Engineering Management Methods BMEVITMAK47
Electrical Engineering BSc Major
Software Engineering BSc Major

ORGANISATIONS IN RESEARCH, DEVELOPMENT AND INNOVATION

from basic research to spin-off firms

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INNOVATION VALUE CHAIN

Research		Development		Capital expenditure	
Basic research	Applied research	Technology development	Product development	CAPEX into technology	CAPEX into infrastructure

Read more: http://bluerockinnovation.com/valuechain.htm

RESEARCH

a.) Basic research

- Theoretical, scientific task only,
- New knowledge for its own sake, irrespective of practical uses,
- Indirect or no impact on business,
- Methodology, basic sciences, new materials,
- Research institutes are financed mainly by state budget.

b.) Applied research

- Research aiming at results applied in the economy,
- Research in fields of technology, engineering, economics, biology, etc.
- Mainly financed by business through research contracts,
- State budget may give only indirect subsidies.

Read more http://dr-monsrs.net/tag/basic-research/

DEVELOPMENT

a.) Technology innovation

- Innovation based on research results,
- Procedure of new way of production,
- Technology to be able to produce more products or services of higher quality,
- Result can be a patent or an improved description for a new procedure

Read more:
https://onlinelibrary.wiley.com/doi/full/10.1111/j.1467-9310.2011.00672.x

b.) Product development

- New product for new or changing demand,
- Can be based on new technology, but not necessarily,
- Totally new technology may lead to totally new products,
- Viability of the new product is measured on the market.

Read more:
https://www.feedough.com/new-product-development-npd/

INVESTMENT INTO CAPITAL EXPENDITURE (CAPEX)

a.) CAPEX into technology

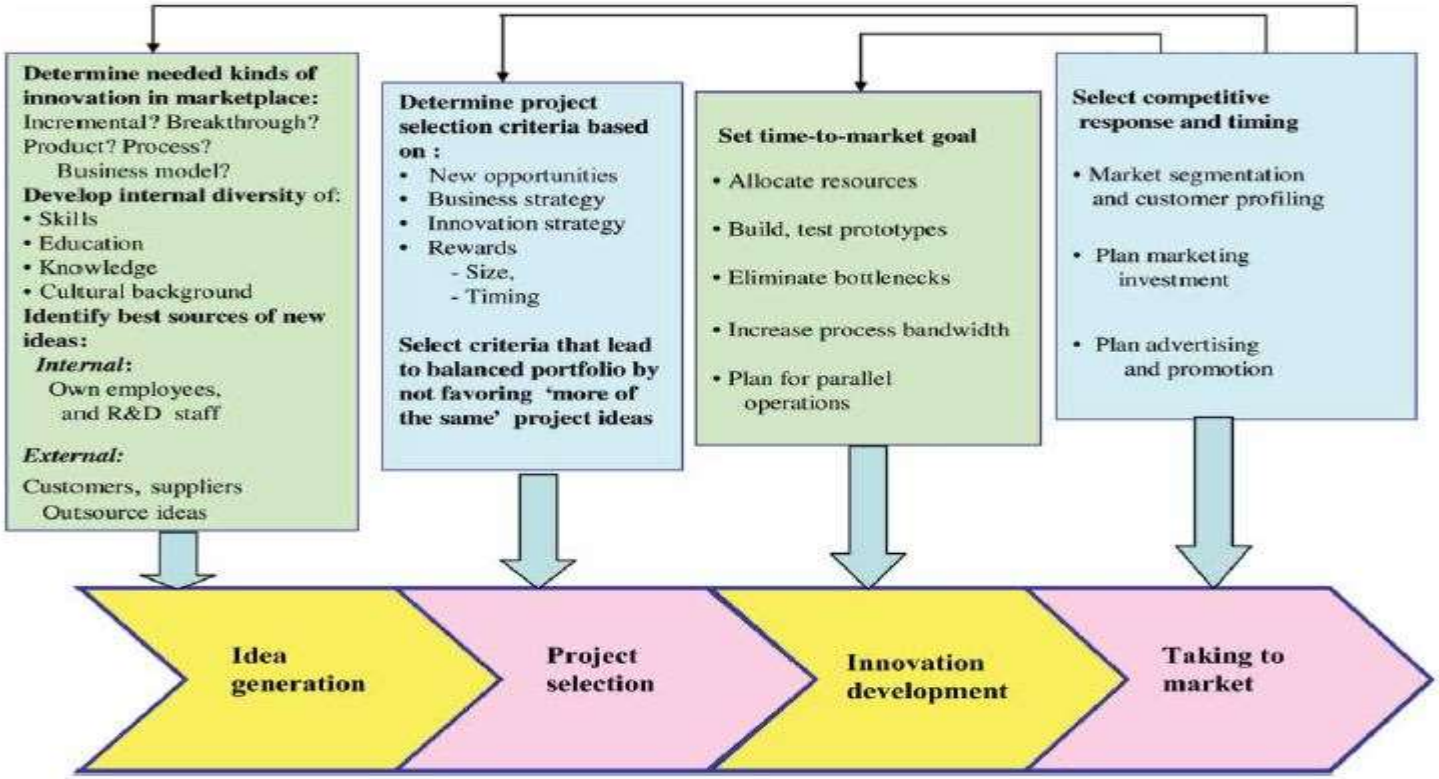
- Investment **directly** into procedures, equipment and devices for the production of the new product or service.
- It can be radically new technology or supplementing of an existing technology.
- Several types of products can be produced by the new technology.
- Or it is built into new products (like processors or formerly steam engines)

b.) CAPEX into infrastructure

- Creates the conditions and environment of the production
- Material conditions: energy, water, means of transportation (roads, railroads, waterways)
- Linkage to the business environment and business communications (infocommunications, postal services, etc.)
- Ensure and develop human infrastructure (transport for workers, lodging workers, training programs)

Watch more: https://www.youtube.com/watch?v=mBHDlJWhKTc

INNOVATION VALUE CHAIN



http://www.adaptivecycle.nl/index.php?title=Literature_Review_%28BG%29

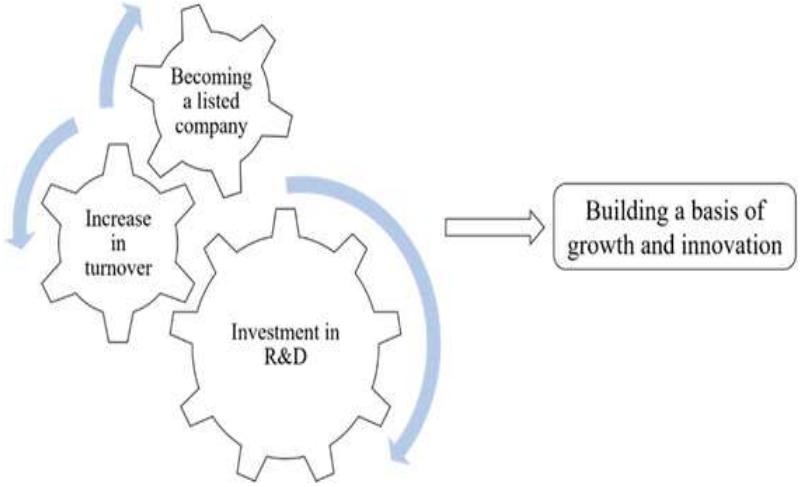
PROJECTS IN GENERAL

- To achieve a given goal, within fixed timeframe, limited financing and other resources.
- Participants: project leader, project administrator, project members
- External participants: project sponsor, project leading committee, project financing organisation (procurer)
- Tasks: being in touch, external and internal communications, archives for interim and final results, utilization of the intellectual properties and products.

https://www.publichealthnotes.com/project-management-cycle-pmc-its-phases-and-characteristics/

RDI PROJECT SPECIALITIES

- There is a need for
  - – diversity of knowledge from participants,
  - – connected knowledge, to communicate to each other.
- Information sources and other research groups' activities should be monitored regularly.
- Methodology should also be documented to repeat or to understand the experiments and accept the results.
- Results should be published *(if it is possible)*



https://jopeninnovation.springeropen.com/articles/10.1186/s40852-018-0093-4

PROJECT ORGANISATIONS

a.) Simbioses of more projects (multiproject management)

- Conditions for more than one project
- Different projects are in different phases of the workflow: from the preparation until the termination
- Common units provide similar services for different projects, like: administration, financing, working rooms, maintenance, server parks, archives for documentation, other infrastructure.

https://www.liquidplanner.com/blog/10-strategies-managing-multiple-projects/

PROJECT ORGANISATIONS

b.) Capacity management

- Look after the new opportunities for new projects, networking, negotiate and bidding, etc.
- To know the knowledge and experties of the fellow workers: „who is able to do it”
- To be informed about the participation of the staff in other projects
- Incentives of the staff should lead to participation in projects: incomes should be higher for members than non-members

https://www.saviom.com/blog/5-best-practices-better-capacity-management/

RESEARCH ORGANISATIONS

a.) Research Institutions and Universities *(traditional organisations)*

- Research is one of the basic activities, it is shown in the name of the institution, the name is also a brand.
- The institution has a main sponsor, to finance it mainly (it may be the government or nongovernment organisation [e.g. foundation]).
- There is an administrative staff for multiproject management.
- There are own publications, conferences, participation in the scientific community events.

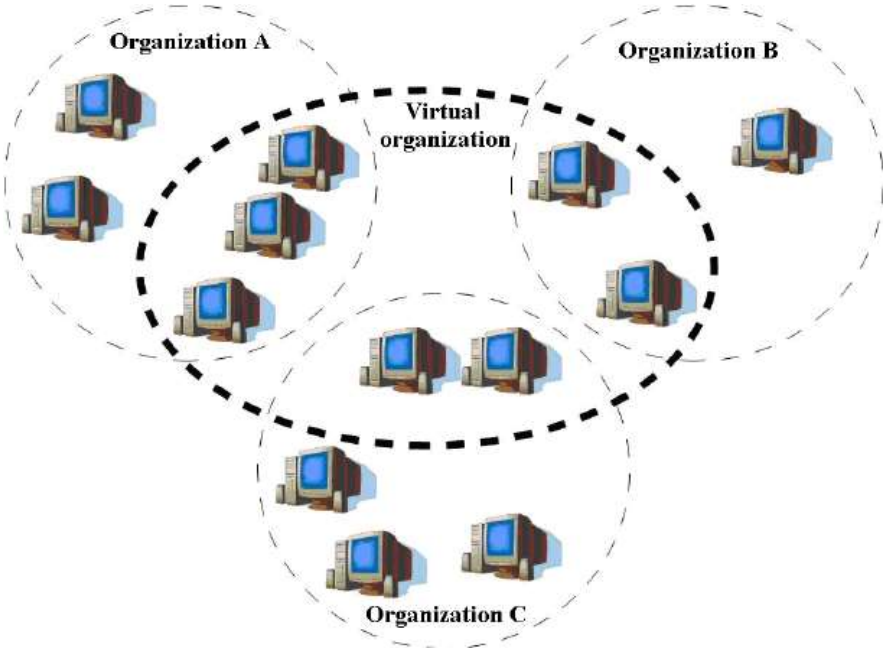
Massachusetts Institute of Technology

http://www.collegechoice.net/rankings/top-universities/

RESEARCH ORGANISATIONS

b.) Networks for research
(virtual organisations)

- Cooperations among research institutions, at departmental or at institutional level.
- Projects and organisations involved in or related to international research (EU and ITU has several of them)
- Foundation for research, contracting independent researchers for projects.
- Participants living very far from each other may work together, meet in the virtual space, they and their results appear in the virtual organisations.



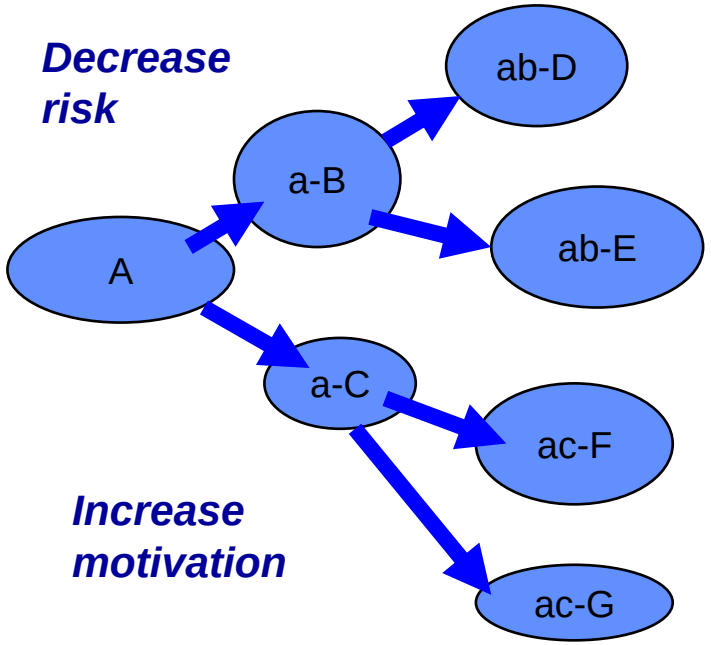
https://www.researchgate.net/figure/Diagram-of-virtual-organization-formed-by-sharing-the-means-of-real-organizations_fig1_263010684

NETWORKS OF SPIN-OFF FIRMS

a.) „Spin off" firms

- New firms or new organisations to develop new technology or new products.
- Separate themselves from the initiator organisation, when it is seen that the result of the RDI activity would produce a viable product.
- Independent small firms, the mother company remains the owner in many cases.
- Staff having the essential knowledge can become owners.

b.) Strategy of Spin-off networks



A good PhD on Spin-off R&D strategy

http://edoc.unibas.ch/276/1/DissB_7179.pdf

SPECIALITIES IN RDI ORGANISATIONS

a.) Knowledge management

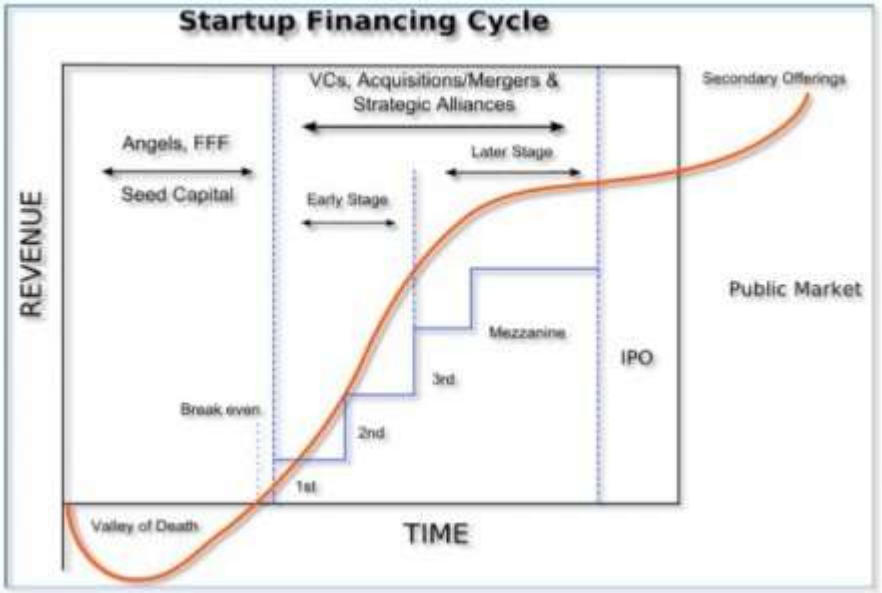
- The value making process (value chain) depends on the staff.
- The most valuable capital (individuals) goes home every day, and next day decide to return or bring the knovledge to the competitors.
- Working style should be cooperative.
- Only the documented (not hidden) knowledge can produce profit.
- A map of knowledge is needed .

http://www.aquatnet.com/index.php/137/experience-share/

SPECIALITIES IN RDI ORGANISATIONS

b.) Credit, mortgage

- Credibility depends on staff‘s knowledge.
- There can be conflicts within the staff.
- The value of the assets are relatively low.
- Prefinancing large projects is a problem.
- Banks do not give high loans to these firms.
- There are strategies to solve these problems: twin firms, and spin-offs



http://economic-consultants.com/funding/seed-money/

SUPPLY AND DEMAND IN RDI

a.) Demand side

- Order for new production method, new product or service or new organisational plan.
- Business firms give the order for the RDI organisations.
- Indirect subsidies might be related to the order (see obligatory contribution for innovations in Hungary).
- The contract for research must not lead to effective results; the contract for development must have effective results.

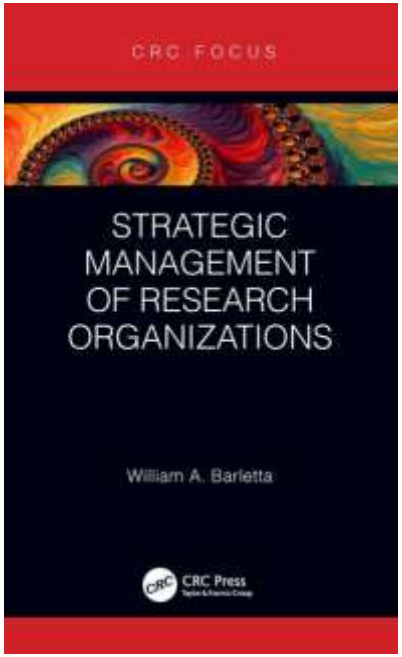
b.) Supply side

- The knowledge based on the research appears in a new technology or in a new product.
- Mainly works for existing orders but there might be some developments on their own risk.
- The result is mainly an intellectual product: plan, description, know how, some prototype.
- The organisation can be an independent firm, an RDI unit of a large firm, a department in a university or other institution.

European Union Research data

https://ec.europa.eu/info/research-and-innovation/funding/funding-opportunities_en

BOOKS ON THE TOPIC



https://www.routledge.com/Strategic-Management-of-Research-Organizations/Barletta/p/book/9780367255855?utm_source=crcpress.com&utm_medium=referral

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