Consumer Resistance to Sustainable Innovations

"The effect of incremental and radical innovations on emotional, cognitive, and / or behavioral resistance"

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Introduction

Sustainability is a concept that becomes more acknowledged by the day and is a central focus for today's society. A relatively recent trend is the shifting towards more sustainable economies (Stahel, 2016). More sustainable innovations are needed to make this transformation to a more sustainable economy (Bag et al., 2018). Sustainable innovations can only contribute to our environment if people are willing to adopt these (Noppers et al., 2014). However, not everyone in our society is ready to embrace these sustainable innovations in their lives; most of the times innovation encounter resistance.

There are a lot of different reasons for consumers to feel resistance towards a certain innovation. For example, someone could resist an innovation because it is not in line with their norms or values, or because they do not belief the innovation will work (Pratkanis, 2011). According to psychology studies resistance can display itself on three different dimensions; emotional, cognitive, and / or behavioral (Pratkanis, 2011). Emotional resistance can be illustrated by "I do not like it". This dimension of resistance is focused on the restriction of choice for a consumer. Cognitive resistance can be exemplified by "I do not believe it". Cognitive resistance concentrates itself on the content of the resistance. It entails skepticism about the proposed change (Pratkanis, 2011) The last dimension of resistance, the behavioral resistance, can be exemplified by "I do not want to use it". Behavioral resistance focuses on the desire to not change when confronted with something new (Pratkanis, 2011). In the remaining part of this research, it is assumed that resistance towards innovations can entail emotional, cognitive, and / or behavioral resistance. It can be argued that resistance can be found towards every innovation and type of innovation (Kleijnen et al., 2009).

Innovations can be classified into two main categories; radical innovations and incremental innovations. Radical innovations are innovations based on totally new products or product categories (McDermott & O'Connor, 2002). On the other hand, incremental innovations are typically product category extensions (McDermott & O'Connor, 2002). For example, think of a global brand like Apple. When they developed their first iPhone, this could be considered as a radical innovation because it was a totally new product at that time. Later iPhones can be considered to be incremental innovation since they can be seen as product improvements in comparison to the first iPhone.

One could, for example, argue that innovations which require a lot of change in behavior from a customer, radical innovations, would develop more resistance than innovations which do not require that much of a change in behavior, incremental innovations. This can be explained by the fact that a higher degree of change is associated with a higher degree of uncertainty (Srivastava & Agrawal, 2020). Furthermore, people tend to perceive change as a shock because of the degree of uncertainty associated with this change (Srivastava & Agrawal, 2020). This also explains that more radical innovations, were confronted with more active campaigns towards these innovations (Kleijnen et al., 2009). Kleijnen et al. (2009) did not make a distinction in different dimensions when it comes to resistance towards innovations. This leads to the following research question: *Do radical and incremental sustainable innovations differ in the level of emotional cognitive, and behavior resistance that they elicit?*

In order to compare radical and incremental sustainable innovations to each other, the choice was made to include one incremental innovation and one radical innovation in this research. An insect burger was chosen as the radical sustainable innovation. For the incremental sustainable innovation, the following was chosen; a metal straw.

This research paper contributes to both academic literature and society. There has not been conducted a lot of research on the different dimensions of resistance towards sustainable innovations, especially taking into account different innovation types. Overall, the research contributes by building further on the total understanding of consumer resistance to innovations. This research builds on the research agenda proposed by Huang et al. 2021. They called for action on several fronts of research on resistance towards sustainable innovations. One of their requests was to further research the difference between innovation types on the resistance towards an innovation. Furthermore, they requested to research the different dimensions of innovation resistance. This research contributes as an improvement in terms of depth on earlier research papers on the topic of consumers resistance to innovations. It contributes to the existing literature and, understanding of these different dimensions of resistance.

The knowledge gained by organizations can be used for practical implementations. Organizations will develop more knowledge about the difference dimensions of resistance elicited by the different types of innovations. When organizations that launch sustainable innovations develop a deeper understanding of these dimensions of resistance, they could overcome these dimensions. The main effect of overcoming these dimensions of resistance

would be that people are more likely to adopt these sustainable innovations in their life, and in the end contribute to a greener planet. Furthermore, it is important to understand the effect of different types of innovations on these dimensions of resistance. It can be of great importance for organizations to understand which type of innovation triggers which dimension of resistance. By understanding this, they can develop campaigns for certain types of innovations in order to overcome specific dimensions of resistance. In the end, this could lead to a tailor-made marketing campaign for each type of innovation, making sure all of the campaigns are successful in overcoming all resistance.

In the next section of this research paper the theoretical background is explained in more detail. This includes the different hypothesis that are formulated regarding this research. These hypotheses are combined in order to construct a conceptual model. Then, the methodology used and results from the analysis are presented. Lastly, the paper ends with a discussion and conclusion section. The discussions section entails result interpretation, research limitations and guidelines for future research on this topic.

Theoretical Background

In this part, the theoretical background is presented on the topic of consumers resistance towards sustainable innovations. It starts with a general conceptualization of the innovation types. Secondly, a conceptualization of resistance in general is presented. Resistance is then narrowed down to the different types of dimensions of resistance. This section also includes the hypotheses that are tested in this research paper. The theoretical background ends with a conceptual model which summarizes all the hypotheses.

Types of Innovation

Innovation-studies have been around in academic literature since the 1960's. An important distinction to take in mind is the one between innovation and invention. Where invention refers to the first occurrence of an idea of a new product or process, innovation is linked to commercialization of this idea (Fagerberg, 2004). The case of innovation is a continuous process because every new innovation is eventually followed up by an even newer innovation (Fagerberg, 2004). In previous literature several classifications have been made

regarding innovations, for example classification by type (Schumpeter, 1939). Schumpeter (1939) distinguished innovations into 5 categories; new products, new methods of production, new sources of supply, exploitation of new markets and new ways to organize business. Further literature focused more on the first two types of this classification, for example Schmookler (1966) argued that the distinction between "product technology" and "production technology" is essential in understanding innovation. These two terms have also been used characterize the existence of completely new or improved goods or services (Fagerberg, 2004). This research paper focuses on the distinction between completely new and improved goods.

The distinction between completely new and improved goods can also be named as radical versus incremental innovations. This distinction can be made by looking at how radical a new innovation is compared to the existing product or process (Freeman & Soete, 1997). Continuous, relatively small alternations on previous product or processes can be characterized as incremental innovations (Fagerberg, 2004). Incremental innovation was first defined as "*a step-by-step process of change that implies small adaptions to the status quo"* (Tushman & Romanelli, 1985). Opposite to incremental innovations are radical innovations; the introduction of completely new, ground-breaking products or processes (Fagerberg, 2004). Radical innovation was first defined as "*processes of reorientation wherein patterns of consistency are fundamentally reordered"* (Tushman & Romanelli, 1985).

The radical versus incremental distinction can also be used when classifying sustainable innovations. Sustainable innovation is broadly defined as "*the development of new products, processes, services and technologies that contribute to the development and well-being of human needs and institutions while respecting natural resources and regeneration capacities*" (Tello & Yoon, 2008, p. 165). On the same line it can be defined as "*innovations in which the renewal or improvement of products, services, technological or organizational processes not only delivers an improved economic performance, but also an enhanced environmental and social performance, both in the short and long term have the capacity to generate positive social and environmental impacts*" (Bos-Brouwers, 2010, p. 422).

Despite the intentions to be beneficial towards the economy, the environment, and society, sustainable innovation also face some serious resistance (Sadiq et al., 2021). Therefore, it also important to understand the concept of resistance in more detail.

Resistance

Resistance to innovations in general is a phenomenon that been around for more than 30 years. It was first conceptualized by Ram and Sheth in 1989. They defined consumer resistance towards innovations as "*the resistance offered by consumers to an innovation, either because it possesses potential changes from a satisfactory status quo or because it conflicts with their belief structure*." (Ram & Sheth, 1989, p. 6).

In earlier literature, resistance to innovation is often discussed by means of functional and psychological barriers. Functional barriers were first described as barriers that most likely arise when consumers perceive significant changes when adopting a certain innovation (Ram & Sheth, 1989). Functional barriers of resistance refer to usage, value and risk barriers that are associated with new products or services (Claudy et al., 2015). The usage and risk barriers are sometimes categorized as psychological barriers as well (Talke & Heidenreich, 2014). The usage barrier develops itself when an innovation conflicts with the already existing usage patterns of a consumer (Ram & Sheth, 1989). The value barrier deals with the quality-to-price ratio of an innovation. If consumers do not think the quality-to-price ratio of an innovation is fair, they will not adopt the certain innovation in their daily live (Claudy et al., 2015). The last functional barrier, the risk barrier, is about perceived uncertainty. In the beginning diffusion stages of innovations there is no to little information available about the product or service, and this causes postponement of adoption until more information comes available (Claudy et al., 2015). Looking at the conceptualization of the usage and risk barriers, they can be classified under functional barriers as first defined by Ram and Sheth in 1989.

On the other hand, the psychological barriers, entail barriers that arise because of conflicts between existing and desired beliefs, traditions or norms (Antioco & Kleijnen, 2010). The psychological barriers are categorized into tradition barriers and image barriers in the research of Claudy et al. from 2015). Tradition barriers arise when accepted norms of society deviate from norms linked to a certain innovation, or when this innovation forces consumers to break with their traditions (Claudy et al., 2015). These tradition barriers can cause strong negative word-of-mouth or even boycotts towards innovations. Image barriers explain that when a certain innovation is linked to low perceived image, consumers are less likely to adopt an innovation because of this reason (Claudy et al., 2015).

A certain type of innovation which requires relatively large psychological and / or economic switching costs, is the type of sustainable innovations (Sadiq et al., 2021). Resistance towards sustainable products and services is a relative new phenomenon since the eco-friendly market is still emerging. This also causes it to be a topic which has not been researched a lot. A recent study by Sadiq et al. (2021) discovered that a main reason for resisting eco-friendly products is the difficulty in finding quality and reliable information about these products. This can cause consumers to not believe a certain sustainable innovation can actually work. If consumers have trouble finding reliable and high-quality information, they could also distrust actual reliable information when they come across it. Also, consumers found the price of many eco-friendly goods too high to replace their current products with more eco-friendly alternatives (Sadiq et al., 2021). Another finding in their research was that consumers found it too risky to switch to an eco-friendlier alternative if they were content with their current product. Consumers were also scared that they would deviate too much from friends or family, and that these would judge them if they would use a certain eco-friendly product (Sadiq et al., 2021).

As mentioned in the introduction, total resistance towards an innovation can be classified into three different dimensions of resistance; emotional, cognitive, and behavioral (Pratkanis, 2011).

Dimensions of Resistance

Emotional Resistance

Emotional resistance can be defined from a psychological perspective. The psychological literature conceptualizes the term of emotional resistance as “reactance” (Pratkanis, 2011). Reactance can be defined as the negative emotional reaction towards a detainer of freedom (Pratkanis, 2011). Emotional resistance is a motivational state, and therefore individuals try to restore this detainer of freedom by rejecting the innovation or policy that threatens this freedom in their opinion (Contzen et al., 2021; Miron & Brehm, 2006). For example, if an attempt to create influence in the daily life of a consumer is perceived as unwanted or blatant, this is perceived as a detainer of freedom and thus emotional resistance is expressed by the individual (Pratkanis, 2011). Therefore, emotions are

an important factor for a consumer when deciding to resist an innovation or not (Mogilner et al., 2012).

According to psychological literature there are several factors that can, consciously or unconsciously, trigger this reactance. Emotional resistance can be triggered unconsciously by the fact that someone's perception about a general idea of adopting a certain innovation already leads to emotional resistance towards this innovation (Mick & Fournier, 1998). The unconscious developing of emotional resistance thus leads to a consumer resisting an innovation before evaluating the innovation. Emotional resistance can also be generated consciously by the innovation itself triggering emotional responses that consciously affect the attitude of the consumer (Castaño et al., 2008; Wood & Moreau, 2006).

From an economic perspective, the dimension of emotional resistance can be explained by the Pleasure, Arousal, and Dominance Theory (PAD Theory) proposed by Mehrabian and Russel in 1974. This theory can explain someone's emotional state by positioning the state along these three dimensions (Kulviwat et al., 2007). Pleasure refers to the degree of enjoyment someone feels towards an innovation (Kulviwat et al., 2007). Arousal is explained by a combination of mental alertness and physical activity which is felt towards an innovation (Kulviwat et al., 2007) Lastly, dominance entails the extent to which someone feels in control of, or controlled by, an innovation (Kulviwat et al., 2007). Using the PAD Theory, the emotional state from a consumer can range from boldness and courage, all the way to anger and fear (Kulviwat et al., 2007). The anger and fear spectrum which can be felt towards an innovation corresponds with emotional resistance as conceptualized in this paper.

In this research it is proposed that both incremental and radical innovations can lead to emotional resistance. All types of innovations could disturb the living patterns of a consumer and therefore both types of innovation can cause emotional resistance to arise.

As mentioned above emotional resistance is a motivational state and consumers try to restore this by rejecting the innovation that is being presented. The amount of emotional resistance that is evoked is determined by the importance of the freedom that is being threatened, and the number of freedoms that is threatened (Miron & Brehm, 2006). A detainer of freedom can for example be the alternation in the daily life of a consumer. If a certain innovation accompanies more change in the daily life of a consumer, this innovation also provokes more emotional resistance (Pratkanis, 2011). In general, radical innovations are accompanied by more change in the daily life of a consumer since these are completely new

products or services. Incremental innovations most likely give small alternations in the life style of a consumer since these are similar to previous innovations.

Emotional resistance is predicted to be higher regarding radical innovations because these innovations have bigger impacts regarding the change in a daily life of a consumer. This leads to the first hypothesis:

H1: Radical sustainable innovations lead to higher emotional resistance as compared to incremental sustainable innovations.

Cognitive Resistance

The second dimension of resistance is the one of cognitive resistance towards innovations. The research of Pratkanis (2011) in the psychological field defines cognitive resistance as skepticism. This dimension of resistance is more focused on the content around a certain innovation (Pratkanis, 2011). For example, a new innovation is introduced onto the market and consumers do not believe it will work or that it will lead to a certain outcome, in the end leading to skepticism.

In economic literature, cognitive resistance is also acknowledged. For example, the Technology Acceptance Model (TAM Model) highlights two cognitive factors; perceived usefulness and perceived ease of use (Davis, 1989). Perceived usefulness refers to the belief of a consumer that an innovation is actually beneficial in his or her personal life (Davis, 1989). Next to this, perceived ease of use entails the degree to which consumers belief using a certain innovation requires little to no effort (Davis, 1989).

Cognitive resistance can emerge through two different routes according to the elaboration likelihood model of attitude change as proposed by Petty and Cacioppo (1986); the more cognitive central route / reasoned route, and a more heuristic route. The first route deals with cognitive biases in the decision-making process of consumers (Petty & Cacioppo, 1986; Stryja & Satzger, 2019). These cognitive biases can be specific values or beliefs of individuals that can be affected by cultural, social, or psychological factors (Campbell, 1994). Within the central route of thinking, these cognitive biases can trigger both supportive, e.g., “that makes sense”, and contrary, e.g., “I do not believe that”, thoughts towards a certain

innovation (Pratkanis, 2011). All these thoughts taken up together form the central opinion towards an innovation according to the central route. The second, more heuristic, route of thinking does not process all the information as deeply as the central route. Petty and Cacioppo (1986) found that individuals could also form strong attitudes towards ideas without thinking deeply about all the information available. When analyzing the heuristic route, individuals could, for example, accept or reject a certain idea or innovation based on whether they like the person who transmits the information (Petty & Cacioppo, 1986).

In the paper by Singh and Giacosa (2019) it is concluded that the cognitive resistance level is important for understanding the resistance towards sustainable innovations. They concluded that cognitive resistance towards sustainable products arises due to the framing of these products. The business models regarding these products are not in line with the psychological, social, and cultural needs of these consumers, and this causes barriers to arise regarding the adoption and diffusion of products in this sector (Singh & Giacosa, 2019).

In this research it is proposed that both incremental and radical innovations can lead to a form of skepticism. Also, all types of innovations could trigger cognitive biases in the decision-making process of consumers. Therefore, it is proposed that both types of innovations can lead to cognitive resistance.

As radical innovations are sometimes also referred to as “disruptive innovations” (Sandberg & Aarikka-Stenroos, 2014), they are likely to clash more with cognitive-biases than incremental innovations. Furthermore, when looking at the perceived ease of use aspect of the TAM Model, it can also be argued that radical innovations lead to higher cognitive resistance than incremental innovations. Radical innovations are completely new for a consumer and this can cause the perceived ease of use to be lower than the perceived ease of use of incremental innovations. The perceived ease of use for incremental innovations can be higher because these innovations can most likely be handled similarly to previous innovations. Earlier research also found a positive effect between perceived ease of use and cognitive intention to use an innovation (Venkatesh, 2000; Venkatesh & Davis, 2000). Meaning that if consumers perceive an innovation as easier to use, they are likely to develop a higher intention of using it as well, and thus less cognitive resistance is felt towards the innovation.

Therefore, it is also predicted that the effect of radical innovations on cognitive resistance is bigger than the effect of incremental innovations on this resistance dimension. This leads to the second hypothesis:

H2: Radical sustainable innovations lead to higher cognitive resistance as compared to incremental sustainable innovations.

Behavioral Resistance

The third and last dimension of resistance is behavioral resistance towards innovations. In psychology literature behavioral resistance to innovation from a consumer perspective is linked to inertia (Ngafeeson & Manga, 2021). In their paper they describe inertia as a rather "neutral" quality whereby the focus on a consumer side is not of resisting an innovation, but focusing on staying put. In the other dimensions of resistance, it often leads to a form of personal antagonism, but the inertia dimension of resistance causes an attitude frustration through a drag of anchor (Ngafeeson & Manga, 2021).

From an economic perspective, the behavioral resistance dimension can be explained using the Status Quo Bias Theory (SQB Theory) proposed by Samuelson and Zeckhauser in 1988. Samuelson and Zeckhauser found that if consumers are presented with different products to choose from, they tend to stick to the product they know even tough other products present them significant benefits. The SQB Theory can be explained by three main categories; rational decision making, cognitive misperceptions, and psychological commitment (Samuelson & Zeckhauser, 1988). These three categories can be used to explain the presence of behavioral resistance.

According to the SQB Theory, rational decision making is often accompanied by transaction costs. The costs of switching to another new product are higher than sticking to the present product someone is using (Samuelson & Zeckhauser, 1988). Thus, switching to newer products is accompanied by more transaction costs and thus causes behavioral resistance to occur. Secondly, cognitive misperceptions can be used to explain the existence of behavioral resistance by the phenomenon loss aversion. Consumers tend to be risk averse when it comes to innovations, and therefore tend to stick with the status quo (Samuelson & Zeckhauser, 1988). Thus, switching to a new product will cause a person to act less risk

averse and break with their status quo causing behavioral resistance to arise in the end. Thirdly, psychological commitment entails that consumes are reluctant to switch to a new innovation because they commit to their previous choice (Samuelson & Zeckhauser, 1988). Thus, breaking this psychological commitment will cause a consumer to break with their status quo, and therefore behavioral resistance will arise.

Overall, behavioral resistance is experienced when something proposes a change in the life of a consumer (Knowles & Riner, 2007). This finding was also confirmed by Pratkanis (2011) who mentioned that an innovation is merely rejected because it proposes a change. This can lead to a paradoxical outcome; an individual agrees with everything accompanied by an innovation, but still has no interest in it because a certain change is needed (Pratkanis, 2011). Since previous academic literature defines behavioral resistance in this way, there can be assumed that behavioral resistance can be felt towards anything that brings change in the life of a consumer. Therefore, behavioral resistance could be felt towards any innovation, both incremental and radical ones.

This resistance dimension is not triggered by the innovation itself, but by the change it brings along. When looking at the three categories of the SQB Theory it can be argued there is a difference between radical and incremental innovation regarding behavioral resistance. As mentioned above Tushman and Romanelli (1985) defined radical innovation as "*processes of reorientation wherein patterns of consistency are fundamentally reordered"*. The patterns of consistency are comparable to the status quo of a consumer. Therefore, if an innovation causes patterns of consistency to be fundamentally reordered, the innovation also breaks with the status quo of a consumer. Radical innovations tend to fundamentally reorder these patterns of consistency, whereas incremental innovations provide small adaptions to someone's status quo (Tushman & Romanelli, 1985).

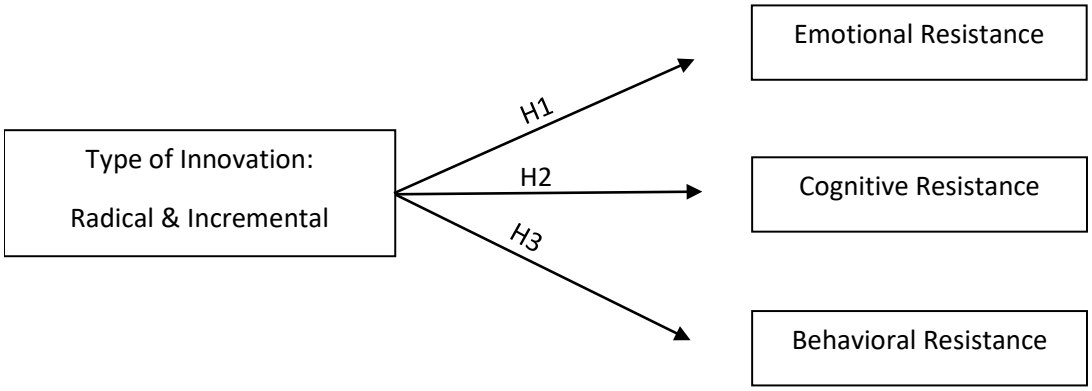
Therefore, it is also predicted that the effect of radical innovations on behavioral resistance is bigger than the effect of incremental innovations on this resistance dimension. This leads to the third hypothesis:

H3: Radical sustainable innovations lead to higher behavioral resistance as compared to incremental sustainable innovations.

The following conceptual model is composed in order to summarize and visualize all the hypotheses:

Figure 1

Conceptual Model 1



Methodology

In this section the method used for the research is explained. First of all, the sample of the research is described. Secondly, the materials that are used are explained. Thirdly, an outline is given of the procedure that is used for this research. Fourth, the chosen method for analysis is given. This research paper is combined with four other papers which are written at the same time and cover the same general topic. These are the research papers from Hilde Bos, Julia Moolenaar, Paola Spaan, and Jeike van Velsen. The reason for combining these papers was to generate more power when it comes to finding respondents and developing stimulus material for innovations.

Sample

A total of 903 Dutch citizens were recruited for this study through Qualtrics XM // Krachtige Experience Management Softwares (2022). These people were recruited through convenience sampling by asking our relatives and friends. Snowball sampling was also used by asking people who were recruited to spread the research amongst their friends and family members as well. We also attended some strategic places like the entrance of a supermarket and a DIY-warehouse to recruit respondents, known as random sampling. Lastly, the research was spread amongst several Social Media platforms in order to establish a larger reach.

Of the 903 Dutch citizens, 49.3% identified themselves as a woman (i.e., 445 women), 26.7% identified as a man (i.e., 241 men), 0.4% identified themselves as something different (i.e., 4 people), people preferred not to say (i.e., 0.8%), and 206 people did not answer the question. Respondents were aged between 15-82 years old, with a mean age of 33.2 years (SD = 15.76). Respondents were also asked about their highest completed level of education. Of the 903 respondents, 0.2% percent completed elementary school as their highest level of education (i.e., 2 people), 9.9% secondary school (i.e., 89 people), 133 people MBO (i.e., 14.7%), 178 people HBO Bachelor (i.e., 19.7%), 36 people HBO Master (i.e., 4.0%), 115 people University Bachelor (i.e., 12.7%), 137 people University Master (i.e., 15.2%), 7 people completed a PHD (i.e., 0.8%), and 206 people did not answer the question.

Since this research combined all items from 5 different research papers, it took a relatively long time for respondents to complete the survey. Therefore, quite some respondents did not complete the entire survey, resulting in a large number of missing values. The number of missing values in this research can be classified as MCAR (Missing Completely at Random). It can be classified as this because no clear pattern could be found when analyzing these values. Therefore, the N number in the results section is lower than the initial amount of 903 respondents.

Material

A questionnaire was constructed including all the items for the 5 different research papers. This paper dives deeper into the items that are used for measuring the effect of different types of innovations on the three dimensions of resistance. In total 9 items were formulated for this on a Likert scale ranging from 1 (completely disagree) to 5 (completely agree). The items used can be found in Table 1. The questionnaire intended to measure the different dimensions of resistance towards innovations by letting respondents answer several statements for both innovations included. These statements were the same for both innovations because this was the most unbiased way of measuring the difference between the types of innovations in the end. The questionnaire used was inspired by two validated questionnaires used in prior research. For emotional and cognitive resistance all items used were derived from the Ngafeeson and Manga (2021) paper. For behavioral resistance items were combined from the Ngafeeson and Manga (2021) paper and the Heidenreich and Spieth (2013) paper. This choice was made since two items used by Ngafeeson and Manga (2021) regarding behavioral resistance did not adequately cover the definition of behavioral resistance as used in this paper. Therefore, the choice was made to include two items from the Heidenreich and Spieth (2013) paper who did cover the definition adequately.

Ngafeeson and Manga (2021) classified cognitive resistance to innovation in two sub-categories, distrust and scrutiny. For this research it was chosen to compromise the two categories into one by choosing the most appropriate items on the basis of the conceptualization of cognitive resistance. This choice was made in order to keep the number of items equal across all the dimensions of resistance. Therefore, the six items in the paper of Ngafeeson and Manga (2021) were analyzed, and the three items that covered the definition of cognitive resistance as used in this paper most adequate were chosen. All constructs taken from the paper by Ngafeeson and Manga (2021) showed a Cronbach's alpha of > .7. Thus, all these items pass the threshold set by Hair et al. (2010) of .7 and can be considered reliable. All items included in this questionnaire were altered in order to fit the innovations chosen. For example, *"I feel frustration when I think of Innovation X"*, is altered into *"I feel frustration when I think of the insect burger"*.

One of the items is reverse coded in order to check if respondents give consistent answers. The item that was reverse coded is marked below with an asterisk. The research is

based in the Netherlands and, therefore back translation was performed in order to make the questionnaire more understandable for the general public. A complete overview of all the items used and the corresponding Dutch translations can be found in Appendix A. The whole questionnaire that covers all items of the 5 different Master's theses can be found in Appendix B.

In the paper by Ngafeeson and Manga (2021) three terms were used in order to measure emotional resistance; frustration, irritation, and stress. These terms were used as an inspiration for the items used in this research. For measuring the cognitive resistance, the six items used by Ngafeeson and Manga (2021) in their user resistance scale, were compromised to three items in order to match the number of statements for every dimension of resistance. The last dimension of resistance, behavioral resistance, is measured by combining items from the Ngafeeson and Manga (2021) paper, and the Heidenreich and Spieth (2013) paper. The 9 items used in this paper are presented in Table 1 below.

Table 1

Items used for Measuring the Dimensions of Resistance

Emotional Resistance
ER1: I feel frustration when I think of Innovation X.
ER2: I feel irritation when I think of Innovation X.
ER3: I feel stressed when I think of the change that Innovation X brings.
Cognitive Resistance
CR1: I do not see potential in Innovation X.
CR2: I see several disadvantages regarding Innovation X.
CR3: I am critical about Innovation X.
Behavioral Resistance
BR1: I would not switch to Innovation X.
BR2: I would try as much as possible to avoid Innovation X.
BR3: I would buy Innovation X. *

Note: the first three items are used to test hypothesis 1, the next three for testing hypothesis 2, and the last three for testing the third hypothesis. Item BR3 is marked with an Asterix since this item is reverse coded.

Procedure

The questionnaire was pre-tested amongst 5 people before the actual data-collection started. A pre-test was performed in order to get rid of all technical and grammatical errors. After pre-testing, the questionnaire was optimized and spread via the above-mentioned methods. We made clear that a respondent has the free choice to quit at any given moment and that participating in the research is completely voluntary.

An aspect we took into account when setting up the questionnaire is the order effect in which the innovations with corresponding questions are presented. We set up the questionnaire in such a way that every respondent got a randomized order of innovations with questions. By applying this method, it was made sure the order effect is taken into account. Also, the 9 items as defined above were presented in a random order for each respondent.

Another aspect to focus on was the length of the total questionnaire. Since it entails a combination of items from different master thesis sub-projects, the questionnaire is quite long in total. We decided to limit the number of minutes to maximum 15 minutes. To overcome the problem of respondents getting bored and quitting with the questionnaire, we decided to offer them a chance of winning a gift card if they completed it. In order to compete for a gift card, people were asked if they wanted to participate in the competition yes or no. If they wanted to participate, they were redirected to a separate questionnaire where they could fill in their personal contact information. By doing it in this way, there was no problem regarding the privacy of information.

Additionally, a manipulation check was incorporated into the questionnaire to check whether the radical innovation indeed is perceived as radical and vice versa for the incremental innovation.

Data-analysis

When it comes to analyzing the output of the questionnaire, several methods were used. First of all, a factor analysis was performed. This type of analysis was appropriate because in this way we can check if the items indeed load on the corresponding dimension of resistance. This is important to check because the three dimensions of resistance need to be distinguished correctly.

Lastly the main research question needed to be answered. Since this entails a comparison between the two types of innovations regarding the dimensions of resistance, it was be appropriate to run a MANOVA analysis. The MANOVA is appropriate since this research contains 3 dependents variables (emotional resistance, cognitive resistance, and behavioral resistance), and it contains one independent variable (type of innovation; incremental and radical).

Ethics Statement

Participation for this research was voluntary, and participations were able to quit at any given moment. Informed consent was provided prior to participation. As an incentive to complete the research, three gift cards from Bol.com were raffled amongst all the respondents who completed it. Respondents who wanted to participate in the raffle were re-directed to a separate questionnaire where they could fill in their e-mail. In this way respondents' answers and their e-mail could not be linked to each other. By using a separate questionnaire, the original answers were kept complete anonymous.

All the data was collected was ensured by the researcher's to be stored safely in a document that is password-protected or encrypted, for example OneDrive. The results of the questionnaire were not spread by the research members through unencrypted channels.

Results

In this section the types of analysis used in this research are described. Firstly, a manipulation check is performed to check whether the radical and incremental sustainable innovations were indeed perceived as intended. Secondly, a factor analysis is conducted in order to see if the 9 items used indeed lead to three distinguishable dimensions of resistance. Lastly, a MANOVA is performed to measure the difference between the incremental and radical innovation on all three dimensions of resistance.

Manipulation Check

Firstly, a manipulation check was conducted to check whether the radical and incremental sustainable innovation were indeed perceived as intended. First, the items included in the questionnaire regarding the manipulation check were checked for their underlying structure by a factor analysis. After this paired samples t-test was ran. The items that were used for the manipulation check can be found at the end of Appendix B. The factor analysis for the items of the manipulation check can be found in Appendix C.

As can be seen in Appendix C, the first item of the manipulation check was excluded from further research. In order to conduct an adequate paired sampled t-test, the items MC2 "*Innovatie X lijkt veel op wat ik al ken*" and MC4 "*Innovatie X is enkel een kleine aanpassing op huidige soortgelijke producten*" needed to be reverse coded for both types of innovations. By reverse coding these items, all of the 4 items included measure the radicalness of the innovations.

The radicalness scores for the metal straw, incremental sustainable innovation, and the insect burger, radical sustainable innovation, were compared. On average, the metal straw scored lower, $M = 2.63$, $SD = 0.69$, than the insect burger, $M = 3.51$, $SD = 0.69$, on perceived radicalness. The difference of 0.88, 95% Confidence Interval [0.81, 0.94], was statistically significant, $t\ (696) = 26.54$, $p < 0.001$.

This means that the insect burger scored 0.88 point higher on average on a 5-point Likert scale when compared to the metal straw. Meaning that the insect burger on average is perceived as 0.88 point more radical than the metal straw. This result confirms that the radical sustainable innovation indeed is perceived as radical, and the incremental sustainable innovation is perceived as incremental.

Factor Analysis

A principal axis factoring analysis (FA) was conducted on the 9 items with Promax rotation. Promax was used since this rotation is applicable for larger datasets and it allows for factors to be correlated. In order to run an adequate FA for the dataset, the data was restructured into a long structure which combined items that measure identical things for the different innovation types. For example, item ER1 "*I feel frustration when I think of the insect burger*" and "*I feel frustration when I think of the metal straw*" were grouped together as a new variable. After doing this for every of the 9 items the FA was conducted. If the decision was made to not group the items together, the results would have looked a lot different. All 9 items regarding the metal straw loaded on the same factor when choosing not to combine items. This caused that interpretation of these FA results would have been troublesome. Therefore, the choice was made to group similar items regarding the metal straw and the insect burger together.

The Kaiser-Meyer-Olkin measure verified the sampling adequacy for the analysis, $KMO = 0.92$ ("marvelous" according to Kaiser & Rice, 1974). The Bartlett's Test of Sphericity showed a significant effect, $p < 0.001$, meaning there was enough correlation between the items in order to conduct a factor analysis. When analyzing the communalities, all of the 9 restructured items displayed communalities scores above 0.5 which is the limit set by Hair et al. (2010). Meaning each variable has a proportion of variance in it that can be explained by an underlying factor structure.

The total variance explained and the scree plot show opposing things when it comes to the number of factors that could explain the underlying structure of the 9 items. Even though, there was only 1 factor extracted with an Eigenvalue greater than 1 and this item had a cumulative variance explained of 62.4%, the scree plot showed a clear cut off point after two factors. However, the choice was made to include 3 factors from a theoretical point of view, in this way each dimension of resistance has its own factor. If the choice was made to stick to the initial outcome of 1 extracted factor, the three hypotheses could not have been tested. By choosing to extract three factors, all hypotheses for the separate resistance dimensions could be tested. Another reason for choosing 3 factors instead of 1 factor is the approach regarding this FA. This FA follows a confirmatory approach because the items and number of factors are derived from theory. Therefore, it was expected to get three factors.

Table 2 entails all the rotated factor loadings per item, assigned to the 3 different factors; emotional resistance, cognitive resistance, and behavioral resistance.

Table 2

Rotated Factor Loadings (Promax) per item, Assigned to Three Dimensions of Resistance (N=1487)

	Factors		
Item	1	2	3
ER1 I feel frustration when I think of Innovation X.	**.92**	-.12	.07
ER2 I feel irritation when I think of Innovation X.	**.82**	.05	.03
ER3 I feel stressed when I think of the change that Innovation X brings.	**.77**	.05	-.5
CR1 I do not see potential in Innovation X.	.27	**.39**	.19
CR2 I see several disadvantages regarding Innovation X.	.03	.01	**.72**
CR3 I am critical about Innovation X.	.02	.13	**.70**
BR1 I would not switch to Innovation X.	-.06	**.87**	.05
BR2 I would try as much as possible to avoid Innovation X.	.34	**.68**	-.09
BR3 I would buy Innovation X. *	.13	**-.87**	-.05

Note: the factor loading in bold indicate to which factor the items belongs. As can be seen ER1, ER2, and ER3 load on factor 1. CR2 and C3 load on the third factor. CR1, BR1, BR2, and BR3 all load on the second factor.

Looking at the Rotated Factor Matrix, item CR1 "*I do not see potential in Innovation X*" loads on another factor than the other CR items. Moreover, this item is a double loader since it loads on both factor 1 and factor 2. Furthermore, when deleting item CR1, Cronbach's alpha would still be .914. This argumentation leads to a solid reason to delete this item from further analysis. Item BR3 "*I would buy Innovation X*" displays a high negative loading which can be explained by the fact that the item is reverse coded.

After deletion of the CR1 item, a reliability analysis was performed to check the internal validity of the resistance dimensions. A high reliability tells us that the measurements obtained are both representative and stable over time (Hair et al., 2010). Emotional resistance showed a good reliability (3 items; $\alpha = .876$), cognitive resistance showed an acceptable reliability (3 items; $\alpha = .795$, after deleting CR1; $\alpha = .756$), and behavioral resistance showed a good reliability as well (3 items; $\alpha = .892$).

After deleting CR1, factor 1 represents emotional resistance, factor 2 represents behavioral resistance, and factor 3 represents cognitive resistance.

MANOVA

The independent variable that needed to be included as a fixed factor, innovation type, was a within-subjects measure. Meaning that the original dataset had no distinguished variable that could be used as the IV. This caused a major complication when setting up the MANOVA.

In order to overcome this complication, a kind of experiment setting was created. This was done by restructuring the dataset into a long-structured dataset. First, an ID dummy variable was created for all of the respondents. Then, aggregated scores were computed for every resistance dimension. For example, items ER1, ER2, and ER3 regarding the radical innovation were grouped together as a mean score under "INS_ER_MEAN". Before aggregating the scores for behavioral resistance, item BR3 "*I would buy Innovation X*" needed to be reverse coded. After computing these six aggregated scores, the switch was made to the long-structured dataset. An index variable "Innovation Type" was created in order to make a distinction between the two innovation types. Furthermore, in the transforming of the dataset, the aggregated variables of the dimensions of resistance regarding both types of innovation were grouped together as well. For example, "INS_ER_MEAN" and MR_ER_MEAN" were grouped together under "Emotional_Resistance".

This caused every respondent to have two rows of answers; one related to the radical sustainable innovation (1) and one related to the incremental sustainable innovation (2). After setting up the experiment design, the newly created "Innovation Type" variable can be used as a fixed factor (IV) and the three aggregated dimensions of resistance can be used as DV's.

Table 2 includes the descriptive statistics for the dependent variables disaggregated by the independent variable.

Table 2

Dependent Variable Descriptive Statistics Disaggregated by the Independent Variable (N = 1487)

	Incremental (n = 744)		Radical (n = 743)	
Variable	*M*	*SD*	*M*	*SD*
Emotional Resistance	1.81	0.84	2.50	1.05
Cognitive Resistance	2.63	1.04	3.31	0.90
Behavioral Resistance	2.23	0.97	3.46	1.07

Before performing and interpreting the MANOVA results, the assumptions related to the analysis needed to be checked. First, the Box's test was consolidated in order to see if the assumption of equality of covariance matrices had been met. The assumption has been violated since it shows a significant effect, $p < 0.001$, meaning the covariance matrices are assumed to be equal. Secondly, the assumption of homogeneity of variance was also checked. All of the three dimensions of resistance displayed a p-value of $p < 0.001$, entailing the assumption of homogeneity of variance has been violated as well. Pillai's trace criterion should be used instead of Wilk's lambda to continue with the analysis. Pillai's trace is a more robust test statistic that can be used when one or more assumptions are violated within a MANOVA analysis (Hair et al., 2010).

Using Pillai's trace, there was a significant effect of the innovation type on all the dimensions of resistance, $V = 0.27$, $F\,(3, 2970) = 361.73$, $p < 0.001$, *partial* $\eta^2 = 0.27$, *observed power* = 1.00. Based on these results, evidence was sufficient to reject the null hypothesis and conclude that the dimensions of resistance, emotional, cognitive, and behavioral, significantly differed based on the type of innovation, radical or incremental. The

effect size of .27 can be interpreted as a large effect (Cohen, 2013). The observed power was 1.00, meaning that there was a 100% chance that the results could have come out significant.

The Bonferroni method was used to test each separate ANOVA at a .017 (.05 / 3) alpha level. Results demonstrated that there was sufficient evidence to reject the emotional resistance null hypothesis, to reject the cognitive resistance null hypothesis, and reject the behavioral resistance null hypothesis, F (1, 2972) = 387.60, $p < 0.001$, *partial* $\eta^2 = 0.12$, *observed power* = 1.00, F (1, 2972) = 366.73, $p < 0.001$, *partial* $\eta^2 = 0.11$, *observed power* = 1.00, *and* F (1, 2972) = 1083.23, $p < 0.001$, *partial* $\eta^2 = 0.27$, *observed power* = 1.00, respectively. Therefore, for every dimension of resistance the alternative hypothesis can be accepted. The alternative hypothesis states that the means between groups are not equal, and significantly differ from each other.

For all three separate ANOVA's the effect size was large. The strength of relationship between type of innovation and emotional resistance was medium, with the type of innovation accounting for 12% of the variance of the dependent variable (Cohen, 2013). The strength of relationship between type of innovation and cognitive resistance was also medium, with the type of innovation accounting for 11% of the variance of the dependent variable (Cohen, 2013). The strength of the relationship between type of innovation and behavioral resistance was strong, with the type of innovation accounting for 27% of the variance of the dependent variable (Cohen, 2013).

A post-hoc test could not be performed since the item "*Innovation_Type*" only contains two groups; radical and incremental. In order to run a post-hoc analysis in SPSS three or more groups are needed (Hair et al., 2010).

Discussion

In this section the results are interpreted in comparison to the hypotheses that were set up earlier. After the interpretation both theoretical and managerial implications are presented. Lastly, the limitations of this research and directions for further research are discussed.

Interpretation of the Results

This research aimed to answer the question: "*Do radical and incremental sustainable innovations differ in the level of emotional cognitive, and behavior resistance that they elicit?"*. This was done by analyzing the difference between radical and incremental sustainable innovations on each dimension of resistance; emotional, cognitive, and behavioral. As anticipated, there is a difference in the amount of resistance between radical and incremental sustainable innovations. This can be confirmed by analyzing the results of the three hypotheses.

A significant difference was found regarding the emotional resistance exposed by the radical sustainable innovation and the incremental sustainable innovation. The radical sustainable innovation displayed higher values on average when analyzing emotional resistance. Therefore, the hypothesis "*Radical sustainable innovations lead to higher emotional resistance as compared to incremental sustainable innovations."* can be accepted. When looking at the theories provided by Miron and Brehm (2006) and Pratkanis (2011), it can be argued that this combination of theory is in line with this finding on emotional resistance. The combination of theory stated that more change in the daily life of a consumer would lead to more emotional resistance. This theory is confirmed by this research since radical innovations are accompanied with more emotional resistance than incremental innovations on average.

Secondly, a significant difference was found with respect to the cognitive resistance shown by the radical sustainable innovation and the incremental sustainable innovation. Again, the insect burger displayed higher values on average when comparing the means of the two items used for measuring cognitive resistance. Accordingly, the hypothesis "*Radical sustainable innovations lead to higher cognitive resistance as compared to incremental sustainable innovations.*" can be accepted as well. This finding is in line with the theory

provided by Sandberg and Aarikka-Stenroos (2014). As mentioned in the theoretical background section, they defined radical innovations as "disruptive innovations" that are more likely to clash with cognitive biases. Furthermore, the finding is in line with the positive correlation between perceived ease of use and cognitive intention to use as found by Venkatesh (2000); Venkatesh and Davis (2000).

Thirdly, the hypothesis "*Radical sustainable innovations lead to higher behavioral resistance as compared to incremental sustainable innovations."* was tested. A significant effect was found in the difference between the behavioral resistance evoked by the insect burger and the metal straw. The finding regarding behavioral resistance is in line with the theory provided in the theoretical background section. The combination of the SQB theory provided by Samuelson and Zeckhauser (1988) and the definition regarding radical innovations as provided by Tushman and Romanelli (1985), also led to the presumption of radical innovation. provoking more behavioral resistance than incremental innovations.

The largest difference between radical and incremental sustainable innovations was found in behavioral resistance. This finding is not surprising when looking at the definition of radical innovations provided by Tushman and Romanelli (1985); "*processes of reorientation wherein patterns of consistency are fundamentally reordered".* This means that radical innovations, thus, desire a lot of behavioral change on the side of the consumer. Incremental innovations as defined by Tushman and Romanelli (1985) do not desire such a large behavioral change from the consumer. Therefore, radical innovations also express more behavioral resistance than incremental innovations.

Furthermore, on average behavioral resistance displayed the highest score regarding the radical sustainable innovation from the three dimensions of resistance with a mean score of 3.46 on a 5-point Likert scale. Cognitive resistance was found to be the second largest dimension of resistance on average with a mean score of 3.31 on a 5-point Likert scale. Emotional resistance displayed itself the least on average regarding the radical sustainable innovation with a mean score of 2.50 on a 5-point Likert scale. These results tell us that certain consumer can feel relatively lower emotional and cognitive resistance, but still would be willing to resist an innovation because of the higher behavioral resistance they feel towards the innovation. This finding is in line with the general theory on resistance provided by Pratkanis (2011). The theory by Pratkanis (2011) states that someone can feel no emotional or cognitive resistance towards an innovation, but still resists it in the end because a certain change is needed; in other words, behavioral resistance is triggered.

Theoretical Implications

From a theoretical point of view this research builds on the existing literature on the topic of resistance towards sustainable innovations. As mentioned in the introduction this research tries to answer part of the research agenda as proposed by Huang et al. (2021). In their agenda they proposed further research on the difference between innovation types on the resistance towards these innovations. This paper fulfills this request by differentiating between an incremental and a radical innovation. Furthermore, they requested to research the different dimensions of innovation resistance. This research realized this request by following the resistance classification by Pratkanis (2011); emotional, cognitive, and behavioral resistance. Additionally, this research examines the different dimensions of innovation resistance for both incremental and radical innovation types. Thus, both the requests proposed by Huang et al. (2021) have been combined.

By combining these requests, this research can be used as a foundation for further research on the concept of sustainable innovation resistance. Together with research on other agenda points proposed by Huang et al. (2021) on the topic of innovation resistance, the knowledge on this topic will expand drastically. The expanding knowledge on this topic will be of great importance in the future in order to explore what is needed for overcoming these dimensions of resistance. Encouraging consumers to overcome the resistance towards sustainable innovation will be critical for the adoption of these innovations. Furthermore, adoption will be key for the sustainability issues the world is already facing, and will continue facing whilst resistance towards these products continues to be this high.

Furthermore, it adds to the research of Sadiq et al. (2021) about why consumers resist sustainable innovations. The research by Sadiq et al. (2021) found that consumers merely resist sustainable innovations because consumers perceive the information about these innovations to be of low quality or unreliable. Furthermore, consumers tend to find prices of sustainable innovations to be relatively high and they were scared to switch to these products because of their status-quo (Sadiq et al., 2021). The knowledge gained by the research of Sadiq et al. (2021) in combination with the gained knowledge about the dimensions of resistance in relation to sustainable products can give a direction to future studies. It can, for example, lead to future studies focusing on the relationship between the dimensions of resistance and the reasons why people resist innovations. Future research in this direction

could contribute to an even better understanding of resistance towards sustainable innovation in general.

A question that remains open is if and how the different dimensions of resistance as proposed in this research are correlated. There has been a lot of research on the dimensions of resistance separately as can be seen in the theoretical background chapter. In previous literature emotional and cognitive consumer resistance are linked to each other (Castro et al., 2019). In this research, they cited that emotional and cognitive resistance together make up the active attitude of consumers to resist innovations. In the research by Castro et al. (2019) they do not mention a correlation between the two dimensions of resistance. Furthermore, nothing could be found on the correlation of behavioral resistance with one of the other dimensions of resistance. I think it can be of great benefit to understand the underlying connections between the three dimensions of resistance because when we understand how these are correlated, more efficient and effective marketing campaigns can be implemented. For example, if we would learn that emotional resistance and behavioral resistance are positively correlated, targeting one of the two dimensions in a marketing campaign would be effective to decrease both.

Managerial Implications

From a managerial perspective it is essential to understand the consequences such resistance can have towards a sustainable innovation. If you are for example a manager of a company who launched a sustainable innovation which can be perceived as radical, you need to understand this innovation can be accompanied by a certain resistance towards it. Managers in these industries need to find ways to overcome these resistance dimensions by for example looking at the barriers which cause these resistance dimensions. In essence, every barrier of resistance to innovations provides these managers with a challenge they need to overcome to successfully launch the innovation. This could for example be done by implementing marketing campaigns focused on distributing more accurate and reliable information about the innovation. These campaigns could stimulate doubting consumers to make the switch to a more sustainable alternative.

As found in this research, behavioral resistance is both the largest dimensions of resistance towards sustainable innovations and differs the most between radical and

incremental types. Furthermore, I think overcoming this resistance dimension as a manager is most effective in order to trigger adoption of an innovation. I think this will be the case since behavioral resistance actually has to do with someone not willing to buy or try something. For example, people could feel relatively low emotional or cognitive resistance towards a sustainable innovation, but in the end still resist to buy it because of the behavioral resistance towards this sustainable innovation. Behavioral resistance is both the largest dimension of resistance and differs the most between the two types of innovation. It indicates that the average consumer is just not ready for implementing a radical sustainable innovation in their life. There could be a lot of reasons for someone to resist a certain innovation. As a manager, it is important to look for these reasons and seek solutions for them. This could for example also be done by implementing marketing campaigns that focus on why someone should buy these innovations. For example, the insect burger included in this research was faced with a lot of behavioral resistance. A marketing campaign could be set up certain stands for people to try a burger without telling them it is an insect burger. If people would like the taste and structure of it, they could be told afterwards which kind of burger it was. Next to this, they could be confronted with all the advantages for the planet when buying an insect burger instead of a regular burger. This could then maybe activate these consumers to actually consider buying them the next time they will buy burgers.

In the end, I think manager active in these industries need to concentrate mainly on effective campaigns that focus on the distribution of relevant and reliable information about these products. If these campaigns would lead to every consumer at least trying certain innovations, this could already make a fundamental difference in the solution towards sustainability issues.

Limitations of the Research and Further Research Directions

Although the results of this research can be used for managerial and theoretical implications, it also has its limitations. First of all, because of time limits this research only includes one sustainable incremental and one sustainable radical innovation for studying the difference among the two innovation types. Therefore, it can be argued that the results of the analysis are not generalizable for every sustainable radical and sustainable incremental innovation. This could be the case since people can form strong opinion towards certain things. Meaning they could really dislike a certain sustainable innovation whilst liking

another. Furthermore, this research is only focused on resistance towards sustainable innovations. Therefore, results can also not be generalized towards other innovations that cannot be classified as sustainable. These limitations could be research further by including more sustainable innovations in research or comparing a "regular" innovation with a sustainable innovation. Furthermore, future research could include several innovations of both types and use a solid pre-test in order to check which innovations to include in the research. In this way, outcomes of that research would be more generalizable.

Secondly, as mentioned in the results section, the research set-up was not ideal for conducting a MANOVA analysis. This was caused by the IV used in this research being a within-subjects measurement. In order to overcome this complication, a categorical variable named "*Innovation_Type*" was created when transforming the dataset to a long format structure. Future research could set up the research in such a way a MANOVA can be conducted without transforming the dataset. For example, by setting up the research as a between-subjects design instead of a within-subjects design. By doing this, one group of consumers could be given a questionnaire regarding a radical sustainable innovation, and another group a questionnaire regarding an incremental sustainable innovation. In this way, you already have separate datapoints for both types of innovation by assigning every respondent with the radical sustainable innovation questionnaire number 0, and every respondent with the incremental sustainable innovation questionnaire number 1. This classification of number 0 and 1 can then be used as the independent variable "*Innovation_Type*". However, the downside of a between-subject research design is that it requires more respondents than a within-subjects design. A benefit of a between-subject design is that it takes a respondent less time than a within-subject design. This could lead to less missing values in the end.

Thirdly, all respondents included in this research paper were based in the Netherlands. Therefore, results found are not generalizable across all the other countries since consumers of other countries could have different perceptions regarding sustainable innovations. Overall, we were happy with the age and educational background representation of this study. It is recommended to perform similar studies across different countries around the world or perform a similar study that includes a wide variety of consumers with different ethnicities.

Lastly, the Netherlands is ranked relatively high when it comes to how technologically advanced countries are (Getzoff, 2022). Generally, when a country is technologically advanced overall, it can also entail that the inhabitants of this country are more likely to

accept innovations. A future research idea could therefore be, to research the correlation between the amount of resistance inhabitants of a country feel towards innovations and how technologically advanced this country is perceived as. Another correlation that could be researched in the future is the correlation between the different dimensions of resistance as mentioned above.

Conclusion

This research adds to the knowledge about consumer resistance to sustainable innovations. It answers the question "*Do radical and incremental CE innovations differ in the level of emotional cognitive, and behavior resistance that they elicit?".* This question was addressed by analyzing the difference between radical and incremental sustainable innovations on all three dimensions of resistance separately. Results showed that each dimension of resistance displayed a significant difference between the insect burger and the metal straw. This indicates that consumers tend to feel relatively more resistance on every front towards radical sustainable innovations than to incremental sustainable innovations.

The outcomes of this research can be used as a building block for further research on this topic. Sustainability is an upcoming phenomenon and therefore, the knowledge on especially resistance towards sustainability is rather limited as of now. By consistently updating knowledge about the topic, adoption of sustainable innovation can be made more effective by overcoming the different resistance dimensions. Manager in the front line of these innovations should be aware of the different dimensions of resistance and how to eventually overcome them. In the end, this can result in a more sustainable plant for us and future generations.

References

Antioco, M., & Kleijnen, M. (2010). Consumer adoption of technological innovations: effects of psychological and functional barriers in a lack of content versus a presence of content situation. *Eur J Mark, 44*(11/12), 1700–1724.

Bag, S., Gupta, S., & Telukdarie, A. (2018). Importance of innovation and flexibility in configuring supply network sustainability. *Benchmarking: An International Journal*.

Bos-Brouwers, H. E. J. (2010). Corporate sustainability and innovation in SMEs: Evidence of themes and activities in practice. *Business Strategy and the Environment*, 19(7), 417– 435.

Campbell, J.I. (1994). "*Architectures for numerical cognition*", Cognition, Vol. 53 No. 1, pp. 1-44.

Castaño, R., Sujan, M., Kacker, M. and Sujan, H. (2008). "Managing uncertainty in the adoption of new products: temporal distance and mental simulation", *Journal of Marketing Research*, Vol. 45 No. 3, pp. 320-336.

Castro, C. A., Zambaldi, F., & Ponchio, M. C. (2019). Cognitive and emotional resistance to innovations: concept and measurement. *Journal of Product & Brand Management*.

Claudy, M. C., Garcia, R., & O'Driscoll, A. (2015). Consumer resistance to innovation—a behavioral reasoning perspective. *Journal of the Academy of Marketing Science*, *43*(4), 528-544.

Cohen, J. (2013). *Statistical power analysis for the behavioral sciences*. Routledge.

Contzen, N., Handreke, A. V., Perlaviciute, G., & Steg, L. (2021). Emotions towards a mandatory adoption of renewable energy innovations: the role of psychological reactance and egoistic and biospheric values. *Energy Research & Social Science*, *80*, 102232.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Quart.13319–339.

Fagerberg, J. (2004). Innovation: A guide to the literature.

Freeman, C. and L. Soete (1997). *The Economics of Industrial Innovation*, Third Ed., London: Pinter.

Getzoff, M. (2022, 4 mei). *Global Finance Magazine - Most Technologically Advanced Countries In The World 2022*. Global Finance Magazine. Geraadpleegd op 4 augustus 2022, van https://www.gfmag.com/global-data/non-economic-data/best-tech-countries.

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate data analysis*. Prentice Hall.

Heidenreich, S. and Spieth, P. (2013). “Why innovations fail - the case of passive and active innovation resistance”, International Journal of Innovation Management, Vol. 17 No. 5, pp. 1350021-1-1350021-42.

Huang, D., Jin, X., & Coghlan, A. (2021). Advances in consumer innovation resistance research: A review and research agenda. *Technological Forecasting and Social Change*, *166*, 120594.

Kaiser, H. F., & Rice, J. (1974). Little jiffy, mark IV. *Educational and psychological measurement*, *34*(1), 111-117.

Kleijnen, M., Lee, N., & Wetzels, M. (2009). An exploration of consumer resistance to innovation and its antecedents. *Journal of economic psychology*, *30*(3), 344-357.

Knowles, E. S., & Riner, D. D. (2007). Omega approaches to persuasion: Overcoming resistance. *The science of social influence: Advances and future progress*, 83-114.

Kulviwat, S., Bruner II, G. C., Kumar, A., Nasco, S. A., & Clark, T. (2007). Toward a unified theory of consumer acceptance technology. *Psychology & Marketing*, *24*(12), 1059-1084.

McDermott, C. M., & O'Connor, G. C. (2002). Managing radical innovation: an overview of emergent strategy issues. *Journal of Product Innovation Management: an international publication of the product development & management association*, *19*(6), 424-438.

Mick, D.G. and Fournier, S. (1998). “Paradoxes of technology: consumer cognizance, emotions, and coping strategies”, Journal of Consumer Research, Vol. 25 No. 2, pp. 123-143.

Miron, A. M., & Brehm, J. W. (2006). Reactance theory-40 years later. *Zeitschrift für Sozialpsychologie*, *37*(1), 9-18.

Mogilner, C., Aaker, J. and Kamvar, S.D. (2012). “How happiness affects choice”, Journal of Consumer Research, Vol. 39 No. 2, pp. 429-443.

Ngafeeson, M. N., & Manga, J. A. (2021). The Nature and Role of Perceived Threats in User Resistance to Healthcare Information Technology: A Psychological Reactance Theory Perspective. *International Journal of Healthcare Information Systems and Informatics (IJHISI)*, *16*(3), 21-45.

Noppers, E. H., Keizer, K., Bolderdijk, J. W., & Steg, L. (2014). The adoption of sustainable innovations: Driven by symbolic and environmental motives. *Global Environmental Change*, *25*, 52-62.

Petty, R. E., & Cacioppo, J. T. (1986). The elaboration likelihood model of persuasion. In *Communication and persuasion* (pp. 1-24). Springer, New York, NY.

Pratkanis, A. R. (Ed.). (2011). *The science of social influence: Advances and future progress*. Psychology Press.

Qualtrics XM // Krachtige Experience Management Software. (2022, 16 maart). Qualtrics. Geraadpleegd op 18 maart 2022, van

https://www.qualtrics.com/nl/?rid=langMatch&prevsite=en&newsite=nl&geo=NL&geomatch=

Ram, S., & Sheth, J. N. (1989). Consumer resistance to innovations: the marketing problem and its solution. *J Consum Mark, 6*(2), 5–14.

Sadiq, M., Adil, M., & Paul, J. (2021). An innovation resistance theory perspective on purchase of eco-friendly cosmetics. *Journal of Retailing and Consumer Services*, *59*, 102369.

Samuelson, W., & Zeckhauser, R. (1988). Status quo bias in decision making. *Journal of risk and uncertainty*, *1*(1), 7-59.

Sandberg, B., & Aarikka-Stenroos, L. (2014). What makes it so difficult? A systematic review on barriers to radical innovation. *Industrial Marketing Management*, *43*(8), 1293-1305.

Schmookler, J. (1966*). Invention and Economic Growth*, Cambridge, Mass: Harvard University Press.

Schumpeter, J. (1939). Business Cycles: *A Theoretical, Historical, and Statistical Analysis of the Capitalist Process* (2vol), New York: McGraw-Hill.

Singh, P., & Giacosa, E. (2019). Cognitive biases of consumers as barriers in transition towards circular economy. *Management decision*.

Srivastava, S., & Agrawal, S. (2020). Resistance to change and turnover intention: a moderated mediation model of burnout and perceived organizational support. *Journal of Organizational Change Management*.

Stahel, W. R. (2016). The circular economy. *Nature*, *531*(7595), 435-438.

Stryja, C., & Satzger, G. (2019). Digital nudging to overcome cognitive resistance in innovation adoption decisions. *The Service Industries Journal*, *39*(15-16), 1123-1139.

Talke, K., & Heidenreich, S. (2014). How to overcome pro-change bias: incorporating passive and active innovation resistance in innovation decision models. *Journal of Product Innovation Management*, *31*(5), 894-907.

Tello, S. F., & Yoon, E. (2008). Examining drivers of sustainable innovation. *International Journal of Business Strategy*, 8(3), 164– 169.

Tushman, M. L. & Romanelli, E. (1985). *Organizational Evolution: A Metamorphosis Model of Convergence and Reorientation*. In L. L. Cummings & M. B. Staw (Eds.), *Research in Organizational Behavior,* 7: 171-222). Greenwich, CT: JAI press.

Venkatesh, V. (2000). Determinants of perceived ease of use: Integrating control, intrinsic motivation, and emotion into the technology acceptance model. *Information systems research*, *11*(4), 342-365.

Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management science*, *46*(2), 186-204.

Wood, S.L. and Moreau, C.P. (2006). "From fear to loathing? How emotions influence the evaluation and early use of innovations", Journal of Marketing, Vol. 70 No. 3, pp. 44-57.

Appendices

Appendix A – Translation Questionnaire Resistance Items

Emotional Resistance Items

ER1: I feel frustration when I think of Innovation X.
Translation: Ik voel frustratie als ik aan Innovatie X denk.
ER2: I feel irritation when I think of Innovation X.
Translation: Ik voel irritatie als ik aan Innovtie X denk.
ER3: I feel stressed when I think of the change that Innovation X brings
Translation: Ik voel me gestrest als ik aan de verandering denk die Innovatie X brengt.

Cognitive Resistance Items

CR1: I do not see potential in Innovation X.
Translation: Ik zie geen potentie Innovatie X.
CR2: I see several disadvantages regarding Innovation X.
Translation: Ik zie verschillende tekortkomingen met betrekking tot Innovatie X.
CR3: I am critical about Innovation X.
Translation: Ik ben kritisch over Innovatie X.

Behavioral Resistance Items

BR1: I would not switch to Innovation X.
Translation: Ik zou niet overstappen op Innovatie X.
BR2: I would try as much as possible to avoid Innovation X.
Translation: Ik zou proberen zoveel mogelijk Innovatie X te vermijden.
BR3: I would purchase Innovation X.
Translation: De kans is groot dat ik Innovatie X ga kopen.

Appendix B – Full Questionnaire

Introductie Beste respondent,

Voor ons afstudeeronderzoek aan de Radboud Universiteit doen wij - onder begeleiding van dr. Simone Ritter en Juliëtte van Acker - onderzoek naar de reactie van mensen op verschillende innovaties. In dit onderzoek zullen wij een aantal vragen stellen over twee innovaties, en een aantal algemene vragen.

Uw antwoorden zullen enkel gebruikt worden voor onderzoeksdoeleinden. Uw deelname is anoniem en vrijwillig. U kunt te allen tijde stoppen en er zijn geen goede of foute antwoorden. Aan het einde van deze enquête heeft u de mogelijkheid om één van de drie bol.com cadeaubonnen ter waarde van elk € 25,- te winnen. De enquête zal ongeveer 10 minuten duren.

Alvast hartelijk dank voor uw deelname! U helpt ons en de wetenschap een stap verder!

Hilde, Jeike, Julia, Paola & Ricky

Voor vragen of opmerkingen kunt u mailen naar het volgende e-mailadres: ricky.gommans@ru.nl

P.S.: This survey contains a completion code for SurveySwap.io & SurveyCirle

○ Ik stem geheel vrijwillig in met deelname aan dit onderzoek, waarbij mijn onderzoeksgegevens anoniem worden gemaakt en veilig worden opgeslagen volgens de richtlijnen voor het beheer van onderzoeksgegevens van de Radboud Universiteit. (1)

○ Ik stem niet in met deelname aan dit onderzoek, ik kies ervoor om de enquête te beëindigen. (2)

OPENNESSINTRO Hieronder staan een aantal stellingen die gaan over uw persoonlijkheid. Geef op een schaal van 1 (Helemaal mee oneens) tot 5 (Helemaal mee eens) aan in hoeverre u het met deze stellingen eens bent. Er zijn geen goede of foute antwoorden.

OPENNESS/NEUROTICSM Ik zie mezelf als iemand die...

	Helemaal mee oneens (1)	Mee oneens (2)	Neutraal (3)	Mee eens (4)	Helemaal mee eens (5)
...origineel is, met nieuwe ideeën komt (1)	○	○	○	○	○
...somber is (2)	○	○	○	○	○
...benieuwd is naar veel verschillende dingen (3)	○	○	○	○	○
...ontspannen is, goed met stress kan omgaan (4)	○	○	○	○	○
...scherpzinnig, een denker is (5)	○	○	○	○	○
...een levendige fantasie heeft (6)	○	○	○	○	○
...gespannen kan zijn (7)	○	○	○	○	○
...vindingrijk is (8)	○	○	○	○	○
...waarde hecht aan kunstzinnige ervaringen (9)	○	○	○	○	○
...zich veel zorgen maakt (10)	○	○	○	○	○
...een voorkeur heeft voor werk dat routine is (11)	○	○	○	○	○

... emotioneel stabiel is, niet gemakkelijk overstuur raakt (12)	○	○	○	○	○
...graag nadenkt, met ideeën speelt (13)	○	○	○	○	○
...weinig interesse voor kunst heeft (14)	○	○	○	○	○
... humeurig kan zijn (15)	○	○	○	○	○
... kalm blijft in gespannen situaties (16)	○	○	○	○	○
...het fijne weet van kunst, muziek, of literatuur (17)	○	○	○	○	○
... gemakkelijk zenuwachtig wordt (18)	○	○	○	○	○

Page Break

TRAITINTRO Ook de volgende stellingen gaan over uw persoonlijkheid. Geef op een schaal van 1 (Helemaal mee oneens) tot 5 (Helemaal mee eens) aan in hoeverre u het eens bent met deze stellingen. Er zijn geen goede of foute antwoorden.

TRAITRESISTANCE In hoeverre bent u het eens met de volgende stellingen?

	Helemaal oneens (1)	Mee oneens (2)	Neutraal (3)	Mee eens (4)	Helemaal mee eens (5)
Ik gebruik over het algemeen liever duurzame producten waarmee ik vertrouwd ben dan dat ik een nieuw, duurzaam product zou gaan gebruiken (1)	○	○	○	○	○
Ik vind het geweldig om nieuwe, duurzame producten uit te proberen (2)	○	○	○	○	○
Het voelt voor mij vaak een beetje onprettig om nieuwe, duurzame producten uit te proberen, ook al kan het gunstiger voor me uitpakken (3)	○	○	○	○	○
Als ik eenmaal bepaalde producten gebruik, ben ik niet snel geneigd om over te stappen naar een ander product (4)	○	○	○	○	○

End of Block: 'Openness to Experience' en 'Trait' vragen

Start of Block: Introductie Innovaties + Vragen

INN_INTRO De volgende vragen zullen gaan over twee innovaties. De innovaties zullen eerst door middel van een korte tekst geïntroduceerd worden, daarna volgen er vragen over de innovaties.

End of Block: Introductie Innovaties + Vragen

Start of Block: Innovatie 1: Insectenburger

INS_INTRODUCTIE **Insectenburger**

Insecten zijn een milieuvriendelijker alternatief voor vlees, zonder in te hoeven leveren op het binnenkrijgen van dierlijke eiwitten. Zo is voor één kilogram koeienvlees 10 kilogram voer nodig, terwijl voor één kilogram krekels maar 1.7 kilogram voer nodig is. Daarnaast stoten insecten veel minder broeikasgassen uit, vergt het verbouwen van insecten aanzienlijk minder water, hebben ze amper ruimte nodig, en zijn insecten geen kieskeurige eters. De insectenburger bestaat deels uit insectensoorten zoals sprinkhanen, meelwormen en/of andere soorten en deels uit groenten en kruiden. Vaak worden de insecten zo gemalen dat ze niet meer te zien zijn. Dit betekent dat de insectenburger qua uiterlijk lijkt op een standaard vleesburger. De insectenburger smaakt kruidig, maar is wel wat droger en minder sappig dan een normale burger gemaakt van vlees. De insectenburger wordt per twee stuks verpakt en is te koop voor €3,99.

INS_RESISTANCE Hieronder volgen een aantal stellingen over de insectenburger. Geef op een schaal van 1 (Helemaal mee oneens) tot 5 (Helemaal mee eens) aan in hoeverre u het met deze stellingen eens bent. Er zijn geen goede of foute antwoorden.

	Helemaal mee oneens (1)	Mee oneens (2)	Neutraal (3)	Mee eens (4)	Helemaal mee eens (5)
Ik voel frustratie als ik denk aan de insectenburger (1)	○	○	○	○	○
Ik voel irritatie als ik denk aan de insectenburger (2)	○	○	○	○	○
Ik voel me gestrest als ik aan de verandering denk die de insectenburger teweeg brengt (3)	○	○	○	○	○
Ik zie geen potentie in de insectenburger (4)	○	○	○	○	○
Ik zie verschillende tekortkomingen met betrekking tot de insectenburger (5)	○	○	○	○	○
Ik ben kritisch over de insectenburger (6)	○	○	○	○	○
Ik zou niet overstappen op de insectenburger (7)	○	○	○	○	○

Ik ga proberen de insectenburger zoveel mogelijk te vermijden (8)	○	○	○	○	○
De kans is groot dat ik de insectenburger ga kopen (9)	○	○	○	○	○

INS_ANTECEDENTS In hoeverre bent u het eens met de volgende stellingen?

	Helemaal mee oneens (1)	Mee oneens (2)	Neutraal (3)	Mee eens (4)	Helemaal mee eens (5)
De insectenburger biedt voordelen die andere, concurrerende producten niet bieden (1)	○	○	○	○	○
In mijn ogen overtreft de insectenburger concurrerende producten (2)	○	○	○	○	○
Ik geloof dat de insectenburger makkelijk in gebruik is (3)	○	○	○	○	○
Het is makkelijk voor mij om te leren hoe ik de insectenburger moet bereiden (4)	○	○	○	○	○
Ik weet waar ik naartoe kan gaan om de insectenburger uit te kunnen proberen (5)	○	○	○	○	○
Ik heb niet echt de mogelijkheden om de insectenburger uit te kunnen proberen (6)	○	○	○	○	○

Ik heb er geen vertrouwen in dat de insectenburger aan de gemaakte beloftes voldoet (7)	○	○	○	○	○
Ik ben niet zeker dat de insectenburger aan mijn verwachtingen voldoet (8)	○	○	○	○	○
Het consumeren van de insectenburger past goed bij mijn levensstijl (9)	○	○	○	○	○
Het consumeren van de insectenburger sluit helemaal aan op mijn behoeften (10)	○	○	○	○	○
De mogelijkheid om de insectenburger te kunnen kopen, maakt me blij (11)	○	○	○	○	○
Het kopen van de insectenburger zal mij blij maken (12)	○	○	○	○	○

INS_CONSEQUENCES In hoeverre bent u het eens met de volgende stellingen?

	Helemaal mee oneens (1)	Mee oneens (2)	Neutraal (3)	Mee eens (4)	Helemaal mee eens (5)
Op dit moment weet ik niet zeker of het kopen van de insectenburger de juiste beslissing is (1)	○	○	○	○	○
Ik zal in de gaten houden of anderen problemen ervaren met het consumeren van de insectenburger voordat ik deze zelf ga consumeren (2)	○	○	○	○	○
Ik zal niet overhaast besluiten om de insectenburger te consumeren (3)	○	○	○	○	○
Ik vertel mijn vrienden dat ze de insectenburger niet moeten consumeren (4)	○	○	○	○	○
Ik vertel mijn vrienden waarom het geen goed idee is om de insectenburger te consumeren (5)	○	○	○	○	○

Als een vriend vertelt dat het consumeren van de insectenburger een goed idee is, zal ik daar tegenin gaan (6)	○	○	○	○	○
Ik denk dat het niet kopen van de insectenburger de juiste beslissing is (7)	○	○	○	○	○
Ik denk dat de insectenburger waardeloos is omdat consumenten er geen duidelijk voordeel uit kunnen halen (8)	○	○	○	○	○
Ik denk dat consumenten de insectenburger moeten afwijzen (9)	○	○	○	○	○

MR_INTRODUCTION **Metalen rietjes**

Metalen rietjes zijn herbruikbare, milieuvriendelijke alternatieven voor plastic rietjes. Metalen rietjes worden vaak gemaakt van roestvrij staal, waardoor ze geen metalen bijsmaak geven. Daarnaast gaan metalen rietjes levenslang mee, zijn ze makkelijk schoon te maken, en besparen ze een hoop afval. Plastic rietjes dragen namelijk bij aan de plastic soep in de oceaan, wat ernstige en dodelijke gevolgen kan hebben voor de dieren in de oceanen. Daarnaast zijn plastic rietjes schadelijk voor het milieu. Daarnaast zijn metalen rietjes ook een goed alternatief voor papieren rietjes. Papieren rietjes lossen gemakkelijk op, en kunnen leiden tot verstikkingsgevaar bij kleine kinderen. Het metalen rietje is hetzelfde in gebruik te nemen als de plastic en papieren rietjes. Het enige verschil is dat het metalen rietje na gebruik niet weggegooid wordt, maar schoongemaakt wordt middels een speciaal borsteltje om

vervolgens weer hergebruikt te worden. De prijs voor een set (vier metalen rietjes inclusief schoonmaakborsteltje) is €3,20.

MR_RESISTANCE Hieronder volgen een aantal algemene stellingen met betrekking tot de metalen rietjes. Geef op een schaal van 1 (Helemaal mee oneens) tot 5 (Helemaal mee eens) aan in hoeverre u het met deze stellingen eens bent. Er zijn geen goede of foute antwoorden.

	Helemaal mee oneens (1)	Mee oneens (2)	Neutraal (3)	Mee eens (4)	Helemaal mee eens (5)
Ik voel frustratie als ik denk aan het metalen rietje (1)	○	○	○	○	○
Ik voel irritatie als ik denk aan het metalen rietje (2)	○	○	○	○	○
Ik voel me gestrest als ik aan de verandering denk die het metalen rietje teweeg brengt (3)	○	○	○	○	○
Ik zie geen potentie in het metalen rietje (4)	○	○	○	○	○
Ik zie verschillende tekortkomingen met betrekking tot het metalen rietje (5)	○	○	○	○	○
Ik ben kritisch over het metalen rietje (6)	○	○	○	○	○
Ik zou niet overstappen op het metalen rietje (7)	○	○	○	○	○
Ik ga proberen het metalen rietje zoveel mogelijk te vermijden (8)	○	○	○	○	○

De kans is groot dat ik het metalen rietje ga kopen (9)	○	○	○	○	○

MR_ANTECEDENTS In hoeverre bent u het eens met de volgende stellingen?

	Helemaal mee oneens (1)	Mee oneens (2)	Neutraal (3)	Mee eens (4)	Helemaal mee eens (5)
Het metalen rietje biedt voordelen die andere, concurrerende producten niet bieden (1)	○	○	○	○	○
In mijn ogen overtreft het metalen rietje concurrerende producten (2)	○	○	○	○	○
Ik geloof dat het metalen rietje makkelijk in gebruik is (3)	○	○	○	○	○
Het is makkelijk voor mij om te leren hoe ik het metalen rietje moet gebruiken (4)	○	○	○	○	○
Ik weet waar ik naartoe kan gaan om het metalen rietje uit te proberen (5)	○	○	○	○	○
Ik heb niet echt de mogelijkheden om het metalen rietje uit te kunnen proberen (6)	○	○	○	○	○

Ik heb er geen vertrouwen in dat het metalen rietje aan de gemaakte beloftes voldoet (7)	○	○	○	○	○
Ik ben niet zeker dat het metalen rietje aan mijn verwachtingen voldoet (8)	○	○	○	○	○
Het gebruiken van het metalen rietje past goed bij mijn levensstijl (9)	○	○	○	○	○
Het gebruiken van het metalen rietje sluit helemaal aan op mijn behoeften (10)	○	○	○	○	○
De mogelijkheid om het metalen rietje te kunnen aanschaffen, maakt me blij (11)	○	○	○	○	○
Het kopen van het metalen rietje zal mij blij maken (12)	○	○	○	○	○

MR_CONSEQUENCES In hoeverre bent u het eens met de volgende stellingen?

	Helemaal mee oneens (1)	Mee oneens (2)	Neutraal (3)	Mee eens (4)	Helemaal mee eens (5)
Op dit moment weet ik niet zeker of het kopen van de metalen rietjes de juiste beslissing is (1)	○	○	○	○	○
Ik zal in de gaten houden of anderen problemen ervaren met het gebruik van de metalen rietjes voordat ik deze zelf ga gebruiken (2)	○	○	○	○	○
Ik zal niet overhaast besluiten om gebruik te maken van de metalen rietjes (3)	○	○	○	○	○
Ik vertel mijn vrienden dat ze de metalen rietjes niet moeten gebruiken (4)	○	○	○	○	○
Ik vertel mijn vrienden waarom het geen goed idee is om de metalen rietjes te gebruiken (5)	○	○	○	○	○

Als een vriend vertelt dat het gebruiken van de metalen rietjes een goed idee is, zal ik daar tegenin gaan (6)	○	○	○	○	○
Ik denk dat het niet kopen van de metalen rietjes de juiste beslissing is (7)	○	○	○	○	○
Ik denk dat de metalen rietjes waardeloos zijn omdat consumenten er geen duidelijk voordeel uit kunnen halen (8)	○	○	○	○	○
Ik denk dat consumenten de metalen rietjes moeten afwijzen (9)	○	○	○	○	○

Motivatie U bent bijna aan het einde van de enquête. Herinnering: bij volledige afronding van de enquête maakt u kans op één van de drie bol.com cadeaubonnen ter waarde van elk €25,-.

INS_MANIPULATIECHECK Hieronder staan een aantal stellingen over de insectenburger. Geef op een schaal van 1 (Helemaal mee oneens) tot 5 (Helemaal mee eens) aan in hoeverre u

het met deze stellingen eens bent. Er zijn geen goede of foute antwoorden.

	Helemaal mee oneens (1)	Mee oneens (2)	Neutraal (3)	Mee eens (4)	Helemaal mee eens (5)
De insectenburger is een totaal ander product in vergelijking met (vlees)burgers (1)	○	○	○	○	○
De insectenburger lijkt veel op wat ik al ken (2)	○	○	○	○	○
De insectenburger is heel vernieuwend (3)	○	○	○	○	○
De insectenburger is enkel een kleine aanpassing op huidige (vlees)burgers (4)	○	○	○	○	○
De insectenburger is een totaal nieuw product (5)	○	○	○	○	○

MR_MANIPULATIECHECK Hieronder staan een aantal stellingen over het metalen rietje. Geef op een schaal van 1 (Helemaal mee oneens) tot 5 (Helemaal mee eens) aan in hoeverre u het met deze stellingen eens bent. Er zijn geen goede of foute antwoorden.

	Helemaal mee oneens (1)	Mee oneens (2)	Neutraal (3)	Mee eens (4)	Helemaal mee eens (5)
Het metalen rietje is een totaal ander product in vergelijking met huidige plastic/papieren rietjes (1)	○	○	○	○	○
Het metalen rietje lijkt veel op wat ik al ken (2)	○	○	○	○	○
Het metalen rietje is heel vernieuwend (3)	○	○	○	○	○
Het metalen rietje is een kleine aanpassing op huidige plastic/papieren rietjes (4)	○	○	○	○	○
Het metalen rietje is een totaal nieuw product (5)	○	○	○	○	○

GESLACHT Met welk geslacht identificeert u zich?

- ○ Vrouw (1)
- ○ Man (2)
- ○ Anders, namelijk: (3) _____
- ○ Zeg ik liever niet (4)

OPLEIDING Wat is uw hoogst behaalde opleidingsniveau?

- ○ Basisschool (1)
- ○ Middelbare school (2)
- ○ MBO (3)
- ○ HBO Bachelor (4)
- ○ HBO Master (5)
- ○ Universiteit Bachelor (6)
- ○ Universiteit Master (7)
- ○ PHD (8)

EINDE Bedankt voor uw deelname aan ons onderzoek.

Als u wilt deelnemen aan de loting voor de bol.com cadeaubonnen, wordt u doorgestuurd naar een nieuwe pagina. Klik hiervoor op volgende. Deze doorschakeling is nodig vanwege privacy overwegingen, op deze manier kunnen we uw antwoorden op de huidige enquête loskoppelen van persoonsgegevens (dat wil zeggen uw e-mailadres). Mocht u niet willen deelnemen dan kunt u de pagina sluiten. De cadeaubonnen zullen rond 1 juni 2022 worden verloot en de winnaars worden op de hoogte gebracht via het doorgegeven e-mailadres.

Voor vragen of opmerkingen met betrekking tot de enquête of het gehele onderzoek, kunt u contact opnemen met ons via dit e-mailadres: ricky.gommans@ru.nl

Voor SurveyCircle-gebruikers (www.surveycircle.com): De Survey Code is: 2H2U-PTW8-JKJQ-2H55
Voor Surveyswap gebruikers: de code is PDWX-EYQL-1T3J

Met vriendelijke groet,

Hilde, Jeike, Julia, Paola & Ricky

Appendix C – Factor Analysis Manipulation Check

A principal axis factoring analysis (FA) was conducted on the 5 items with Promax rotation. Promax was used since this rotation is applicable for larger datasets and it allows for factors to be correlated. In order to run an adequate FA for the dataset, the data was restructured into a long structure which combined items that measure identical things for the different innovation types. For example, item "*De insectenburger is een totaal nieuw product*" and "*Het metalen rietje is een totaal nieuw product*" were grouped together as a new variable. After doing this for every of the 5 items the FA was conducted.

The Kaiser-Meyer-Olkin measure verified the sampling adequacy for the analysis, *KMO* = 0.65 ("mediocre" according to Kaiser & Rice, 1974). The Bartlett's Test of Sphericity showed a significant effect, $p < 0.001$, meaning there was enough correlation between the items in order to conduct a factor analysis. When analyzing the communalities, the first two restructured items displayed communalities scores below 0.5 which is the limit set by Hair et al. (2010). However, the decision was made to include these items in the further factor analysis.

The total variance explained and the scree plot show complementary outcomes when it comes to the number of factors that could explain the underlying structure of the 5 items. There were two factors extracted with an Eigenvalue greater than 1, and these two made up for a cumulative 67.38% of explained variance. The scree plot showed a clear cut off point after two factors as well.

Table 3 entails all the rotated factor loadings per item, assigned to the 2 different intended measures; radical measurement and incremental measurement.

Table 3

Rotated Factor Loadings (Promax) per item, Assigned to the Two Types of Intended Measure (N=697)

	Factors	
Item	1	2
MC1 Innovatie X is een totaal ander product in vergelijking met soortgelijke producten.	**-.460**	.235
MC2 Innovatie X lijkt veel op wat ik al ken.	**.584**	-.09
MC3 Innovatie X is heel vernieuwend.	.101	**.701**
MC4 Innovatie X is enkel een kleine aanpassing op huidige soortgelijke producten.	**.808**	.131
MC5 Innovatie X is een totaal nieuw product.	-.091	**.752**

Note: the factor loading in bold indicate to which factor the items belongs. As can be seen MC1, MC2, and MC4 load on the first factor. MC3 and MC5 load on the second factor.

MC1, MC3, and MC5 all intended to measure the perceived radicalness of the innovations. As can be seen MC1 does not load on the same factor as the other two, and is therefore excluded from further research. MC2 and MC4 both intended to measure how incremental the innovations are perceived as, and they both load on the same factor.

After deletion of the MC1 item, a reliability analysis was performed to check the internal validity of the manipulation items. A high reliability tells us that the measurements obtained are both representative and stable over time (Hair et al., 2010). Perceived radicalness showed a questionable reliability (3 items; $\alpha = .632$, after deleting MC1; $\alpha = .675$). Perceived incrementalness showed a questionable reliability (3 items; $\alpha = .616$).

After deleting MC1, factor 1 represents perceived incrementalness and factor 2 represents perceived radicalness.