamics nature of engineer job.

* Scalability of Grassroot ideas: offers innovation opportunity to STEM graduates:

- If a grassroot idea adds 2 percent extra to the rural economy, the compounding effect of it over 10 to 20 years could be significant. Hence the focus should be on fostering creativity, idea production, integration, and diffusion at the grassroots level.

* Creating and Capturing Economic Value out of Technology Possibilities:

Smart Technology Users - extracting value out of wages.

- Technology we creates economic value - could be measured as consumer surplus. Hence, savings from labour and natural resource trade could be used to import and use technology to create further economic value.

- Bangladesh's RMG sector is the success story of creating employment of low skilled workforce out of technology import.

* Technology service providers:

- There are two major categories of services:

(i) technology development and innovation,

(ii) Technology operation management services.

* Technology Intensive Manufacturing:

- Value from technology could also be derived from manufacturing services.
- Through manufacturing services, both labor, knowledge and ideas could be leveraged.
- Instead of taking advantage of low cost labor, they focus on the quantity, cost, scope, and scale & advantage of emerging production technologies.
- Succes story - Taiwan semiconductor manufacturing company.

* In-house custom solution Provides and Contractors:

- Technology value could be derived through customized application development.
- most of the major technologies started the journey for serving the customized application development.
- IBM developed customized computer for US air force B52
- In the 1950s, US Air Force pursued customized application development for air defense.
- IBM and Siemen has a large busines of customized application development. Recently, Microsoft has got involved with US defence for offering customized application around its holoens technology.

Idea Building Block or IP Provider:

- All major products, whether hardware or software, contains several IP building blocks. They could be developed and licensed
- the semiconductor industry has a rich history of IP development and trading. One of the notable example is ARM holdings.
- another one is cyber security segment.
- So there should be focus to obtain adequate clarity on the role of the intellectual property (IP) system for tradable ideas.

Component Innovator:

- As opposed to innovating a finished product, whether for consumers or bwiness customers, you may target to exploit technology possibilities out of your knowledge and ideas as component innovator.
- Sony has been developing image sensor.
- Intel created huge bwiness out of developing and supplying components to Personal computer Makers.

Process Equipment Innovator:

- Technology possibilities could also be harnessed by developing intellectual assets and trading them as production process equipment.
- more or less, all the ~~pr~~ robotics companies are process equipment innovators and suppliers.

End-user product innovators:

- technology capability, finished product innovation demands a very high focus on understanding end user preferences. In some cases, aesthetic appeal is far more important than technology and functional capability of products.
- To succeed as finished product innovator, there should be also focus on forming partnership with component and process equipment provider.
- Apple vs ~~Foxcon~~ Foxcon ⇒ next generation robotics to support the production process of Apple products like iPhone.

(*) Startups- for pursuing creative destruction:

⇒ History of the startup journey could be divided into four distinct phases.

Phase-1: During the 19th century, out of tinkering, Edison and many others came up with ideas, got patents, and started rolling out innovation - even through craftsmanship.

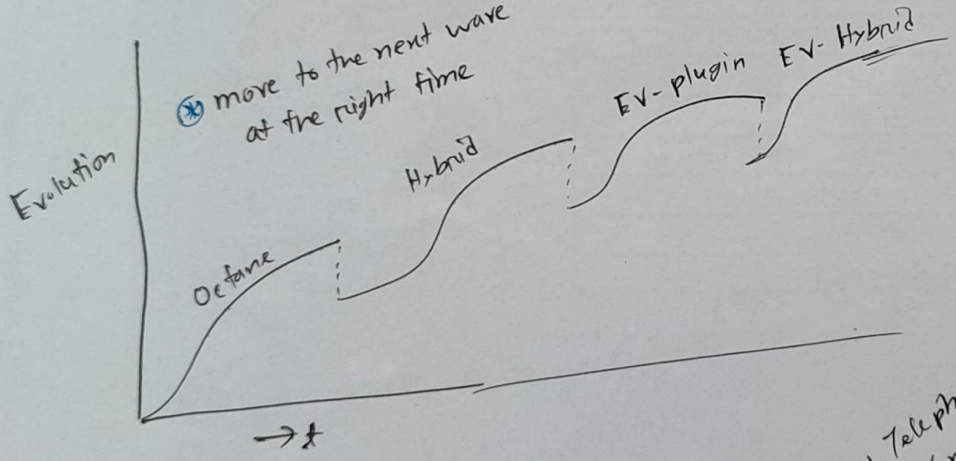
Phase-2: In the USA, just right after WWII, institutional R&D for war agenda led to the formation of some technologies for rolling out innovations for defense and civilian applications. Consequentially, it led to new companies by R&D staff members, graduate students, and professors.

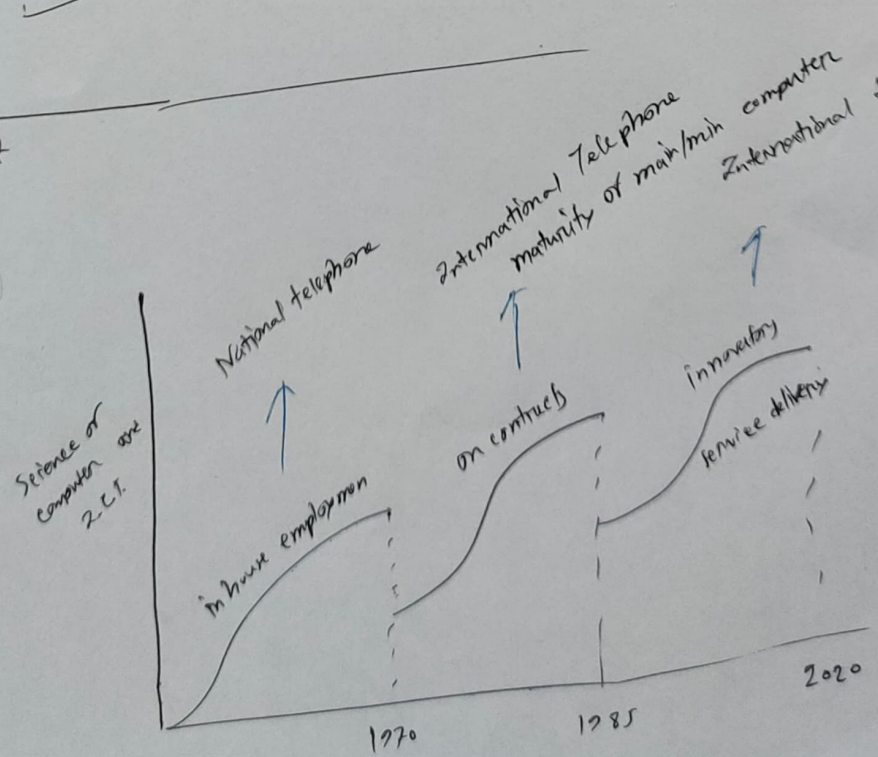
Phase-3: The growth of silicon technology led to the ideas and formation of startups around personal computers, handheld devices, and software applications. The scalability of silicon and software was the underlying force in turning some of these startups into highly valuable corporations like Microsoft, Apple, and many more. But it was not naturally occurring.

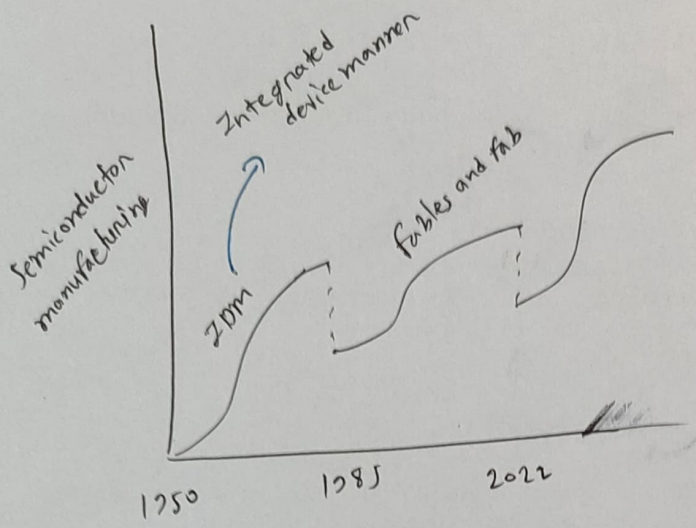
Phase-4: Digitization ideas around the smartphone, mobile, internet, and cloud computing led to the formation of the latest startup rush. This time it has propagated to the developing part of the world.

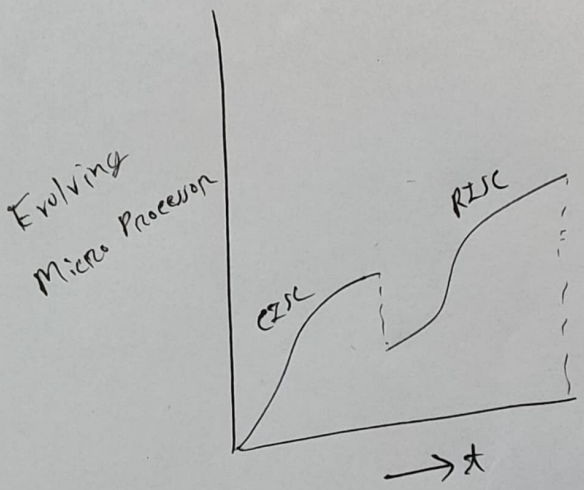
⇒ Great ideas demands systematic research.

- subsidies in increasing customers for inflating valuation run the risk of burning investors money, failing to create wealth, and indulging in fraudulent practices.






Integrated device manufacturing
Semiconductor manufacturing
IDM
Fables and fab
1950
1985
2022


Evolving
Micro Processor
CISC
RISC
→ *