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For the Success of Smart Product Bundling: Complementarity Level and Advertising Strategy

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Abstract

Purpose: This study investigates how to successfully promote the smart product bundle by exploring (1) how consumers' adoption intention toward a smart product bundle differs by the complementarity level of the bundled items and (2) how the ad appeal type influences the effect of complementarity level on adoption intention via goal fluency. **Research design, data and methodology:** This study was a 2 (complementarity level: low vs. high) × 2 (ad appeal type: attribute vs. benefit) between-subjects experiment. The proposed hypotheses were verified using analysis of variance (ANOVA) and bootstrap analysis using PROCESS. **Results:** This research demonstrated that adoption intention toward smart products increases when the complementarity level of bundled smart items is high. Goal fluency underlies this relationship. Further, attribute versus benefit appeal type moderates the relationship between the complementarity level and goal fluency. **Conclusions:** Compared with the attribute appeal, benefit appeal leads to higher goal fluency when the complementarity level of the bundled items is low. However, there was no differential impact of appeal type on goal fluency when the complementarity level of bundled items is high. Finally, goal fluency mediated the interaction of complementarity level × ad appeal type on adoption intention.

Keywords: Smart product bundling, Complementarity, Attribute vs. Benefit appeal, Goal fluency, Adoption intention

JEL Classification Code: M10, M11, M30, M31, M37

1. Introduction

The global "Internet of Things (hereafter referred to as IoT)" market is projected to grow from USD 381.30 billion in 2021 to USD 1,854.76 billion in 2028. It is the increasing adoption of "smart sensors" that has driven the growth of the IoT market (Fortune Business Insight, 2021). Smart sensors measure the external environment, such as light intensity, flow, pressure, position, and temperature, and also measure the physical input and convert it into raw data that is then stored digitally for analysis. IoT solutions require a continuous flow of data from the surrounding environment to function more effectively. For example, smart sensor data of user activities are integrated with connected devices, such as actuators (Fortune Business Insight 2021; Raff, Wentzel, & Obwegeser, 2020). These new smart and connected products are considered disruptive innovations that have revolutionized consumers' lives (Hopp, Antons, Kaminski, & Salge, 2018). Accordingly, company offerings for smart products as solution bundles in the IoT ecosystem have significantly increased.

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Although smart sensors are the key players in the growth of the IoT market, research in this area is scant. While there has been a recent study of the conceptual review of smart products, few studies have specifically looked into smart sensors as separate and independent products (Raff, Wentzel, & Obwegeser, 2020). As smart products frequently serve as a solution bundle, businesses need to understand how to derive the optimal architecture for their smart sensors and associated actuators (Mani & Chouk, 2017; Raff, Wentzel, & Obwegeser, 2020; Valencia, Mugge, Schoormans, & Schifferstein, 2015). Actuation can occur either through a built-in physical smart sensor attached to the product itself or by connecting an external smart sensor virtually through an app. An example of the former is an air conditioner that detects air contamination via a built-in air quality monitoring sensor and then proposes air purification that can be performed through a built-in air purifying actuator. Virtual actuation can be illustrated by a smart air bundling solution that consists of an air quality monitor that detects air contamination through an air quality monitoring sensor and a separate air purifier that solves the air contamination problem by purifying the air via the command of a smart air app. These tasks are also related to the initial conceptualization of product autonomy, which describes the independent behavior of products without user inference (De Bellis & Johar, 2020; Raff, Wentzel, & Obwegeser, 2020; Rijsdijk, Hultnik, & Diamantopoulos, 2007).

However, owing to technological and cost issues, it is impossible to provide such complex AI-based product autonomy in all smart products (Raff, Wentzel, & Obwegeser, 2020; Valencia, Mugge, Schoormans, & Schifferstein, 2015). Therefore, companies often sell smart sensors separately from actuators. The smart sensor (such as an air quality monitoring sensor or a sleep monitoring sensor) triggers an actuator to operate in an optimized way based on the accumulated data. As such, a smart sensor plays a key role in the joint use of two or more smart products to achieve relevant and meaningful consumption goals. Therefore, smart sensors are often promoted with an actuator in a bundle. According to Samu, Shanker, and Smith (1999), the complementarity level of bundled items can lead to different adoption intentions. This research aims to investigate (1) how consumers' adoption intention toward a smart product bundle differs by the degree of complementarity of the bundled items, and (2) how the advertising appeal type influences the effect of complementarity level of bundled items on adoption intention via goal fluency. Theoretical and managerial implications are discussed, and future research directions are suggested to enrich our understanding of smart product bundling and effective advertising strategy.

In the following sections, we review related theoretical concepts regarding the complementarity level of smart products bundles, goal fluency, and ad appeal type. Based on these reviews, hypotheses are proposed and tested. The results, implications, and future research directions are then discussed.

2. Theoretical Review and Hypotheses Development

2.1. Complementarity Level of Smart Product Bundles

The significantly increasing adoption of smart sensors drives the growth of the IoT market (Fortune Business Insight, 2021). This study focuses on smart sensors that transmit monitored data to trigger the operation of connected smart products and play key roles in the joint use of two or more smart products to achieve related and meaningful consumption goals. By triggering actuators to work, smart sensors facilitate the holistic use of smart products as a solution bundle. In this paper, we discuss the virtual actuation of an actuator via connection with an external smart sensor through the Internet. Although marketers can offer these smart sensors by separate selling, offering them in a solution bundle with an actuator might lead to more favorable evaluation toward the smart sensors, because they are the actuators that function to solve the problem diagnosed by the data transmitted from the smart sensors.

Bundling is the sale of two or more separate products in a package (Reinders, Frambach, & Schoormans, 2010; Stremersch & Tellis, 2002; Yan & Bandyopadhyay, 2011). This strategy is pervasive in markets today in one form or another. Firms use bundling for various purposes, such as reducing costs, expanding the market, and improving product performance (Lee & O'Connor, 2003). Furthermore, bundling decisions have significant implications for business managers in promoting innovative new products (Reinders, Frambach, & Schoormans, 2010). Especially for high-tech products, bundling can be used to reduce the perceived risk of new products (Lee & O'Connor, 2003; Reinders, Frambach, & Schoormans, 2010).

One of the important factors when bundling products is whether to bundle complementary or non-complementary items. Prior research suggests that complementary products are products that are chosen to fulfill different aspects of a consumer's composite needs (Chernev, 2005; Lattin & McAlister, 1985). The degree of complementarity is determined by consumers' perception that one product is necessary for the performance or use of a second product (Samu, Shanker, & Smith 1999). Product complementarity is measured by the degree to which the products tend to be consumed jointly. Thus, the consumption of one product enhances the consumption of the other (Chernev, 2005). If there is a high complementarity between two

products, the goal-relatedness between the categories will be strong (Mueller, Tauber, & Dunlosky, 2013). In contrast, noncomplementary products have weak (or no) goal-relatedness to each other.

2.2. Goal Fluency

The nature of the smart product market provides network effects and connectivity between products via the Internet (Lee & O'Connor, 2003). The expanded capabilities of smart products and their generated data make it possible for firms to provide smart products into single solutions (Porter & Hepplemann, 2014; Valencia, Mugge, Schoormans, & Schifferstein, 2015). Consumers' decisions to buy a product depend on the importance of the goal that the product serves (Van Osselaer & Janszewiski, 2012). Prior research suggests that shared goals create a network of associations that facilitate the transfer of knowledge and affect (Martin & Stewart, 2001). Exposure to one product enhances the accessibility of related products that are part of the consumers' associative network in memory. In other words, relevant products are primed. Products that are more accessible in memory benefit from the positive valence of processing fluency and thus are evaluated more favorably by the consumer (Alter & Oppenheimer, 2009; Labroo & Lee, 2006; Lee & Labroo, 2004).

To the extent that priming can make goals more accessible in memory, exposure to advertising that activates a specific consumption goal renders the goal more accessible (Labroo & Lee, 2006; Lee & Labroo, 2004). When encountering an advertisement for bundling that serves a certain consumption goal, such as an advertisement for an air quality monitor for clean air, consumers experience facilitated ease of goal-processing when an air purifier for clean air is featured in the bundle. In turn, this fluent goal-processing experience leads to more favorable attitudes toward the product and results in higher adoption intention (Alter & Oppenheimer, 2009; Labroo & Lee, 2006; Lee & Labroo, 2004; Mueller, Tauber, & Dunlosky, 2013). In contrast, when consumers encounter an advertisement for product bundles that address different consumption goals, such as a sleep monitor for sound sleep and an air purifier for clean air, consumers' goal fluency for this bundle decreases. When the goal fluency is low, this results in less favorable attitudes toward the featured bundle (Alter & Oppenheimer, 2009; Labroo & Lee, 2006; Lee & Labroo, 2004; Mueller, Tauber, & Dunlosky, 2013). Thus, this will lead to less adoption intention toward a bundle. Based on these, we posit the following hypothesis:

H1: Adoption intention toward a smart product bundle increases when the complementarity level of the bundled items is higher.

H2: The effect of a higher complementarity level in increasing adoption intention toward a smart product bundle is mediated by goal fluencye

2.3. Attribute versus Benefit Appeal

Marketers use advertising to promote the attributes or benefits of their product offerings (Hernandez, Wright, & Rodrigues, 2015). Product attributes are the intrinsic properties and characteristics attached to a product. Attributes are measurable, concrete, observable, and relevant in discerning alternatives (Hernandez, Wright, & Rodrigues, 2015; Lamberton & Diehl, 2013). When presenting products by attributes, items are grouped on the basis of tangible product features, such as flavor, size, or ingredients. Attribute-based groupings are similar to *taxonomic* categories (Rosch & Mervis, 1975), which group objects based on physical or structural characteristics (Lamberton & Diehl, 2013). When consumers are exposed to attribute appeal, items are displayed in terms of low-level, concrete features. In this way, attributes form the lowest level in the "means-end" chain (Gutman, 1982).

In contrast, product benefits are conceptually distinctive values that consumers derive from consuming or possessing a product (Hernandez, Wright, & Rodrigues, 2015). In benefit-based presentations, items are organized in terms of their ability to solve consumer problems or meet consumer needs, such as "lose weight," "be healthy," or "relieve stress." Benefit appeal highlights more abstract or superordinate constructs. Benefit-based groupings are similar to *thematic* categories (Barsalou, 1983; Ratneshwar, Barsalou, Pechmann, & Moorem, 2001). In other words, benefits capture aspects of products that are higher on the "means-end" chain (Gutman, 1982). Thus, a marketer implementing the attribute-appeal would promote the product in terms of its physical features, details, and quantitative characteristics. Contrariwise, the benefit-appeal would emphasize the result of owning or using the product in terms of values or consumption goals (Hernandez, Wright, & Rodrigues, 2015).

Consider, for example, two different alternatives: an air quality monitor and an air purifier. These two products can be framed as a wonderful combination of the "Smart Air" bundle or framed by the concrete attributes of each product

characteristic. These two products have higher complementarity. Thus, it is easy to understand why these two products are bundled together. Whether marketers choose the appeal for this bundle based on its benefits or attributes, consumers can easily understand why they should use the two products as a bundle. In other words, when the complementarity level of the bundled items is high, there will not be any differential impact on goal fluency and adoption intention.

In contrast, consider the alternative bundle of a sleep monitor and an air purifier. These two products can be framed as a wonderful combination of the "Smart Sleep" bundle, or detailed product attribute information can be provided for each product. It is not easy to understand why these two products are bundled together if the external cues of using them based on shared and superior consumption goals or benefits (e.g., healthy lifestyle or sound sleep) are not provided. In other words, it is easier to understand the reason "why" two products are presented together by appealing to the benefits of the featured bundle when the complementarity level of bundled items is low. Compared with attribute appeal, benefit appeal increases consumers' goal fluency when the complementarity level of the bundled items is low. Increasing goal fluency will positively impact adoption intention toward a featured bundle. Based on this theoretical view, we propose the following hypotheses and conceptual model (see Figure 1).

H3: Attribute versus benefit appeal in advertising moderates the effect of low versus high complementarity level on goal fluency.

H3-1: *Attribute versus benefit appeal* will not have a differential impact on *goal fluency* when the complementarity level of the bundled smart products is high.

H3-2: Compared with attribute appeal, *benefit* appeal increases *goal fluency* when the complementarity level of bundled smart products is low.

H4: Goal fluency mediates the relationship between complementarity level × ad appeal type (H3) and adoption intention toward a smart product bundle.

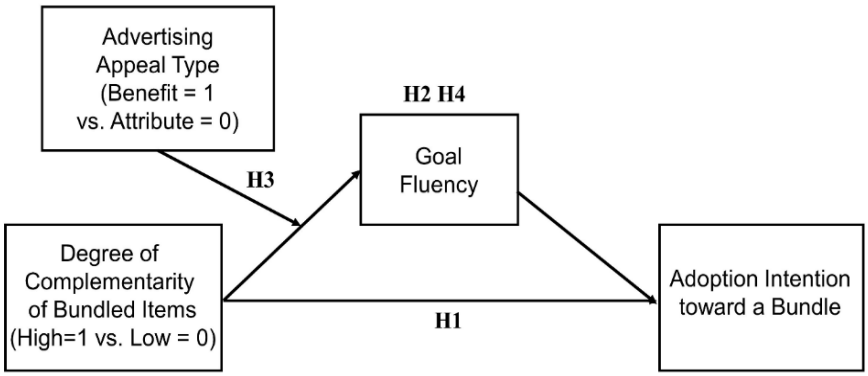


Figure 1: The conceptual model for the degree of complementarity of bundled items x ad appeal type on adoption intention via goal fluency

3. Research Methods

This study investigated the mediation of goal fluency and the moderation of benefit versus attribute appeal in a moderated mediation framework. We expected the negative effect of lower complementarity of bundled items on adoption intention via goal fluency to be attenuated when the bundled item is advertised using benefit (vs. attribute) appeal.

3.1. Methods

3.1.1 Pretests

We chose an air purifier as a bundled item with a smart sensor (air quality monitor and sleep monitor) in this experiment.

We conducted two pretests: online surveys via Prolific (1) to determine the degree of complementarity between the bundled smart items and (2) to verify the attribute vs. benefit ad appeal type. In the first pretest, 28 respondents (gender: 53.6% male; ages: 20–29, 64.3%) participated in the study. Following the current literature (Samu, Shanker, & Smith 1999), we asked participants to score the degree of complementarity on a scale from 1 = *low degree of complementarity* to 9 = *high degree of complementarity*. As expected, participants perceived the air quality monitor–air purifier pair as a bundle with higher complementarity than the sleep monitor–air purifier pair ($M_{\text{air bundle: air quality monitor-air purifier}} = 7.54$, $M_{\text{sleep bundle: sleep monitor-air purifier}} = 5.57$; t (54) = 3.325, p = .002).

The second pretest was conducted to develop the attribute versus benefit ad appeal type in which 32 participants (gender: 50% male; ages: 20–29 68.8%) from Prolific responded to the questionnaire. We prepared attribute versus benefit ad appeal types by varying the pictorial cues and ad messages for each bundle, one pair of ads for the Air bundle (high level of complementarity condition), and another pair of ads for the Sleep bundle (low level of complementarity condition). Based on the method used in Hernandez, Wright, & Rodrigues (2015), we asked two questions to the participants to check ad appeal type manipulation: "In your opinion, does this specific advertisement focus more on the benefits one would gain by using this bundle or on specific product attributes?" (1 = *attributes* to 9 = *benefits*) and "How much do you agree with the following statement: The ad focuses on benefits over attributes" (1 = *strongly disagree* to 9 = *strongly agree*; α = .98; Hernandez, Wright, & Rodrigues, 2015). This pretest confirmed that attribute appeal was rated more attribute-focused than the benefit appeal for the Air bundle ($M_{\text{high complementarity\_attribute}} = 4.56$ vs. $M_{\text{high complementarity\_benefit}} = 7.45$; t (1, 62) = 5.17, $p < .001$). For the Sleep bundle, the attribute appeal was also rated as more attribute-focused than the benefit appeal ($M_{\text{low complpementarity\_attribute}} = 4.48$ vs. $M_{\text{low complementarity\_benefit}} = 7.31$, t (1, 62) = 4.84, $p < .001$). The stimuli developed in this pretest were used in the main experiment. Please refer to Appendix.

3.1.2 Subjects, Designs, & Procedure

A total of 140 participants were recruited through Prolific. Three participants were excluded from the analysis for failing the attention check, leaving a sample of 137 participants (gender: 51.1% female; ages: 20–29 60.6%). This study was a 2 (complementarity level: low vs. high) × 2 (ad appeal type: attribute vs. benefit) between-subjects experiment. Respondents were randomly assigned to one of the four conditions.

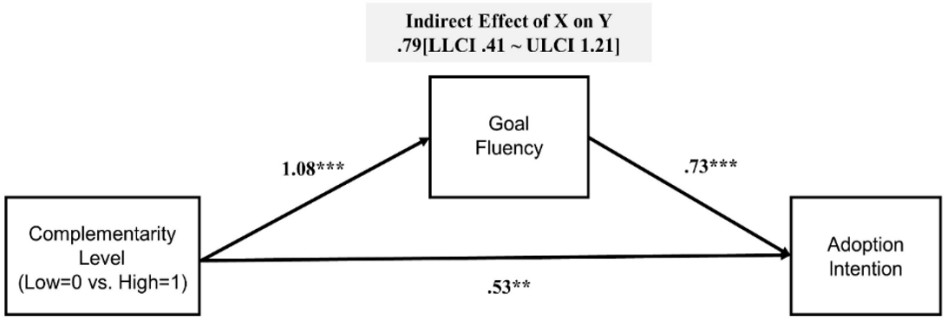
3.1.3 Measures

Consumers' adoption intention toward a smart product bundle was measured with two items scored on a 9-point Likert scale, "How interested will you be in buying the SMART bundle?" and "How likely is it that you will buy the SMART bundle?' (1 = *not at all interested/not at all likely* to 9 = *extremely interested/extremely likely*; α = .70; Ma, Gill, & Jiang, 2015). Goal fluency was measured with four items: "Please indicate how you processed the advertisement of the SMART bundle" (*difficult to understand the reason why you use the bundle/ difficult to process / not at all eye-catching / not at all attractive* = 1 to *easy to understand the reason why you use the bundle / easy to process / very eye-catching / very attractive*; α = .86; Labroo & Lee, 2006). The degree of complementarity was measured with a single item, "To what degree do you think that the SMART air quality monitor and SMART air purifier are complementary? Please indicate the degree of complementarity" (1 = *low degree of complementarity* to 9 = *high degree of complementarity*; Samu, Shanker, & Smith 1999). Similarly, the attribute versus benefit ad appeal type was measured with two items, as in the pretest: "In your opinion, does this specific advertisement focus more on the benefits one would gain by using this bundle or on specific product attributes?" (1 = *attributes* to 9 = *benefits*) and "How much do you agree with the following statement: The ad focuses on benefits over attributes" (1 = *strongly disagree* to 9 = *strongly agree*; α = .93; Hernandez, Wright, & Rodrigues, 2015). We also measured innovation newness level, trait innovativeness, familiarity, involvement, and demographics (gender, age, race, education, and income) to control for potential effects due to these individual differences. Innovation newness was measured with four items, such as "How new/novel/original/innovative do you think is the SMART air quality monitor?" (1 = *not at all* to 9 = *extremely*; α = .86; Ma, Gill, & Jiang, 2015). Trait innovativeness was measured with two items: "I am usually among the first to try new products" and "I like to buy new and different things." (1 = *not at all* to 9 = *very much*; α = .71; Ma, Gill, & Jiang, 2015). Familiarity was measured with a single item, "How familiar are you with an air quality monitor?" (1 = *not at all familiar* to 9 = *very familiar*; Park & Lessig, 1981). Involvement was measured with a single item, "How important is an air quality monitor to you?" (1 = *not at all important* to 9 = *very important*; Zaichkowsky, 1985). The subsamples used in the experiment did not differ in innovation newness, trait innovativeness, familiarity, involvement, or demographics.

4. Results and Discussion

First, the manipulation check for the ad appeal type confirmed that the manipulation was successful. Participants in the attribute appeal condition rated the advertisement as more attribute-focused than did those in the benefit appeal condition ($M_{attribute}$ = 3.69 vs. $M_{benefit}$ = 6.96; t (1, 135) = 12.02, p < .001). Second, in the high degree of complementarity condition (Air bundle), participants rated a higher degree of complementarity than the low degree of complementarity condition (Sleep bundle; $M_{high\ complementarity}$ = 7.59 vs. $M_{low\ complementarity}$ = 6.09, F (1, 135) = 34.82, p < .001). This study confirmed that manipulation of ad appeal type (attribute vs. benefit) and complementarity level (low vs. high) was successful.

Supporting H1, the main effect of the complementarity level on adoption intention toward a bundle was significant (F (1, 135) = 11.45, p < .001). As predicted, adoption intention toward bundles increased when the degree of complementarity was high ($M_{high\ complementarity}$ = 6.95, SD = 1.27, n = 69) than when the degree of complementarity was low ($M_{low\ complementarity}$ = 5.63, SD = 1.85, n = 68). The main effect of complementarity level on goal fluency was also significant. A high level of complementarity increased perceived goal fluency ($M_{high\ complementarity}$ = 6.80 vs. $M_{low\ complementarity}$ = 5.72; F (1,135) = 12.93, p < .001). A mediation analysis was conducted using PROCESS model 4 with 5,000 bootstrapping samples (Hayes, 2012; Preacher & Hayes, 2008). The results revealed a significant indirect effect of the degree of complementarity on adoption intention via goal fluency (β = .79; 95% CI [.41, 1.21]). These results support H2.Please refer to Figure 2.



Significant indirect effect of complementarity level on adoption intention through "goal fluency" = .79; 95% CI [.41, 1.21]. ***p < .001, **p < .05.
Number of bootstrap samples = 5,000. Regression coefficients are unstandardized.

Figure 2: The effect of complementarity level on adoption intention toward a bundle via goal fluency

ANOVA was conducted to examine whether the ad appeal type moderated the effect of complementarity level on goal fluency (H3). The ANOVA on goal fluency with the complementarity level, ad appeal type, and their interaction revealed a significant interaction effect of complementarity level × ad appeal type (F (1, 133) = 5.18, p = .024). The simple effect test revealed that when the ad appeal type was attribute-focused, the effect of the complementarity level on goal fluency was significant (F (1,133) = 26.49, p < .001). The goal fluency for low complementarity x attribute appeal was 5.02 (SD=1.70, n=34), and the goal fluency for high complementarity x attribute appeal was 6.60 (SD=1.25, n=35). Contrariwise, when the appeal type was benefit-focused, the effect of complementarity level on goal fluency was insignificant (F (1,133) = 3.61, p > .05). The goal fluency for low complementarity x benefit appeal was 6.41 (SD=1.08, n=34) and the goal fluency for high complementarity x benefit appeal was 7.0 (SD= .93, n=34).

The ANOVA on adoption intention with the complementarity level, ad appeal type, and their interaction also revealed a significant interaction effect of complementarity level × ad appeal type (F (1, 133) = 14.62, p < .001). The simple effect test revealed that when the ad appeal type was attribute-focused, the effect of the complementarity level on adoption intention was significant (F (1,133) = 42.71, p < .001). The adoption intention for low complementarity x attribute appeal was 4.65 (SD=1.52, n=34) and the adoption intention for high complementarity x attribute appeal was 6.90 (SD=1.36, n=35). Contrariwise, when the appeal type was benefit-focused, the effect of complementarity level on adoption intention was insignificant (F (1,133) = 1.21, p = .27). The adoption intention for low complementarity x benefit appeal was 6.62 (SD=1.08, n=34) and the goal fluency for high complementarity x benefit appeal was 7.0 (SD= .93, n=34). See Table 1, Figure 3, and Figure 4.

Table 1: The effect of complementarity level x ad appeal on goal fluency and adoption intention

	Goal Fluency		Adoption Intention	
	Attribute Appeal	**Benefit Appeal**	**Attribute Appeal**	**Benefit Appeal**
Low Complementarity (n=68)	5.02 (1.70)	6.41 (1.08)	4.65 (1.52)	6.62 (1.63)
High Complementarity (n=69)	6.60 (1.25)	7.00 (0.93)	6.90 (1.36)	7.00 (1.18)

Note: N=137 participants. Standard deviations are in parentheses.

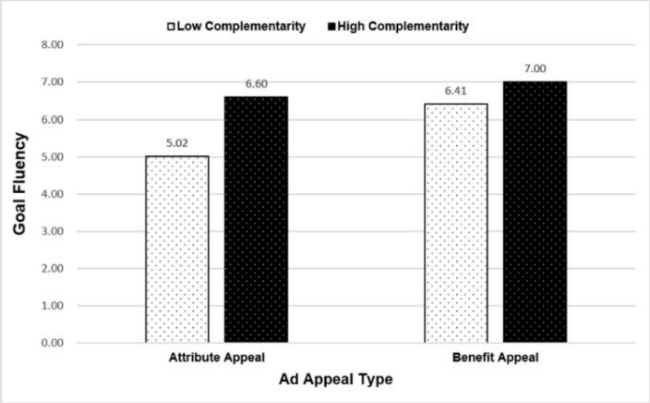


Figure 3: The interaction effect of complementarity level and ad appeal type on goal fluency

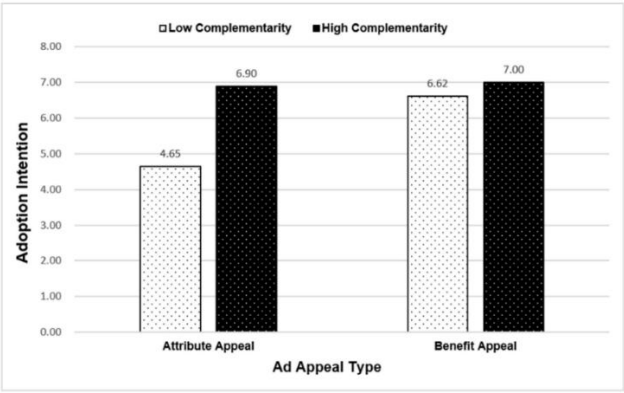
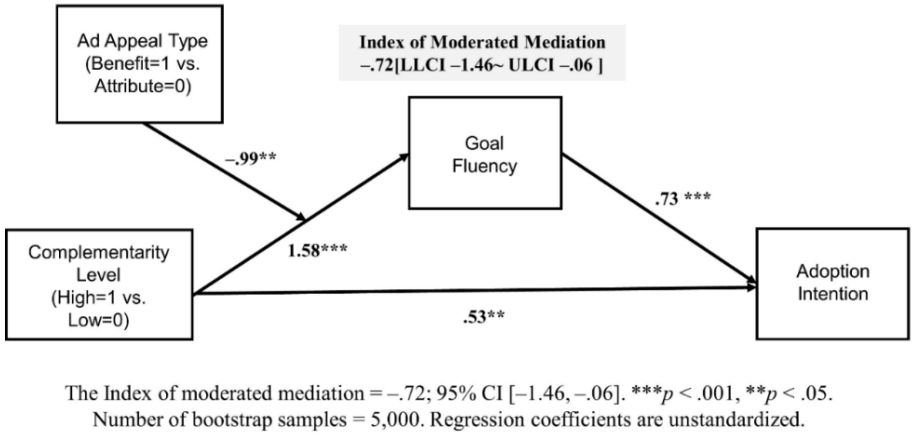


Figure 4: The interaction effect of complementarity level and ad appeal type on adoption intention

We performed a moderated mediation analysis to examine whether goal fluency mediates the interaction of complementarity level and ad appeal type on adoption intention toward a bundle (Hayes, 2012; Preacher & Hayes, 2008; Model 7: 5,000 resamples). As illustrated in Figure 5, the results confirmed a significant indirect effect mediated by goal fluency (β = –.72, 95% CI [–1.46, –.06]). Specifically, under the attribute appeal-condition, the moderating effect of the complementarity level on goal fluency was significant (β = 1.58, 95% CI [.97, 2.18]). Contrariwise, under the benefit-appeal condition, the moderating effect of complementarity level on goal fluency was insignificant (β = .59, 95% CI [–.02, 1.20]). These results support H3. Further, under the attribute-appeal condition, the indirect effect of complementarity level on adoption intention via goal fluency was significant (β = 1.15, 95% CI [.56, 1.84]), and under the benefit-appeal condition, the indirect effect of complementarity level on adoption intention via goal fluency was also significant (β = .43, 95% CI [.09, .79]). These results support H4.



The Index of moderated mediation = –.72; 95% CI [–1.46, –.06]. ***$p < .001$, **$p < .05$.
Number of bootstrap samples = 5,000. Regression coefficients are unstandardized.

Figure 5: The effect of complementarity level x ad appeal type on adoption intention toward a bundle via goal fluency

This study provides support for H1. When the complementarity level of bundled items is high, consumers' adoption intention increases. Consistent with H2, this study validated the mediation effect of goal fluency as an underlying mechanism behind the relationship between the complementarity level of bundled items and consumers' adoption intention. Further, the experiment casts light on the boundary condition of the above effects by affirming the moderating role of the ad appeal type. In other words, in the attribute-focused ad, when the featured bundled items' complementarity level is low, goal fluency decreases thus leading to lower adoption intention toward smart product bundles. In contrast, in the benefit-focused ad, when the complementarity level of the featured bundled item is low, goal fluency and adoption intention toward a bundle increase. As predicted, when the featured bundled items' complementarity level is high, it does not interact with the ad appeal type. This implies that when the complementarity level of bundled items is high, consumers can easily understand the consumption goals ("why" they use the bundled items together) associated with the bundle whether the bundle is advertised using either attribute or benefit appeal. The moderated mediation analysis confirmed that goal fluency underlies the effect of complementarity level on adoption intention. These results support H3 and H4.

5. General Discussion

5.1. Theoretical implications

The studies reported herein have direct implications for theory and practice. First, we extend the literature on smart products bundling. Second, we illuminate goal fluency as a psychological mechanism underlying the relationship between the complementarity level of bundled items and adoption intention. Third, we highlight the moderating role of attribute versus benefit appeal in advertising. Prior research exploring the effect of bundling on smart product adoption suggests that when innovation is radical, providing radical innovation in a bundle with an existing product enhances adoption intention rather than selling the radical innovation separately (Reinders, Frambach, & Schoormans, 2010). This study extends the findings to the smart product market, indicating that the positive effect of bundling smart sensors and actuators is likely to depend on the complementarity level of the bundled items. In this study, we show that bundling a highly complementary actuator with the sensor product may increase consumers' adoption intention toward a bundle. Specifically, the current study results imply that when a smart product bundle is featured in an advertisement, benefit (vs. attribute) appeal increases goal fluency and leads to higher adoption intention. This strategic intervention for bundling smart products works when the bundled items have a lower level of complementarity. The moderating role of ad appeal type did not occur when the complementarity of bundled smart items was high. The current research findings extend the understanding of the goal theoretical approach (Barsalou, 1983; Gibbert & Mazursky, 2009; Ratneshwar, Pechmann, & Shocker, 1996; Ratneshwar et al., 2001) toward smart product adoption decisions.

5.2. Managerial implications

This study holds several practical implications for managers. First, the findings suggest when managers launch a smart product bundle, they should consider the complementarity level of bundled smart items. Promoting low complementary products in a smart bundle will result in lower goal fluency, as it is difficult for consumers to process information from incongruent combinations (Noseworthy & Trudel, 2011). Thus, when the complementarity level of the bundled items is low, managers can use advertising as an effective marketing strategy to increase consumers' processing of the common consumption goal of the featured bundle. They could encourage consumers to imagine a new salient consumption goal of the smart product bundles (Gibbert & Mazursky, 2009; Ratneshwar, Pechmann, & Shocker, 1996; Ratneshwar et al., 2001). Second, the nature of the high-technology market, such as connectivity and network effects, allows managers numerous combinations of bundling smart products. Managers should consider the optimal architecture of smart product bundling when developing and launching new smart sensors and actuators (Raff, Wentzel, & Obwegeser, 2020). Managers should consider the most effective way of appealing smart product bundles by appealing to the shared and meaningful benefits of using the bundled items together.

5.3 Limitations and future research directions

The limitations of this study provide the potential for future research. First, future studies may investigate the effect of bundling smart products when the innovation newness level of the bundled items is relatively high or low. For example, really new products (RNPs) versus incrementally new products (INPs) may show different results when different appeal types are applied to advertising (Hoeffler, 2003). Compared with the analytical appeal, imagery appeal would be helpful for consumers to understand really new products (Dahl, Chattopadhyay, & Gorn, 1999; Lee & Chu, 2020; Zhao, Hoeffler, & Dahl, 2012). Second, future research may investigate whether these results can be generalized to other product categories and other contexts. Field experiments could enhance the external validity of our findings (Brewer & Crano, 2000). Finally, several extensions of this study are proposed. A list of constructs such as brand loyalty (Mathew & Thomas, 2018), schema-congruity (Meyers-Levy & Tybout, 1989), and thinking style (Monga & John, 2007) may influence adoption intention toward smart product bundles. The investigation of this premise awaits future research.

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Appendices

Appendix 1: Stimuli used in the main experiment

High Complementarity x Attribute Appeal

High Complementarity x Benefit Appeal

Low Complementarity x Attribute Appeal

Low Complementarity x Benefit Appeal