

Technology and Operations Strategy–Part 1: Innovation Strategy

3/9: Technology Evolution

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Modern technology continues to evolve rapidly, when the first computer invented, the size was as large as a room. Now, that is ten thousand times more useful, but the volume can be accommodated in the palm. Understanding technology innovation is essential for enterprises. In this article, we will discuss the evolution of technology from three aspects. The first is to introduce the process of technology innovation, and then discuss the innovation model, as well as explain the organizational elements of innovation, and finally put forward the view of innovation in the Internet era.

How technology evolves?

The technology life-cycle is composed of four phases: The research and development phase, the ascent phase, the maturity phase, and the decline phase. It is generally believed that when the S-Curve is considered only when the industry develops to the highest point, then it will be threatened by the next technologies. However, Christensen (1992a) argued that a shape of S-curve, where the path of technological evolution does not resemble an S-curve, but follows a series of irregular step functions. The multiple S-curves is better approximated with than a single S-curve.

Moreover, the Y axis of the traditional S-Curve is ‘product performance’, but Christensen (1992b) pointed out that there is another Y axis of ‘performance as defined in application’. So this is not merely to understand the progress of product performance, but also to the needs of users of the application.

For example, in 2007, when most of the mobile phone manufacturers focus on improving screen size, camera pixel, shape designing, Apple Inc. has innovated the iPhone, one of the first smartphones to use a multi-touch interface.

The Four Types of Innovation

From 1st S-Curve to 2nd S-Curve, jumping the S-Curve will be an essential issue, that’s a chance to break out of a routine, as well as explore and build for the evolution of technology. Enterprises must continue to innovate, but how to start at the first step? First of all, we must understand what kind of innovation the company is suitable for? Rebecca & Clark (1990) listed four types: radical, architectural, modular and incremental. The difference between those types is whether there are new business model or technical competences.

The radical innovation is a whole new design, using new components configured in a new way, and it establishes a new dominant design. The invention of the telephone is an example of a new way of mass communication. Radical innovations are comparatively rare. Rothwell and Gardner (1989) estimated that at the most about 10% of innovations are radical.

The incremental innovation is the most common type of innovation. It improves the existing technology, for example, the phone manufacturers enhancing the features, design changes, etc. within the existing market.

However, Rebecca & Clark (1990) argued that the architectural innovation which involves the using of existing technologies for developing the innovations by reconfiguring of the components can carry a great economic potential for the firms.

Each kind of innovation mode has its own characteristics, and they are complementary to each other. No matter what kind of innovation mode, the company should be familiar with the capital and the ability of their own, and determine how to allocate resources.

The importance of value work on innovation

As Albert Einstein said: "The significant problems we face cannot be solved at the same level of thinking with which we created them." When companies realize the importance of innovation, how to start? The key is the organization, after all, it is difficult to use the original organization mode to solve new problems.

Rebecca & Clark (1990) explained a product development requires component and architectural knowledge. When the dominant design built up, the organizations also build knowledge and capability around the recurrent tasks.

Lots of business organizations are more suitable for the innovation of the component level, because the organization was organized by the team responsible for the product component. As long as the basic structure of the product remains unchanged, the organization system can work well. But when technological change occurs, such organizations are not good at the radical and architectural innovation.

Christensen (1993) defined the situation as organizational of value network, which is an ecosystem of interrelationships between products and complementary services on different hierarchical levels, managing, organizing, and responding to the technological changes.

This also explains why the mainstream established firms failed, and the rise of the startup firms. The advantage of new enterprise is not the difference between technology and organization ability, but they have different value network positioning. With value network of relatively flexible innovation strategy and cost structure, it is easier to find and develop potential markets.

Rethinking the meaning of innovation

These article introduce the innovation process, mode and organization of value network, but it is necessary to pay attention to, the above point of views were based on 'manufacturing technologies innovation'. However, in the Internet era, some important innovations may have little connection with new technology. There are plenty of start-up companies (Facebook, Netflix, Amazon, LinkedIn, Uber, etc.) bring business model innovation.

The classification criteria for Rebecca & Clark (1990) are core concepts and components Linkage as a classification standard, which are based on core technologies. Abernathy & Clark (1985) from the marketing point of view of innovation type to whether the existing market, and whether the existing manufacturing technology to classify. Nooteboom (1999) is a classification for the degree of innovation and product process. There are a number of classification standards, summarized as: technology development, customer market and business model. It is worth discussing that there are no other classified items, especially in the Internet Era?

Although innovation is extremely important, executives must pay attention to the innovation doesn't guarantee success, it does not mean that innovation process may be failed, but even if you have a great innovation, but may be limited for a variety of factors which lead to failure.

Taking WiMAX for example, WiMAX is a kind of wireless communications standards, led by Intel Corporation. Taiwan government has also vigorously investment, Taiwan manufacturers also developed more quickly speed transmission rate, and farer distance. Unfortunately, WiMAX is not the last choice to be adopted by the telecommunications leader.

There is no one system that fits all companies under all circumstances. Enterprises need to rethink what time and how to innovate, and how to allocate resources. Managers are often caught in a dilemma, then the innovation strategy is very important, and it must be closely linked with the company's business strategy, the core competence, to create value for customers.

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