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1. The Innovation

INNOVATION DISTINGUISHES BETWEEN A LEADER AND A FOLLOWER
– STEVE JOBS

One day in 1978, growing up in a village in India, I learned that someone in the neighborhood had purchased a radio that also showed a movie picture. My curiosity pushed me to learn more, and I had my first look at this big box, which we later learned was called a television. My father explained the terms invention, scientist, and inventor; and I realized that is what I wanted to be. He got me ‘Meccano’ - a model construction system to build creative toys by putting pieces together. For many years, I was a living room (re)inventor assembling working models of earthmoving machinery. Today, we tend to use the term *innovation* for this. Forty years later, even though I still can’t define it precisely or uniquely, I believe I understand what it entails. My preferred definition from Crossan and Apaydin¹ comes close,

Innovation is:

*Production or adoption, assimilation, and exploitation of
a value-added novelty in economic and social spheres;
renewal and enlargement of products, services, and markets;
development of new methods of production; and
establishment of new management systems.*

It is both a process and an outcome.

This definition is the most comprehensive, as it captures several important aspects of innovation: it includes both internally conceived and externally adopted innovation (production or adoption); it highlights

¹ A Multidimensional Framework of Organizational Innovation: A Systematic Review of The Literature; M M Crossan and M Apaydin; J of Mgmt Stu, Vol 47, pp 1154; 2010.

innovation as more than a creative process, by including application (exploitation); it emphasizes intended benefits (value-added) at one or more levels of analyses; it leaves open the possibility that innovation may refer to a relative novelty of an innovation as opposed to the absolute (an innovation may be common practice in other organizations but it would still be considered as such if it is new to the unit under research); and it draws attention to the two roles of innovation (a process and an outcome), the keyword being ‘*outcome*’.

ISO has recently converged on a simple set of terms and descriptors² for use in innovation management.

Innovation is “New or changed entity, realizing or redistributing value.”

Novelty and value are relative to, and determined by, the perception of the organization and relevant interested parties. An innovation can be a product, service, process, model, method, etc. Innovation is an outcome. The word ‘innovation’ sometimes refers to activities or processes resulting in, or aiming for, innovation. When ‘innovation’ is used in this sense, it should always be used with some form of qualifier, e.g. innovation activities. (ISO 56000:2020 Clause 3.1.1)

New or changed entity corresponds to a new or improved product or process, or a combination thereof, that differs significantly from previous products or processes. Realizing or redistributing value indicates that it has been made available to potential users or brought into use. This is also captured in Oslo Manual³.

In this context, the concept of innovation is characterized by novelty and value and both are necessary and sufficient. To realize value, the entity must be introduced, implemented, deployed, adopted, or used to a certain extent. This also means that insights, ideas, and inventions, without the manifestation of **value**, are not innovations.

² ISO 56000:2020 – Innovation Management - Fundamentals and Vocabulary; www.iso.org; Feb 2020.

³ Oslo Manual: Guidelines for Collecting, Reporting and Using Data on Innovation; 4th Edition; <https://www.oecd.org/science/oslo-manual-2018-9789264304604-en.htm>; Oct 2019.

The value of an innovation may be perceived differently, at different times, by different categories of users and consumers throughout a particular value stream or a specific network. Value can be either or both financial and non-financial, such as revenues, savings, productivity, sustainability, satisfaction, empowerment, engagement, trust, or experience. Individual value perception highly depends on the individual purpose.

Additional definitions, to help you grasp the breadth of the term, are in an appendix. Having researched so many of these definitions, I am one of those who believe that it has become a bit of a buzzword and perhaps we shouldn't be looking for a precise definition. Subsequent subsections will show that the meaning will vary based on circumstance, application, domain, purpose, and a few other factors. However, I have complete faith that by the end of this book series, you will know what it means to you, your company, and your social network. At that point, you are welcome to add one of your definitions, which will help you anchor your thoughts.

In the meantime, if we accept that there are multiple correct definitions of innovation, then we can view it from various angles and viewpoints. In line with ISO definition, an innovation can have one or more attributes describing what, how, and why it is innovated. These attributes could provide a broader context or specific purpose. Let us define a few types of innovation with certain distinguishing attributes. These are not unique; in fact, some innovations can be a combination of multiple other innovations and we can classify some under multiple categories. You are welcome to add your preferred category, after reviewing these.

Innovation Classification based on the Scope

From a high level, I view the realization of value at different levels: individual, organizational, market, and social.

Workbench Innovation for Personal Efficiency and Effectiveness

Most individuals are continuously improving their work (and even life). I will call it *Workbench Innovation or Point of Action Innovation*. For

example, when you create an Excel Macro to speed up repeated calculations, create a widget to hold your workpiece in place reducing variation, or devise a new recipe for a dessert. This benefits an individual or an employee and the organization may never realize its impact. It is happening in every organization all the time, and most of it goes unnoticed or unappreciated. However, building this is foundational to a mindset of innovation, which involves a conscious effort towards developing Innovative Processes, Products, Services, and Business Models.

Process Innovation for Bottom line

Most companies are continuously improving the tools, methods, models, and processes used to design, develop, and produce a product or deliver a service to a customer. This is generally focused on reducing risk, cost, and improving quality and turn time; improving the company's profit margins. For example, automation in material handling to create a 24/7 operation, or re-arranging a manufacturing cell for production and delivery activity. Typically, this helps improve the organization's productivity, net profits, and employee engagement. Market or customer may not see much benefit, other than a potential price drop.

Process innovation typically requires low investment and has low returns. It can be easily seen, justified, and usually forms the bulk of the innovation portfolio with many companies.

Product or Service Innovation for Top Line

This constitutes innovation in technology and product performance or a novel service, which creates a market differentiator and impacts net sales. For example, a new microwave, or an automobile, or laundry service that combines cleaning and minor repairs. Typically, this helps improve revenues through better customer experience. Depending upon the application, this can have a much broader impact. Some innovations can change our lifestyle, such as a smartphone or a Global Positioning System (GPS). Product innovation requires higher investment with possibly much higher returns, at higher risk levels, over an extended period. All of us need

to be conscious of the impact of our products on society and the environment, while innovating. This will be discussed at length later in the purpose of innovation.

Broadly, the term product in this book includes service as well. A simple differentiator – a service cannot be created without engaging a customer or a consumer.

Business Model Innovation for Market Recapture

Business model innovation is an art of creating value out of the same product or service by engaging with the customer differently. For example, power by the hour from Rolls Royce, where instead of selling the jet-engine to the airline, you maintain the engine and sell the power; or Uber – a novel way of connecting excess supply with demand through existing technology. Typically, business model innovation provides higher returns for very low investment. Unfortunately, they are short-lived, unless supported by product innovation. A brief life span emanates from its inability to intellectually protect itself from being copied.

Innovation Classification based on an Attribute

Once again, the innovation may create different levels of value, at a different pace, under varied scenarios of collaborative and budgetary constraints. Let us define a few that we will discuss in Volume-2 at much greater lengths.

Evolutionary Innovation (Small improvement)

Evolutionary Innovation is when you make an incremental change to an existing product, service, or a process to stay competitive. It typically draws upon user feedback, lessons learned, or quick improvements just to go one-up in the marketplace. Examples: a new smartphone with twice the memory, higher screen resolution, a refrigerator with better internal lights, or a smoother automatically closing door. It is a ‘must-do’ in today’s business environment. All those who stopped doing this are already out of business.

Eco-adaptive Innovation (Translation)

Eco-adaptive Innovation (Translation) is when you take a successful product from one ecosystem and adapt it to work in another. Examples: adapting a German Porsche car for US roads, a US refrigerator modified for Indian households, or a menu of a well-established fast-food chain in the US altered to suit the local taste buds in African countries. This is typically driven by a desire to enter new markets. Global growth requires a serious study of regional, religious, and cultural acceptance.

Peripheral Innovation (Adjacent)

Peripheral Innovation (Adjacent) is when you create new products as peripheral devices, accessories, and adjacent services. This is done to enhance the value of the core product through compatibility and convenience, with options to purchase, upgrade, discard, and even use with a competitor's or white labeled products. Examples: ultralight tripod, or a thin carry case for the camera.

Crisis Innovation (Emergency)

Crisis Innovation (Emergency) is when you have extremely limited time to solve a problem, possibly to save a few human lives at stake. Examples: Return of Apollo 13 in 1970, Rescue of chili miners in 2010, and innovations around handling the Coronavirus outbreak in 2020. Competency, emotional control, and some level of readiness are required.

Burst Innovation (Rapid Fire)

Burst Innovation (Rapid Fire) is when you have a business crisis on hand, with some direct impact on employment, service deliveries, or the environment. Examples: a bailout of a reputed airline heading into bankruptcy, Containment of British Petroleum Oil Spill. These are driven by a desire to control financial losses, or turnaround a business.

Bold Innovation (Multi-Faceted and Integrated)

Bold Innovation (Multi-Faceted and Integrated) is when the effort is enormous in magnitude, requiring serious integration of multiple innovations to come together. Examples: Human mission to Mars, or a floating city. These are driven by a few bold visionaries, willing to take the risk and drive investments that most would think insane.

Frugal Innovation (Resource Starved)

Frugal Innovation (Resource Starved) is when the budget is low, and quality is of little consequence. Examples: you create a makeshift rooftop rack for your car to carry stuff for vacation, and now it lasts forever. We can also call this a ‘Hack Job’. Affordable prototyping to prove a concept is not to be confused with frugal innovation brought into practice.

Open Innovation (External Participation)

Open Innovation (External Participation) is when you engage external entities or individuals outside the boundaries of an organization without serious constraints on knowledge sharing to accelerate the creation of new products. Examples: Procter & Gamble’s program called Connect and Develop, where together with OraLabs produced a new lip balm called CoverGirl.

At times, multiple parties come together to share solution development. An example is the Global Human Body Modeling Consortium, where seven auto companies created digital human models to replace costly test dummies and better understand human body injuries in auto accidents.

Classified Innovation (Secrecy)

Classified Innovation (Secrecy) is when you work on something highly confidential and you must not disclose it even to the closest of your relations. Examples: Strategic Defense Initiative or Skunkworks of Lockheed Martin. Typically, these are in the context of national defense projects, to gain military superiority. Within the business world, most of

Merger and Acquisition activities are kept close to the chest by a few people. This is the exact opposite of open innovation.

Breakthrough Innovation (Significantly New)

Breakthrough Innovation (Significantly New) is when there is a high degree of change or impact, related to an organization, process, technology, product, or service. Examples: Paying for insurance by the mile based on a plug-in telematics device. Breakthrough innovation is at the other end of the continuum to evolutionary or incremental innovation.

Disruptive Innovation (Turning Point)

Disruption is defined when a significant fraction of potential customers adopts something new or when a fundamental breakthrough or value proposition leads to a change in lifestyle. It usually involves a new business model, though not always. Typically, this type of innovation initially addresses a less demanding need with lower performance, but eventually displaces established offerings. These are generally more cost-effective, needing lot fewer resources, and are offered at a lower cost. Disruptive innovation will often hurt some other businesses. Netflix killed Blockbuster.

There is another term called Radical innovation. Different people use it interchangeably with Breakthrough or Disruptive innovations. Is it somewhere in between?

Responsible Innovation (Socially Conscious)

Responsible Innovation (Socially Conscious) is when an approach to innovation anticipates and assesses potential implications and societal expectations; intending to foster the design of inclusive and sustainable research. In some sense, this distinguishes Good from Bad innovation; akin to saying, 'do the right thing.'

I believe, most of the innovation types discussed above should also attempt to be a *Responsible type* except Crisis Innovation, when human lives are at risk. The social responsibility should be a piece of the purposeful innovation.

Open-source Innovation (Social & Free)

Open-source Innovation (Social & Free) is about creating a new product design for social good, using openly available resources, and freely giving away the design so anyone can produce for use where they need and when. Multiple contributors and beneficiaries get connected using geographical or virtual platforms. In some sense, it is a combination of Crisis, Frugal, and Responsible innovations with no business model associated with it. The recent pandemic brought out a lot of open-source innovation to address a shortage of hand sanitizers and ventilators.

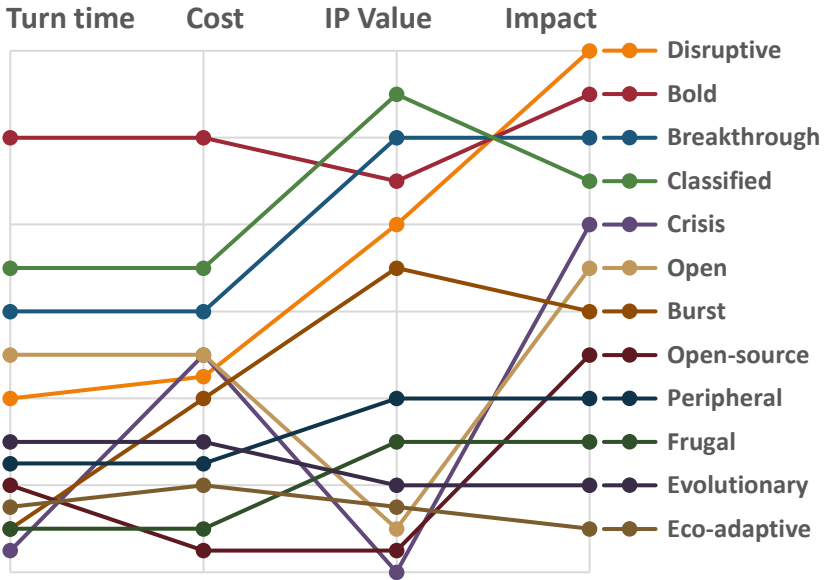
Dark Innovation (Unwanted)

Dark Innovation (Unwanted) is exactly the opposite of responsible innovation. This is about new products or new use of an existing product with a purpose to hurt people, their property, their reputation; or to hurt a community, faith, country, or even deliberately impact the environment or planet sustainability. The intent is important here. Many innovations provide an opportunity for dark applications that are illegal or unethical. That does not make the innovations ‘dark innovation’.

The unintentional side effect due to lack of awareness of a well-intentioned innovation is not to be confused with dark innovation either. However, once you become aware, you need to activate your moral compass.

Distinct Innovation

It appears that we can put any adjective ahead of the term ‘innovation’ to describe the innovative activity or context or outcome, with the sole purpose of being specific. You can think of and define ‘Free Innovation’, ‘Fast Innovation’, ‘Academic Innovation’, ‘Sharp Innovation’, ‘Bull**** Innovation’, or maybe not.



Various forms of innovation discussed in this section can be compared on a few parameters at some contextual relative levels. The identification of parameters that could provide a meaningful comparison across classifications may not be an exact science. After discussions with a few expert peers, we narrowed it to Turn time, Cost, Intellectual Value, and Impact. The above visual shows these in relative terms just to provide a perspective, which is not based on data.

In the Context of the Automobile Industry

Let's just look at the most familiar industry – automobile and connect a few of the classifications above. We could think of mobility, if we wish to go back in time, and project into the future. Over 5000 years ago, man learned how to ride a horse for mobility (disruptive). The uses spread to the agriculture and battlefield (eco-adaptive). Then came the chariot (radical) around 2000 B.C., which allowed multiple warfighters to move swiftly with the power of multiple horses. Four-wheeled wagons were used in bronze age with Europe providing a comfortable seating(evolutionary) as there is historical evidence that the platforms were suspended elastically. Carriage,

coaches, and wagons went through evolutionary innovations for comfort, steering, and stability for many centuries. These basic forms also went through a series of eco-adaptive and peripheral innovations for various uses and terrains.

A breakthrough or a disruption happened when the horse was replaced by a steam engine, sitting underneath the carriage, in early machines. Series of evolutions started moving the entire thing towards automobiles of today. Comfort, safety, stability, control, and cost have been the key drivers. Every year, every new model has a few new features (evolutionary). The introduction of an Airbag could be considered a breakthrough for safety. Going from 4 to 6 airbags is evolutionary. An active braking system is a breakthrough technology today. When you take a car designed for the US market to India, you have to redo the suspension for Indian roads and change to right-hand drive (eco-adaptive). Design of rooftop rack for sports package, or a tow dolly, are peripheral innovations.

There were a lot of Burst Innovations in the industry, when President Obama offered bailout packages to the big auto manufacturers in 2009. Yes, they were evolutionary at the technology level, but the speed and scope were to help recover from a business crisis. Innovations in design methods and assembly lines can be categorized as process innovations. A brand new powerful automated manufacturing machine could be a breakthrough innovation for the machine manufacturer, and process innovation for the automobile manufacturer. When there is a machine tool breakdown causing a delivery pressure, a machinist quickly hacks a new tool to get going. This will be a frugal innovation, or workbench innovation, Car lease, rental car, and ride-sharing, belong to the business model innovation. Creative arrangements with suppliers can be process or business model innovations.

When the manufacturer is called in to secretly modify an existing car model for military applications with certain capabilities for the battlefield, it would be a classified innovation. On the other spectrum, if a car company openly solicits ideas for their next model, this would be an open innovation.

When material scientists came up with fiber-reinforced plastics, it was a breakthrough for them. However, the application in automobile bumper is evolutionary for the car. The revisions to design, manufacturing, and quality checks in the factory for such a bumper are process innovations. Most car users won't even notice the new material in the bumper until they have to take the car to the body shop, who might create an innovative business model to repair it.

When a bad guy uses the car as a car bomb or to ram through a crowd, it is an example of a dark innovation. When Toyota had an issue with sticky pedals and lives were being lost, the solution required a crisis innovation. The Eisenhower Interstate Highway System authorized in 1956 is an example of a bold innovation. Tesla is more of a breakthrough innovation. All through the evolution of the automobile industry, manufacturers have been doing responsible innovations – reducing emissions and improving passenger safety.

There have been a series of breakthroughs in other sectors such as visual recognition, cloud computing, networking, GPS, that are finding their way into automobile safety and control, bringing us to a driverless car. We can call it a disruptive innovation because it is going to change our lifestyle altogether. The ripples may adversely affect many other sectors such as parking lots, highways, Dept of Motor Vehicles, insurance, highway patrol, emergency rooms, injury lawyers, and others.

Thus, we could say that the mobility can be characterized by a few desirable aspects such as speed, safety, stability, cost, and comfort. These are continuously pushing changes in design, manufacturing, and business models. The changes can be small, large, or lateral. I would say, driverless cars are short-lived. Once mobility gets automated, there is no reason to stick to the ground. We will go for personal drones. The technology is there. We just need a bold vision, safety regulations, and an ethical pursuit.

In the Context of the Recent Pandemic

The world has seen a significant amount of innovation over the last few months (as I write this in the middle of 2020) in trying to survive the