

The Dynamics of Innovation in Times of Crisis

Innovation in Business and Society: Final Assignment

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0.1 Abstract

This paper investigates how innovation works under moments of crisis and how it differs from the normal dynamics of innovation. In order to do that, one must first understand how innovations normally operate within society. To reach this understanding, it is helpful to look at established firms and their industry. Thus, this paper also briefly explains the basic dynamics of innovation within established firms and society, but since it is not the topic of focus, it is only vaguely touched upon. This paper also explores the factors of crisis that causes change in the dynamics of innovation. The different types of crisis is discussed, as well as how the dynamics of innovation differs for each type.

Keywords: Dynamics, innovation, crisis, disaster

0.2 Introduction

Innovation has been a tool that has gotten mankind to where it is today. For many decades, people have researched and defined innovation and its dynamics. Today, the dynamics of innovation is now a topic with a lot of depth, yet the topic continues to widen in breadth. Although the dynamics of innovation of everyday life is thoroughly defined, there are still aspects of it that could use more inspection. One of those is the change in the dynamics of innovation upon the moments of crisis. Examples of these crises are disease outbreaks and natural disasters. In order to counteract these crises and respond to urgent medical needs, innovations must change its dynamics. Products can no longer follow its usual routines of innovations when there is a ticking clock and human lives are at stake. In response to the pressure of crisis, the dynamics of innovation changes drastically in many ways - from the origin of the innovations to the forms of their diffusion.

0.3 Dynamics of Innovations

To investigate the change in the dynamics of innovation when crisis strikes, one must know the general dynamics in which innovation works in society. And in order to understand how innovation works in society, it is best for one to first understand how innovations work in a community which makes up the society. The community that is explored is that of established firms.

0.3.1 In Firms

Innovation is a crucial part of any firm. In order to survive and thrive, every firm must innovate to satisfy the need of society. For these firms, there are two important aspects of innovation: product innovation and process innovation. Product innovation is the part in which new ideas are created into reality, while process innovation is about how the product is presented to the public and implemented into society. The figure below explains the correlation between product and process innovation. As soon as a product

has been innovated, the rate for product innovation goes down as the rate for process innovation increases (1).

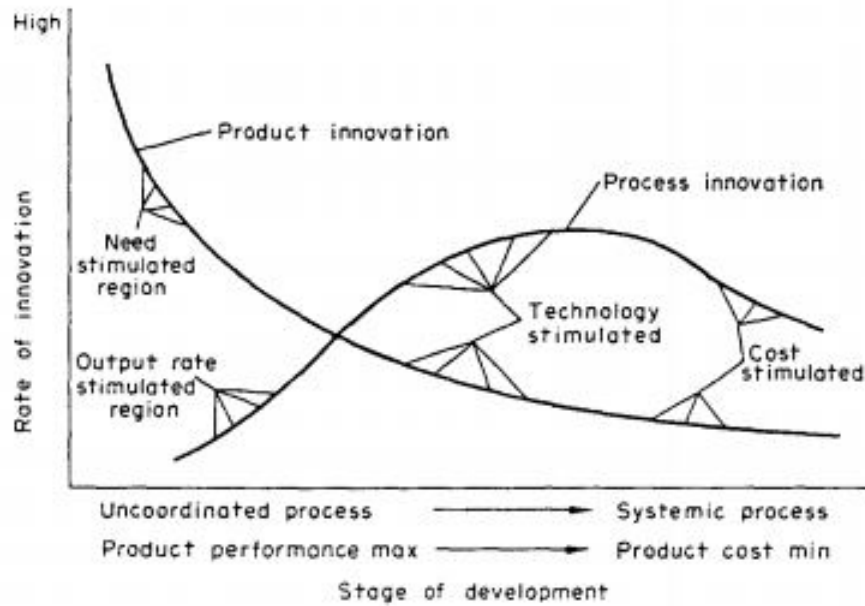


Figure 0.1: Product and Process Innovation Progression (1)

Product innovation is the beginning process of innovation. This is initiated by sparks of creativity. Within firms, this creativity could lead to either a completely new product or the improvement of an existing product, either for an old or a new market. Thus, innovation can be categorized into four categories: Architectural, Niche, Regular, and Revolutionary. Architectural innovations are products which are new, but still based on the same concept as their earlier products. These innovations open up new markets for the firms, just like niche innovations. The difference is that niche innovations build on the strengths of products which are already in existence. Regular innovations are progressive changes of a certain product, which are accumulated over time. Regular innovations remain in the same markets, just like revolutionary innovations, only that the latter makes a completely new product, keeping no characteristics of its earlier version. The four categories of innovations described are what makes up the transilience map, a concept that forms the framework for the evolution of industries due to innovation (2).

Once the process of product innovation is done, the process of implementing the innovation into society begins. This section is the process innovation - how the product is delivered to its target groups and how it diffuses and finds its place in society. For most companies, prototypes may be built to test the innovated product and see how the public reacts to it by giving out free trials or samples. Technology-push and market-pull is a model that describes how process innovation works. Technology-push is the process when the innovated products gives people a need to use it. While market-pull is when

the product was innovated in order to meet the needs that are already existing (3). For firms, this is a very important theory to take into account when innovating a product and implementing it.

0.3.2 In Society

Once an innovation is implemented into society, it has a process in which it diffuses. The process of diffusion for most products in general can be modeled by the double-boom cycle. The first boom is usually due to technology-push, while the second is due to market-pull. The first boom is the first wave of when the innovation first comes out and the second is when it becomes a fad for the society. The growth of a boom can be divided into five different sections: innovators, early adopters, early majority, late majority, and laggards. Innovators are the ones who take the risk and buy the new product. The majority then follows the innovators once they have an idea of how the innovation is. The laggards are then usually the last one to buy the product before it leaves the market or no longer becomes a trend (3). The boom is caused by diffusion, which happens because of the communication between people. Nowadays, diffusion is much easier and faster due to the Internet (4).

0.3.3 During Crisis

From this section on, innovation will be used in a broad description and can be described as any method, product, or technique that can be implemented into certain societies to meet their needs (5). As for the terms, “crisis” and “disaster”, although there is no one definition that has been universally agreed upon yet, this paper will use the following definitions:

- Crisis: “a situation in which important decisions involving threat and opportunity have to be made in a particular short time.”
- Disaster: crisis situations in which management skills are needed to cope technical problems with any life at stake (6).

Upon the moments of crisis and disaster, the dynamics of innovation most likely differs. This is because there is such an urgent need from specific populations that innovations can no longer have the same dynamics as before. Changes in the dynamics of innovation are needed to meet the urgent needs in which the stakes are high. Throughout this changed dynamics in which innovation proceeds, there is constant pressure for the innovation to succeed under a certain time constraint.

When discussing crisis and disaster, the concept is often divided into five phases: prevention, mitigation, preparedness, response, and recovery. But in discussing innovation together with crisis, it is most helpful to divide crisis and disaster into three phases: pre-impact, trans-impact, and post-impact (5). In the pre-impact phase, the dynamics of innovation is still more or less the same, but has the risk of changing due to possible crisis or disaster. The most interesting part is the trans-impact phase. This includes the

phase right before the crisis, as well as the phase during and after the crisis. This is when the time pressure is very high. In the post-impact phase, the dynamics of innovation could still continue to be very much under time pressure due to the need of response and recovery. Quick response is needed to save the people and things that have been affected by the crisis or disaster. As for recovery of the whole impacted environment, the faster the recovery, the better. After some time, the dynamics of innovation during the post-impact phase will return to normal and there will be a large amount of new innovations, due to the experience that mankind has gained and the need to prevent the disaster from occurring again.

Product innovation during the trans-impact phase, as well as the post-impact phase, is a tough job, since cultivating creativity is much more difficult due to the stress. Creativity is most likely replaced by human will and determination. In the process of coming to an innovative solution, there is bound to be failure - from both pressure and undiscovered knowledge. This failure needs to be overcome through willpower and the determination to solve problems and save lives.

During the pre-impact and trans-impact phase, process innovation should occur immediately after product innovation and should be a quick process. This is because once an innovative solution has been found, it needs to be implemented immediately due to the importance of the need and urgency. As soon as the innovation has been tested and confirmed of its safety, then it would be implemented into the needed society right away. This is drastically different from the general dynamics, in which the firm would have time to test and perfect the innovation. For the moment of crisis, the innovation cannot be tested to perfection. If it works, then it is done; it can be further innovated to a more perfect product after the crisis has been solved. Process innovation in this case is also purely driven by market-pull rather than technology-push. The innovation is occurring only because there is a need and it is not creating any need for society. This also makes the diffusion of the innovation in the case of crisis much quicker than that of the general dynamics of innovation. The boom of diffusion is no longer composed of the five different user groups of innovators, early adopters, early majority, late majority, and laggards. The user becomes one group of those in need; a group of people whose lives are at risk.

0.4 Types of Crisis

There are many different types of crisis that could occur and each of them may have some slight differences in how innovation works during its occurrence. The three different types of crisis/disaster that is discussed are natural disasters and disease outbreaks.

0.4.1 Natural Disasters

In this paper, natural disasters are any phenomenon of nature which could put any lives at the risk of injury or death (6). Some examples of natural disasters are earthquakes, floods, avalanches, volcanic eruptions, tsunamis, and so on. According to a conversation with Norman Kerle, a specialist in information technology communication (ITC), he

speculates that in the case of natural disasters, a lot of innovations tend to occur during the pre-impact phase (7). Procedures are occasionally innovated to be prepared for these disasters which may occur at any moment. While during the trans-impact phase, there is not much which can actually be done except to find and help as many lives as possible. Saving these lives do not need any innovation in medical care since it is just first-aid, although innovation may be needed in the delivery of the medical services. This is because of the damage of the terrain, causing the difficulty in reaching the injured. The dynamics of innovation for delivering the medical services are those of crisis situations as explained earlier.

0.4.2 Disease Outbreaks

For disease outbreaks, there is not much in the pre-impact phase, because unlike natural disasters, there are no warnings for when a new virus is going to appear. This means that the trans-impact phase is very important and innovation is under huge time pressure. If lucky, the disease outbreak may be identified at an earlier stage and there are fewer lives at stake when innovating. During the post-impact phase, the dynamics of innovation will immediately return to normal, because once a solution is found, recovery is quick. This quickness in recovery is due to the healthcare system nowadays in which the infected are isolated and given time to recover alone, preventing further contamination. For this type of crisis, there is a lot of innovation during the post-impact phase and beyond. This is because once a vaccine is developed, it is forever going to be constantly innovated, because virus is always mutating at a fast rate. “Influenza vaccines changes every year, because the virus itself changes its genetic formation very quickly,” stated Dr. Janneke Alers during a lecture. Even though during the trans-impact period, the innovation is purely driven by market-pull, there may be technology-push in the post-impact period and onwards. This is because the vaccines have created a need for people in disease prevention. And during the post-impact period, there may be a large boom in the innovation curve, due to the fear and panic that is still lasting from the crisis.

0.5 Discussion

Innovation is very important for overcoming crises and disasters and the field of disaster technology development is continually growing (8). Nowadays with the help of the Internet, innovation in times of crisis and disaster is much easier. The difference between the dynamics of innovation in times of crisis/disaster and in times of peace is becoming less and less. This is because both the growth of disaster technology development and the Internet are making the situations of disaster less drastic, therefore the dynamics of innovations during crisis is becoming more like the regular dynamics.

0.6 Conclusion

In moments of crisis, the dynamics of innovation is changed to meet the needs of the urgency. This urgency is due to the lack of time and the lives of people at stake. The dynamics of innovation differs slightly for different types of crisis, but in general it becomes more market-pull driven. The spark of creativity that originates the innovation is also replaced by the willpower to save the lives that are at risk. Even though the dynamics of innovation during moments of crisis are different from the regular dynamics, they are becoming more and more alike due to the improvement of technology and the efficiency of the Internet.

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