If at first you don't adopt - Investigating determinants of new product leapfrogging behavior

Citation for published version (APA):

Document license:
CC BY

DOI:
10.1016/j.techfore.2021.121437

Document status and date:
Published: 01/03/2022

Document Version:
Publisher’s PDF, also known as Version of Record (includes final page, issue and volume numbers)

Please check the document version of this publication:
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Download date: 09. Jun. 2022
If at first you don’t adopt - Investigating determinants of new product leapfrogging behavior

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ARTICLE INFO
Keywords:
New product adoption
Leapfrogging
Active innovation resistance
Passive innovation resistance
Disposition to leapfrog

ABSTRACT
In times of rapid technological advancements, consumers often reject new products as they intentionally postpone their adoption until significant technology improvements are available. This phenomenon is commonly called consumer leapfrogging behavior. While previous studies have found vast empirical evidence for the occurrence and detrimental effects of such behavior, only a few studies have focused on investigating the nature and determinants of consumer leapfrogging. Hence, this article systematically explores and empirically validates potential determinants of consumer leapfrogging behavior by applying a multimethod approach. First, we conducted a systematic literature review to summarize the current research. Second, we applied a qualitative study to identify potential reasons for consumer leapfrogging behavior. The results show that known theoretical rationales for innovation rejection behavior tied to active and passive innovation resistance do not comprehensively account for the complex psychological processes of this behavior. Consequently, we introduce a new construct called “leap disposition” to explain consumers’ disposition to reject a new product and instead wait for a superior subsequent product generation. Third, we empirically validate and quantify the relative importance of both established constructs (i.e., active and passive innovation resistance), as well as the newly introduced leap disposition, for leapfrogging behavior within a large-scale study.

1. Introduction
In a time of rapid technology changes and declining product life cycles, new products are launched with accelerating speed (Chen et al., 2012; Khan et al., 2018). Consequently, innovations quickly become outdated, challenging companies to create innovations faster and at higher profit levels (Cui et al., 2009; Jahanmir and Cavadas, 2018). Slow-paced new product adoption and diffusion are thus becoming a major challenge for companies (Jahanmir and Cavadas, 2018; Van den Bulte, 2000). Unfortunately, prior literature has documented that consumers show little enthusiasm for frequently buying new product generations (Heidenreich and Handrich, 2015; Mani and Chouk, 2017). This situation appears to result from the fact that consumers regularly face the dilemma of whether to buy a new product with the latest technology at the time of market introduction or to intentionally postpone their adoption until a subsequent new product—with possibly even greater technological advancements—is available (e.g., see Kornish, 2001; Shih and Schau, 2011). The latter option is commonly referred to as “leapfrogging,” describing a consumer’s decision to reject a new product and instead wait for a superior subsequent product generation (Talke and Heidenreich, 2014).

Leapfrogging behavior is particularly prevalent in product categories with rapid technological advancements and fast product life cycles, such as the smartphone market. A consumer might be impressed and attracted by the features of a new smartphone generation at the time of market introduction but may still decide to reject the current product to wait for the next generation, which may have significant technological improvements. However, for an innovation to become successful, it is critical for as many consumers as possible to become early adopters (Heidenreich et al., 2017). If too many consumers decide to leapfrog a...
new product, the necessary number of early adopters needed for a product generation to be rapidly adopted by the remaining consumers might never be reached (Allaway et al., 2003; Mahajan et al., 1990). Consequently, intense leapfrogging could lead to market failure of the current new product generation, such that the return on investment falls short of expectations and activities to develop subsequent new product generations are terminated. Not surprisingly, studies on consumer adoption behavior highlight the significance of leapfrogging as a major reason for low adoption and diffusion rates (Herrmann et al., 2017; Weiber and Pohl, 1996). Moreover, slow adoption and diffusion due to leapfrogging might also lead to a company’s market share becoming lost to competitors, resulting in negative financial performance (Jahani and Cavadas, 2018).

While the impact of leapfrogging on the success of new products and even the long-term survival of companies has been acknowledged (Kornish, 2003; Peres et al., 2010), only a few studies have been conducted that investigate the nature and potential causes of consumer leapfrogging behavior (Peres et al., 2010). Accordingly, empirical insights into psychological processes underlying this behavioral response to new products are lacking. Thus, further knowledge on the determinants of leapfrogging behavior is still required to fully understand how this behavior evolves and to derive measures to reduce its occurrence to enhance new product adoption and diffusion (Herrmann et al., 2017).

To close this research gap, following procedures suggested by Harrison (2013), we applied a sequential research design consisting of an initial qualitative and a subsequent quantitative study, both developed and based on the findings of a systematic literature review. Such a mixed-method approach was used effectively in previous research (Kawakami et al., 2011; Lastovicka and Siriani, 2011) and allowed us to conduct a comprehensive examination of the leapfrogging phenomenon. Moreover, the use of different methods might lead to cross-validation of our results based on qualitative and quantitative data, resulting in greater robustness of our derived findings (Kaplan and Duchon, 1988).

From a theoretical perspective, our findings contribute to the knowledge on consumer adoption behavior by providing initial empirical insights into the determinants of new product leapfrogging behavior. Corresponding findings further challenge the current “black-and-white” thinking in consumer adoption research, which has led to a focus on either adoption or rejection, neglecting more nuanced outcomes such as temporary rejection (e.g., leapfrogging) (Talke and Heidenreich, 2014). Our findings thus contribute to innovation-decision models on consumer adoption behavior by providing theoretical rationales for leapfrogging, which has thus far been a widely neglected negative outcome in consumer adoption processes. From a managerial perspective, our research provides new product managers insights into the causes leading to consumer leapfrogging behavior. These insights equip new product managers with the knowledge to develop marketing strategies to increase new product adoption by specifically addressing consumers who deliberately postpone adoption to wait for a subsequent product generation.

The manuscript is structured as follows. First, we conduct a systematic literature review to identify potential determinants and theoretical rationales of consumer leapfrogging behavior in the context of new product adoption. Second, we use an online survey with open-ended questions to revise and extend the derived typology of determinants. Third, we apply a large-scale quantitative study to empirically validate the final typology and estimate the relative importance of each determinant for the development of leapfrogging behavior. The article concludes with a discussion of the results, theoretical and practical implications, and future research avenues.

2. Current state of research on consumer leapfrogging

2.1. Methodological approach

As outlined in the introduction, studies on consumer leapfrogging behavior are scarce, yet insights on potential determinants are urgently needed for both academics and practitioners. To derive such determinants and corresponding theoretical rationales, a systematic overview of current and past findings in the area of consumer leapfrogging is of utmost importance. Since no such overview is available in the literature, we conducted a systematic literature review based on an automated database search following procedural suggestions by Bartels and Reinders (2011) and Greenhalgh (1997). The database search included the following online resources: ScienceDirect, Emerald Insight, EBSCO Host and JSTOR. All publications before May 2019 were considered. To narrow down the relevant literature, the full papers in each database were screened by several search terms. First, we included all articles that directly referred to the phenomenon of leapfrogging. Accordingly, the search term “leapfrog*” was applied in a first step to include multiple forms of the word (e.g., leapfrogged, leapfrogger). As this first step led to a broad range of results beyond the scope of our study (e.g., leapfrogging of emerging technologies by developing countries) (Lee and Malerba, 2017; Tan et al., 2018), we further refined our search string by connecting the initial search term “leapfrog*” to “consumer behavior” OR “customer behavior.” (To avoid any confounding effects due to differences between American and British English spelling, we also included an additional search string with the spelling “behavior.”) Finally, we connected the resulting search strings to “innovation” OR “new service” OR “new product.” The abstracts of the resulting papers were then screened for contextual fit, leading to 45 potential articles in a narrow set. These articles were subsequently read, and potential overlaps across the different databases were eliminated, such that 28 articles were ultimately deemed relevant. Table 1 gives an overview of the search results from each database (for detailed findings from the systematic literature review, see Appendix A).

Based on the depth of the examination of the leapfrogging phenomenon, each article was assigned to one of two categories: (1) research that provides conceptual or empirical evidence for the occurrence of consumer leapfrogging (26 articles) and (2) research that provides conceptual or empirical insights into potential determinants of consumer leapfrogging (2 articles). With regard to the first category, the included studies focused on research fields adjacent to consumer adoption behavior rather than on leapfrogging itself, but based on their findings, some conceptual or empirical evidence for the occurrence of consumer leapfrogging behavior was found. For instance, Kornish (2001) investigated pricing strategies for durable goods among monopolists and showed that the adoption of a product could be delayed and product generations could be skipped. In reference to Fudenberg and Tirole (1998), she called this behavior leapfrogging. Goldenberg and Oreg (2007) point out that the consumer leapfrogging effect is an essential but underestimated economic impact factor. More specifically, based on a historical narrative about the introduction of portable music players, they show that leapfrogging is prevalent and might also have an important impact on firms’ revenues. Peres et al. (2010) reviewed the interaction-based diffusion literature of the past decade and showed that in multiple-generation scenarios, adopters often skip new product generation and leapfrog to a successive version instead. Furthermore, they conclude that leapfrogging is a subscription issue, as they call it, has received little attention in the past. Last, van Rijnsoever and Oppewal (2012) investigate how early innovation adoption depends on ownership, purchase experience, and adoption times for prior product generations. Their findings indicate that consumers often skip a new product generation in expectation of a superior subsequent generation. They further conclude that this form of adoption pattern is prevalent in industries such as home entertainment products, where successive product generations are quite common. In conclusion, all these studies confirm
that leapfrogging is a common response when consumers are confronted with new products and that it might have a detrimental effect on new product success.

However, none of these studies sheds light on the potential determinants of, and thus the psychological processes leading to, consumer leapfrogging behavior. Conversely, the two articles in the second category identified within the systematic literature review do provide some conceptual and empirical insights in this respect. Talke and Heidenreich (2014) introduce an integrated innovation-decision model based on the traditional adoption process by Rogers (2003), which strives to integrate all positive and negative outcomes within consumer adoption decisions. According to their innovation-decision model, consumer leapfrogging represents a specific form of temporary rejection and, similar to continuous rejections, is thus driven by consumers’ active and passive innovation resistance. Active resistance to innovation refers to a negative attitude formation that evolves (1) if consumers perceive product-specific factors as dysfunctional or inadequate with regard to personal needs and usage expectations, leading to functional barriers, or (2) if consumers perceive that product-specific factors are in conflict with the consumers’ own value and belief systems, leading to psychological barriers (Talke and Heidenreich, 2014). Passive innovation resistance evolves as a predisposition if (1) adopter-specific factors form an inclination to resist changes or (2) situation-specific factors constitute a high level of satisfaction with the status quo (Talke and Heidenreich, 2014). Based on the level of passive and active innovation resistance toward current product generation, consumers decide whether to wait for subsequent and potentially superior product generation. In the case of leapfrogging, consumers “stop the current adoption process and start a new one as soon as the next product generation is available” (Talke and Heidenreich, 2014, p. 904). Taking all constituting factors of passive and active innovation resistance into account, the innovation-decision model by Talke and Heidenreich (2014) provides hints of 23 potential determinants of consumer leapfrogging behavior. However, empirical validation of these determinants in the context of consumer leapfrogging remains to be conducted.

Recently, Herrmann et al. (2017) conducted a field study gathering data from the automotive market to investigate factors that drive consumers to replace the product they currently own (P0) with the upcoming generation (P2), instead of its most recent version (P1). According to their results, consumers’ tendency to leapfrog is driven by the expected quality advantages, possible switching costs, the time until the launch of a future product, and the urgency to replace the old product. The first two factors provide initial empirical evidence that one of the nine functional barriers (i.e., value barriers) and one of the eight psychological barriers (i.e., usage barriers) introduced by Talke and Heidenreich (2014) are also relevant for consumer leapfrogging. However, the remaining barriers were not tested in the empirical setting of Herrmann et al. (2017). Furthermore, since the time until the launch of a future product and the urgency to replace the old product were also found to be significant determinants of consumer leapfrogging, this indicates that some external factors not considered within the framework of Talke and Heidenreich (2014) might also influence consumer leapfrogging behavior. To fully capture the psychological processes leading to consumer leapfrogging, all potential determinants of consumer leapfrogging should be covered in a comprehensive typology. Such a typology could then be used as a common ground so that the empirical relevance of each potential determinant for consumer leapfrogging behavior can be investigated across research objects and areas. However, since such a comprehensive typology is still lacking, subsequent explorative studies strive to fill this research gap.

### 3. Study 1: explorative identification of leapfrogging determinants

#### 3.1. Methodological procedure

As both theoretical and empirical evidence on potential determinants of consumer leapfrogging are scarce, an explorative approach to revise and extend the identified determinants from the literature review seems most fitting. In particular, we conducted an online survey with open-ended questions in line with the methodological procedures used by Lawson et al. (2016). Using an online survey with open-ended questions guarantees comparability of responses as well as openness to unexpected responses, such that even unexpected determinants can be identified (Reinhardt et al., 2015). The online survey was structured as follows. First, the participants were instructed to think of an innovative product that had caught their attention within the last six months but that they had chosen not to buy to wait for the next generation of the product. This step was necessary to collect answers from consumers for whom skipping innovations in favor of successors is a real and valid outcome during their adoption decisions and, thus, for whom potential determinants for such behavior are detectable. Based on their choice, they were asked to name and describe the product and explain why they had chosen to wait for the next product generation instead of buying the current product. At the end of the online survey, the participants were asked to report common demographic information (age, gender, and current occupation).

A total of 443 individuals took part in our online survey, of whom 54.70% were female. The average age was 29.62 years, with ages ranging from 16 to 92 years. Of the participants, 218 (42.66% male, average age 29.82 years) indicated that they could not recall any product relevant to our leapfrogging scenario. However, 225 participants (67.56% male, average age 29.42 years) recalled a relevant product. For subsequent and potentially superior product generation. In the case toward current product generation, consumers decide whether to wait instead of buying the current product. At the end of the online survey, the participants were asked to report common demographic information (age, gender, and current occupation).

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Procedures for qualitative data analysis and interpretation suggested by Spiggle (1994) were employed in the exploratory study. Because the interpretation of statements by other persons is rather subjective, we also used a systematic approach for the analysis to minimize the

### Table 1: Methodological approach of the systematic literature review.

<table>
<thead>
<tr>
<th>Step</th>
<th>Search term</th>
<th>Search</th>
<th>Database</th>
<th>EBSCO</th>
<th>JSTOR</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>leapfrog*</td>
<td>6656</td>
<td>996</td>
<td>9330</td>
<td>5970</td>
<td>Searching within</td>
</tr>
<tr>
<td>2</td>
<td>leapfrog* AND “consumer behavior” OR “customer behavior”</td>
<td>117</td>
<td>87</td>
<td>47</td>
<td>10</td>
<td>complete text</td>
</tr>
<tr>
<td>3</td>
<td>leapfrog* AND “consumer behavior” OR “customer behavior” AND “new service” OR “new product”</td>
<td>87</td>
<td>65</td>
<td>138</td>
<td>61</td>
<td>Abstract check for context fit</td>
</tr>
<tr>
<td>4</td>
<td>Narrow set</td>
<td>12</td>
<td>11</td>
<td>2</td>
<td>0</td>
<td>Full paper check for context fit</td>
</tr>
<tr>
<td>5</td>
<td>Relevant set (single)</td>
<td>10</td>
<td>5</td>
<td>12</td>
<td>5</td>
<td>Check for overlaps</td>
</tr>
<tr>
<td>6</td>
<td>Relevant set (combined)</td>
<td>Σ 28</td>
<td></td>
<td></td>
<td></td>
<td>Relevant set without overlaps</td>
</tr>
</tbody>
</table>

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*Notes: 56 Relevant set (combined) 10 5 12 5 Check for overlaps, 4 Relevant term 6656 996 9330 5970 Searching within, 6656 996 9330 5970 Searching within, 6656 996 9330 5970 Searching within, 6656 996 9330 5970 Searching within.
possibility of heterogeneous interpretations. First, an introductory framework based on the innovation-decision model by Talke and Heidenreich (2014) was set up; this framework listed short definitions of all constituting factors of active and passive innovation resistance (for details on the introductory framework, see Appendix B). Based on these descriptions of potential determinants for consumer leapfrogging behavior, a group of three experts from the fields of marketing and innovation management categorized the qualitative data according to the scheme used in this framework (Spiggle, 1994). Specifically, each expert analyzed and interpreted the answers given by the participants and assessed whether a certain statement matched a given determinant within our framework. In the former case, the statements were assigned to one or more categories. In the latter case, the statements were categorized as “other determinants.”

3.2. Analysis and results

Based on the responses, 376 (100%) reasons for leapfrogging could be evaluated by the three independent experts. To ensure systematic and thorough data processing, the experts applied qualitative data interpretation operations suggested by Spiggle (1994), namely, categorization, abstraction, comparison, and integration. Starting with categorization, the experts linked 308 (81.91%) reasons for the provided framework (see Table 2). Of these, 286 (76.06%) reasons were allocated to innovation-specific factors, with 188 (50.00%) assigned to functional barriers and 98 (26.06%) to psychological barriers. Within this category, the most frequently mentioned reasons were (1) value barriers (144, 38.30%; e.g., “There were no technical advantages compared to its forerunner which convinced me to buy the actual product”), (2) economic risk barriers (41, 10.90%; e.g., “A better price-performance ratio”), and (3) functional risk barriers (33, 8.78%; e.g., “Shortcomings regarding the hardware, especially the display but also buggy software”). Meanwhile, 22 (5.85%) reasons were assigned to adopter- or situation-specific factors forming passive resistance to innovation. Of these, 20 (5.32%) reasons were rooted in high status quo satisfaction (e.g., “My old mobile device is just fine and still working”), and 2 (0.53%) reasons were allocated to factors referring to an individual’s inclination to resist changes (e.g., “Changing to a new version of a computer operating system is annoying”).

A residual quantity of 68 (18.09%) reasons from the total of 376 (100.00%) did not match the existing framework. Those answers were categorized as other determinants. However, to clarify the large number of unallocated reasons, a detailed follow-up analysis was conducted employing abstraction and comparison as qualitative data interpretation operations (Spiggle, 1994). Specifically, we asked the experts to review the remaining data to find commonalities between the leftover statements and group them into an initial theme, if possible. Based on the discussion, it was concluded that the remaining answers mainly dealt with aspects related to temporal distance (e.g., “Time till something new will appear is relatively short”), effort expectancy (e.g., “For probably less money, I will get a newer/better/faster version”), prudence (e.g., “When I saw it, I just wanted to have it”), and patience (e.g., “If a new version is available, I do not have the patience to wait with the purchase”). Finally, the experts employed integration as a qualitative data interpretation operation (Spiggle, 1994) and incorporated the four emergent categories into the established framework. As a result, 354 (94.15%) of the 376 (100.00%) responses could be linked to the refined framework (see Table 3). The remaining reasons were highly contextual (e.g., mobile phone contract, “Contractual obligation”; software support, “I had to buy the new one because the support for my product ended”); or seasonal (biking), “The season was almost over and there was no need to buy a new bike”) and therefore impeded generalization. Therefore, we omitted the unassigned responses from further discussion and analysis.

4. Discussion

This explorative study strived to validate and extend the determinants for consumer leapfrogging derived from the literature review. Several noteworthy implications can be drawn from the findings.

First, the explorative findings indicate that adopter-, situation-, and product-specific factors constituting active and passive innovation resistance serve as determinants not only for rejection behavior in general but also for more specific versions of innovation rejection—in

Table 2

<table>
<thead>
<tr>
<th>Study 1 - Matching to the established framework of innovation resistance.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3rd Order construct</td>
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<tr>
<td>---------------------</td>
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<tr>
<td>Active Innovation Resistance (AIR)</td>
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<tr>
<td>Passive Innovation Resistance (PIR)</td>
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<td></td>
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<tr>
<td># Mentioned reasons allocated to the established framework</td>
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<tr>
<td>Ratio of allocated reasons to total # reasons mentioned</td>
</tr>
</tbody>
</table>
particular, consumer leapfrogging behavior. Hence, in line with prior research on active (Joachim et al., 2018; Wiedmann et al., 2011) and passive innovation resistance (Heidenreich and Kraemer, 2016; Labrecque et al., 2017), our findings also confirm that both types of consumer resistance to innovation constitute important inhibitors of new product adoption, at least temporarily. However, our results also indicate that active innovation resistance seems to be a much more important driver of leapfrogging behavior than passive innovation resistance. Of all the mentioned reasons for the participants’ decisions to leapfrog, 76.06% were categorized as either functional or psychological barriers constituting active innovation resistance. Only 5.85% of the reasons were assigned to adopter- or situation-specific factors forming passive innovation resistance. Hence, our findings are in line with the predictions made by the innovation-decision model by Talke and Heidenreich (2014), suggesting that passive innovation resistance might be more relevant in earlier stages of the adoption process, while active innovation resistance might be more relevant in later stages and, thus, also more important for leapfrogging behavior.

Second, a significant proportion of the reasons mentioned by our participants could not be explained by the framework based on passive and active innovation resistance. More specifically, two situation-specific factors (i.e., temporal distance and effort expectancy) as well as two adopter-specific factors (i.e., prudence and patience) emerged as additional determinants for leapfrogging behavior. Based on these findings, we propose a new construct called “leap disposition” evolving from such situation- and adopter-specific factors (see Fig. 1). Specifically, the temporal distance and effort expectancy ratio between the product generation in place and its successor, as well as the degree to which an individual is characterized by prudence and patience, induce a generic disposition to act in a consistent way when confronted with a new product in sight of its successor. Conceptually, leap disposition thus represents a generic predisposition of consumers to leapfrog a new product in favor of waiting to buy its successor. Methodologically, leap disposition represents a hierarchical construct evolving from a situation-specific subdimension encompassing temporal distance and effort expectancy as separate constructs and an adopter-specific subdimension encompassing prudence and patience as separate constructs. Accordingly, leap disposition can be further differentiated into situational and cognitive leap disposition. With respect to the former, situational circumstances (i.e., low temporal distance between the current and subsequent product generation, as well as low effort expectancy in adopting the subsequent product generation compared to the current one) make the consumer leapfrog rather than purchase the current new product. With respect to the latter, the individual’s cognitive style (i.e., being prudent and patient regarding product purchases) triggers the consumer to leapfrog rather than to purchase the current new product. With respect to the nomological validity of this newly defined construct, leap disposition is conceptually related to but distinct from established constructs due to both different consequences and different determinants. In contrast to leap disposition, passive innovation resistance comprises routine seeking, short-term focus, emotional reaction to imposed change, cognitive rigidity, and satisfaction with the extent of innovation and with current products. Similarly, and in contrast to leap disposition, active innovation resistance comprises eight functional barriers and eight psychological barriers that evolve due to deviations between expectations and perceptions of new product attributes.

While the results of Study 1 provide initial insights into potential determinants of consumer leapfrogging behavior, an empirical and quantitative validation of the applicability and relative importance of established constructs (i.e., active and passive innovation resistance) and newly introduced constructs (i.e., leap disposition) is still needed. Consequently, the subsequent study strives to (1) quantitatively validate the potential determinants and (2) determine their relative importance for consumer leapfrogging behavior.

### 5. Study 2: empirical validation of leapfrogging determinants

#### 5.1. Conceptual development

While the results of Study 1 provide the first anecdotal evidence that both established types of innovation resistance (i.e., passive and active) and leap disposition influence consumer leapfrogging behavior, theoretical rationales for the assumed relationships are still lacking. Therefore, we will first provide theoretical rationales on how these constructs affect leapfrogging behavior before empirically testing the proposed linkages.

Past research has confirmed the important role of passive innovation resistance as an inhibitor of new product adoption in general (Heidenreich and Kraemer, 2015; Labrecque et al., 2016). Moreover, Oreg (2003) suggests that an individual’s resistance to change, which represents a subdimension of passive innovation resistance, might be significantly linked to the moment of new product adoption. Likewise, Goldenberg and Oreg (2007) propose that psychological disposition, such as passive innovation resistance, might affect the timing of new product adoption and thus leapfrogging behavior. Since consumers with a high degree of passive innovation resistance are less open to new products in general (Heidenreich and Handrich, 2015), they might try to postpone an adoption decision as long as possible rather than adopt a

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**Table 3**

Study 1 - Outcome after introducing leapfrogging-specific determinants.

<table>
<thead>
<tr>
<th>3rd Order construct</th>
<th>2nd Order construct</th>
<th>1st Order construct</th>
<th># Reasons 1st Order construct</th>
<th># Reasons 2nd Order construct</th>
<th># Reasons 3rd Order construct</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leap disposition</td>
<td>Cognitive</td>
<td>Prudence</td>
<td>6</td>
<td>14</td>
<td>46</td>
</tr>
<tr>
<td></td>
<td>leap disposition</td>
<td>Patience</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Situational</td>
<td>Effort expectancy</td>
<td>12</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td></td>
<td>leap disposition</td>
<td>Temporal distance</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td># Mentioned reasons allocated to new constructs</td>
<td>46</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total # of other reasons mentioned</td>
<td>68</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ratio of allocated reasons to other # reasons mentioned</td>
<td>67.65%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># Total reasons allocated to the extended framework</td>
<td>354</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total # reasons mentioned</td>
<td>376</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ratio of allocated reasons to total # reasons mentioned</td>
<td>94.15%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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**Fig. 1.** Leap disposition sources.
new product right away. Hence, for consumers with high levels of passive innovation resistance, it might be more attractive to leapfrog and wait for a succeeding product generation than to adopt the current product generation. Thus, we propose that passive innovation resistance will positively affect consumers’ intention of leapfrogging a new product (see Fig. 2).

**H1:** Passive innovation resistance will positively affect the intention of leapfrogging.

Active innovation resistance was shown to negatively affect consumers’ attitude formation and adoption behavior, driving rejections of new products in diverse categories such as green innovations (Claudy, 2011), technology-based services (Joachim et al., 2018), and internet banking (Laukkanen et al., 2009). Moreover, the findings of several studies also suggest that barriers leading to active innovation resistance, such as risk (Ram and Sheth, 1989), trialability (Nabih and Bloem, 1997) and observability barriers (Olshavsky and Spreng, 1996), affect the timing of new product adoption. Accordingly, Laukkanen et al. (2009) empirically confirmed that both psychological and functional barriers, and thus active innovation resistance, negatively influence the timing of internet banking adoption. Consumers with high levels of active innovation resistance toward a current new product perceive a large discrepancy between their expectations of product-specific factors and what the actual product offers. Hence, for consumers with a high level of active innovation resistance, it might be more attractive to leapfrog the current new product and wait for a succeeding product generation that is enhanced in some aspects, such that their perceived discrepancy is attenuated. Thus, we propose that active innovation resistance will positively affect consumers’ intention of leapfrogging a new product (see Fig. 2).

**H2:** Active innovation resistance will positively affect the intention of leapfrogging.

Since leap disposition is a newly introduced construct, both conceptual rationales and empirical evidence for its relationship to consumer leapfrogging behavior are lacking. Nevertheless, based on the constituting subdimensions (i.e., cognitive and situational leap disposition), the following theoretical rationales can be derived. With respect to cognitive leap disposition, several studies have shown that consumers who lack prudence and instead are characterized by high levels of impulsiveness buy products without evaluating their decisions and act rather spontaneously (Alloway et al., 2016; Coutlee et al., 2014). Likewise, several studies have confirmed that consumer impatience leads to a desire for quicker product delivery and difficulties in waiting for a new product (Chen et al., 2005). Hence, both prudence and patience seem to be important determinants of leapfrogging behavior, such that consumers with high levels of prudence and patience are more inclined to wait for a succeeding product generation instead of buying a new product right away. With respect to situational leap disposition, prior research has shown that shorter product lifecycles and, thus, a smaller temporal distance to a subsequent product generation, influence the decision to wait for a subsequent product (Cui et al., 2009; Ziamou and Veryzer, 2005). Likewise, Herrmann et al. (2017) show that switching costs associated with a product in place and its successor significantly influence consumers’ decision to leapfrog. Hence, both temporal distance and effort expectancy seem to be important determinants of leapfrogging behavior, such that consumers perceiving a small temporal distance and low effort expectancy in adopting a succeeding product generation are more inclined to leapfrog. Accordingly, we propose that leap disposition will positively influence the intention of leapfrogging a new product (see Fig. 2).

**H3:** Leap disposition will positively affect the intention of leapfrogging.

### 5.2. Data and measures

To empirically evaluate our hypotheses, a market research institute distributed a self-administered online questionnaire to a representative panel of consumers in Germany. The design of the survey was set up similarly to the methodological procedure already used in Study 1. Accordingly, the participants were initially asked to remember a technological product that had recently caught their attention but that they intentionally did not buy to wait for a later version. In the next part of the survey, participants were asked about the corresponding product, the purchase situation and environmental circumstances. Afterward, the participants responded to demographic questions. All constructs were operationalized using established or adapted measurement inventories employing seven-point Likert scales. Relying on the measurement inventory of Heidenreich and Handrich (2014),
passive innovation resistance was operationalized as a third-order construct, with an inclination to resist changes as well as status quo satisfaction as second-order dimensions. Using items from the measurement inventory of Joachim et al. (2018), active innovation resistance was operationalized as a molar third-order construct with the second-order dimensions of functional and psychological barriers. As discussed above, an operationalization of leap disposition as a hierarchical construct with cognitive and situational subdimensions seems most fitting for our context. Since prudence and patience as well as temporal distance and effort expectancy are different but associated constructs, leap disposition was operationalized as a molar third-order construct with formative second-order dimensions. With respect to the reflective first-order dimensions, we used items from Rook and Fisher (1995) for prudence and items from Sunderland et al. (2017) for patience. Items from Ganesh et al. (2000) were adapted for effort expectancy, and items on technological turbulence provided by Jaworski and Kohli (1993) were revised for our context to measure temporal distance. To measure the dependent variable of interest—the intention to leapfrog—we asked participants about the probability that they would wait for the next version of the current product instead of immediately buying it, using a four-item, seven-point bipolar semantic differential scale anchored by “impossible/possible,” “unlikely/very likely,” “unthinkable/thinkable,” and “unimaginable/imaginable” from Kulviwat et al. (2007). Four control variables that are frequently used in studies on innovation resistance (age, employment, education, and income; Claudy et al., 2015; Laukkanen et al., 2008; Lian and Yen 2013) were employed to ensure a stronger test of the study’s hypotheses.

A total of 477 respondents participated in the online survey. In detail, female participants with an average age of 43 years made up 46.75% of the sample, while male participants with an average age of 41 years accounted for 53.25%. The educational level attained by most of the participants (53.04%) was either a university degree or a high-school diploma. A substantial percentage of the remaining participants (27.25%) reported having completed vocational training as their highest educational degree. Last, 45.49% of the participants reported an annual salary of more than 25,000 Euro, in line with the usual distribution of income in the German population. For details on the measures, see Appendix C1–4.

To ensure the validity of the data collection, various quality criteria were determined ex ante. For instance, the examination of the response behavior showed no irregularities; thus, no uniform response styles (e.g., giving the same answer to all questions) were identified (Völckner et al., 2010). Furthermore, the response time analysis did not show abnormalities. With respect to potential distortion effects due to common method variance, we employed several procedural and statistical remedies (Podsakoff et al., 2003). With respect to procedural measures, we disconnected all independent and dependent variables throughout the

![Fig. 3. Structural model results.](image-url)
online survey and tried to keep the complexity of each item’s construction as well as the questions’ complexity to a minimum (Weber and Heidenreich, 2017). With respect to statistical remedies, Harman’s single-factor test (Podsakoff et al., 2003) and the full collinearity assessment approach (Kock, 2015) were conducted. Concerning Harman’s single-factor test, the first factor only accounted for 23.61% of the total variance, clearly falling below the common threshold of 40% (Fuller et al., 2016). Concerning the full collinearity assessment approach, the highest variance inflation factor (VIF) was 1.66, which was well below the conservative threshold of 3 (Rock, 2015). Based on these results, support for the absence of a common method bias is given (Klein et al., 2021).

5.3. Analysis and results

To validate our research model and empirically test the hypotheses, we used structural equation modeling (SEM) to set up and evaluate all constructs and their corresponding relationships at the same time. While principally covariance-based and variance-based SEM can be used, the latter methodological approach is better suited to handle highly complex models (Chin, 2010; Hulland, 1999; Jöreskog and Wold, 1982) and is able to model molar hierarchical constructs (Chin, 2010). Because our model is rather complex and includes molar higher-order constructs, we decided to use variance-based SEM for our analysis. Specifically, we used SmartPLS 3.0 (Ringle et al., 2015) to estimate the inner and outer models. For the inside approximation, we employed a centroid weighting scheme as well as the mean replacement as an algorithm (Chin, 2010; Heidenreich and Spieth, 2013). Nonparametric bootstrapping with 5000 replications and individual-level change preprocessing was employed to compute the standard error of the estimates and test for significance.

5.4. Measurement model results

The measurement model was evaluated before continuing with the assessment of the proposed hypotheses at the structural level. As suggested by Hair et al. (2016), we first checked if the indicator loadings of the reflective constructs at the first-order level exceeded the critical value of 0.60 (Hair et al., 2016; Hulland, 1999). After having confirmed high indicator loadings for all our constructs, we checked in a second step whether (1) the composite reliabilities (CR) exceeded 0.70 (Bagoszzi and Lee, 1999) and whether the constructs’ average variances extracted (AVE) were (2) above 0.50 (Bagoszzi and Yi, 1988) and (3) greater than the highest squared correlation with another construct (Fornell and Larcker, 1981). These quality criteria were met by all constructs. To assess the measurement models of the formative second- and third-order constructs, we started by checking the corresponding weights and their significances. All second- and third-order weights exceeded the critical threshold of 0.10 and proved to be significant. To conclude, we also assessed the degree of multicollinearity by assessing the variance inflation factor (VIF). The highest VIF was 3.602, which means that multicollinearity should be of no significant concern. In conclusion, the measurement model seems suitable for structural model analysis. For details on the measurement evaluations, see Appendix D1–3 and Appendix E.

5.5. Structural model results

As shown in Fig. 3, the estimations fit the data well; the $R^2$ for the intention of leapfrogging is 0.123. The hypotheses were subsequently evaluated by examining path coefficients and their corresponding significance levels (Chin, 2010).

Contrary to our expectations, Hypothesis 1 has to be rejected, since passive innovation resistance did not significantly affect consumers’ intention of leapfrogging ($\beta = 0.063$, n.s.). However, in line with Hypothesis 2, active innovation resistance positively affected consumers’ intention of leapfrogging ($\beta = 0.344$, $p < 0.001$). Likewise, leap disposition also positively affected leapfrogging intention ($\beta = 0.208$, $p < 0.001$). Age ($\beta = 0.010$, n.s.), gender ($\beta = -0.119$, $p < 0.01$), education ($\beta = 0.092$, $p < 0.05$), and income ($\beta = -0.081$, $p < 0.10$) did not affect leapfrogging intention.

6. Discussion

Contrary to our expectations, no support was found for the hypothesized effect of passive innovation resistance. A potential explanation for the nonsignificant effect might lie in the dispositional nature of passive innovation resistance. More specifically, leapfrogging a current new product only procrastinates a potential readjustment process due to changes entailed in new product adoption. Hence, high levels of passive innovation resistance most likely lead to an enduring decision to reject a new product, as consumers are not willing to deal with changes either in the present or in the future. Second, the hypothesized effect for active innovation resistance was confirmed by the study. Specifically, active innovation resistance had the strongest positive effect on leapfrogging intention and thus represents the most important determinant. Active innovation resistance, as negative attitude formation toward a new product, develops from a mismatch between consumers’ perceptions of product-specific factors and corresponding expectations (Talke and Heidenreich, 2014). As theorized earlier, consumers with high levels of active innovation resistance toward a current new product seem to prefer to leapfrog and wait for a succeeding product generation that is enhanced in some aspects to alleviate the perceived discrepancy. This finding confirms suggestions of prior research that both functional and psychological barriers negatively influence the timing of new product adoption risk (Laukkonen et al., 2009; Nabih and Bloom, 1997; Ram & Sheth, 1989).

Third, after the results of Study 1 led to the introduction of leap disposition as a newly formulated construct, the findings of Study 2 confirmed both its factorial structure and its proposed effects on consumers’ intention of leapfrogging. More specifically, both adopter-specific factors (i.e., prudence and patience) and situation-specific determinants (i.e., temporal distance and effort expectancy) significantly contributed to the formation of this predisposition and positively affected leapfrogging intention. This finding is in line with prior research highlighting the importance of switching costs (Herrmann et al., 2017) and product lifecycle (Bergstein and Estelami, 2002; Kornish, 2001) as well as impulsiveness (Alloway et al., 2016) and consumer impatience (Chen et al., 2005) for the timing of adoption.

6.1. Theoretical implications

In the past, innovation management research focused on factors and determinants to explain consumers’ adoption or rejection behavior. However, investigations into temporary rejection behavior, especially consumer leapfrogging, remained absent. The current studies addressed this research gap by (1) providing a systematic and comprehensive overview of past literature on leapfrogging, (2) exploring determinants leading to consumer leapfrogging behavior, and (3) empirically validating the proposed determinants. Therefore, several implications for theory can be derived.

First, the systematic literature review provides a first-time summary of the literature related to consumer leapfrogging behavior. The results indicated that research on leapfrogging is still in its infancy, highlighting the need to present theoretical rationales to conceptually and empirically understand this phenomenon. According to our results, the occurrence of leapfrogging has been widely acknowledged (Goldenberg and Oreg, 2007; Kornish, 2001), yet its theoretical underpinnings still represent a “significant gap in the innovation adoption and consumer behavior literature” (Cui et al., 2009 p. 112). Our systematic and reproducible literature review lays a foundation for future scholars to better understand consumer leapfrogging behavior.
Second, the qualitative study highlighted that established constructs such as passive (Labrecque et al., 2016) and active innovation resistance (Joachim et al., 2018) are not able to comprehensively explain consumer leapfrogging behavior. The exploratory findings allowed us to derive a typology of potential determinants that are relevant to understanding the origin of consumer leapfrogging. Specifically, we introduced the construct of leap disposition to explain why consumers deliberately reject a focal product generation to wait for a more advanced yet not developed subsequent product generation. Due to its operationalization as a hierarchical construct including adopter- and situation-specific factors as second-order dimensions, leap disposition synthesizes and unites previous scattered findings on potential leapfrogging determinants in one encompassing construct. The corresponding conceptualization and empirical validation of leap disposition represent an important contribution to the literature on consumer adoption behavior for several reasons. First, conceptualizing leap disposition as a multidimensional construct not only unites previously dispersed findings but also represents a first step toward shedding light on the psychological processes that drive consumers to leapfrog innovations. Second, the corresponding measurement inventory might serve as common ground for future research, helping scholars design empirical studies of the nature, antecedents, and consequences of consumer leapfrogging across research objects and areas. Third, prior research on consumer adoption behavior largely neglected nuanced outcomes such as temporary rejections (e.g., leapfrogging) (Talke and Heidenreich, 2014). The measurement inventory for leap disposition might help in this respect, as it makes it possible for future empirical research to explicitly account for nuanced outcomes such as leapfrogging in consumer adoption processes.

Finally, our findings also extend prior research on consumers’ adoption behavior in general and on innovation-decision models, such as Talke and Heidenreich’s (2014), in particular. By validating the empirical relevance of consumers’ leap disposition as a newly formulated construct that is tailor-made for explaining consumer leapfrogging behavior, we not only provide an additional determinant for consumer leapfrogging but also extend the set of relevant predispositions in adoption research beyond traditional concepts such as consumer innovativeness (Roehrich, 2004) and passive innovation resistance (Heidenreich and Handrich, 2015).

### 6.2. Managerial implications

From a managerial perspective, it is essential to understand consumer leapfrogging behavior, especially today, as technology continues to advance rapidly and consumers are frequently confronted with “buy or wait” decisions (Kornish, 2001). In this context, consumers often opt out of the innovation-decision process and leapfrog the current new product generation, slowing adoption rates and ultimately decreasing sales (Jacco et al., 2008). To counteract the detrimental effects of consumer leapfrogging, companies need insights into the actual causes of such behavior to develop efficient marketing strategies. Our results provide guidance and suggest two areas for managerial action.

First, our results indicate that active innovation resistance is a strong force contributing to leapfrogging behavior. Hence, new product managers might draw on the vast literature on marketing instruments to stimulate new product adoption (see Heidenreich and Kraemer, 2016, for a systematic overview) and use measures to reduce functional or psychological barriers. More precisely, our results indicate that focusing on reducing the functional barriers of amenability and trialability will be most effective. Therefore, companies might seek to ensure sufficient opportunities for consumers to get updates and try out their products prior to adoption (Ruisma et al., 2007). Furthermore, to reduce psychological barriers, companies might carefully select communication measures when launching new products. In particular, companies might focus on reducing image and norm barriers surrounding the new product. One possible solution might be to use horizontal cooperation with a prominent partner to counteract negative impressions connected to a brand or country of origin (Garcia et al., 2007). Another necessary check prior to market introduction involves the alignment of the new product with social norms, family values, and/or entrenched traditions (Laukkanen, 2016).

Second, to attenuate the effects of leap disposition on leapfrogging behavior, companies might select marketing instruments that address consumers’ cognitive style and situational circumstances. Specifically, with respect to the former, companies might employ benefit comparison approaches (Ziamou and Ratneshwar, 2003) in their new product communication to highlight the superiority of the current product generation and to activate consumers’ impatience and impulsiveness. At the same time, however, these efforts will likely be effective only if companies reduce their communication about future generations to a minimum. Rumors and other viral information sharing about subsequent product generations might work against efforts to highlight the current product generation’s superiority and, thus, spark leapfrogging behavior. Last, following indications from our results, companies are advised to consider educating customers in their new product communication. In particular, communication might involve highlighting the ease of using the new product after purchase (e.g., mental stimulation; Zhao et al., 2011) to minimize perceived efforts leading to leapfrogging behavior.

### 6.3. Limitations and future research avenues

As laid out above, this study offered the first insights into the phenomenon and determinants of consumer leapfrogging behavior. However, like all empirical studies, the studies presented within this manuscript have some limitations that might open up avenues for future research.

First, our results were derived from a dataset from a single country (Germany). Research by Tansuhaj et al. (1991) suggests that adoption behavior and the relevance of consumer resistance to innovation are influenced by the level of traditionalism, fatalism, and religious commitment in the focal country. As cultural differences thus might also affect our findings, future research on consumer leapfrogging might employ a multicountry setting to clarify differences with respect to the occurrence or determinants that might result from different cultural backgrounds.

Second, we focused on high-tech consumer products (i.e., smartphones), as this product category guarantees both high levels of innovativeness and considerable variation in actual new product adoption behavior (Heidenreich and Kraemer, 2016; Im et al., 2003). However, recent findings of Joachim et al. (2018) indicate that there might be differences with respect to the relative importance of passive and active innovation resistance in product versus service contexts. Hence, future research might explore whether and how the determinants of consumer leapfrogging behavior differ between those contexts.

Third, the focus of our study was on a first assessment of the nature and consequences of consumer leapfrogging behavior. However, as already mentioned in our managerial implications, effective strategies and countermeasures to attenuate the occurrence of consumer leapfrogging and resulting negative effects on a firm’s sales are needed. According to the vast research stream on marketing instruments to stimulate new product adoption (Hess, 2009) and reduce consumer resistance to innovation (Hess, 2009), future research might draw on experimental studies to test the effectiveness of suitable countermeasures to prevent leapfrogging behavior.

**CRediT authorship contribution statement**

Sven Heidenreich: Conceptualization, Methodology, Supervision.

Jan F. Killmer: Writing – original draft, Visualization, Formal analysis.

Jan A. Millemann: Writing – review & editing, Supervision.
Supplementary materials

Supplementary material associated with this article can be found in the online version, at doi:10.1016/j.techfore.2021.121437.

References


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