Table of Contents

1. Innovation Value Chain

INNOVATION IS THE PROCESS OF TURNING IDEAS INTO MANUFACTURABLE AND MARKETABLE FORM
– WATTS HUMPREY

With a team of aerospace graduate students in 1995, we took on a challenge to build a *Flying Tiffin* – a box to carry food across the university campus. Today, we would call it a pizza-drone, which was not a popular term back then in India. We sketched around a dozen helicopter type configurations, picked an attractive one, did our preliminary design, and started our search for a financial sponsor. Once, we realized that we may not get all the funding we need, we started brainstorming on what parts can we afford and how. Luckily, we managed to excite a local two-wheeler manufacturer, TVS Motor Company, to offer us a used 4.5HP engine free of cost; though prohibitively heavy for any flight vehicle. That brought us back to the drawing board for resizing around the only engine we had. The helicopter became heavier, larger, at the cost of food box becoming smaller. Taneja Aerospace, an upcoming manufacturer, offered us a small amount of money to build the airframe in exchange for our service to create and host their website – a big deal at that time and place. We then cannibalized a control system from an old materials test lab equipment sitting unused with a friend, and resolved the last of our financial concerns. The shape and size of the control system, took out any remaining room and weight margin for the food box. We could see a flying machine in our future with no payload capacity to carry anything. Another round of iteration and we gave up the look and feel of the machine to at least have enough room for a sandwich. The team went over a dozen learning iterations, and were still excited to follow through, but they ran out of time. The academic semester was over and the students graduated. The following year, another batch of students picked up the engine, the controls, redesigned the airframe for a better look

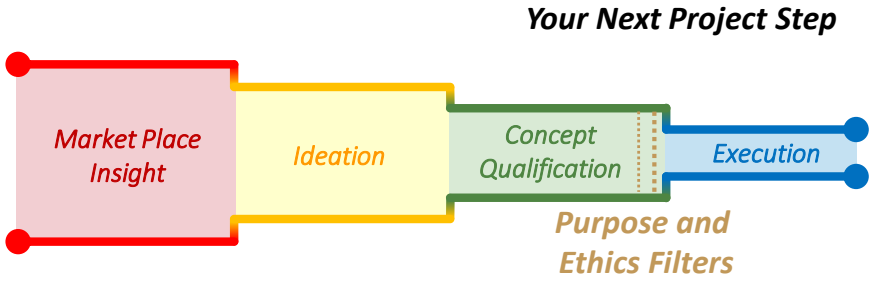
and feel, and with larger payload capacity; a result of a fresh set of minds and eyes. Just before they graduated, they rolled out a fine-looking helicopter from the local hangar (workshop) to an exciting celebration, knowing very well that the rotors were not balanced to the level required for a safe flight. That machine never flew; but the project served the purpose – *taught two batches of graduate students as to what innovation entails.* We also realized the power of network capital that enabled us to get an engine, controls and financial sponsorship.

Simplified Innovation Value Chain

The Innovation Value Chain is a series of connected steps, which lead to an innovative product, service, or a business model. Successful outcomes typically require an innovator to make some assumptions at each step, validate or challenge them at the next step, go back and revise those assumptions if required, continuously build upon new learnings, and iteratively close in on the purpose.

In its simplest form, an innovation is about the visualization of the end solution for a customer, starting with a lot of ideas or opportunities; filtering them down to a few qualified projects; and then ethically executing them to a successful delivery, or, sometimes, to a new learning (failure).

The beginning of an innovation process is always very hazy. It is generally an accidental or deliberate match between an idea and the problem it can solve. It is often difficult to discern whether the idea or the problem came first. Generally, individuals and startups get an idea and start exploring the market opportunity, while corporate innovations search for ideas to go after a market opportunity. In either case, almost everyone goes through several iterative cycles before converging on an idea-market combination worthy of pursuit.



Value Chain as a Multilayer Filter

The multi-step activity from market insight to market capture is like a multilayer filter. At each step, you remove the options that may not work. From experience, we all know that only a handful of ideas will qualify for execution out of the 100s that are captured. At this stage, you could either create a portfolio of projects, or use a criterion for prioritization.

Marketing folks might see this process as a funnel. But a funnel is a poor metaphor because it allows everything that gets in from the top to get out at the bottom. I prefer to call it a filter. In a well-designed filter, only the desired material comes out at the other end. In the case of the Innovation Value Chain, the filter design is the innovation management process and the human mindset.

Let's briefly understand these steps now, and details in chapters later.

Market Insight

When the objective is to take a new product or a service to the market, you need a good insight into what opportunities exist out there and what you are competing against. This marketplace insight is an absolute necessity to fulfill the desire or purpose to influence it.

Customer insight: The first major step in structured innovation is to define a problem worth solving. The opportunities are all around us, in every little action starting with waking up and having coffee to flying across the world for business or pleasure. We see, hear, use, or talk about new products

from toothbrushes to Space Station almost every day. Often, they appear obvious and simple in hindsight, and yet we had never asked for it or thought about it, staying busy doing the same thing, the same way, in our habitual routines.

Competitive insight: Another step is to see what already exists or is in the works to solve the problem you have identified. Once again, there is generally some competition, or an incumbent solution resisting change. And, when you make something new and promising, it invites new competitors to the market.

Chapter-2 will cover details on how various innovation profiles capture and use marketplace insight.

Structured Ideation

This is the most creative and elusive step of the innovation, and generally the origin of the myth that innovation can't be taught, or that innovators are born, not made. Ideation may not be science, but it is certainly not magic. It is probably an art, and sustained practice gets you to a state of mind that is continuously generating great ideas. Experience has shown that the ideas are not a random occurrence, but rather triggered by some form of an intellectual stimulus. This implies that we can create a stimulating environment or devise an exercise to generate hundreds of ideas. Quite often, an ideation session can lead to tapping new markets, in addition to serving a specific pre-defined objective.

Structured Ideation helps in asking the right questions, bringing together perspectives and strengths of the participating members to take steps beyond the obvious solutions and therefore, increasing the innovation potential of a solution, through volume and variety. The structure includes planning, facilitation, technique, triggers, data capture, and preliminary sorting or clustering into themes.

Chapter-3 will briefly discuss a few ideation techniques that are way more effective than traditional brainstorming.

Purposeful Qualification

After a couple of iterations between customer problem and solution ideas, you will get to the stage of assessment of their worth. At this point, you must ask these three questions before investing resources into the ideas.

Value Proposition: Does it add value to a customer/user/consumer? A good value proposition acts as a pain reliever and/or gain creator for a job to be done by a prospective customer.

Purpose & Ethics Check: Does it fit your self-defined purpose and self-imposed ethical standards, in addition to being legally compliant?

Concept Qualification: Can you deliver it profitably, to sustain or grow your own business? Is it dependable, scalable, sustainable, and whatever else it needs to be to align with your purpose in the short or the long run?

I am not offended when people use the traditional term – *Business Case*; I just do not like it, from the perspective of a mindset. A business case generally tends to diminish the purpose down to merely a Financial Drive.

Chapter-4 covers these steps in reasonable detail to make them useable.

Creative Execution

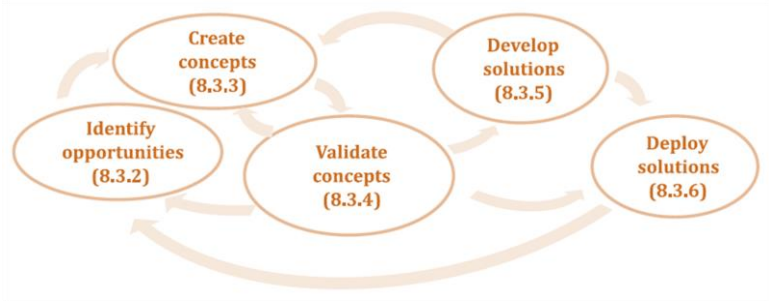
A concept, once qualified needs to be converted into reality. Most companies have some form of project management, or phase-gate process to continuously reduce the execution and market risks. Depending on how much your innovation pushes the envelope of existing knowledge and experience, you need to be prepared to iterate on the value proposition and execution options. The ability to learn and adapt is the key to successful innovation.

Chapter-5 provides detailed steps on defining the innovation project, success criteria, teaming, and the review structure for continuous risk reduction.

ISO 56002 - Innovation Management System - Guidance[11]

ISO 56002:2019 lays out a very similar baseline innovation process that can be configured to suit any initiative.

> ***General (Clause 8.3.1)*** *The innovation processes can be flexible and adaptable, and form different configurations, depending on, e.g. the types of innovations and the circumstances of the organization. They can (a) form a fast track of selected processes; (b) have a non-linear sequence; (c) be iterative; (d) be implemented within, or independently from, other processes in the organization; and (e) be connected to other processes in the organization. The creative and experimentation processes focus on exploration to gain knowledge and can require resilience and flexibility. The innovation processes can interact and interrelate with other processes in the organization. e.g. research, product development, marketing, sales, partnering, mergers and acquisitions, collaboration, and intellectual property.*



> ***Identify Opportunities (Clause 8.3.2)*** *can result in (a) An understanding of the potential value to be realized and other potential impacts; (b) Identified, defined, and prioritized opportunities, areas of opportunity or problem statements; and (c) An understanding of state of the art, including intellectual property rights.*

> ***Create Concepts (Clause 8.3.3)*** *can result in the (a) Concepts with preliminary value realization models that can be validated; (b) An understanding of the critical uncertainties or assumptions for each concept to be validated; and (c) an*

[11] ISO 56002:2019 – Innovation Management System - Guidance; July 2019.