Abstract: The Abernathy-Utterback model (A-U model) has significant impacts on innovation studies and is adopted by many scholars. Although many studies quote Abernathy and Utterback (1978), the dominant design idea was not explicitly shown in the model. Thus, the model used in Abernathy and Utterback (1978) differs from the A-U model imaged by us. The A-U models, adopted by many scholars, are actually formulated through the accumulation of the three critical works of Utterback and Abernathy (1975), Abernathy and Utterback (1978), and Abernathy (1978). The A-U models were finally completed by Abernathy (1978), becoming the A-U models that were imaged by us. However, Teece (1986) and Utterback (1994), who significantly popularized the A-U model, quoted the model in Abernathy and Utterback (1978) as a completed model. This was re-quoted, and the misconception that the A-U model was the same as the model in Abernathy and Utterback (1978) was disseminated. Abernathy and Utterback's (1978) original paper is a strange compilation that independently introduces a diagram of the A-U model even before the title page. Moreover, there is neither an explanation nor a reference to the diagram in the paper. In fact, many researches quoting these works are unaware of this fact.
Introduction

Innovation is seen as an extremely important element in corporate competition, and considerable attention has been paid to it in existing research. Among them, the Abernathy-Utterback model (A-U model) is a representative model in the field. The A-U model shows that many product innovations occur from the initial stage of an industry to the advent of dominant design. After the advent of dominant design, a shift toward process innovation and incremental innovation related to products and processes also takes place.

The A-U model has heavily influenced innovation study and many scholars quote Abernathy and Utterback (1978) (Christensen & Rosenbloom, 1995; Durand, 1992; Teece, 1986). However, in Abernathy and Utterback (1978), the dominant design idea was not explicitly shown in the model and was different from the A-U model imaged by us. The A-U model adopted by many scholars was actually formulated through the accumulation of the three critical works of Utterback and Abernathy (1975), Abernathy and Utterback (1978), and Abernathy (1978). The A-U model finally reached completion in Abernathy (1978) and the model in Abernathy (1978) became the A-U models conceptualized by us.

However, Teece (1986) and Utterback (1994), who significantly popularized the A-U model, quoted the model in Abernathy and Utterback (1978) as a completed model. This was re-quoted, and the misconception that the A-U model was the same as the model in Abernathy and Utterback (1978) was disseminated.

First, this paper comments on the A-U model in the three works of
Utterback and Abernathy (1975), Abernathy and Utterback (1978), and Abernathy (1978), in the order of the formation process of the A-U model, and then observes how the A-U model changed. This paper shows that Abernathy (1978) showed the completed form of the A-U model. Then, we note that the model of Abernathy and Utterback (1978) is quoted as the A-U model because of the influence of Teece (1986) and Utterback (1994).

The Formulation Process of A-U Model

This paragraph reviews the A-U model in the three works of Utterback and Abernathy (1975), Abernathy and Utterback (1978), and Abernathy (1978) in order of the formation process of the A-U model and observes the changes in the A-U model. First, we introduce the model in Utterback and Abernathy (1975) (Figure 1). Studies on innovation prior to Utterback and Abernathy (1975) have focused on how to guide radical innovation to success (Myers & Marquis, 1969). Nevertheless, Utterback and Abernathy (1975) adopted the time axis concept and specified the “unconnected stage” as the appropriate time for radical innovation in an industry.¹ Then, they created a cross tabulation based on more than 100 innovation cases cited by Myers and Marquis (1969) and performed a chi-square test. The A-U model in Utterback and Abernathy (1975) displays the rate of innovation on the vertical axis and the evolutionary steps of process, such as the unconnected and systemic stage, on the horizontal axis. It depicts a curved line on which the rate of product innovation is highest in the initial stage and decreases as the stages progress. On the other hand, the unconnected stage shows lower incidence rates of process innovation and the incidence rates

¹ Shintaku (2005), Ogawa, Shintaku, and Yoshimoto (2005), and Wada (2011) are examples of current studies adopting the time axis in the innovation model.
increase as the stages progress. However, at the systemic stage, incidence rates for process innovation decrease again.

Next, we examine the A-U model of Abernathy and Utterback (1978). Abernathy and Utterback (1978) presented the concept of dominant design, which was not mentioned in Utterback and Abernathy (1975). The model in Abernathy and Utterback (1978) transforms from the model in Utterback and Abernathy (1975), as shown in Figure 2. The vertical axis transforms to depict the rate of major innovation and the horizontal axis transforms to depict fluid, transition, and specific patterns. In addition, the curved line depicting the incidence rate of product innovation also changes. The curved line of the product innovation first decreases smoothly and then drops sharply. It is considered that the concept of dominant design is reflected in the model. However, the dominant design is not included in the model diagram. In this manner, the model of Abernathy and Utterback (1978) is different from our image of the A-U model because the model of Abernathy and Utterback (1978) does not depict dominant design.

Finally, we present the A-U model in Abernathy (1978). Figure 3 displays the model in Abernathy (1978). Although Abernathy and Utterback (1978) and Abernathy (1978) were published in the same year, Abernathy and Utterback (1978) was published in the June/July edition of Technology Review, while Abernathy (1978) was published in November. Hence, it is assumed that the complete form of the A-U model is the same as the model in Abernathy (1978). Abernathy (1978) focused on the automobile industry. The concept that as the product and its manufacturing process develop over time, costs decrease, product design becomes more standardized, and changes less fluid is known as “productivity dilemma.” It takes its name from the title The Productivity Dilemma and has heavily
influenced subsequent research. The A-U model presented in Abernathy (1978) supports the concept of productivity dilemma.

In comparison to the model in Abernathy and Utterback (1978), the curved line for the incidence rate of product innovation in the model in Abernathy (1978) takes a more complex shape. Although it is not depicted in Figure 3, the fluid pattern → transition pattern → specific pattern in Abernathy and Utterback (1978) is not presented in Abernathy (1978). In Abernathy (1978), the three patterns change as two conditions of “fluid state” and “specific state” and a “transition” from a fluid state to a specific state with the wording for each stage. Furthermore, the existence of the dominant design is clearly depicted in the A-U model diagrams in Abernathy (1978). In this manner, the A-U model was completed through repeated improvements, such that it would further reflect reality and finally become the model imaged by us.

Today’s A-U Model

By examining the A-U model formation process through the aforementioned three important works, it is clear that the A-U model is the model in Abernathy (1978). However, currently, many studies quote Abernathy and Utterback (1978) as research showing that the type of innovation changes as industries mature (Gavetti & Levinthal, 2004; Loch & Huberman, 1999; McGahan & Silverman, 2001; Urlich & Ellison, 1999). Furthermore, although Adner and Levinthal (2001) quoted Utterback and Abernathy (1975), the model depicted in their paper (Figure 3) was clearly the A-U model in Abernathy and Utterback (1978) (Figure 4).

Why did such a phenomenon occur? Teece (1986) and Utterback (1994) play a major role in this occurrence. Although Teece (1986)

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2 Fujimoto (2012) also touches upon productivity dilemma.
3 Gavetti and Levinthal (2004) is the 50th Anniversary Article.
Figure 1. A-U model in Utterback and Abernathy (1975)


Figure 2. A-U model in Abernathy and Utterback (1978)

Figure 3. A-U model in Abernathy (1978)


Figure 4. A-U model in Adner and Levinthal (2001)

**Figure 5.** A-U model in Teece (1986)


**Figure 6.** A-U model in Utterback (1994)

quoted Abernathy and Utterback (1978) in the analysis of complementary assets, the quotation of the model in Abernathy and Utterback (1978) is not accurate. This is because the curved line showing the rate of innovation in the A-U model (Figure 4) of Teece (1986) is depicted as an inverted U-shape (the fluid pattern portion has a low rate of innovation) and certain positions on the dotted line’s imagined to represent the dominant design are not accurate, as shown in Figure 5. Incidentally, as one can see from Figure 2, this type of dotted line does not even exist in Abernathy and Utterback (1978).

The model in Abernathy and Utterback (1978) is also quoted in Utterback (1994). In comparison to the model in Abernathy and Utterback (1978), we must pay more attention to changes such as “fluid pattern → specific pattern” becoming “fluid phase → specific phase” in the A-U model in Utterback (1994). The influence of these two works is significant and many studies quoted the model in Abernathy and Utterback (1978) as the A-U model. This is because the amount of research that re-quoted the model in Abernathy and Utterback (1978) as the A-U model through these two works increased. In this way, the common belief was formulated that the “A-U model” and “the model in Abernathy and Utterback (1978)” are the same. However, the A-U model imaged by us is the model in Abernathy (1978), which is the completed form of the A-U model.

Technology Review, which originally printed Abernathy and Utterback (1978), seems to be a business journal, and Abernathy and Utterback (1978)’s paper is a strange compilation, which independently introduces a diagram of the A-U model (Abernathy & Utterback, 1978, p. 40) even before the title page (Abernathy & Utterback, 1978, p. 41). Moreover, there is neither an explanation nor a reference to the diagram in the paper (Abernathy & Utterback, 1978, pp. 41–47). In fact, many researchers quoting these works are unaware of this fact.
We often misquote by re-quoting without understanding the formation process of the theory. However, Utterback tried to formulate a system of innovation by citing innovation cases from Myers and Marquis (1969) (Utterback, 1971a, 1971b, 1974) before writing Utterback and Abernathy (1975) with Abernathy. Abernathy also expressed ideas relating to the A-U model (Abernathy & Townsend, 1975; Abernathy & Wayne, 1974) prior to writing Utterback and Abernathy (1975). In this manner, they completed the A-U model, although it was a long process. Hence, it is necessary to understand the transitions of the A-U model.

References


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4 A similar case is the misquotation about NIH Syndrome (Takahashi & Inamizu, 2012).


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