

Evolution of innovation process: From Edison to Lafley

Dr. Vinay Dabholkar
President, Catalign Innovation Consulting
vinay@catalign.com

1. Introduction

Thomas Edison is known to have pioneered the prototype of the modern research and development laboratory in 1876 when he set up his “invention factory” in Menlo Park, New Jersey [1]. This factory was designed to produce a stream of new products and improvements to the existing products and indeed it produced inventions such as the phonograph, high resistance incandescent lamp, Kinetographic camera, Electrical automobile and many improvements in the telegraphy. Edison had set himself a goal of producing “a minor invention every ten days and a big thing every six months or so”. Over his working lifetime of sixty-one years, Edison actually averaged eighteen patents annually or one patent every twenty days – not far from the goal he had set at the Menlo Park [2]. Edison was also an innovator. He had set another goal in 1887 of “returning 500 percent back to stockholders” [8]. At the time of his death in 1931, Thomas Alva Edison Inc. (TAE Inc) was returning a dividend and had an average yearly surplus of \$7 million [8].

When A. G. Lafley then CEO of Procter & Gamble kick started the initiative to revitalize the innovation program in 2000, he envisioned a different kind of factory. He says, “We started from the premise that it is possible to run an innovation program in much the same way we run a factory. There are inputs; these go through a series of transformative processes, creating outputs. It is possible to measure the yield of each process, including quality, the end product, and the financial and market results.” [3] In the next seven years, the “innovation factory” Lafley set up at P&G helped grow its revenue from \$39 billion to \$76 billion, the number of “billion dollar brands” – those earning a billion dollars or more in sales each year – has more than doubled, from ten to twenty-three, and the brands with sales between \$500 million and \$1 billion has more than quadrupled, from four to eighteen. [3] The success rate of introducing new products and brand in the market was 15 to 20 percent in 2000. In 2007, the rate runs between 50 to 60 percent. Over the same period the R&D spending as a percentage of sales has

reduced from 4.5% to 2.8%. Lafley says, “We are getting more value for every dollar we invest in innovation today” [4]. Lafley has demonstrated that we can engineer innovation.

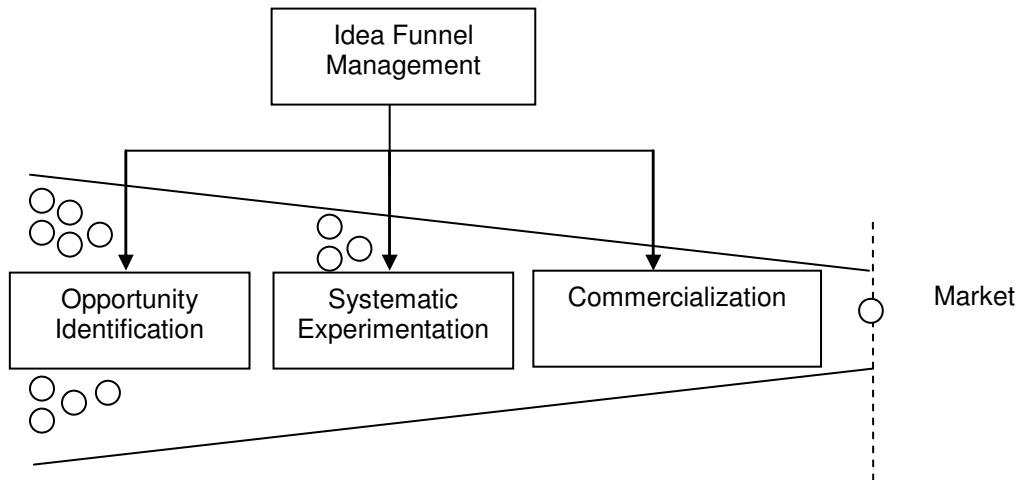
The question that we address in this paper is: How has the process of industrial innovation evolved from Edison’s invention factory to Lafley’s innovation factory? We use a model for idea funnel [5] to compare innovation approaches of Edison and Lafley. Further, we explore the questions - Are there any underlying principles which are common to both the approaches? Are there any principles which are different?

2. Process of innovation – a model

We use innovation funnel [5] as a basic unit of analysis of the innovation process. Based on the stage-gate approach described in Game-Changer [4] and Davila et al [5], we divide the idea funnel into 3 stages:

- (1) **Opportunity identification:** This is sometimes referred to as the fragile front-end of the innovation funnel and during this stage opportunities are identified and ideas are generated. Peter Drucker presents systematic ways of identifying opportunities [13].
- (2) **Systematic Experimentation:** This stage is at the heart of the innovation process and involves testing various assumptions associated with the ideas [6].
- (3) **Commercialization:** During this stage (also called back-end) the idea is taken to the market and commercial viability of the idea is proven.

Idea funnel management is involved in (a) financing (b) reviewing and (c) catalyzing the three stage innovation process described above. *Financing* involves deciding how much money should each idea get at various stages? Where should the money come from (e.g. corporate venture fund, joint venture etc)? *Reviewing* involves selecting promising idea to the next stage. The less-promising ideas are killed thereby improving the success rate of the ideas launched in the market [4]. *Catalyzing* involves creating structures such as innovation gyms [4] that catalyze the innovation process.



In the following sections we see how these four elements – three stages of the funnel and the management process have evolved in the past 130 years from Edison to Lafley.

3. Edison's approach to systematic innovation

Let's look at how Edison practiced each of the 4 elements of the innovation process:

1. **Opportunity identification:** Edison was the one man idea machine for his invention factory. He formally researched potential new markets, often collected data on annual sales of various products that he thought he could improve either in terms of design or in terms of manufacturing method (mainly to reduce production costs) [2]. A friend Edison and a successful businessman Henry Ford (founder of Ford Motor Co) writes following about Edison [7] – First he determines the objective – exactly what he wants to accomplish. He may start to improve some crude device already in existence, as he did with telephone, typewriter, dynamo and scores of other bits of apparatus. In any case he gets before him all that is known on the subject.

2. **Systematic experimentation:** Experimentation was second nature to Edison. Henry Ford writes about Edison's style of experimentation [7] – Sometimes Edison makes the tests himself but usually he states what he wants on a sheet of yellow paper in his own handwriting and sends it to an assistant. The assistants record in notebook the results of each of their tests and these books are turned in to Edison each evening. The notes mean more to Edison than to anyone else, for he knows exactly what he is after and the assistant does not always know.

Henry Ford writes further - Edison almost never gives verbal instructions because he finds it easier and quicker to write and draw than to talk. If there is anything to be made or an experiment is to be conducted in a certain way, he draws a diagram in such a clear, quick fashion that no further explanation is necessary. He sketched the model of his first phonograph in less than five minutes.

Experimentation capacity of Edison's factory was high. For example, in spring of 1884 alone, he supervised 2774 lamp experiments at Menlo Park prior to authorizing the beginning of mass production [2].

3. **Commercialization:** Establishing commercial viability of the invention was an important part of Edison's business. For example, this is how Edison explained it to Henry Ford how he discovered the principle of mass production [7] – I found that the lamps were costing one dollar and twenty five cents each to make. I offered to make them at forty cents each if the Edison Light Company – which was the power company - would buy all the requirements from us during the life of the patent. The first year we sold twenty to thirty thousand lamps at forty cents each while the cost turned out to be one dollar ten cents each. The second year each lamp cost seventy cents and they still lost money. The third year the cost was down to fifty cent and we lost more money that year than any other year. However, in the fourth year the cost was down to thirty-seven cents and he made up all the money in one year that he had lost previously. I finally got the cost down to twenty-two cents, and sold them for forty cents; and they were made by the million. Whereupon the Wall Street people thought it was a very lucrative business, so they concluded they would like to have it, and bought us out.
4. **Management of idea funnel:** Edison managed the idea funnel himself. At any point of time, Edison would manage a portfolio of ideas. For example, in the two years 1891-1892 he was granted patents related to phonograph-doll, process and apparatus of generating electricity, process of extracting copper pyrites, trolley for electric railways, fac-simile telegraph, apparatus for making glass, process of extracting gold from sulphide Ores [2].

4. Lafley's approach to systematic innovation

Let's look at how P&G under Lafley practiced each of the 4 elements of the innovation process:

1. **Opportunity identification:** First thing Lafley did was to put customer at the heart of the innovation process. He called it "Customer is the boss". P&G focused on the process of "immersive research" where employees at all levels spend time with consumers and in retail shops to understand consumers deeply. They started an initiative called "Living It, Working It" through which this would happen and by 2007 70% of executives had at least one experience of this kind. P&G opened up the front-end of the innovation funnel. In fact, Lafley set a goal that for every two ideas that reach market; one idea should have a partner outside P&G [3]. This meant that the ideas would come not only from various corners of the company but also from the P&G network of partners, customers, technologists outside the company.
2. **Systematic experimentation:** Getting the idea to prototype fast and showing it to the customer and incorporating the learning into it was followed as a process. P&G created Innovation Centers like Clay Street, Innovation Gyms, Becket-Ridge center where prototyping and consumer testing can be done rapidly. [3]
3. **Commercialization:** An important part of P&G innovation process is to find an "owner" for every selected idea and he becomes accountable for its success or failure. He would own goals associated with the idea which include revenue growth, gross margin, preventing price erosion, budget and performance [3]. During this phase major investment decisions are made for example manufacturing facilities, marketing and advertising campaigns and new channels of distribution are developed. Owner is responsible for making sure that the marketing and technology teams work together in the go-to-market process.
4. **Management of idea funnel:** Funding, reviewing and catalyzing innovation funnel is a rigorous and cross-functional activity at P&G. In every business unit, the review takes place quarterly and every year they present their innovation program to senior management [3]. Having business goals clearly defined for 3 to 5 years and a clearly defined "where to play" choices are a pre-requisite for every innovation review. A

typical innovation review involves a cross-function team such as business head, technology head, brand manager, functional specialist and head of finance. The team reviews the innovation portfolio from three perspectives: robustness, competitiveness and financial goals. Leadership training is an integral part of the innovation process. Reward systems are in place to encourage innovators and teams. More importantly, failures resulting in learnings are also respected and rewarded. For example, P&G's feminine care business unit presents the President's Fail Forward Award to the "team of individual that enabled the organization to significantly learn from a failure and as a consequence enables a future project or team to move forward much faster and/or better."

5. How has the process of innovation evolved?

Following principles of the innovation process are common to both Edison's and Lafley's approaches and hence we believe they are time tested and fundamental to the process of innovation:

- **Innovation process as a three stage funnel:** It is clear from both the processes that opportunity identification, experimentation and commercialization are key stages in the innovation process for both Edison and Lafley.
- **Role of experimentation as a core activity:** Systematic experimentation is common to both the processes and is a core activity. In fact, research laboratory got established as a formal structure in the last century whose primary role is to perform systematic experimentation [12]. Technological advances especially in computers have made it easier to front-load a product development process with more experiments [6].
- **Management of innovation as a portfolio:** In both processes, innovation is managed as a portfolio and success-failure is looked upon in the context of a portfolio rather than an individual idea.

Following principles of the innovation process have evolved in the last century

- **Putting customer at the center of the process:** For Edison, the customer or market data was important in identifying opportunities. However, he paid less attention to customer input on the back-end. For him, every problem had to be solved as an engineering or a technology problem. For example, dealers told Edison that their music records are not selling because they don't have any popular singer in their catalog. However, Edison ignored the message and continued to focus on improving the technical quality of the cylinder. In fact, Edison is said to have proclaimed in a 1912 memorandum, "We care nothing for the reputation of the artists, singers or instrumentalists. All that we desire is that the voice shall be as perfect as possible. We intend to rely entirely upon the tone and high quality of the voice". [8] P&G, on the other hand, gives significant importance to customer feedback. In fact, brand differentiation is core to P&G's strategy and brand is all about customer perception.
- **Open innovation and collaboration:** P&G embraced the concept of open innovation [9]. The fundamental philosophy of open innovation says that capacity and efficiency of innovation increases substantially (perhaps exponentially) with your ability to collaborate with a heterogeneous network. Technological advances such as computers and Internet have made it easy to collaborate across geographic boundaries and at a much higher speed than what was possible at Edison's time. Edison competed primarily on technology patents and was more difficult to collaborate with [10]. Today, many of P&G's business needs are available for anyone to see on the Internet and anyone can potentially collaborate by sending his/her idea to address the need [11].
- **Innovation as a cross-functional process:** Innovation at P&G is cross-functional. This means engineering, industrial design, marketing and finance functions have to work together to take an innovation to the market and make it successful. For Edison, innovation was primarily technology or engineering-led. While this approach may succeed in some cases, it is far more limiting when applied to all innovations.

6. Conclusions

In this article we saw innovation process adopted by Edison in his business more than a century ago. We also looked at one of the most mature innovation processes that of P&G led by A G Lafley executed this decade. We saw that two processes have some elements in common. However, the process today has evolved on dimensions like putting customer at the center, opening the innovation funnel and involving a cross-functional team in the innovation management.

7. References

1. Millard, Andre, Thomas Edison and the theory and practice of innovation, Business and Economic history, volume 24, 1991
2. Axelrod, Alex, Edison on innovation, Jossey-Bass, 2008
3. Lafley A. G. and Ram Charan, Game-changer: How every leader can drive everyday innovation, Penguin Books, 2008
4. Lafley, A. G., P&G's innovation culture, Strategy + Business, Autumn 2008
5. Davila et al., Making innovation work, Wharton School Publishing, 2008
6. Thomke, Stefan, Experimentation matters, Harvard Business Press, 2003
7. Ford, Henry, Edison as I know him,
www.atomiccreative.com/images/ACG_EdisonAsIKnowHim.pdf (accessed on 26th Oct 2009)
8. DeGraaf, Leonard, Confronting the mass market: Thomas Edison and the entertainment phonograph, Business and Economic History, volume 24, Fall 1995.
9. Innovation as a social process: Elihu Thomson and the rise of General Electric, Cambridge University Press, 2003
10. Chesbrough, Henri, The era of open innovation, MIT Sloan Management Review, Spring 2003.
11. www.pgconnectanddevelop.com
12. Buder, Robert, Engines of tomorrow, Simon & Schuster, 2000.
13. Drucker, Peter, Innovation and Entrepreneurship, Harper Collins, 1986