Full length article

Exploring the relationship between perceived pace of technology change and adoption resistance to convergence products

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A R T I C L E   I N F O

A B S T R A C T

Information systems studies oftentimes assume that consumer behaviors are related to the pace of technological innovation, but few of these inquiries empirically demonstrate or discuss this relationship. This study is an empirical assessment of this dynamic. Specifically, we tested a three-part model that attempts to explain how consumers' perceptions of the pace of technological advancement influence both consumers' willingness to purchase said technology, as well as their expectations about its price and quality. This model first assumes that consumers expect that as technology advances in sophistication and quality, it should eventually become less expensive to acquire. The second aspect of this theory posits that the faster technology is perceived to advance, the more strongly consumers will believe that a cheaper better product is just on the horizon. Finally, the expectation that something newer, better, and cheaper is in the immediate offing will strongly predict both consumers' resistance to adopting initial, more expensive technology and their willingness to postpone purchasing such seminal technologies in favor of waiting to buy more attractive iterations of the product later. We found general support for this model in consumer behavior. Theoretical and practical implications of these findings are also discussed.

1. Introduction

Convergence is the process where the functions of unique products are combined for a purpose that can be changed via technology development, circumstance, and point of view. The convergence concept has evolved to include the sophistication of existing industries and the creation of new business opportunities using information technology (IT) in existing industries and the proper combination of products and services. The scope and shape of convergence products continue to change through the combination and convergence of new technologies, regulations, and functions. Under convergence environments, firms strive to occupy the market in advance and secure competitive advantages by launching better-quality products before their competitors. For example, the term "latest model" is now irrelevant to the smartphone industry as many innovative models, such as smart watches and smart rings, are launched immediately after the release of new smartphones; 3D televisions, which were expected to replace televisions, disappeared from the market and were replaced by smart televisions.

However, rapid changes in the technical environment of convergence products create consumer expectations and influence their adoption, rejection, and postponement of adoption of innovative products. In general, psychological factors such as fear, uncertainty, and doubt can contribute to hesitation or refusal to adopt innovative products (Moore, 2006). Most people with uncertainty determine the necessity of a product based on their subjective expectations and may reject or delay adoption until the optimal environment is created (Mahajan, Muller, & Bass, 1990). Studies on consumer behavior suggest that the expectations of potential consumers should be included in discussions on the adoption of new products (e.g., Holak, Lehmann, & Sultan, 1987; Horsky, 1990; Mahajan et al., 1990). Further, most studies on convergent products have been conducted on a specific product category such as tablets, smart watches, smart televisions, smart glasses, or smart car services (Jung, Kim, & Choi, 2016; Kate, Upadhyaya, Joa, & John, 2015; Rauschnabel, Brem, & Ivens, 2015; Wu, Wu, & Chang, 2016; Yoon & Cho, 2016; Yu, Hong, & Hwang, 2016).

In this study, we examine whether consumer perception of rapid technology change leads to adoption rejection or postponement of adoption of convergence products as it fosters the expectation that new and better-quality products will emerge and can be purchased at lower prices. This study shows how the psychological process by which consumers perceive the pace of

technology change is transformed into resistance, and provides implications for the formation of a practical strategy for convergence products.

2. Theoretical background

2.1. Diverse forms of resistance

Resistance to innovation adoption appears in various forms, from simple rejection to strong resistance, and has been classified and defined by several researchers. Ram and Sheth (1989) proposed three types of innovation resistance according to the degree of resistance: inertia (e.g., people maintain existing products, services, or practices), active resistance (e.g., people take a negative position on innovation adoption because they consider the innovation dangerous), and strong active resistance (e.g., people blame innovation adoption because they perceive the innovation as inappropriate). Szmigin and Foxall (1998) claimed that "rejection" represents the strongest resistance to innovation adoption, while "postponement" is a delay in making a decision, and "opposition" is an intermediate stage that may lead to either adoption or rejection. Additionally, Lapointe and Rivard (2005) proposed four types of resistance: apathy, passive resistance, active resistance, and aggressive resistance. Apathy involves the lack of interest in a new system; passive resistance involves staying with an existing method and delaying the introduction of innovation; active resistance involves opposing an innovation and asking others to participate in that objection; and, aggressive resistance involves threatening behavior, such as boycotts and strikes. In addition, Kleijnen, Lee, and Wetzels (2009) suggested three types of resistance. In their study, postponement is the act of waiting to adopt an innovation until suitable circumstances appear, rejection is the refusal to accept an innovation, and opposition is the objection to and attack of an innovation. They noted that rejection is due to consumers' active evaluation of an innovation via cognitive processes rather than their lack of recognition or negligence. They defined "opposition" as the strongest type of resistance.

Accordingly, resistance appears in a wide range of forms according to its stage and degree. This study, as an early investigation of adoption resistance to convergence products, examines resistance types at the level of individual cognitive judgment, excluding strong resistance to innovation (i.e., preventing others from adopting or opposing and attacking the innovation), and classifies the resistance process into adoption rejection and adoption postponement based on Kleijnen et al. (2009). Table 1 summarizes the types of user resistance.

2.2. Expectations for price and quality

Consumers consider various elements when evaluating and selecting products, including price, brand, and quality (Liang &

Table 1
Types of user resistance.

Researchers	Types of resistance
Ram and Sheth (1989)	Inertia/Active resistance/Strong active resistance
Hirschheim and Newman (1991)	Preventive/Reactive/Resistance
Szmigin and Foxall (1998)	Rejection/Postponement/Opposition
Lapointe and Rivard (2005)	Apathy/Passive/Active/Aggressive
Woodside and Biemans (2005)	Adoption/Rejection
Laukkanen, Sinkkonen, and Laukkanen (2008)	Postponer/Opponent/Rejector
Kleijnen et al. (2009)	Postponement/Rejection/Opposition
Lian and Yen (2013)	Rejecter/Opponent/Postponer
Gurtner (2014)	Rejection/Opposition
Brahim (2015)	Adoption/Postponer/Opponent

Chen, 2012). Price is the exchange value of a product in the market, expressed as the value allocated to the efficacy obtained from its use. Price directly stimulates consumer behavior, such as purchasing (Bolton, Warlop, & Alba, 2003; Lii & Erin, 2009; Spreng, MacKenzie, & Olshavsky, 1996). Consumer price expectations may affect purchase timing and brand and quantity decisions. For example, Erdem, Imai, and Keane (2003) examined the impact of future price expectations on purchase timing, purchase quantity, and brand choice for storable goods and found that consumers deliberate the probability of obtaining a better price in the future compared with the inconvenience of stocking-out.

In addition to price, quality, a comprehensive concept reflecting a product's unique characteristics, is another major factor on which market suitability depends (Zaltman & Wallendorf, 1979; Zeithaml, 1988). Quality is divided into objective quality, which is the authentic characteristics of a product, and subjective quality as perceived by consumers. Subjective quality is the quality perceived by a subjective evaluation of the general quality or superiority of a certain product. However, consumer perception of quality is imperfect and slow to consider changes in objective quality (Mitra & Peter, 2005, pp. 05—120). Furthermore, perceived quality is closely related to purchase decisions, a key factor affecting consumers' product selection (Oliver, 1980).

Consumers tend to assume that expensive products are of better quality (known as the "price-quality effect"). This effect is more significant for a product with higher uncertainty, as it is difficult to conduct an objective evaluation using scientific tools in uncertain environments. The standards used by consumers to evaluate product quality have been studied extensively, and price and product quality have been determined as the most important factors in product evaluation.

Perceived quality and price influence the evaluation and adoption of convergence products (e.g., Bass, 1980; Bolton et al., 2003; Garbarino & Edell, 1997; Hartmann, 2006; Li, 2004; Mitra & Peter, 2005, pp. 05—120; Moore, 2006). The perception of function, intended use, performance, appearance, and quality of convergence products are also considered as important factors since convergence products combine multiple functions into a single device. Further, cost significantly affects acceptance, as most convergence products are expensive due to their combination of functions and their intended use. Li (2004) demonstrated that perceived functional characteristics might be related to the adoption of convergence products. Therefore, consumers base their purchase decisions on their beliefs about the firms' future pricing and quality decisions.

Consumers' perception, evaluation, and satisfaction level can affect their subjective comparison point of products or services, which is influenced by their reference point. Examples of important comparison points include expectancy (Oliver, 1980), norm (Swan, Trawick, & Carroll, 1982, pp. 15—22), and desire (Spreng et al., 1996). Expectancy is a reference point used to compare an initial expectation formed before purchasing products or services with the performance after use. This factor influences the performance and satisfaction levels of an information system, as well as the intention of continued use. Thus, an examination of potential consumers' expectations of convergence products should assist in explaining their psychological resistance to innovation.

In summary, this study investigates how quality and price expectations affect innovation resistance, as they are critical factors in the evaluation and adoption of innovative products.

3. Research model and hypotheses

Although many convergent products offer consumers what