Chapter 20
3D Printing Technology Diffusion:
A Revolution or an Illusion?

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ABSTRACT

3D printing technology has been considered one of the most potentially groundbreaking technologies for the future, as the customer expectations, market requirements, and the competition grows in a global scale. In order to understand the potential effect of 3D printing technology and if it is a disruptive innovation that will change the traditional manufacturing paradigm, it is essential to examine the diffusion of knowledge in this area. In this study, 3D printing technology has been reviewed and patent analysis regarding 3D printing technology has been conducted in order to understand the diffusion of 3D printing technology. The results of the patent analysis indicate that the diffusion of 3D printing technology which is represented by the patents of four key methods not expected to fit with Bass diffusion model. According to the findings, it can be concluded that 3D printing technologies are in a situation where a state of maturity has not been reached, yet the growth still continues.

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INTRODUCTION

In advanced economies, the range of economic variables, such as firm performance and technological specialization, play important role in explaining economic growth. The essence of this argument is that innovation, which involves resembles aspects of evolutionary process of accumulating and consolidating existing technologies into new technologies, is a natural process. However, the diffusion of knowledge plays an active role in shaping the direction of innovation, technological and economic evolution. It is only through the dissemination of information that the knowledge that a product or service can be created in the medium in which it could generate an additional opportunity for the economic units in every society (Hur, 2017). The diffusion of new ideas to different environments through recombination of existing technologies depends on the flow of technology in between different sectors (Fleming, 2001; Fleming & Sorenson, 2001). At this point, digital transformation creates opportunities and advantages for the global dissemination of any kind of information that has been produced (Kiesling, Günther, Stummer, & Wakolbinger, 2012; Rifkin, 2012; Samuelson, 2000).

Digitalization is rapidly transforming all sectors that it touches. Although it is not yet clear how digitalization finds a precise response in the society, it seems to affect the certain layers of society more rapidly. Production technology is at the forefront of this change. Cloud Computing, Internet of Things and Robotics are regarded as major technologies, which have emerged as the benchmarks of digitization (Manyika et al., 2013). All of these technologies are considered as technical innovations which generally create changes in business processes, product functions or customer-oriented services, rather than creating value directly.

Among the varied emerging technologies, 3D printing technology stands out as a phenomenon within the concept of technological innovation. 3D printing applications are used in a wide range of areas, from direct production of digital goods to hobby products or biomedical applications (Forrest & Cao, 2013; Gibson, Rosen, & Stucker, 2015; Pierrakakis, Gkritzali, Kandias, & Gritzalis, 2015). 3D printing promises a new wave of innovation that will enable the production of wide variety of objects for a wide user range, from amateurs, to new business ventures, and large-scale companies (Desai & Magliocca, 2013).

3D printing technology is predicted the one of driving forces of technological revolution, which will have a substantially profound economic impact on the manufacturing sector. In addition, 3D printing will spark a new industrial revolution and, technology will have transformational effects in the coming years. 3D printing is generally the nomenclature of mass media, marketers of the technology, and decision makers. The similarity between Additive Manufacturing and 2D printing has given rise to the alternate common name of 3D printing. However, AM (Additive Manufacturing) is broader term that embraces all the technologies within the name of a single one (Bourell, 2016). There has been an accelerating amount of interest in AM technologies since the early 1990s. At the same time, scholars in the field of technology of management have been increasingly attracted the business model and technological development perspectives.

In particular, there is clearly articulated perception by both scholars and practitioners that AM technologies have the potential to change the traditional manufacturing paradigm. However, there are only a small number of early global adopters in the new business model of AM systems, which have seen predominantly in sectors that produce small batches of products and/or require customization (Jiang, Kleer, & Piller, 2017; Rogers, Baricz, & Pawar, 2016; Steenhuis & Pretorius, 2016; Weller, Kleer, & Piller, 2015). It appears to be significantly unrealistic to expect AM technologies will disrupt the existing

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