Unit I: Innovation: What and Why?

Innovation as a core business process, Sources of innovation, Knowledge push vs. need pull innovations. Innovation, invention and creativity, Types of Innovation, Challenges of Innovation, Steps of Innovation Management, Idea Management System,

Case Study I: Innovation management in the IT industry.

What is Innovation?

Innovation is defined as the process of bringing about new ideas, methods, products, services, or solutions that have a significant positive impact and value. It involves transforming creative concepts into tangible outcomes that improve efficiency, and effectiveness, or address unmet needs.

Innovation is not limited to technological advancements and encompasses novel approaches to problem-solving, processes, organizational practices, or business model innovations. At its core, innovation involves challenging the status quo, thinking outside the box, and taking calculated risks to drive progress and achieve breakthrough outcomes.

Innovation is driven by a combination of factors, including curiosity, creativity, and the desire for improvement. It requires a mindset that embraces change, welcomes ideation, and encourages experimentation. Innovation can occur in various contexts, such as business, science, technology, social sectors, or public services. It can lead to economic growth, social progress, improved quality of life, and sustainable development.

What is Innovation? (Definition)

The word “innovation” is derived from the Latin verb innovare, which means to renew. In essence, the word has retained its meaning up until today. Innovation means to improve or to replace something, for example, a process, a product, or a service. In the context of companies, however, the term needs a definition. In the complex context of business, a definition is needed.

Innovation is a process by which a domain, a product, or a service is renewed and brought up to date by applying new processes, introducing new techniques, or establishing successful ideas to create new value.

The creation of value is a defining characteristic of innovation.

Why is innovation so important?

Organizations have several options to increase their competitiveness: they can strive for price leadership or develop a strategy of differentiation. In both cases, innovation is essential.

Companies that choose price leadership must secure their long-term competitiveness by developing innovative, highly efficient processes. Process optimization and continuous improvement in terms of costs are important for them.

Companies that strive for a differentiation strategy need innovation to develop unique distinguishing features to their competitors.

Many start-ups launch their activities by developing an innovative product or service.

Continuous innovation is, therefore, crucial for all companies. The main difference is in the focus of the innovation strategy, which varies considerably from company to company.

The Right Mindset for Innovation

Innovation requires more creativity and more willingness to take risks than the implementation of typical projects. To successfully realize innovation projects, a different mindset is needed. We have created four cartoons, which you are welcome to include in presentations or on your website with reference (backlink) to this page.

Break the rules!

With traditional approaches and conventional methods, you will often not get anywhere in the field of innovation. Challenge the status quo consistently! And explore new paths off the beaten track.

Collect ideas everywhere!

Innovation projects constantly need new ideas: To overcome obstacles, to change concepts, and to optimize strategies.

Believe in the impossible!

Imagine how your innovation will look like in reality. And believe that you will be able to overcome all obstacles on the way to realization.

Put together an innovation team of individuals with different perspectives and thinking styles!

Innovation needs the diversity of various competencies and diverse ways of thinking.

Innovation aims to address existing challenges, inefficiencies, or limitations by developing innovative solutions that offer tangible benefits or improvements.

Innovation requires more than just ideation; it involves implementing and executing new ideas or solutions to bring them to fruition.

Successful innovation creates value for stakeholders, whether it's by improving efficiency, reducing costs, enhancing performance, increasing productivity, or delivering superior user experiences.

Innovation and incremental change

While examples of groundbreaking innovations come easily to mind, small yet significant change can also be innovative. Each day in industry improvements are made to the way processes are carried out leading to increases in production rate, product quality, waste reduction, and worker convenience, comfort, and health. Imagine a spinning manager and his or her team seeking to improve the quality of wool yarn. Greater yarn uniformity and fewer thin places are the goals. After some thought and some well controlled trials a combination of improved fibre selection and changes to drawing and spinning frame parameters result in significant improvement in yarn quality. A plot of Coefficient of Variation (CV) versus Time shows a relatively rapid jump from the old level to the new. In general, the reward continues on through time.

A common feature of this kind of innovation is the very significant benefits gained downstream as a result. Fewer clearing breaks, greater winding efficiency, reduced waste, fewer loom stoppages, reduced fabric mending and increased fabric quality will most likely result from the spinning team's effort. So, while this kind of innovation might be thought of as incremental, the benefit to the whole enterprise may be very significant. This is why effective enterprises encourage the development of awareness by their staff of the whole process, not just the immediate work area. And while the innovation on the spinning floor may not easily be seen in terms of attack and defence, the improved product quality and value for money the company as a whole can offer to its customers as a result may very well be the weapon of attack, which the company uses to increase its market share against competitors.

The evolution of an innovation

Whether it is monumental or incremental, all innovations follow a similar pattern. There is a new understanding, inspiration, challenge, opportunity or discovery that initiates the whole thing Almost always, technology will be involved, whether the innovation is a startling new discovery or a novel use or novel combination of existing technologies. There follows an expenditure of effort in developing the new initiative. A period of reward for effort follows and this can be explosive in nature. This is called the 'boom' phase. Finally, the reward for effort expended tails

off and flattens. In the end it will usually fall away, and this can often be catastrophic as a result of a challenge from another innovation.

The plot of Reward (number of sales, profit, and so on) against Effort (staff hours expended, money invested, and so on) is usually referred to as an S curve. S curves can be used to characterise many areas of human activity, from the progress of a building project to the rise and fall of an empire. They are particularly useful in visualising the evolution of innovations in periods of rapid technological change. While many S curves are a plot of Reward versus Time, it may often be more informative to choose a variable more closely related to the true effort expended. The plot of CV% versus Time in the spinning example referred to earlier may also be seen as an S curve.

A particular class of S curves uses a plot of cash flow against time. An initial promising idea usually needs considerable resources applied to enable it to develop it into a prototype and even more expenditure to push the development through to commercial release. Up to this point there has been no income at all. The cash flow has so far been negative and generally will remain so for a time after product release because of the cost of marketing and product support. If the product is successful, cash flow will become positive and even highly lucrative until competition erodes or eliminates the advantage. This class of S curve therefore has a negative dip to begin with and is sometimes referred to a J curve. Nevertheless the shape is still clearly that of an S.

Example:

A good example of an S curves can be obtained by plotting recorded music album sales as Sales versus Time. Here, both vinyl discs and CDs are regarded as albums. The curves for the two types of recording are plotted separately together with their combined sales. Clearly, the CD was seen by the market as a much more desirable product than the vinyl disc and the peak number of CDs sold per annum vastly exceeded that of the vinyl product at its peak. Despite its success, the CD has passed its heyday, the curve suggests

The discontinuity

Foster refers to the period of transition from one innovation to another as a ‘discontinuity’. At a discontinuity, the Reward versus Effort curve breaks into two. It is the point at which one technology, design or concept takes over from another. In many cases because the new innovation is able to almost immediately capture the defending technology’s market and build upon it, the rewards to the innovator will surpass those of the defender, just as in the case of the CD.

There are a multitude of examples of innovative attack leading to a break or discontinuity with what has happened in the past. The following are some examples.

Defender	Attacker
Sword and shield	Bow and arrow
Bow and arrow	Firearms
Wind power	Steam power
Horse power	Internal combustion engine
Cylinder recording	Disc recording
Telegraph	Telephone
Thermionic valve	Transistor
Discrete wired electronic circuits	Integrated circuits
Portable CD player	MP3 player and music downloads
Natural fibres	Synthetic fibres
Denim	Tencel
Wool knitwear	Cotton knits

Importance of Innovation in Entrepreneurship

1. **Market Differentiation:** The approach entrepreneurs take to innovation will give them an advantage in coming up with products that are not sold by competitors or services that have different business models from others. In this regard, it makes the manufacturer remain relevant in the market, thus enhancing customer choice and building a fresh brand image.

2. **Customer Satisfaction**: As a result, innovation yields entrepreneurs' better understanding of and responsiveness to customers' constantly changing desires and preferences. Through providing answers to particular problems or introducing better features for performance, usability or convenience, innovators could create an interesting customer experience leading to the increased satisfaction and loyalty and better prospects of references by customers.

3. **Competitive Advantage:** In the business world of our time, the key to success lies in the entering the market in front of competitors, and this is the most important way to survive. Innovation provides them with a competitive advantage through product or service advancements, market openings, and streamlining of processes. The competitors cannot follow the innovation as fast as the innovation leader.

4. **Revenue Growth:** Inspiring ideas that have proved fruitful can not only lead to revenue generation for new-age ventures but also create wealth. They introduce new products or services to markets that are not fully explored, or they refine and improve existing products which ultimately leads to an increase in sales and market share.

5. **Cost Efficiency:** Innovations, furthermore, not only comprise product and service innovations, but also include process optimizations. Innovative entrepreneurs who are quick to make amendments in their business management practices can cut costs, improve productivity and increase efficiency and consequently boost profitability.

6. **Attracting Investment and Talent:** Investors tend to buy shares in startups that have great ideas and whose growth potential is high. Innovation does not only suggest that one is committed to progress but is also courageous in trying to break the mold in which established firms already have market shares. This further makes investors more risk-takers and encourages them to embrace entrepreneurial businesses.

7. **Sustainability and Resilience:** Innovation usually outlives those disturbances that can be unpredictable. It puts you into the position of being flexible and resilient. Even for innovative entrepreneurs who can embrace the new and exploit new opportunities once they surface, continue with diverse strategies, and maneuver through obstacles, the continuity of their enterprises depends on their capacity to prosper in the long run.

8. **Social Impact:** The innovation is not merely creating economic value but also brings social benefit as well as environmental improvement. Social entrepreneurs capable of proposing creative solutions that answer the society's problems are always welcome since they help improve community welfare, build a better life, and promote sustainable development.

Types of Innovation

Innovation implicates different dimensions, from the state of the art to step-function-like breakthroughs. Here are some common types of innovation,

1. **Product Innovation:** Product innovation consists of developing new products with superior characteristics, adding new features to the existing ones, or improving the quality and functionalities of the existing products. These innovations usually incorporate research and development to introduce brand new and appealing technological systems, designs, or materials more often.

2. **Process Innovation:** The constant improvement of methods, technologies, or workflows for producing goods or providing services is a part of process innovation. A good supply chain management, production process, or service delivery system can result in a variety of benefits like costs savings, increased efficiency, as well as quality improvement.

3. **Business Model Innovation:** The innovation of the business model implies the recreation of the fundamentals of the business systems related to how the business does its work, gets revenue, creates value to its customers. Such endeavor may coincide with designing corresponding pricing schemes, distribution channels, revenue streams, or partnerships that can challenge the current order that reigns in the market and discover new market gems.

4. **Marketing Innovation:** Innovation in marketing is about new and dynamic tactics for attracting customers, building the brand and sending to their attention the goods or services at one's offer. Some examples could be creative marketing tools and fresh approaches to social media visibility, experiential techniques, and customer-centered strategies, to help brand differentiate in the market.

5. **Technological Innovation:** Technological innovation is a very broad concept that defines how companies get a production of a new product or service by means of some technologies that have never been utilized before or only recently used up to the innovating moment. These, of course, can range from breakthroughs in areas of AI, biotechnology, renewable energy, nanotechnology, IT or communication, which in turn form a basis for the industries of the future and become drivers of economic growth.

6. **Incremental Innovation**: Creeping innovation encompasses repeated minor upgrading of products, processes and services that occur over time. The incremental approach is a consistent and continuous strategy, and combined with other approaches, it is one of the most viable strategies for businesses. However, these advancements may not be earth-shattering at the moment, but, they give organizations a generative edge in the long run in the sense that they keep on enhancing the performance, reliability, or affordability of the various products.

7. **Open Innovation:** Open innovation means the external partners' collaboration and transfer of knowledge, which may be customers, suppliers, universities, or research institutions with their own ideas and resources. This could be through the form of open-source projects, crowdsourcing, or strategic partnerships to utilize the out-of-box and streamline innovation action plans.

8. **Radical Innovation:** Entails significant breakthroughs that create entirely new markets or revolutionize existing ones.

9. **Disruptive Innovation:** Introduces products or services that start in simple applications at the bottom of a market and then move up, displacing established competitors.

10. **Architectural Innovation:** Combines existing technologies in new ways to create new markets.

Incremental and monumental innovation

Monumental innovation	Incremental innovation
Major paradigm shift in technology	Novel combination of existing technologies or pedestrian change in use of known technology
Initial high risk of failure	Low risk of failure
Technology based on, and continues to require, scientific study at a fundamental level	Little or no new fundamental science needed
Significant R and D costs in both time and money even before product launch	Relatively small development costs
Major negative cash flow as a result of not only R and D costs, but initial marketing costs	Marketing costs likely to be the most important component of relatively small initial negative cash flow
Costly technical support even well into the boom stage and beyond	Little technical support beyond product launch
Potentially very high returns if successful	Generally smaller returns, particularly where innovations are following fashion trends
Lifespan of years, sometimes decades	Shorter lifespan, often within a fashion cycle
Technology used in many product ranges	Directed at a single product range
Triggered by a major innovative attack	Directed at maintaining a mature phase of a major product line
Often seen as the only way to save an enterprise or industry in the mature phase particularly if is under attack.	Often seen as preferable because of the higher number of ventures at lower risk

Factors Affecting Innovation Adoption:

Several factors can influence the adoption of innovations, including:

- **Perceived Risk:** Potential adopters' assessment of the uncertainty and potential negative consequences of adopting the innovation.
- **Social Influence:** The effect of social networks and peer pressure on an individual's decision to adopt an innovation.
- **Economic Factors:** Cost considerations and potential financial benefits associated with the innovation.

Phases of Innovation

Innovation typically progresses through several distinct phases as ideas are developed, refined, and ultimately brought to market. Here are the common phases of innovation,

1. **Discovery:** The first process is to pick out really good ideas or possibilities. The procedure could be any kind of brainstorming, product research, trade analysis, or customer feedback stimulated by ideas for potential innovations.

2. **Definition:** After the idea generation, the next step is to refine the ideas and examine their feasibility and the viability in terms of the current market situation. This stage includes conducting market research, feasibility analysis, and a preliminary business development plan to establish the worth and effect of those ideas.

3. **Design:** It is now the time to turn the originally generated idea into either a conceptual prototype or a concrete plan. Through collaborations among designers, developers, and engineers, we are able to create prototypes that we will use for testing purposes in order to find out if the technology is feasible and it actually works the way we want it to.

4. **Development:** The next stage is product innovation design by the developers into a marketable form ready for business. Doing this implies that designing, engineering, manufacturing, or generally any process needed to turn the conception into reality is involved.

5. **Testing:** The tested invention then enters the phase of examination aimed at checking its functionality, ergonomics, reliability, etc. Testing may include testing with alpha and beta users which is aimed at early adopters of the product. Quality assurance tests also aim at identifying and resolving any defects found within the system.

6. **Launch:** The launching of the innovation entails expressing it at the market to cater for the needs of customers. This is where you plan activities like marketing exercises, promotion, and distribution strategies aimed at creating visibility, building customer base, and achieving critical mass in the market.

7. **Growth:** Following the launch, the task of scaling will eventually give way to the growth and expansion plan. This part is a continuous cycle of adding new functionalities, features or services aligned with feedback from customers, expanding product availability for different markets and customers, and refining business processes with an aim of sustaining market growth.

8. **Maturity:** The innovation progresses and winds up at a point of maturity beyond which the growth is more or less stable and the market becomes more saturated. At that stage, the goal is no longer gaining market share and escalating profit margins but successful sustenance of the share, continuous profitability, and possible diversification, including the creation of new opportunities for innovation.

Barriers to Innovation

1. **Resistance to Change:** Workers, shareholders, or staff might operate slowly in the formulation and implementation of novel ideas and approaches out of the fear of the unknown,

what is or what they cannot foresee. Perhaps they are so reluctant to let the present go, and give a way to something that is not known.

2. **Lack of Resources:** Insufficient funding, time, competence, or connectivity accessing the required technology and infrastructure are some of the significant challenges associated with innovation enterprises. Without these necessary funds, organizations can't try out, experiment, or implement new ways of solving a problem.

3. **Risk Aversion:** A lack of self-confidence, unidentified source, or the realization of the consequences of innovation may create a barrier for an organization to try out something else or to be reluctant to actually be exploring new ideas.

4. **Bureaucracy and Organizational Hurdles**: The traditional complex organizational hierarchies, rigid decision-making processes, and ineffective bureaucratic regulations may hinder innovation as they stifle creativity, disturb teamwork, and cause new initiatives to be fruitless.

5. **Short-Term Focus:** The failure to propound short-term outcome or an ensuing laser focus on immediate organizational targets may become a hindrance to raise awareness and initiate innovation-centered programs. Enterprises with an eye only on the quick buck are likely to focus on optimization and little operational improvement, rather than the riskier, longer-term innovative work.

Benefits of Innovation

1. **Competitive Advantage:** Introducing new and innovative products, services, or processes can be an effective way to differentiate an enterprise from competitors in a specific market and allow a company continue dominating the market.

2. **Increased Efficiency:** Innovation is one of the key factors of success promotion, since it usually brings about process changes and makes everything work in a more streamlined manner, with those costs being reduced and productivity rising.

3. Revenue Growth: Many innovative products that are successful can ensure the revenue growth of an enterprise by tapping new markets, drawing new customers, and raising the consequent sales of existing items or services.

4. **Enhanced Customer Satisfaction:** Sharp solutions determine the customer requirements precisely, meaning customers will be even more satisfied, loyal and have a good brand image.

5. **Improved Productivity**: Technology holds the potential to automate some functions, improve processes, and also empower workers with the necessary tools and technologies used to improve productivity on the team.

6. **Attracting Talent and Investment:** The innovative firms, who have the talent as well as investors under their belt, adore institutions with innovation and invoke a lot of inspiration into their businesses.

7**. Social Impact:** Innovation is able to eliminate societal problems, enhance quality of life, and achieve sustainable development, which is achieved through leadership in the creation of solutions that benefit communities, the environment, and future generations.

Risks of Innovation

1. **Financial Risk:** Innovation usually implies a great deal of financial injection into the research and development department, including experiments that have no guarantees of success. Unsuccessful innovations may lead to financial losses, the utilization of resources with low or even negative efficacy, and losses of reputation.

2. **Market Uncertainty:** Development involves treading the path that nobody has ever walked before, that is full of risky phases when it comes to market demand, competition, and regulation.

3. **Technological Risks:** The introduction of new technologies or inventing the solutions by wide purposes could bring along technical challenges like mismatching, compatibility problems, and cybersecurity threats.

4. **Resource Constraints:** Innovation means that we will spend some time on developing and research, and accumulating the requisite personnel and infrastructure, which could be tighter either in terms of resources or permeating focus on others' priorities.

5**. Resistance to Change:** Implementation entrepreneurship thinking can be hindered by employees, stakeholders, and organizational culture in form of resistance to new ideas. In this case such creation may bring more harm to the success of innovation programs than benefit.

6. **Regulatory Compliance:** Regulatory agencies and bodies may apply a regulatory straitjacket, requiring conformity to compliance procedures and legal requirements. Governance frameworks and a policy governing compliance strategies are necessary for thorough risk assessment and compliance management.

7**. Reputation and Brand Risk:** The after-effects of not living up to innovation expectations (or even failure), not to mention weak execution, let go plenty of bad vibes about the returning company, In addition, both the customer trustworthiness and market confidence are badly damaged.

The Seven Sources Of Innovation

1. Unexpected occurrences

2. Incongruities
3. Process needs
4. Industry and market changes
5. Demographic changes
6. Changes in perception
7. New knowledge

Technological Innovation Process

1. **Basic Research**: Understanding core principles.
2. **Applied Research**: Solving specific problems.
3. **Technology Development**: Prototyping.
4. **Technology Implementation**: Product introduction.
5. **Production**: Scaling up.
6. **Marketing**: Reaching consumers.
7. **Proliferation**: Ensuring widespread adoption.
8. **Technology Enhancement**: Maintaining competitiveness.

Innovation in Indian Firms

Examples:

- Aadhaar: World's largest biometric ID system.
- ZipDial: Missed-call marketing.
- Mitra Biotech: Personalized cancer treatments.

Difference Between Creativity and Innovation

Creativity	Innovation
To create or make.	To innovate or take action.
Generation of ideas.	Implementation of ideas.
Related to experience.	Related to observation.
Preferred in art context.	Preferred in business context.

How to encourage an Aha! Experience:

From the above stories, there seem to be some promoters for the Aha! experience:

- a clear perception of the goal of the task at hand
- a good and preferably deep understanding of the theory and technology of the subject areas associated with a problem or opportunity

- a mind that is prepared, not just in the immediate problem area, but more broadly. Experience and knowledge from often seemingly unrelated areas sometimes makes surprising contributions. Developing a wide and deep knowledge, experience and understanding base well outside of one's area of occupation is seen by Stephen Covey as one of the Seven Habits of Highly Successful People. He calls it'sharpening the saw'
- a focus of attention, not necessarily continuously, but at least over time. A willingness to wrestle with, or even become obsessed with a problem is valuable. Even when conscious thought is not directed to the task at a particular moment, a solution often pops up from the unconscious provided the mind has been engaged with the challenge. Alertness to the possibility of innovative attack, either as an attacker, or a defender, is a good example of focus over time
- interaction with other people and other minds
- a time and place to dream, create and, above all, play
- an element of fun

Case Study:

The conception of an innovation – the Aha! experience

1. **The integrated circuit – Jack Kilby**

In August1958, while employed at Texas Instruments, Jack Kilby invented the idea of assembling electronic components on a chip by successively depositing layers of conducting and semi-conducting materials. This bypassed the need to assemble discrete components like resistors and capacitors to form an electronic circuit. The breakthrough ultimately allowed huge electronic devices to be shrunk to the size of a pinhead and is the basis for all modern consumer products, such as computers, mobile phones, iPods and, indeed, anything else electronic. The immediate circumstances of the point of invention were that, because he lacked seniority, Jack was unable, like the rest of the company, to take a summer vacation. Working alone, he recalled, 'I was sitting at a desk, probably stayed a little longer than usual. Most of it formed pretty clearly during the course of that day'. Little else seems to be known about the mental processes involved at the time – the actual Aha! moment. Jack's historical background included an introduction to radio electronics by his father, a time working for a company manufacturing hearing aids using the new transistor technology invented in 1947, and the silk screen technique of producing ceramic-based circuit boards. Reduction of size was an important goal for hearing aid design.

The Nike air shoe – Bill Bowerman

Some time in 1959, Bill Bowerman invented his waffle iron-based sole for a running shoe. Bowerman had been the athletics coach at Oregon State University since 1948 and strongly believed that a reduction in weight of running equipment, while preserving durability and functional performance, would greatly improve athletic performance. While at breakfast he was watching his wife prepare waffles and conceived the idea of constructing a sole using a waffle

iron to form the cleats. The Waffle Iron Sole was born, and became a signature product for what was to become the Nike Company. It is interesting how a prepared mind, focused over an extended period on a problem to be solved, made a connection with what at first sight might seem to be unrelated technology.

Questions:

1. How does innovation impact sustainability and the environment?
2. What role does innovation play in healthcare and medical advancements?
3. How can individuals cultivate their innovation mindset?
4. What examples are there in your area of business where incremental improvement can have or has had important rewards?
5. Where has the innovative attack on the CD come from?
6. What steps would you take to encourage innovation in your own line of business?
7. What triggered the innovation?
8. What is known about the actual Aha! experience?
9. How well prepared was the mind of the innovator or innovators?
10. Where does the innovation lie on the monumental/incremental scale?
11. Where is the innovation now on the S curve?
12. What scientific and technological challenges has the innovation faced as it moves through its S curve?
13. What is the likely lifetime of the innovation?
14. What has been the reward for effort expended? Who has reaped the rewards?
15. What threat or threats might the innovation face in the future?
16. If the innovation is in its mature phase, what can be done to head off a potential attack?
17. Can an invention be made with no prior related knowledge? Give examples to support your case
18. The zipper was patented in the middle of the 19th century. It was used in a relatively minor way for rubber boots and tobacco pouches early in the 20th century; however, its first use in textiles was in children's wear and men's trousers in the 1930s.
    Discuss when the zipper became an 'innovation'. (As a help, visit http://inventors.about.com/library/weekly/aa082497.htm)
19. Describe an Aha! experience that you have had and try to think of the circumstances and background knowledge that may have triggered it.
20.