

Simulated Responses: Scale Development and Validation of Satiating and Immersion in Reality-enhancing Technologies

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Abstract

Reality-enhancing technologies, spanning fields from entertainment and medical training to the military and gaming, create immersive, realistic, and engaging experiences. Prior research has highlighted that these technologies have altered marketing, especially in tourism and retail, by offering numerous benefits to companies and consumers. However, the success of these technologies heavily depends on consumer responses to computer-generated simulated experiences. Experiences in reality-enhancing technology environments are considerably different from real-world experiences, both physiologically and psychologically. Several problems, such as latency-rendering issues, low graphic quality, delays, and the awareness that the experience is just a simulation, can reduce the growth of these technologies. Reality-enhancing technologies are immersive by their nature; however, these issues can hinder the positive effect of immersion and ultimately lead to satiation. Satiation is an omnipresent phenomenon that lowers enjoyment levels and satisfaction caused by overexposure or overconsumption. This phenomenon poses a critical challenge to businesses because it is directly linked to product disposal and replacement behaviour. Although this notion significantly influences consumer behaviour and decision making, literature regarding satiation in reality-enhancing technologies is nascent and there are no psychometric measures to assess this concept in such technologies. This gap in the literature leads to formulation of four research questions that were answered across two papers organized as Chapters 3 and 4.

To address this gap, the first paper conceptualizes satiation in reality-enhancing technologies as 'simulated satiation,' which refers to 'attenuation in perceived benefits that occurs due to repeated or prolonged exposure to vicarious and simulated intermediary sources,' conducts a proof-of-concept study, and creates nine testable propositions as future research directions. The second paper proposes a sister concept called 'simulated immersion,' which refers to a sense of harmony, high involvement, and being a part of a reality-enhancing technology experience. Simulated immersion significantly boosts satisfaction, loyalty, and enjoyment. As can be seen, these two concepts counter each other and together form consumers' simulated responses in reality-enhancing technology settings. Following this, the research formally defines simulated responses

in reality-enhancing technology as attenuation or rise in perceived benefits that occurs due to repeated or prolonged exposure to vicarious and simulated intermediary sources, and then develops a 12-item scale to measure simulated responses. 'Simulated responses' is a multi-dimensional construct, and the newly developed scale has two dimensions: simulated satiation (6 items) and simulated immersion (6 items). The two papers together contribute to the marketing literature by conceptualizing multiple constructs, developing, and validating a new scale. This thesis lays a foundation for future research and will serve as a leverage point for marketing practitioners who wish to assess their content efficiency.

Attestation of Authorship

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the acknowledgements), nor used artificial intelligence tools or generative artificial intelligence tools (unless it is clearly stated, and referenced, along with the purpose of use), nor material which to a substantial extent has been submitted for the award of any other degree or diploma of a university or other institution of higher learning.

Erol Pala

July 24th, 2024

Publications From This Thesis

The listed publications are the result of the work undertaken for this research:

Peer-reviewed Journal Article

Pala, E., Kapitan, S., & van Esch, P. (2022). Simulated satiation through reality-enhancing technology. *Psychology & Marketing*, 39(3), 483-494.

The following manuscript is currently under second-round review

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Conference Papers

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Declaration of Co-authorship



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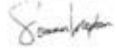
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Table of Contents

Abstract.....	i
Attestation of Authorship	iii
Publications From This Thesis.....	iv
Acknowledgements	v
Declaration of Co-authorship	vii
Table of Contents	ix
List of Tables.....	xii
List of Figures.....	xiii
Chapter 1: Introduction	1
1.1 Research Background	1
1.2 Research Purpose and Research Questions	4
1.3 Research Philosophy and Design.....	4
1.3.1 Ontology.....	5
1.3.2 Epistemology.....	6
1.3.3 Research Paradigm.....	7
1.3.4 Methodology	9
1.3.5 Method	10
1.4 Contributions and Significance of the Research.....	13
1.5 Organization of the Thesis.....	16
Chapter 2: Literature Review	19
2.1 Introduction	19
2.2 Chapter overview.....	19
2.3 Brief History and Overview of Reality-Enhancing Technologies	22
2.4 Definitions of Reality-Enhancing Technologies	23
2.5 Theoretical Frameworks in Reality-Enhancing Technologies	26
2.5.1 Information Processing Theory	27
2.5.2 Stimulus-Organism-Response Framework.....	32
2.5.3 Push and Pull Factors Theory.....	34
2.5.4 Technology Acceptance Model	35
2.5.5 Uses and Gratifications Theory.....	37
2.6 Applications and Use Cases of Reality-Enhancing Technologies in Marketing.....	39
2.7 Impact of Reality-Enhancing Technologies on Consumer Behaviour.....	43
2.8 Challenges and Limitations of Reality-Enhancing Technologies in Marketing	45
2.9 Implications for Marketing Practice and Research.....	49
2.10 Conclusions	55
Preface to Chapter 3: Contributions	58

Chapter 3: Simulated Satiation Through Reality-Enhancing Technology	59
3.1 Abstract.....	59
3.2 Introduction	60
3.3 Literature Review And Propositions.....	62
3.3.1 Reality-enhancing technology.....	62
3.3.2 Satiation.....	63
3.3.3 Simulated satiation	64
3.3.3.1 Physiological drivers of simulated satiation	65
3.3.3.2 Perceptual drivers of simulated satiation	66
3.3.3.3 Self-evaluation drivers of simulated satiation.....	67
3.3.4 Cognitive and affective experiences.....	68
3.3.5 Increasing or decreasing simulated satiation.....	69
3.3.6 The effects of vicarious experiences on simulated satiation	70
3.4 Proof-of-Concept Experimental Study	73
3.5 Method.....	73
3.6 Results and Discussion	74
3.7 Directions For Future Research	75
3.8 Conclusion	78
3.9 References	79
Preface To Chapter 4: Link and Contributions.....	86
Chapter 4: Simulated Responses in Reality-Enhancing Technologies: Scale Development and Validation.....	87
4.1 Abstract.....	87
4.2 Introduction	88
4.3 Literature Review	90
4.3.1 Reality-enhancing technologies in marketing settings.....	91
4.3.2 Simulated Satiation	92
4.3.3 Simulated Immersion	94
4.3.4 The Need for a Simulated Responses Scale	95
4.4 Development of the Simulated Responses Scale.....	96
4.4.1. Study overview.....	96
4.4.2 Study 1: Item generation and content validity.....	97
4.4.2.1. Study 1 discussion.....	100
4.4.3 Study 2: scale purification.....	100
4.4.3.1 Study 2 results.....	100
4.4.3.2 Study 2 discussion.....	102
4.4.4. Study 3: Scale validation and nomological validity	103
4.4.4.1 Study 3 results.....	103
4.4.4.2 Study 3 discussion.....	105

4.4.5 Study 4: Scale confirmation	106
4.4.5.1 Study 4 results.....	106
4.4.5.2 Study 4 discussion.....	107
4.4.6 Study 5: Predictive Validity Test	107
4.4.6.1 Study 5 results.....	110
4.4.6.2 Study 5 discussion.....	113
4.5 Discussion and Contributions	113
4.6 Limitations, Future Research Directions and Conclusions.....	116
4.7 References	117
Chapter 5: Conclusion	122
5.1 Introduction	122
5.2 Review of Research Questions	123
5.2.1 Research Question 1	123
5.2.2 Research Question 2.....	125
5.2.3 Research Question 3.....	127
5.2.4 Research Question 4.....	128
5.3 Review of Research Purpose	130
5.4 Theoretical, Managerial and Methodological Contributions	131
5.4.1 Theoretical Contributions.....	131
5.4.2 Managerial Implications.....	133
5.4.3 Methodological Implications.....	135
5.5 Limitations and Future Research Directions	137
5.6 Research Agenda	140
5.7 Conclusion	149
References	151
Appendices.....	172

List of Tables

Table 2.1 Example studies from existing literature.....	27
Table 3.1 Definitions of satiation in the marketing and psychology literature.	64
Table 3.2 Factors that increase/decrease satiation (adapted from Redden, 2015).....	69
Table 3.3 Key theoretical contradictions and areas for future empirical testing.....	76
Table 4.1Demographic data across five studies.	97
Table 4.2 Participant details.	98
Table 4.3 Study 2: Factor loadings of the 12 items & Cronbach’s alpha values of sub-scales.	102
Table 4.4 Convergent & discriminant validity correlations.	104
Table 4.5 Confirmatory factor analysis fit indices.	107
Table 5.1 Information Processing Theory related research agenda.....	143
Table 5.2 Stimulus-Organism-Response Framework related research agenda.	146
Table 5.3 Push and Pull Factors Theory related research agenda.	148

List of Figures

Figure 1.1 Thesis overview	17
Figure 3.1 Proof-of-concept experimental study framework	75
Figure 4.1 Study 2 - Scree plot analysis.....	102
Figure 4.2 SEM – two-factor solution	107
Figure 4.3 Conceptual model	108
Figure 4.4 Example screenshots of products in augmented reality settings.....	109
Figure 4.5 Simulated satiation related main effects	110
Figure 4.6 Simulated immersion related main effects.....	110
Figure 4.7 Perceived enjoyment related interaction effects	111
Figure 4.8 Perceived usefulness related interaction effects	112
Figure 4.9 Attitude towards AR related interaction effect	112
Figure 4.10 Purchase intention related interaction effect.....	113

Chapter 1: Introduction

1.1 Research Background

Reality-enhancing technologies are becoming an increasingly integral part of the daily lives of humans (Marr, 2021). Such technologies, namely Virtual Reality (VR), Augmented Reality (AR), and Mixed Reality (MR), provide many benefits to users and businesses, including increased engagement, enhanced enjoyment, and greater satisfaction; moreover, they have received prominent attention from both businesses and scholars (Bonetti et al., 2018; Kang et al., 2020). These technologies find application in numerous fields, including gaming, entertainment, healthcare, retail, and tourism (Buhalis & Law, 2008; Bonetti et al., 2018). As a result of this the total worth of reality-enhancing technologies is expected to reach \$454.73 billion in 2030 (Kim, Kim, Park & Yoo, 2023). Many major companies, such as Volvo, Mercedes, Adidas, Shangri-La Hotels, Marriott, and Thomas Cook Airlines, have already adopted reality-enhancing technologies in their marketing campaigns to provide more engaging and immersive experiences to their customers (Chylinski et al., 2020; Or, 2022).

Virtual reality blends visual, kinetic and audio elements in a digital environment and creates a simulated experience to provide immersive and engaging experiences (Kim et al., 2020). Likewise, augmented reality represents a digital simulated experience that generates supplementary sensory information that overlays real-world experiences, such as avatars, navigation cues, virtual buttons and text annotations (Wedel et al., 2020). Lastly, mixed reality is a combination of these two technologies, merging real and digital worlds together to create new simulated environments where physical and digital objects can exist at the same time (Rokhsaritalemi, Sadeghi-Nyarai & Choi, 2020). Upon the increased popularity of these technologies, many researchers have tried to identify the impacts of reality-enhancing technologies on consumers.

Notably, existing literature has unveiled that reality-enhancing technologies play a critical role, particularly in the tourism and retail industries, because they offer invaluable benefits to businesses, including interactive marketing campaigns, access to virtual store walk-in, all-angle

product viewing, distinct store designs, and reduced marketing costs and product returns (Scholz & Smith, 2016; Bonetti et al., 2018; Heller et al., 2019). All of these benefits enhance consumers' enjoyment levels, purchase intent, satisfaction and engagement, resulting in increased sales and profits for businesses (Pachoulakis & Kapetanakis, 2012; Javornik, 2016; Poushneh & Vasquez-Parraga, 2017). However, even though reality-enhancing technology experiences provide numerous invaluable benefits to both consumers and businesses, the success of such technologies heavily depends on how consumers respond to these computer-generated simulated experiences (Moorhouse et al., 2018; Kowalczyk et al., 2021). Reality-enhancing technology experiences significantly differ from real-life experiences both physiologically and psychologically and certain issues threaten the acceptance and growth of such technologies. For instance, issues such as latency-rendering problems, delays, low graphic quality, discomfort caused by the weight of a headset, or the awareness that the experience is just a simulation, may block the positive effect of immersion and ultimately result in satiation and lower enjoyment levels (Guerreiro et al., 2015; Wedel et al., 2020).

Satiation is a ubiquitous phenomenon that lowers consumers' enjoyment levels and satisfaction from a stimulus (Redden, 2008). Existing literature identifies many factors that can trigger this notion and among them the most prominent ones are overexposure and overconsumption (Becerril-Castrillejo & Muñoz-Gallego, 2022; Nelson & Redden, 2017). For instance, playing a video game for hours can lower a player's interest in the game, or reading the same book multiple times may not be as exciting as the first time reading it. This pervasive notion poses a significant challenge to businesses because it significantly decreases satisfaction regarding products and services, moreover, influences product disposal and replacement behaviour (Chugani et al., 2015; Poor et al., 2012; Redden, 2015).

Existing literature suggests that individuals can experience satiation without being the protagonist of an experience, simply through the vicarious observation of others' experiences or feelings, a phenomenon referred to as vicarious satiation (Tobin et al., 2015). Vicarious satiation has been explored in several contexts including goal fulfilment, visit intent, food consumption, and variety-seeking behaviour (McCulloch et al., 2011; Tu & Fishbach, 2012; El-Said & Aziz, 2022; Larson

et al., 2014). In reality-enhancing technology experiences, for instance, overexposure or repeated exposure can result in vicarious satiation and lower consumers' intention to visit the destination depicted in virtual reality (Deng, Unnava & Lee, 2019; Li & Chen, 2019; Manchanda & Debb, 2022). Likewise, the perceived similarity between real-world products and augmented reality holograms can trigger vicarious satiation as well and lower consumers' physical product purchase intent (Rauschnabel, 2018; Carozzi et al., 2019). On the other hand, even though satiation significantly influences consumer behaviour and decisions in nearly every experience, existing literature does not have a psychometric measure to assess this concept in reality-enhancing technology experiences (Redden, 2015). In order to fully understand how satiation works and how it influences consumer decisions, marketing literature needs a scale that can measure the notion of satiation in such technologies.

The main driver of this research is to address that very need, to develop a scale that can measure satiation in reality-enhancing technologies. Existing literature generally associates satiation with physiological elements and overlooks its complex nature, which is significantly related to psychological factors (Antón et al., 2018; Park & Jang, 2014; Redden, 2015). Furthermore, current marketing research overlooks the importance of satiation in reality-enhancing technologies, such as augmented reality, virtual reality, and mixed reality (Zandstra et al., 2020; Le, Chen & Nguyen, 2024). To fill this gap, this research first reviews the literature to conceptualize satiation in reality-enhancing technologies as simulated satiation, which refers to "attenuation in perceived benefits that occurs due to repeated or prolonged exposure to vicarious and simulated intermediary sources." Simulated satiation creates challenges for marketers regarding brand loyalty, content engagement, consumer attitudes, and purchase intention (Deng et al., 2019; Redden, 2015). Also, this research then proposes a sister construct, simulated immersion, which can counter the negative consequences of simulated satiation in reality-enhancing technologies. Simulated immersion can be defined as a state of harmony, high involvement, and being part of a reality-enhancing technology experience. Unlike simulated satiation, simulated immersion is anticipated to enhance satisfaction, loyalty, and enjoyment (Kang et al., 2020). As can be seen, these two concepts counter each other, and they are both

vitality important to understand consumers' simulated responses to marketing content. To that end, this research defines simulated responses in reality-enhancing technology as attenuation or rise in perceived benefits that occurs due to repeated or prolonged exposure to vicarious and simulated intermediary sources (Galak & Redden, 2018).

Understanding consumers' simulated responses to marketing content in reality-enhancing technology experiences can provide numerous benefits to scholars and businesses, including better-targeted advertising and measuring the effectiveness of marketing content. However, as stated earlier, there are no psychometric scales in the marketing literature to assess consumers' simulated responses in such technologies. To this end, this research aims to satisfy that need by positing and later exploring the questions listed below.

1.2 Research Purpose and Research Questions

The purpose of this research is:

To conceptualise simulated satiation and immersion constructs and develop a scale to measure consumers' simulated responses in reality-enhancing technology settings, exploring the impact on their perceptions and behaviour.

Based on this objective, the following research questions (RQ) emerge:

RQ1: *What is simulated satiation?*

RQ2: *What is simulated immersion, and how does it mitigate the negative effects of simulated satiation?*

RQ3: *How should simulated responses (simulated satiation and simulated immersion) be measured in reality-enhancing technology settings?*

RQ4: *How do simulated responses (simulated satiation and simulated immersion) impact consumers' perceived enjoyment, purchase intent, perceived usefulness and attitude towards reality-enhancing technologies?*

1.3 Research Philosophy and Design

Prior literature in the social sciences has outlined that the philosophical framework of social research involves five sequential elements: ontology, epistemology, research paradigm, methodology, and method (Crotty, 1998; Bhaskar, 1998; Smith, 2006). These elements shape research strategy, impact the research process, and guide the interpretation of research outcomes. Considering the nature of the present research and its objectives, this section will discuss the five elements of research philosophy and the view taken in the present thesis by this PhD candidate.

1.3.1 Ontology

Ontology in the social sciences explores the nature of being, existence, and reality (Antwi & Hamza, 2015). It aims to answer one of the most fundamental philosophical questions: whether social entities exist independently or are constructed by individuals' perceptions and actions (Bryman & Bell, 2015). Existing literature identifies several ontological stances, with realism situated at one end and relativism positioned at the opposite end (Harper, 2012; Grix, 2018). Scholars who adopt a realist approach believe that there is a direct relationship between reality and the observations, therefore there is only one true reality that is independent of individuals' perceptions and actions (Creswell & Poth, 2018; Pickard, 2017). On the other hand, relativism claims that there can be multiple interpretations for the same observation, indicating that data does not directly reflect reality (Harper, 2012).

Ontological approaches span between realism and relativism, and critical realism is located between these two distinct stances (Bhaskar, 2008; Bogna, Raineri & Dell, 2020). Critical realism poses a challenge to both realism and relativism; moreover, it became an important alternative to such ontological approaches since the 1970s (Sayer, 2000). This ontological stance accepts the existence of an objective natural and social reality that waits for scientific discovery and study (realism); however, it also recognizes that reality is imperfectly assessed and subjectively shaped as a result of human imperfection and limited capabilities (Hunt, 1983; Pickard, 2017). Hence, critical realism aims to close the gap between two opposing ontological approaches: realism and relativism. Grix (2018) has identified fundamental features of critical realism, of which some of the characteristics are outlined below:

- Critical realism combines elements of both the realist and relativist ontological stances, while also acknowledging the role of interpretation in research.
- Critical realism, unlike relativism, aims to both understand and explain the social world.
- In critical realism, structure and agency are seen as mutually essential, but they can be examined independently.
- Critical realism aligns with various research methods and states that the selection of the method should be based on the object and the purpose of the study.

The aim of this research is to understand and conceptualize consumers' simulated responses in reality-enhancing technology settings, develop a scale to measure simulated responses, and explain how these responses influence the marketing world. Aligning with the characteristics of critical realism, one of the purposes of this research is to explain how simulated responses and their dimensions affect the marketing world. Additionally, this research used different data collection methods and employed qualitative interpretation and quantitative statistical analysis to develop a scale. As such, the ontological approach that best suits the purpose and methodology of the present research is critical realism.

1.3.2 Epistemology

Epistemology is an important branch of research philosophy that deals with the nature, acquisition, validation, and justification of knowledge (Burr & Hofer, 2002; Creswell, 2013). More precisely, epistemology poses a number of critical questions: how is it possible to obtain knowledge, how could knowledge be justified, and what is truth (Snape & Spencer, 2013). There are different epistemological stances in social sciences, with objectivism situated at one end and subjectivism positioned at the opposite end (Feast & Melles, 2010).

Objectivism proposes a reality that exists independent of people's perception and belief (Antwi and Hamza, 2015). This approach focuses on developing objective ways of accessing reality. Prior research states that realist ontology is aligned with objectivist epistemology in terms of rules and objectives (Hiller, 2016). On the contrary, subjectivism postulates that reality is a social construct and hence, knowledge cannot be generalized for all users (Given, 2008; Gray, 2009). For

subjectivists, social reality is viewed as the structure of actors' perceptions and actions (Crotty, 1998). Subjectivist epistemology is generally linked with the structure of relativist ontology (Dieronitou, 2014).

Constructionism lies in between these two opposing epistemological stances of objectivism and subjectivism. Constructionists believe that reality consists of both an objective truth and subjective creation of the mind (Kakkuri-Knuuttila et al., 2008). Additionally, scholars who follow a constructionist epistemological stance indicate that “truth” can be something that individuals can agree upon; different times and occasions can lead to different interpretations (Eriksson & Kovalainen, 2015).

The position of constructionism provides freedom to scholars who conduct research in social sciences because it aligns with many ontological stances, such as realism, critical realism and relativism (Creswell, 2013; Grix, 2018). Also, as stated earlier, one of the main concerns of epistemology is how knowledge is acquired and how it can be justified. To develop a scale that can measure individuals' simulated responses in reality-enhancing technology settings, this research collected and interpreted both qualitative and quantitative data, which strongly aligns with constructionism (Graham & McAleer, 2018). Consequently, constructionism offers an appropriate epistemological basis for this thesis.

1.3.3 Research Paradigm

A research paradigm influences how the world is perceived and serves as a guide for explaining and understanding the social world. It encompasses the researcher's worldview, the frameworks to be employed, and the methodology to be used (Crotty, 1998; Bryman & Bell, 2015). The existing literature identifies several research paradigms, with positivism situated at one end and interpretivism positioned at the opposite end (Irshaidat, 2022).

Positivism is the most popular and dominating research paradigm in business studies (Biedenbach & Müller, 2011; Goulding, 2002a; Sachan & Datta, 2005). Researchers who follow the positivist research paradigm believe that reality is objective and independent of the observer (Myers, 2013). Positivists aim to find causal explanations to make law-like generalizations (Eriksson &

Kovalainen, 2015). This research paradigm generally uses quantitative data collection methods and is associated with realist ontology and objectivist epistemology (Gray, 2009).

Interpretivism can be seen as the opposite paradigm to positivism and can be considered a response to the dominance of positivism in the social sciences (Grix, 2018). This research paradigm suggests that people form a subjective understanding of their surroundings when constructing their social world (Creswell, 2013). Interpretivists argue that experiences are shaped by interpersonal interactions and the influence of cultural and historical norms (Creswell, 2007). This research paradigm is generally linked with qualitative data collection methods and is associated with relativist ontology and subjectivist epistemology (Antwi & Hamza, 2015).

Post-positivism can be defined as a combination of both positivism and interpretivism and can be placed between these two research paradigms (Kankam, 2019; Turyahikayo, 2021). Post-positivists suggest that understanding reality is beyond a researcher's capability, and scholars can only approximate it (Creswell, 2013). Therefore, post-positivists follow critical realist ontology and argue that the truth of findings is questionable and subject to falsification. This research paradigm offers flexibility to academics who want to employ mixed method research design, allowing the collection of both qualitative and quantitative data to examine the subject from multiple perspectives (Creswell & Poth, 2018).

This research is directed by four research questions, and one of them is to develop a scale to measure consumers' simulated responses in reality-enhancing technologies. To develop a scale, the present research benefits from existing validated scale development approaches, which include a mixed-methods research design (Nunnally, 1978; Churchill, 1979; Kapitan et al., 2019). Additionally, this method is frequently used in marketing research, where qualitative studies support and enhance quantitative studies (Creswell, 2013). The majority of the studies conducted in this research were quantitative. However, aligning with the existing literature, during the scale development process, this research employed interviews to collect qualitative data in order to generate an initial set of measurement items. Consequently, the post-positivist research paradigm provides the flexibility that this research needs.

1.3.4 Methodology

The methodology represents the techniques that researchers use to understand the world (Creswell, 2014). Existing literature identified the three approaches of methodology, including quantitative, qualitative and mixed-method (Grix, 2018). Quantitative research focuses on the quantification of data and uses various statistical tools to analyse the data (Creswell, 2014). This approach uses a deductive method where the focus is on theory testing, usually associated with positivism, and considers social reality as external and objectively real (Okoli, 2023; Rahi, 2017). On the other hand, qualitative research usually focuses on words instead of numerical data during data collection and analysis (Taylor, Bogdan, & DeVault, 2016). Qualitative research mainly uses an inductive approach and focuses on generating theories rather than testing them, associated with interpretivism, and sees social reality as a property of individuals' creation (Thomas, 2003).

The third methodological approach is mixed methods, which involves combining qualitative and quantitative approaches within a single research project (Creswell, 2014). Although qualitative and quantitative research have their distinct characteristics in terms of the role of theory, the type of data that is used, and the epistemology and ontology, combining them in one project can create productive outcomes (Bryman & Bell, 2015). The amount of research that employs a mixed methods approach has been increasing in the past decades and it is extensively used in business and management research (Benz & Newman, 2008; Leech & Onwuegbuzie, 2009). Prior literature has identified four basic techniques of mixed method design, including convergent parallel design, exploratory sequential design, explanatory sequential design, and embedded design (Stentz, Clark & Matkin, 2012). These techniques were created based on the sequence of qualitative and quantitative data collection and the purpose of each type of data collection.

A well-established research design can address questions regarding the validity of the research (Bryman & Bell, 2007). The main aim of the research is to review the existing literature regarding satiation and immersion to build a theory and develop a scale that can measure consumers' simulated responses in reality-enhancing technology settings. In order to develop the theory and further develop the scale, a literature review followed by a narrative review was first conducted. This process led to the conceptualization of simulated satiation, the identification of some

contradicting statements from the existing satiation literature, and the creation of nine testable propositions for future research in the first manuscript. Also, in the first manuscript, a proof-of-concept study was conducted, which provided the first evidence on how physiological factors can decrease the benefits for consumers in reality-enhancing technologies. Afterwards, this thesis incorporated simulated immersion into the framework and focused on the development of a simulated responses scale in the second paper. During the scale development process, this research followed existing validated scale formation methods and employed a systematic five-step procedure, including item generation and content validity, scale purification, scale validation and nomological validity testing, confirmation of the scale structure, and a predictive validity test (Churchill, 1979; Webb & Peck, 2015; Böttger et al., 2017). At the end of the process, a 12-item simulated responses scale with two distinct dimensions, simulated satiation and simulated immersion, was formed.

To achieve the research objectives, this study employed a mixed-method methodological design, more specifically, an exploratory sequential design. The exploratory sequential design is traditionally used to guide the development of a new scale so that the results from the quantitative phases can confirm and validate the exploratory qualitative phase (Munce, Guetterman & Jaglal, 2021). This design allows the quantitative findings to validate and confirm the initial qualitative results. In this design, the results of the qualitative component can be used to help develop a scale for the subsequent quantitative phase. Considering these factors, this research used exploratory sequential design because the research required both qualitative and quantitative data to develop the scale for simulated responses, and the qualitative study served as a foundation for the subsequent quantitative studies.

1.3.5 Method

The purpose of this research is to conceptualise simulated satiation and simulated immersion constructs, and to develop a scale capable of measuring consumers' simulated responses in reality-enhancing technology settings to explore the impact of simulated satiation and simulated immersion on consumers' perceptions and behaviour in reality-enhancing technologies. To this

end, this research first conceptualised simulated satiation by conducting a narrative review. Narrative reviews are usually contrasted with systematic reviews; however, narrative reviews mostly focus on providing a comprehensive summary and synthesis regarding a research topic (Hopkinson & Blois, 2014). This type of research allows researchers to illustrate the known information in the literature, discuss the current situation of the topic, and demonstrate insights regarding the developments of the field (Sukhera, 2022). Additionally, highly relevant to this research, narrative reviews help in the conceptualization of constructs (Ranjan et al., 2015).

After the conceptualization of the simulated satiation construct, this research focused on creation of nine testable propositions. Each of the propositions was formed based on the existing literature and aims to illustrate the potential ways that simulated satiation can influence consumers' behaviour, engagement, and decision-making processes, and consequently, shape marketing outcomes within reality-enhancing technology mediums. Following the conceptualisation and creation of the testable propositions, this research conducted a quantitative experiment as a proof-of-concept study. This proof of concept study examined how lower exposure duration to virtual reality content, acting as a physiological driver of simulated satiation, leads to increased perceived benefits and usefulness perceptions for virtual reality offerings. Notably, these perceptions serve as mediators, influencing the stickiness of VR experiences and contributing to consumers' subjective well-being. This study provides the first evidence that physiological factors can decrease benefits for consumers.

This research also demonstrates key theoretical contradictions and illustrates prospective research directions for future research. Following this, it highlights the importance of exploration of various concepts, such as immersion, cognitive and affective states, habituation, and adaptation within the reality-enhancing technology settings. The research illustrates a rich theoretical field that has numerous research opportunities with numerous potential outcomes waiting to be explored.

Upon conceptualisation of simulated satiation and conducting the proof-of-concept study, the research produces another concept called simulated immersion and incorporated it into the theoretical framework. Simulated immersion counters the negative effects of simulated satiation

in reality-enhancing technology experiences, and these two concepts together form consumers' simulated responses in such technologies. Following this, the subsequent studies are designed to focus on the development of the simulated responses scale. To this end, this research employed a systematic five-step procedure for scale development, including (1) item generation and content validity, (2) scale purification, (3) scale validation and nomological validity testing, (4) confirmation of the scale structure, and (5) a predictive validity test (Churchill, 1979; Webb & Peck, 2015; Böttger et al., 2017). In the first step, semi-structured interviews are employed to understand the complex nature of satiation and immersion in reality-enhancing technologies. Interviews provide a great opportunity for researchers wishing to collect narrative data, which is essential for understanding participants' thoughts about the subject (Butt, More & Avery, 2013). Purposive sampling was employed to interview individuals, and the selection criteria were whether the participants had used reality-enhancing technologies in the last three months. This sampling method was chosen because it allows researchers to select participants that can provide rich information (Suri, 2011). During the recruitment phase, a digital advertisement containing information about the research was published on social media platforms, and participants voluntarily applied to be part of the research. Data collection was stopped after fourteen interviews because the research reached the theoretical saturation point (Boddy, 2016; Saunders et al., 2018). At the end of this interview process, 115 potential measurement items were created. Extant literature emphasizes that employing expert judges to assess the representativeness of the measurement items can significantly enhance the robustness of content validity (Stratman & Roth, 2002). To this end, in the first step, this research employed a panel of 7 expert judges (marketing academics from multiple universities). This panel of experts evaluated the representativeness of each item on a scale of 1 (does not represent) to 5 (strongly represents). After the expert evaluation and following the guidelines of existing literature, items with a mean evaluation score lower than 3.0 were removed from the item pool (Böttger et al., 2017). This process reduced the total number of items from 115 to 49.

Item generation and content validity step were followed by step two, which is scale purification. Even after reducing the number of measurement items based on the expert judge evaluations, 49

measurement items are significantly high for the extant literature (Johns, 2010). Therefore, this research conducted an exploratory factor analysis and reviewed the factor loadings of each item. This process resulted in the creation of a 12-item simulated responses scale, which has two distinct dimensions: simulated satiation and simulated immersion. Afterwards, in step three, scale validation and nomological testing were performed. The process validated the findings of the previous steps and tested the convergent and divergent validities of simulated satiation and simulated immersion subscales within the nomological network of related constructs. Following this, step four confirmed the structure of simulated responses scale via structural equation modelling. Results indicate that the structure of the newly developed scale is sound and fits the hypothesized two-factor model.

Lastly, step five examined the predictive power of the 12-item simulated responses scale and its dimensions. In this step, study participants evaluated augmented-reality furniture and appliances, superimposed in their own homes via their digital devices. The results illustrate that variety and duration of an AR-aided product experience lowers perceived enjoyment for those consumers who are high in simulated satiation, yet increases positive product evaluations and robustness of decision-making for those high in simulated immersion.

1.4 Contributions and Significance of the Research

This research contributes to the fields of marketing, disruptive technologies, reality-enhancing technologies, and consumer behaviour by exploring consumers' simulated responses to marketing content in reality-enhancing technology settings. The first significant theoretical contribution of this research is the conceptualization and introduction of simulated satiation and simulated immersion as key components of consumers' simulated responses in reality-enhancing technologies. Initially, the theoretical development and conceptualization of simulated satiation, which refers to "*attenuation in perceived benefits that occurs due to repeated or prolonged exposure to vicarious and simulated intermediary sources*" is formally defined (Pala Kapitan & van Esch, 2022). Following the conceptualization and theoretical development, the present thesis identifies key theoretical contradictions about the concept of satiation and demonstrated them in

the context of reality-enhancing technologies. Afterwards, nine testable propositions that show how simulated satiation can influence consumer behaviour in such technologies were formed and presented as future research directions. Additionally, this research highlights that the existing literature lacks psychometric measures that can assess consumers' simulated satiation in reality-enhancing technologies.

To fill the gap in the literature, this research engaged in scale development and validation process. During the scale development process, this research introduces another novel concept, simulated immersion, which refers to the extent to which a person views a computer simulation as realistic, influenced by sensory inputs such as sight or hearing (Li et al., 2003; Hudson et al., 2019; Krishna, 2011). Simulated satiation lowers satisfaction, loyalty, intention to purchase a product, and enjoyment; conversely, simulated immersion enhances such attributes (Kang et al., 2020). Taken together, the concepts of simulated satiation and simulated immersion counter each other, highlighting the importance of exploring such concepts to fully understand how consumers respond to reality-enhancing technology content. After the theory development and conceptualization of relevant concepts, this research followed the steps of existing validated scale development literature and employed a systematic five-step procedure for scale development, encompassing item generation and content validity, scale purification, scale validation, nomological validity testing, confirmation of the scale structure, and a predictive validity test (Churchill, 1979; Webb & Peck, 2015; Böttger et al., 2017). This process resulted in the development of a 12-item simulated responses scale with two distinct dimensions: simulated satiation and simulated immersion. By employing the newly created scale in predictive validity tests, this thesis provides the first known evidence of the main and moderating effects of simulated responses in the marketing literature.

Aside from the theoretical contributions, the present thesis offers multiple managerial insights for marketing practitioners. For instance, with the help of the newly developed scale, marketers can optimize their content in terms of duration, amount of information, and variety before launching any marketing campaigns. Businesses who pilot test their content with the constructs of satiation and immersion in simulated responses in mind will have an opportunity to measure the

effectiveness and avoid undesired outcomes, such as inefficient or off-putting marketing content. Also, by using optimum content, businesses will enhance their communication effectiveness, enabling them to achieve desired goals, including boosted engagement, profitability, and sales.

Additionally, the simulated responses scale can help marketers understand whether their offerings perform better in augmented reality, virtual reality, or mixed reality mediums. For example, product-related offerings such as a coffee machine or a desk, may perform better in augmented reality mediums because consumers can display the product in their home settings. On the other hand, service-oriented offerings may result in better outcomes in virtual reality environments because consumers may not be willing to view the service in their own personal environment as an augmented experience. On this basis, content creators, businesses and marketers can benefit from the simulated responses scale to choose the optimal technological medium for their marketing campaigns in order to enhance their engagement, interaction, and effectiveness.

Also, the simulated responses scale can enhance the efficiency of targeted advertising, which can result in better engagement and satisfaction. By using the newly developed scale in market research, businesses will have the opportunity to test how each market segment reacts to their reality-enhancing technology content in terms of simulated satiation and simulated immersion. This vital information can help businesses focus their marketing efforts on certain segments, which can help companies adjust their marketing budget.

When marketing teams generate multiple content formats, the simulated responses scale can provide an opportunity for decision makers to quickly evaluate the effectiveness of each content. This fast evaluation process will result in more informed decision-making when selecting the best content, as well as helping businesses save significant amount of time. Therefore, employing simulated responses can optimize workflow within marketing departments, allowing marketers to focus on generating more relevant content that can enhance efficiency of the marketing campaigns.

Lastly, this thesis demonstrates that increased exposure duration interacts with high simulated satiation to reduce consumers' enjoyment levels when using reality-enhancing technologies. This

means that individuals who derive less enjoyment from reality-enhancing tools react more negatively when marketing practitioners ask them to commit more time to the experience via such tools. On the other hand, increasing the duration of reality-enhancing technologies does not significantly interact with higher levels of simulated immersion. This suggests that so far, the threshold to amplify effects of VR, AR or MR marketing tools has not yet been found. This research shows that even when individuals receive enhanced advantages from reality-enhancing technology tools, they still do not want to dedicate more time to simulated marketing content experiences. Consequently, this research suggests that exposure duration plays a critical role in the efficiency of the marketing content, and it can influence consumers' decisions and perceptions in reality-enhancing technologies.

In terms of methodological contributions, the predictive validity study in scale development process manipulated content variety and exposure duration by employing a 2x2 between-subjects design in a novel way. Respondents were randomly assigned to interact with AR products at different levels of content variety (one product vs. three products) and exposure duration (single location in-home vs. three different locations in-home) within their own personal environments via their digital devices. Afterwards, they took and uploaded screenshots of each of their interactions to the Amazon MTurk platform. Following this, all participants were asked to evaluate their AR experiences by rating their perceived enjoyment, purchase intent, perceived usefulness of the AR tool, and attitude towards AR. This innovative approach allowed the collection of authentic and generalizable data from participants' own settings, enhancing ecological validity. The use of personal devices and the requirement of screenshots ensured that the interactions were tracked as accurately as possible, while the variability in settings improved generalizability. Therefore, this study design provides a replicable framework for research investigating real-world consumer experiences with technology.

1.5 Organization of the Thesis

Following the Auckland University of Technology PhD by publication thesis format guidelines, the present thesis is structured into five chapters. The chapters are organized as follows: Chapter

1 – Introduction, Chapter 2 – Literature Review, Chapter 3 (Manuscript 1) – organized as a Narrative Review, Chapter 4 (Manuscript 2) – Development and Validation of the Simulated Responses Scale, and Chapter 5 – Conclusion. Chapters 3 and 4 illustrate two journal articles created during the doctoral program by the researcher (i.e., 1 x published, 1 x under review). Both manuscripts were developed based on the specific research questions of this thesis and include their own literature reviews, methodologies, findings, limitations, and future research directions.

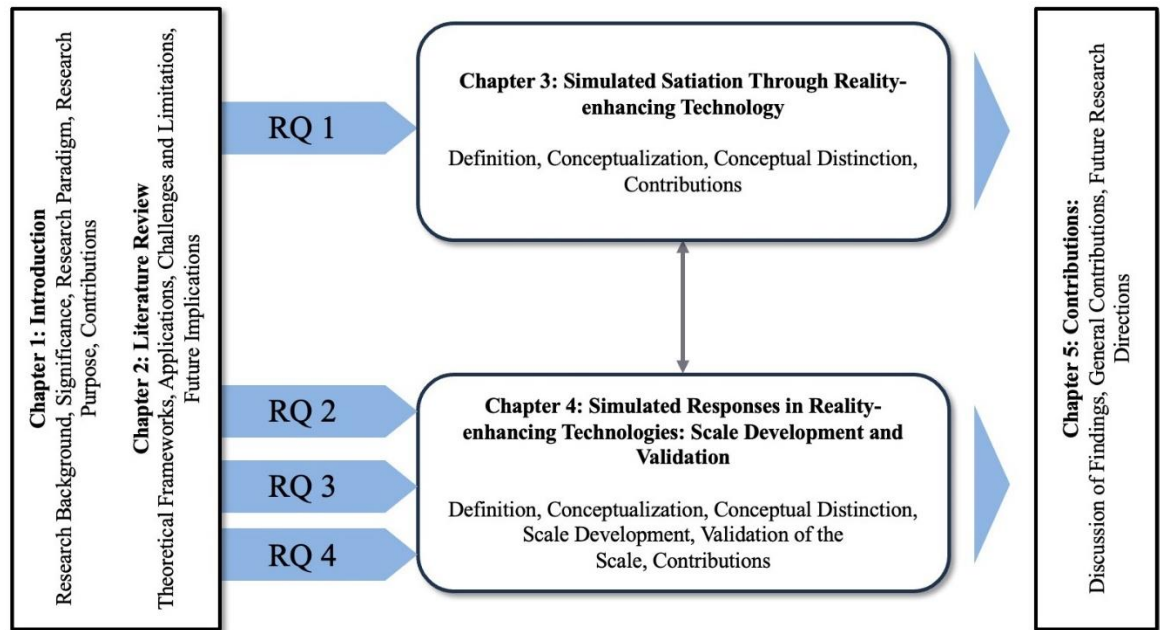


Figure 1.1 Thesis overview.

All chapters are interconnected and collectively contribute to demonstrating the overall significance and potential of the research. Chapter 1 illustrates the purpose of the research, research questions, research philosophy, contributions, and significance of the research. Chapter 2 provides a comprehensive understanding regarding reality-enhancing technologies by exploring their history, definitions, and theoretical frameworks used in existing literature, application cases in the marketing world, impacts on consumer behaviour, challenges and limitations, and implications for future marketing practice and research. Chapter 3 conceptualizes simulated satiation, creates testable propositions for future research, and hence serves as a narrative review while answering the first research question. Chapter 4 conceptualizes another theory-based construct called simulated immersion and explains that simulated satiation and simulated immersion together form consumers' simulated responses in reality-enhancing technologies.

Following this, the chapter generates an initial set of measurement items, conducts multiple studies to test the factor loadings of the items, develops a simulated responses scale, and tests its predictive validity. Lastly, Chapter 5 summarizes Chapters 3 and 4 (manuscripts) and provides theoretical contributions, managerial implications, limitations, and future research directions.

Chapter 2: Literature Review

2.1 Introduction

This chapter reviews prior literature relevant to reality-enhancing technologies from marketing and business perspectives for Chapters 3, 4, and 5. To understand reality-enhancing technologies, first, the concepts and definitions are discussed. Afterwards, the theoretical frameworks used in reality-enhancing technologies are provided to highlight the potential and capabilities of such technologies. Theoretical knowledge provides invaluable insights; however, real-world applications provide more robust evidence and enhance marketers' understanding of such technologies. To this end, this chapter introduces applications and use cases of reality-enhancing technologies in the context of marketing. Additionally, the impacts of these technologies on consumer behaviour and the challenges and limitations of such technologies are provided. Following this, the chapter presents implications of reality-enhancing technologies for marketing practice and research. The chapter ends with a brief summary of the literature review and highlights research gaps.

2.2 Chapter overview

Due to the advancements in technologies, the boundaries between physical and digital worlds have become increasingly blurred. Reality-enhancing technologies, such as augmented reality, virtual reality, and mixed reality, have significantly altered user interactions with brands and other individuals by providing engaging and immersive experiences that look like they came out of science fiction movies (van Berlo et al., 2021; Hudson et al., 2019). The history of reality-enhancing technologies started in the second half of the 20th century; however, their accessibility and market acceptance have recently increased. Enhanced technological capabilities, lowered costs, and reduced weight have significantly accelerated such technologies' market penetration (de Regt, Plangger & Barnes, 2021; Eswaran & Bahubalendruni, 2022; Harz, Hohenberg & Homburg, 2022). These technologies were labelled as one of the most promising disruptive innovations of the 21st century and have already revolutionized many industries including education, training, gaming, retail, and tourism by providing new ways to engage with consumers

(Hilken et al., 2022; Parekh et al., 2020). Notably, reality-enhancing technologies play a critical role in marketing, especially in retailing and tourism (Heller et al., 2019). Prior research indicated that such technologies significantly enhance purchase intentions, engagement, enjoyment, brand advocacy, and loyalty (An, Choi & Lee, 2021; Arghashi & Yuksel, 2022; Kumar et al., 2024; Talukdar & Yu, 2021). Therefore, many major retail and tourism companies, such as Volvo, Sephora, IKEA, Qantas, and British Airways, have already adopted these novel technologies and implemented them in their marketing campaigns (Gupta & Sandhane, 2022; Kim et al., 2023; Tan, Chandukala & Reddy, 2022).

Existing literature has conducted many studies to understand how consumers behave in reality-enhancing technology mediums and how these technologies influence consumer behaviour. To this end, marketing scholars employed numerous theoretical frameworks and models to unveil beneficial insights for the marketing world (Ambika, Shin & Jain, 2023; Jingen Liang & Elliot, 2021; Xi & Hamari, 2021). This research illustrates some of the most widely used and prominent theories regarding reality-enhancing technologies in the context of marketing, such as information processing theory, Stimulus-Organism-Response framework, push and pull factors theory, and provides examples from the existing literature. On the other hand, the current thesis highlights that as the technology advances, the marketing literature needs new perspectives and revisions. To pave the way for future research, the present thesis identified four broad categories that marketers must focus on. First, technological capabilities and efficiency of reality-enhancing technologies are being enhanced; therefore, prior research needs to be constantly updated. Second, concepts that can influence the success, adoption, and acceptance of reality-enhancing technologies, such as satiation, should be carefully examined. Third, marketing literature needs new scales solely designed to capture the impact of those concepts in reality-enhancing technologies. Lastly, scholars should conduct studies to understand how ethics-oriented concerns influence consumers' behaviour.

Reality-enhancing technologies significantly enhance consumer behaviour, attitudes, and decision-making processes (Xi & Hamari, 2021; Zeng et al., 2020). These technologies provide highly immersive, engaging, and interactive experiences to their users, which results in enhanced

presence and perceived realism (Leveau & Camus, 2023; Daassi & Debbabi, 2021). Such experiences can lead consumers to form positive associations with brands and increase loyalty. For example, with the help of virtual reality technology, consumers can be virtually taken to a store where they can experience the products, or they can use augmented reality applications and see the products in their own space. These technologies reduce the perceived risk for consumers and increase purchase or visit intentions (An, Choi & Lee, 2021; Arghashi & Yuksel, 2022; Haile & Kang, 2020; Qin, Peak & Prybutok, 2021). Also, the newness aspect of reality-enhancing technologies makes the experience more fun and interactive (Talukdar & Yu, 2021). This chapter gives an overview of the capabilities of reality-enhancing technologies and how they affect consumer behaviour by referring to existing literature.

Besides their huge potential and popularity, reality-enhancing technologies have several limitations and challenges. Some of the most prominent limitations and challenges can be listed as technical difficulties, problems with latency rendering, high development costs, accessibility difficulties, content quality-related issues, and satiation (Lee et al., 2020; Stauffert, Niebling & Latoschik, 2020; Weir et al., 2023). In spite of all these issues and challenges, the popularity and application areas of such technologies are rapidly growing. Moreover, with technological advancements, the quality of reality-enhancing technologies is increasingly improving (Harz, Hohenberg & Homburg, 2022). On this basis, this research suggests that marketing scholars and practitioners should not treat reality-enhancing technologies as a new gimmick but rather consider these technologies an important and increasingly prominent part of the marketing environment.

Reality-enhancing technologies influence how marketers interact with consumers. The immersive, engaging, and interactive nature of such technologies transforms the marketing industry and results in novel and innovative consumer engagement. This chapter provides a comprehensive understanding regarding these technologies by exploring the history of reality-enhancing technologies, definitions, and theoretical frameworks used in existing literature, application cases in the marketing world, impacts on consumer behaviour, challenges and limitations, and implications for future marketing practice and research.

2.3 Brief History and Overview of Reality-Enhancing Technologies

While the early definitions of reality-enhancing technologies were formalised in the 1990s, the history of the very first virtual reality/augmented reality devices dates back to the 1950s (Mandal, 2013). One of the very first prototypes of such technologies was developed by Morton Heiling in 1957 and called the Sensorama Simulator. The device was similar in size to an arcade cabinet and allowed individuals to experience 3D images, vibrations, wind, stereo audio, and scents (Akinola, Agbonifo & Sarumi, 2020). Even though the device was one of the earliest prototypes of reality-enhancing technologies, it was far distant from what we call virtual reality or augmented reality today.

After a decade of the creation of the Sensorama Simulator, the very first virtual reality/augmented reality headset was created by Ivan Sutherland in 1968 and named the Sword of Damocles due to its scary look that had a sword-like contraption that connects the headset to a computer (Grabarczyk, 2020). It was the first device that had a headset equipped with augmented reality lenses, which allowed users to see images superimposed onto real-world settings (Paro, Hersh & Bulsara, 2022). Even though these technologies were created more than half a century ago, their accessibility and market acceptance increased relatively late due to several factors, such as high costs, low technological capabilities, and high weight (Angelov et al., 2020; Shen et al., 2022). In the past decade, such technologies experienced significant changes due to the advancement in technology, high internet speed, and lower material costs; moreover, these changes rapidly enhanced the accessibility of reality-enhancing technologies. The advancements in reality-enhancing technologies made significant changes in the business world by transforming various industries, creating new markets, empowering their users, and most importantly, disrupting traditional practices (Hilken et al., 2022; Parekh et al., 2020).

Disruptive technologies are the innovations that drastically change the ways industries operate, challenge existing business models, or create new market dynamics by offering simpler, cheaper, more convenient, or more effective products or services (de Regt, Barnes & Plangger, 2020). Companies that employ such innovations prior to other businesses generally become dominant leaders of their market and those companies that refuse to employ disruptive innovations usually

fail (Si & Chen, 2020). As disruptive innovations, reality-enhancing technologies should not be perceived as a new gimmick because these technologies provide immersive experiences that transport their users to digital worlds by blending virtual and real experiences. They are not ordinary novelties because they reshape many industries from gaming to tourism, healthcare and retail (Parekh et al., 2020). These technologies do not just allow individuals to play games or try-on virtual clothes; they significantly change how people work, learn, and interact with each other (Rospigliosi, 2022).

2.4 Definitions of Reality-Enhancing Technologies

Even though virtual reality and augmented reality technologies share many similarities, such as immersive nature, spatial interaction, and visual and audio enhancements, both technologies have their own distinct features. Virtual reality transforms user experiences and creates highly immersive experiences. More specifically, this technology represents a computer-generated artificial environment where users can immerse themselves in a three-dimensional simulation and interact with a virtual world (Malik, Masood & Bilberg, 2020). VR typically requires hardware (e.g., head-mounted display and hand controllers) to create a sense of immersion and presence in simulated environments. The rise of consumer-ready virtual reality headsets in the market, such as HTC Vive, Meta Quest 3, PICO 4, and the developments in motion-tracking systems allows companies to provide engaging, immersive, and interactive experiences to users. With these technologies, users can engage with virtual objects and environments with higher levels of realism and enjoyment (Lee et al., 2020; Moreira et al., 2022). Reality-enhancing technologies provide sensory experiences, such as visual, audio, and haptic, to create an illusion in the minds of consumers about being present in the simulated settings (Mattila et al., 2020).

In the marketing context, virtual reality provides clear opportunities for firms. It aids companies in creating experiences that attract consumer attention and thereby creates durable impressions (Han, Bergs & Moorhouse, 2022). Companies can use virtual reality to teleport a person to a virtual location where they will experience new products, destinations, and socialize with other users (Barreda-Ángeles & Hartmann, 2022; Cruz et al., 2019; Fan, Jiang & Deng, 2022; Ying et

al., 2022). Such experiences may create attachment to the companies, leading to enhanced brand awareness, brand loyalty, and more sales (Baek et al., 2020). Another advantage associated with virtual reality is its capability to evoke emotional responses that are held for a longer period in memory (Yung et al., 2021). To create excitement and wonder, this advantage can be utilized by businesses through developing virtual reality content that narrates compelling stories related to their history or products. The content might be about a unique location, an interactive product showcase, or even a brand-new exciting game—regardless of the type of experience, virtual reality can make a difference in generating emotions that affect consumer perceptions and decisions (De Canio et al., 2021; de Regt, Plangger & Barnes, 2021).

Compared to virtual reality, augmented reality also generates experiences that can be rather immersive in nature for consumers; however, this immersion is relatively limited because users don't wear a head-mounted display that blocks their surroundings (Qian et al., 2020; Verhulst et al., 2021). Augmented reality refers to using digital content that supplements the real-world environment with digital elements, combining virtual and real worlds smoothly. In other words, augmented reality overlays digital content onto the real world in order to change users' perceptions and interactions with their surroundings. The main goal of this technology is to enable individuals to experience virtual objects as if they are real in the physical world (Chen et al., 2024). The enhanced immersive augmented reality experiences blur the lines between physical and simulated worlds.

Advancements in mobile technologies and applications have made augmented reality a very popular tool, and many businesses, such as IKEA, Pepsi, and L'Oréal, have already employed this technology in their marketing campaigns (Abbas, 2024). One of the main advantages of augmented reality technology is that it doesn't restrict users to certain limited locations. Individuals can experience augmented reality-oriented content via their smartphones, tablet computers, or smart glasses and view the desired content in different locations (Saleem et al., 2022). Existing literature has identified that using augmented reality applications enhances behavioural intentions, engagement, enjoyment, purchase intention, and loyalty (Erdmann, Mas & Arilla, 2023; Eru, Topuz & Cop, 2022). For this reason, many companies have employed this

technology in their promotional activities. One of the primary usage areas of augmented reality is product visualization (Cruz et al., 2019; Palacios-Ibáñez et al., 2023). Firms utilize this technology to allow individuals to visualise products in their real-life settings before making the final purchase decisions. Many furniture retailers have benefited from augmented reality technology to reduce consumers' perceived risk and make the purchase process more entertaining and interactive (Ramdani et al., 2022). Another critical usage area of augmented reality technology is in tourism marketing. For instance, a tourism destination can employ this technology to create virtual brochures, present maps, provide beneficial information, and create better, interactive, and engaging experiences for tourists (Fan, Jiang & Deng, 2022).

Synthesising virtual reality and augmented reality technologies has resulted in the creation of a new innovation called mixed reality. Unlike virtual reality, which completely immerses users in a computer-generated simulated world, and augmented reality, which superimposes digital content onto real-world experiences, mixed reality allows users to see and interact with their real-world surroundings as well as digital objects that are superimposed on top of the physical world (Papadopoulos et al., 2021; Rokhsaritalemi, Sadeghi-Niaraki & Choi, 2020). One of the main differences in mixed reality technology is that the digital content created in simulated settings can interact with the physical world. For instance, in Pokémon Go, which is based on augmented reality technology, Pokémons can appear on the street, and gamers can view them in real-world settings. However, Pokémons don't interact with the physical surroundings of the user. On the other hand, in mixed reality applications, digital objects can cast realistic shadows, reflect from shiny surfaces, and dynamically respond to changes in the real-world settings (Park et al., 2020).

Many companies, including Microsoft, Meta, and Magic Leap, have already developed mixed reality devices to provide unique experiences in various industries, such as education, training, gaming, retail, and tourism (Parekh et al., 2020). For instance, considering the gaming aspect, mixed reality technology delivers highly immersive experiences that combine digital and physical features, which create very realistic and exciting moments (Gonçalves et al., 2022). With mixed reality technology, individuals can enjoy even a simple board game by using digital effects superimposed on the physical components of the game or treasure hunts in real-life locations such

as parks or cities. This aspect of mixed reality allows users to socially interact with each other and maximise enjoyment. Regarding tourism applications, by using mixed reality technology, users can view digital information and interactive elements when visiting museums, art galleries, or heritage sites. In the context of retailing, mixed reality applications can allow users to visualise products in a more realistic nature compared to augmented reality applications before the actual purchase or can be used for in-store navigation for major stores or warehouses (Dou & Tanaka, 2020).

As novel disruptive technologies, reality-enhancing technologies have received a tremendous amount of attention from scholars in a variety of disciplines, especially from marketing (Wedel, Bigné & Zhang, 2020). Existing marketing literature employed various theories to develop conceptual frameworks in order to fully understand the impact of such technologies on consumer behaviour. By employing theories, such as information processing theory, Stimulus-Organism-Response framework, push and pull factors theory, technology acceptance model, and uses and gratifications theory, researchers sought to understand the factors, motives, and reasons that influence consumer adoption, engagement, and satisfaction regarding reality-enhancing technology experiences (Ambika, Shin & Jain, 2023; Jingen Liang & Elliot, 2021; Xi & Hamari, 2021). The aforementioned theoretical frameworks and many others provide well-established structures to analyse distinct variables, such as ease of interaction, perceived usefulness, social influence, and gratification-seeking behaviours.

2.5 Theoretical Frameworks in Reality-Enhancing Technologies

Reality-enhancing technologies change the way consumers process information and interact with both digital and physical objects (Kim & Choo, 2021; Renu, 2021). Marketing literature must examine theoretical frameworks that are significantly related to reality-enhancing technologies to get a better understanding of the fundamental mechanisms that influence motives, adoption, and effectiveness of such technologies. In the context of reality-enhancing technology research, marketing scholars utilized a multitude of theories, frameworks, and models to unveil the effects of such technologies on consumer behaviour (Ambika, Shin & Jain, 2023; Jingen Liang & Elliot,

2021; Wut & Ng, 2024). This section next explains some of the most prominent and well-established theories that are used in reality-enhancing technology research, including information processing theory, Stimulus-Organism-Response framework, push and pull factors theory, technology acceptance model, and uses and gratifications theory. Also, example studies from existing literature are provided for each theoretical framework in order to highlight the usage of these theories in reality-enhancing technology research in the context of marketing and business (see Table 2.1).

Table 2.1 Example reality-enhancing technology studies from existing literature.

Theories	Example reality-enhancing technology studies from existing literature
Information processing theory	
• Heuristic and systematic processing	Breves (2021); Xu, Jia, and Tayyab (2024); Jung (2018)
• Nudge theory	Blom et al. (2021); Laukkanen et al. (2022); Hoenink et al. (2020)
• Elaboration likelihood model	Leung, Lyu, and Bai (2020); Chen et al. (2022a); Park and Yoo (2020)
Stimulus-Organism-Response framework	Kim, Lee, and Jung (2020); Kim et al. (2021); Jin et al. (2021); Arghashi (2022)
Push and pull factors theory	Zhang et al. (2022); Kılıçarslan et al. (2024); Mavragani and Dionysios (2022)
Technology acceptance model	Alves and Reis (2020); Jingen Liang and Elliot (2021); Hammady, Ma, and Strathearn (2020)
Uses and gratifications theory	Rather et al. (2024); Ball, Huang, and Francis (2021); Sánchez, Orús, and Flavián (2024)

2.5.1 Information Processing Theory

In the context of marketing, how individuals perceive, process, store, and retain marketing information is encapsulated in information processing theory. This theory is particularly relevant to reality-enhancing technology research since such technologies can create rich sensory experiences (e.g. visual, auditory, and haptic elements) that are more engaging to users than traditional media. (Leung, Lyu & Bai, 2020). By allowing user–digital world interaction and engaging content, these technologies can reduce cognitive load, leading individuals’ short-term memory to operate more efficiently in terms of information processing and retention (Barta, Gurrea & Flavián, 2023; Afify, 2020). Immersive reality-enhancing technology experiences can

create strong and memorable impressions which enhance long-term memory retention, making marketing communications more efficient. Consequently, information processing theory has emerged as one of the key theories to explore the potential of reality-enhancing technologies in terms of understanding consumer engagement, brand recall, and overall marketing effectiveness.

Heuristic and systematic information processing model

Extant literature has developed multiple models and frameworks based on information processing theory, such as heuristic and systematic information processing, nudge theory, and the elaboration likelihood model. These theoretical frameworks have been applied in the context of reality-enhancing technologies and marketing. For instance, the heuristic and systematic information processing model suggests that consumers think about information in two distinct ways: heuristic processing and systematic processing. The former is commonly associated with System 1 thinking while the latter is linked to System 2 thinking (Chen & Chaiken, 1999; Morewedge & Kahneman, 2010). Heuristic information processing occurs quickly and does not require too much knowledge or effort to evaluate information (Chaiken & Ledgerwood, 2012). Product packaging, colours, and emotional appeal of the message are some of the factors that typically elicit heuristic processing when a consumer is making a decision (Tan et al., 2021). On the other hand, systematic processing refers to deep and thoughtful reasoning. Individuals undergo systematic information processing when they have a motive to be cautious about their decisions, evaluate the available information and the existing alternatives, and hence measure both the pros and cons of the products (Zheng et al., 2024). Generally, consumers undertake systematic information processing when purchase decisions are highly risky for them, such as high involvement products like cars and houses. Extant research has used heuristics and systematic processing in a number of contexts in an effort to explain how consumers process information in reality-enhancing technology experiences. For example, a series of studies were conducted by Breves (2021) to test the persuasive effects of spatial presence when engaging with virtual reality experiences, and the underlying processes regarding how this presence affects cognitive processing. The findings demonstrate that those who experience a higher level of spatial presence are more favourable in their evaluation of the content because they use heuristic processing. This positive perception

afterward influences deep thinking, which is systematic processing, and makes the content more persuasive.

In another recent study, Xu, Jia, and Tayyab (2024) examined the dual routes impacting sales and adoption in augmented reality retailing and found a positive, significant relationship between heuristic cues and trust in retailing within augmented reality settings. Jung (2018) used heuristic and systematic information processing to test the effectiveness of delivering a health-related message using augmented reality with projection mapping technology. The results revealed that individuals experienced higher levels of spatial presence, which led to heuristic information processing when the message was projected onto their bodies. Therefore, using augmented reality technology with projection mapping can create beneficial outcomes if employed in health-related marketing campaigns.

Reality-enhancing technologies changed the way consumers process information, and as can be seen, some theoretical frameworks derived from information processing theory have already been used by marketing scholars to explain how consumers process information and how it affects their decisions and perceptions. The heuristic and systematic processing model hence becomes a useful tool for marketing scholars who desire to conduct research in reality-enhancing technology research.

Nudge theory

Another important theoretical framework concerning the manner of consumers' decision-making and information processing is the nudge theory (Mele et al., 2021; de Ridder, Kroese & Gestel, 2022). Conceptualised by Richard Thaler and Cass Sunstein (2008), this theory defines nudges as subtle interventions that do not restrain or restrict consumers' freedom of choice, and examines the significance of nudges in the decision-making process. In marketing, nudge theory seeks to subtly influence consumer behaviour by using several methods to shape choice architectures such as making desirable options more attractive or accessible, providing beneficial information effectively, and designating defaults.

Nudges have major potential in reality-enhancing technology-oriented research as these technologies provide immersive experiences through which users can be guided slightly. For instance, in virtual reality shopping experiences, consumer decisions can be influenced by highlighting certain products or offering more information on certain items. In augmented reality settings where digital objects, avatars, and information are directly overlaid on real-world experiences, consumers again can be subtly directed towards desired products or services by providing positive product reviews or promotions. In other words, while the interactive nature of reality-enhancing technologies can make advertisements more engaging, spatial nudges can influence consumers' shopping behaviour.

Existing marketing literature has employed nudge theory to examine several key concepts in the context of reality-enhancing technologies. For instance, Blom et al. (2021) examine how nudging influences healthy food choice in virtual reality settings. They performed a test with consumers by putting them under different levels of time pressure, and their results revealed that a salience nudge can enhance healthy food choices in a virtual reality supermarket environment regardless of the time pressure. In other research, Laukkanen et al. (2022) examined the possible uses of reality-enhancing technologies to support sustainable consumption, and emphasized that employing such technologies creates an opportunity to nudge consumers towards more sustainable consumption. This work shows that rich and vivid information provided by reality-enhancing technologies can provide a deeper understanding regarding green consumption, which nudges consumers to make greener choices. For example, virtual reality technology can promote sustainable consumption by reducing the need to travel from one place to another, which reduces carbon footprint. Hoenink et al. (2020) also explored the effects of nudges and different pricing strategies on consumers' food purchasing behaviours in online supermarkets. They employed salient pricing strategies—including increasing prices or offering discounts on certain products—and nudges such as promoting high-fiber or low-fat dairy products, to lead consumers to make healthier food choices in virtual supermarkets. Results show that pricing strategies and nudges together outperform using each of them alone. As can be seen, applying nudge theory to

immersive reality-enhancing technology experiences can help marketers design their content in a way that will more subtly lead consumer decisions toward predetermined objectives.

Elaboration likelihood model

The elaboration likelihood model, an important component of information processing theory, has also been applied in studying reality-enhancing technologies. The model has two routes of persuasion: the central route and the peripheral route (Kitchen et al., 2014). High degrees of consumer involvement, cognition, and deep processing are required to elaborate via the central route. Following this route results in stronger attitude changes since when consumers have great motivation, carefully consider the message, and experience high involvement, they are more prone to be persuaded by strong arguments. It is important to note that this kind of persuasion lasts longer (O'Keefe, 2013). On the other hand, the peripheral route to less elaboration occurs when there is low involvement and low cognition level. It causes short-term and temporary changes in attitude. Such consumers get impressed by superficial elements like attractive visuals and catchy slogans rather than information (Kerr et al., 2015).

Prior literature has employed elaboration likelihood to unveil how reality-enhancing technologies influence information processing and consumer behaviour. For example, as they studied the impact of virtual reality advertising in the hotel industry, Leung, Lyu, and Bai (2020) found that such advertisements generated better immediate and peripheral effects in comparison to traditional advertisements. Also in recent research, Chen et al. (2022a) examine consumer impulse buying behaviour in augmented reality mobile shopping apps. Results show that while making an impulse purchase in a virtual shopping medium, the main paths through which consumers process information include arousal, which is the peripheral route, and perceived diagnosticity, which forms the central route. Moreover, augmented reality application developers who create experiences with higher positive emotions can push people towards greater impulse buying, which may not be desirable for consumer spending.

Park and Yoo (2020) examine the impact of perceived interactivity of augmented reality on consumer responses. They show that augmented reality interactivity significantly influences

mental imagery, providing empirical evidence regarding the elaboration likelihood model by highlighting the importance of involvement. As indicated in this section, the elaboration likelihood model provides insights via examining the routes of persuasion. For this reason, prior literature has used this beneficial model in various fields, including marketing and reality-enhancing technology-related research. The model has contributed to the literature by enhancing the understanding of how consumers process information in reality-enhancing technologies.

2.5.2 Stimulus-Organism-Response Framework

The Stimulus-Organism-Response framework is a psychological model that shows how individuals respond to various stimuli, making it highly applicable and well used in marketing and reality-enhancing technology research (Kim, Lee & Jung, 2020; Lee, Xu & Porterfield, 2022). In marketing and reality-enhancing technologies, a stimulus refers to any external factor that may sway people's behaviour, including advertisements, interactive experiences, and product displays. For instance, an augmented reality application may allow consumers to digitally overlay the products within their home settings, allowing them to visualise the products. On the other hand, virtual reality can completely immerse and engage retail experiences. Such stimuli can attract more attention and engage with consumers in ways that traditional marketing tools cannot do (Leung, Lyu & Bai, 2020).

In this framework, the 'organism' is the internal process of consumers, which is initiated as a response to the stimuli (Hameed, Hussain & Khan, 2022). The internal responses can be related to the cognition, emotions, and psychological responses of the consumers. Reality-enhancing technologies affect various attributes, including engagement, presence, and interactivity, which can contribute effectively to the responses of consumers towards marketing content and messages (Fan, Jiang & Deng, 2022). For example, the sense of presence may provoke strong affective responses which can influence consumers' perceived value about the experience. Understanding the 'organism' is crucial for marketing because individual effects have a tremendous influence on consumer behaviour and their perceptions towards a product. The sense of presence can generate

strong emotional responses, for example, which can result in consumers' perceived value regarding the experience.

The last element, the 'response' component in the framework, is the result of interaction between the external, marketing stimulus and the individual organism. Examples of responses in a marketing context include purchase intent, brand loyalty, and attitude toward product and service. Such variables can be greatly enhanced by reality-enhancing technologies, which can offer highly immersive, memorable, and engaging experiences for the consumers (Erdmann, Mas & Arilla, 2023; Eru, Topuz & Cop, 2022; Han, Bergs & Moorhouse, 2022). For example, augmented reality mirrors allowing consumers to try clothes virtually increase purchase intentions by decreasing the perceived risk and achieving more confident and robust decisions on the part of consumers (Berman & Pollack, 2021; Lavoye et al., 2023; Xue, Parker & Hart, 2023).

The Stimulus-Organism-Response framework emerges as an important tool for scholars researching reality-enhancing technologies' effects on consumer behaviour. For example, Kim, Lee, and Jung (2020) investigate why potential tourists are motivated to visit the places they have seen in their virtual experiences. Via the Stimulus-Organism-Response model, Kim et al. (2020) found that the perceived authenticity of the virtual reality experience had a very strong influence on cognitive and affective responses. This means that virtual tourism experiences are driven by perceived authenticity. They also reported that cognitive responses explained more variance in the intention to visit a destination than affective responses. In another recent study, Kim et al. (2021) applied the Stimulus-Organism-Response model to understand how virtual reality tourism experiences influence the attitude and visit intentions of millennials before and after the Covid-19 pandemic. Their findings suggest that virtual reality can play a very significant role in supporting tourism destinations to counterbalance the after-effects of the global pandemic and in promoting tourism resilience.

Existing literature has also used this model in retailing context and reality-enhancing technologies to study consumer response behaviour (Bigné et al., 2018). Jin et al. (2021) compare the attractiveness of the virtual reality store and the regular website store. The authors found that virtual reality stores created strong, positive emotions that led to perceived store attractiveness.,

Arghashi (2022) also utilized this model to explore how a chain of effects of augmented reality, such as novelty, wow-effect, inspiration, information overload, and distraction, influence purchase intention. The study found that novelty and inspiration in the augmented reality experience have a positive influence on purchase intention, whereas wow-effect, information overload, and distraction affect it negatively.

The Stimulus-Organism-Response framework is thus a widely applied theory that offers insights to marketing scholars through the assessment of stimuli driving consumer responses. It has helped researchers gain insight into how reality-enhancing technologies influence consumer behaviour, particularly in factors such as engagement, satisfaction, and purchase/visit intention (Kalaizarasan et al., 2024; Sann, Luecha & Rueangchaithanakun, 2023).

2.5.3 Push and Pull Factors Theory

Since their emergence, reality-enhancing technologies have left their mark on tourism. Much recent research has attempted to explore how such technologies alter the perceptions, attitudes, and behaviours of potential tourists. Reality-enhancing technologies increase enjoyment, satisfaction, and visit intentions (An, Choi & Lee, 2021). While examining tourists' behaviours and intentions, literature in tourism has particularly employed push and pull factors theory to explain individual visiting motivations (Dann, 1977). This framework identifies two overarching dimensions that influence tourists' travel habits via (1) push factors and (2) pull factors. The fundamental mechanism of this theory indicates that people choose to travel because they are pushed by their internal motivations and pulled by the features of the destination (Arowosafe et al., 2022; Cha et al., 1995).

Push factors are associated with the internal motivations that lead individuals to travel. These motivations can be a desire for adventure, escape from daily life, stress relief, or seeking novelty. Individuals might feel pushed to travel because they might be experiencing a stressful time at work or want to take a break from mundane daily life. On the other hand, pull factors are external attractions that lure individuals to visit a specific destination. These attractions can be the beauty of nature, cultural landmarks, historical significance, and unique experiences. Marketers seek to

benefit from these factors to lure potential travellers. For instance, the pristine beaches of the Maldives, the historical sites of Istanbul, or the exciting and adventurous safaris of Kenya can serve as prominent pull factors.

The push and pull factors have been particularly applied in the context of reality-enhancing technologies and tourism marketing to explain travel motives and behaviours of tourists. For example, during crises like a global pandemic, consumer attitudes towards reality-enhancing technologies may experience a significant positive shift. Zhang et al. (2022) use push and pull factors to explore both internal motivations and external factors that could influence these perceptions. Push factors, such as previous travel regrets and knowledge acquisition, can drive individuals to engage in virtual tourism experiences to meet their needs and desires. In the same way, pull factors, including time-space limits, economic costs, and risk pressure, make the virtual tourism experience a worthy alternative to actual experiences. In another work, Kılıçarslan et al. (2024) rely on push and pull factors analyses to examine the impact of the Metaverse on tourism behaviour. The results showed that the Metaverse can significantly influence tourism behaviour by influencing specific push motivations, such as curiosity, showing-off, excitement, and socialization, of potential tourists. Prior literature found that Gen Z tourists are motivated by push and pull factors in the context of gamified augmented reality experiences; however, discomfort caused by the headset and personal data-related issues can cause significant problems and reduce the impact of such motivations (Mavragani & Dionysios, 2022).

Consequently, many push factors— such as desire for adventure, prestige and status, relaxation, escape from daily life, stress relief, seeking novelty and social interactions— can push individuals to virtually visit a destination in reality-enhancing technology settings. Likewise, pull factors such as beauty of nature, affordability, cultural landmarks, historical significance and unique experiences can pull individuals to have tourism oriented reality-enhancing technology experiences. This theoretical framework helps researchers understand underlying tourism motivations, perceptions, and reasons for visiting tourism destinations.

2.5.4 Technology Acceptance Model

Technology acceptance is a conceptual framework that helps marketing scholars and practitioners better understand the acceptance and use of any technological innovation. In the context of reality-enhancing technologies, this framework offers insights into how technologies can become effectively integrated into marketing decisions, strategies, and consumer experiences. The technology acceptance model, developed by Fred Davis (1989), explains consumers' acceptance of technology through two major factors: perceived usefulness and perceived ease of use. While perceived usefulness is the extent to which an individual believes that using a particular technology will improve his or her job/task performance, perceived ease of use refers to how much an individual believes that utilizing a given technology will be free of effort (Mathew & Soliman, 2021). These two variables play a major role in the adoption of reality-enhancing technologies among people.

In the scholarship on marketing of reality-enhancing technologies, this model helps marketing scholars understand how one could effectively promote and integrate marketing-oriented content. By investigating perceptions of technology, marketing scholars and practitioners explore which factors affect perceived usefulness and how it influences consumers' decisions and attitudes. Han et al. (2020) apply technology acceptance to virtual reality shopping to show that perceived usefulness is strongly associated with consumers' behavioural intentions. The other component of this model, perceived ease of use, includes employing user-friendly interfaces, providing clear instructions for consumers when using reality-enhancing technologies, and eliminating or minimizing technical barriers. Reality-enhancing technology experiences that are perceived as easy to use thus significantly enhance consumers' willingness to pay more for the technology, adoption rates, perceived utilitarian value, and hedonic value; therefore, they provide a competitive advantage to businesses (Yang & Han, 2021; Yang et al., 2022).

Technology acceptance has also been applied to the study of consumer adoption of reality-enhancing technologies. For instance, Alves and Reis (2020) examined consumers' intention to use augmented reality applications in e-commerce. They find the technology was useful to consumers and that ease of use significantly increases attraction to buying products. A systematic literature review on augmented reality tourism research (Liang & Elliot, 2021) indicated that both

perceived usefulness and perceived ease of use are major influences that affect the intent to use augmented reality tools, attitude towards this technology, and adoption rates. Additionally, Hammady, Ma, and Strathearn (2020) explore mixed reality applications in museum visits to show that perceived ease of use plays a significant and positive role in consumer acceptance of mixed reality applications. The authors indicated a strong correlation between perceived ease of use and willingness to use mixed reality applications in the future. These studies together point out the relevance of the technology acceptance model in explaining actual consumer behaviour with regard to reality-enhancing technologies and emphasize the significance of perceived usefulness and perceived ease of use in driving the intention to adopt reality-enhancing technologies within different marketing contexts.

2.5.5 Uses and Gratifications Theory

Uses and gratification theory represents one of the most well-established theoretical frameworks within media and communications research. Specifically, this theory investigates reasons people search for, find, and consume media content (Ibáñez-Sánchez, Orus & Flavian, 2022). Uses and gratifications in reality-enhancing technologies uncover how and why consumers would prefer to engage with such technologies. Reality-enhancing technologies offer immersive and interactive experiences that no ordinary traditional media can provide (Bongomin et al., 2020; Hudson et al., 2019). Such technologies can create rich, engaging experiences that meet divergent customer needs and wants, such as offering information about products through product visualization, socializing with others, and interactive storytelling (Barreda-Ángeles & Hartmann, 2022; Cruz et al., 2019; Fan, Jiang & Deng, 2022; Ying et al., 2022). Uses and gratification theory suggests that consumers view media content for the gratification of certain needs and wants, including entertainment, social interaction, personal identity, and information (Geng et al., 2024). In using an augmented reality application, for example, a consumer can visualise how furniture would look in his/her home settings, satisfying an informational need by providing product information and details in an engaging and interactive way. Yet interactive and social capabilities of reality-enhancing technologies can satisfy consumers' social needs (Wedel, Bigné & Zhang, 2020). By using virtual reality and augmented reality applications, individuals can participate in multi-user

experiences with their friends, family, or completely strangers. This aspect of such technologies satisfies their social connection need which results in significant gratifications that consumers seek from media.

Scholarship has relied on uses and gratifications theory to unveil how and why consumers engage with reality-enhancing technologies. Tourists engage with virtual reality technology for specific gratifications such as brand involvement and identification which leads to brand loyalty and co-creation (Rather et al., 2024). Ball, Huang, and Francis (2021) explored virtual reality adoption during the Covid-19 pandemic, specifically how the pandemic influenced virtual reality adoption in work, education, and tourism. The research demonstrated that consumers seek gratifications such as social interactivity and utility in virtual reality, which mediates the relationship between the impacts of Covid-19 and future virtual reality adoption intentions. Sánchez, Orús, and Flavián (2024) explore the usage of augmented reality filters on social media based on the uses and gratifications perspective. Their findings illustrate that individuals receive entertainment, interactivity, curiosity, and compatibility gratifications when using augmented reality filters. The research also indicates that the success of augmented reality filters depends on their ability to entertain, facilitate social interaction, and importantly provide novel and engaging experiences that encourage electronic word of mouth.

Altogether, this section of the chapter has provided theoretical knowledge regarding reality-enhancing technologies in the context of marketing and business. Obtaining theoretical knowledge provides useful insights into factors that reveal why these technologies have potential, limitations, and how they can influence consumer behaviour. However, the actual effect of reality-enhancing technologies can only be assessed in practical applications. Following this, the chapter's next section aims to demonstrate that these technologies have numerous real-world applications and are already adopted by many major companies. To this end, this chapter provides some use cases for each of the reality-enhancing technologies: augmented reality, virtual reality, and mixed reality—to illustrate how these technologies are being utilized in the business world. The goal is to establish the ground for what is possible and what is being enacted in the

marketplace as part of the broader project of research investigating consumer responses to simulated and virtual technology applications.

2.6 Applications and Use Cases of Reality-Enhancing Technologies in Marketing

With the emergence of commercial reality-enhanced technology devices, marketing strategies have entered a new era regarding how brands interact with consumers. These technologies provide immersive experiences that lead to higher levels of customer satisfaction, engagement, and loyalty (Erdmann, Mas & Arilla, 2023; Hudson et al., 2019; Kumar et al., 2024). Knowing this, many companies have adopted this technology and actively used it in their marketing campaigns. This section explores some cases and applications of reality-enhancing technologies, along with examples of how these technologies are used in the marketing world. The goal is to centre the phenomenon of this research and show its present, current and ongoing use case. In this chapter, this thesis takes the time to establish the context of the use of virtual, augmented and mixed reality in marketing to showcase the wide and varied uptake of this technology and its potential effects. Because many of these technologies are anticipated to rapidly evolve, describing the present and recent use of this technology will be key to establishing the boundaries and setting for the research questions investigated in the thesis.

Use cases regarding augmented reality applications in marketing

Augmented reality overlays digital objects in a real world to provide an enhanced view by combining the virtual and real worlds.(Chen et al., 2024). This technology has found many application areas in the context of marketing, especially in retail and tourism because of its ability to provide engaging and interactive consumer experiences. For instance, one of the most prominent features of augmented reality in marketing is product visualization. Many well-known brands such as IKEA and Sephora employ this technology. They have created their own augmented reality applications that allow customers to visualise products in their own physical settings before making an actual purchase (Ozturkcan, 2021; Plotkina, Dinsmore & Racat, 2022). IKEA's app, IKEA Place, allows customers to try digital furniture as they exist in their own

surroundings. This feature reduces consumers' perceived risk and makes them more confident when making any purchase decisions (Ramdani et al., 2022). Likewise, Sephora launched Sephora's Virtual Artist app, which enables customers to virtually try on makeup products on their face, helping them to identify their desired products without actually trying the products (Tan, Chandukala & Reddy, 2022).

Augmented reality can also make advertising more appealing, dynamic, and interactive. Pepsi launched an ad campaign that equipped augmented reality technology in bus shelters in London (Maria, 2023). Individuals who wait for a bus in these shelters viewed wild scenarios including a tiger escaped from a zoo, a meteor hitting right next to the bus shelter, or a UFO landing. This kind of campaign captures attention, encourages electronic word-of-mouth, provides engaging and entertaining experiences, and enhances reach of the brand (Sung, 2021). In another campaign, Burger King employed augmented reality that allowed consumers to "burn" competitors advertisements in their own Burger King app. Consumers who completed the task received a free Whopper burger (de Ruyter et al., 2020). This altered a simple promotional tool to create an engaging and interactive activity.

Businesses also employ augmented reality to design smart packaging that provides additional information and entertaining experiences. Wine brand 19 Crimes employed this technology to bring its labels to life (Robertson et al., 2024). When consumers scan QR codes located on 19 Crimes bottle labels, the labels talk and tell stories about the historical figures shown on the bottles. The augmented approach allows customers to have unique, interactive, and engaging customer experiences.

Use cases regarding virtual reality applications in marketing

Virtual reality represents a computer-generated digital medium where users step into fully immersive experiences in a three-dimensional simulated world (Malik, Masood & Bilberg, 2020). The strength of this technology for marketing use lies in creating immersive, more impactful brand experiences that result in long-lasting impressions (Han, Bergs & Moorhouse, 2022). Car brands Toyota and Volvo offer virtual reality showrooms and test drives to potential buyers,

inviting them to more fully experience and explore different models and features in a computer-generated simulation (Akın & Uzun, 2022; Kim et al., 2023). Showcasing products that are too heavy and large can cost a lot of time, energy, money, and effort. Virtual reality applications eliminates these costs to create engaging and interactive experiences. In real estate, Sotheby's employs virtual reality technology to offer virtual tours of luxury estates to prospective buyers (Talukdar & Yu, 2021). By employing virtual reality, Sotheby's eliminates many costs, such as time and effort, for the customers and allows buyers to explore different homes from all across the world.

Virtual reality is a promising tool in experiential marketing as well. This technology creates memorable experiences that result in emotional connections with the brands. Thomas Cook Airlines' virtual reality campaign "Try Before You Fly" allows tourists to virtually travel to destinations to visit before booking. This enhances consumers' travel decision making as virtually experiencing destinations reduces perceived risk (Kadry, 2022; Mustaphi, 2020). In parallel, Marriott Hotels launched "VR Postcards" to allows individuals to teleport to destinations, providing a feeling of what it's like to be in the destination via virtual reality (Bharwani & Mathews, 2021).

Immersive storytelling is another feature of virtual reality technology businesses benefit from. TOMS Shoes takes customers on a virtual giving trip to Peru, demonstrating the impact of their purchases on lower income locals who receive shoes (Bauer et al., 2022). This way to connect with customers first illustrates the company's commitment to social responsibility projects and drives connections between consumers and TOMS. In tourism, airlines Qantas and British Airways use virtual reality to demonstrate the entire flight process from check-in to in-flight services, giving an idea to customers about what they can expect from a flight (Gupta & Sandhane, 2022).

Use cases regarding mixed reality applications in marketing

In synthesising virtual reality and augmented reality, mixed reality unifies real and virtual worlds, creating environments where users can see and interact with their real-world surroundings as well

as digital objects that are superimposed atop the physical world (Papadopoulos et al., 2021; Rokhsaritalemi, Sadeghi-Niaraki & Choi, 2020). Mixed reality offers realistic and interactive experiences for retail brands in particular. IKEA's Kreativ application is a mixed reality service that allows consumers to preview interior design products, such as lamps, chairs, and couches in consumers' home settings (Keegan et al., 2024). IKEA Kreativ adjusts lights, reflections, and shadows in the simulation based on the environment, resulting in even more realistic simulations than in augmented reality settings. The furniture brand also created 50 pre-made virtual showrooms, including furnished, partially furnished, and unfurnished, for customers to view products in any showroom. By employing mixed reality, IKEA allows customers to design their dream homes in an engaging and more realistic way.

At Gillette Stadium in the U.S., Proctor & Gamble launched a mixed reality advertisement on sports channel ESPN prior to a National Football League Patriots game kick-off and converted the stadium into "GilletteLabs Stadium" for 45 seconds (Hill, 2022). Individuals viewed a virtual razor being made right on the field, illustrating product innovation. By employing this novel technology, the company created memorable advertisements, enhanced brand visibility, and positioned itself as a pioneer in the creative advertising space.

In another use case of mixed reality, Marvel Studios and ILM collaborated to benefit from the immersive storytelling feature of this technology. The collaboration resulted in the creation of "What If...? – An Immersive Story" which is the first interactive Disney+ original story that can only be viewed through Apple Vision Pro (Marvel, 2024; Obias, 2024). In this storyline, users can experience adventures in the Marvel Universe on an immersive platform and engage with the Marvel heroes for up to an hour. Due to the advancements in spatial computing capabilities, within this experience, users can interact with the environment, meet their favourite characters, and learn mystic arts. This immersive experience transports users from their homes into the Marvel Universe and creates engaging, entertaining, and interactive narrative experiences. This use case demonstrates that reality-enhancing technologies have the capability to bring fictional worlds into real-life and provide memorable experiences for their users.

Augmented reality, virtual reality, and mixed reality technologies have yielded novel ways to interact with consumers and drive consumer responses. Brands from a wide berth of industries with offerings both material and experiential in nature have integrated reality-enhancing technologies to offer engaging and memorable experiences to their consumers. The adoption of such technologies is increasing, and as technology evolves further, their application areas in marketing will expand (Chen et al., 2022b). As technology integration reaches parity, more companies will look for opportunities to connect with their customers in creative and effective ways to enhance brand loyalty and visibility. Consequently, reality-enhancing technology use in marketing is becoming an essential way to stay relevant and competitive. These technologies are rapidly moving from novel to necessary foundational pieces integrated into marketing campaigns (Jayawardena et al., 2023).

2.7 Impact of Reality-Enhancing Technologies on Consumer Behaviour

Reality-enhancing technology in marketing influences consumer attitude, behaviour, and decision-making processes (Xi & Hamari, 2021; Zeng et al., 2020). These technologies alter the way users interact and engage with brands and their products, hence making significant changes in enjoyment, satisfaction, purchase, and visit intentions (An, Choi & Lee, 2021; Arghashi & Yuksel, 2022; Qin, Peak & Prybutok, 2021). Reality-enhancing technologies revolutionise the retailing world by providing all-angle product visualisation, which traditional media tools were not capable of (Bongomin et al., 2020; Hudson et al., 2019). Augmented reality technology allows customers to overlay digital products, such as chairs and couches, in their physical environment, which significantly reduces prospective customers' perceived risk and uncertainty. Moreover, it leads to higher levels of purchase intention (Haile & Kang, 2020). Zimmermann et al. (2023) show that these technologies also provide interactive product information as well as personalised recommendations while consumers view the products, resulting in higher levels of customer satisfaction and enjoyment that eases decision-making.

Virtual reality provides immersive experiences in a completely digital environment that allows its users to experience products and services in a computer-generated simulation. These fully

immersive simulated experiences likewise significantly affect consumer decisions and behaviour (Wedel, Bigné & Zhang, 2020). For instance, the real estate industry frequently employs virtual reality technology to entice potential buyers because illustrating virtual tours to properties before the actual visit makes consumers' decision-making process more informed and convenient (Cheong et al., 2023; Starr, Saginor & Worzala, 2021). Similarly, retail also benefits from using virtual reality because applications such as digital product demonstrations or virtual stores enhance consumers' trust, enjoyment, and satisfaction by providing a demonstration of the product (Kang, Shin & Ponto, 2020; Schnack, Wright & Elms, 2021).

Reality-enhancing technologies have the ability to provide immersive and personalised experiences which are critical for boosting consumer engagement and generating positive attitudes towards businesses (Barhorst et al., 2021; Smink et al., 2020). Augmented reality applications enhance emotional engagement with both brand and product. Companies who employ augmented reality technology in their marketing campaigns are also perceived as more innovative by consumers (Lee, Xu & Porterfield, 2021). Zeng, Xin, and Jin (2023) found that interactive and engaging augmented reality applications can strengthen consumer-brand relationships and lead to more memorable experiences. Similarly, virtual reality technology experiences also lead to deeper emotional connections between customers and companies, especially in the context of experiential marketing (Hollebeek et al., 2020; de Regt, Plangger & Barnes, 2021). When consumers virtually experience tourism destinations, events, concerts, or product demonstrations, they tend to develop more prominent emotional responses that affect their decisions and attitudes (Leung et al., 2023; Yung et al., 2021). Rather et al. (2024) indicate that virtual reality experiences can also lead to positive word-of-mouth and attachment.

Mixed reality applications can provide digital and physical elements together and allow customers to have relatively richer, more realistic, and dynamic experiences (Bec et al., 2021; Buhalis & Karatay, 2022). When consumers interact with such elements in a more realistic and natural way, their engagement, satisfaction, and enjoyment levels increase. Sung et al. (2021) unveiled that mixed reality improves the overall shopping experience by providing pertinent and contextual information that boosts behavioural responses, willingness to share the experience, and purchase

intention. The interactive and engaging nature of reality-enhancing technologies positively affects brand loyalty and brand advocacy (Hudson et al., 2019; Kumar et al., 2024). Individuals who had positive and long-lasting experiences in reality-enhancing technologies develop stronger attachments to the brand that they viewed in such technologies, moreover, recommend the brand and the experience to other consumers.

As can be seen, prior scholarship has examined many early impacts of reality-enhancing technologies on consumer behaviour. Such technologies provide product visualisation, engaging experiences, and long-lasting emotional connections with the brand, and these aspects result in increased satisfaction, brand loyalty, brand advocacy, and more informed decision-making. Interest in reality-enhancing technologies is growing and their application areas are widening; therefore, their impact on consumer behaviour will become more prominent in the future and this offer important and pressing new research opportunities for marketing scholars.

2.8 Challenges and Limitations of Reality-Enhancing Technologies in Marketing

Reality-enhancing technologies have revolutionized the marketing world by providing immersive, engaging, and interactive experiences to their users. However, these technologies experience certain challenges and limitations that can impact their success and market acceptance. This section discusses some of the most prominent challenges of working with, living with, and responding to such technologies.

Technological constraints

Technological constraints are a critical problem for reality-enhancing technologies in marketing. When businesses create high-quality content, the experiences require significant amounts of computational power and expensive hardware (Soliman et al., 2021). Virtual reality and mixed reality hardware, such as Oculus Quest 2 and Apple Vision Pro, are especially expensive and require computers with high performance, which reduces the accessibility of such technologies (Tan, Chandukala & Reddy, 2022). Likewise, advanced augmented reality and mixed reality applications depend on new mobile devices or smart glasses that have not yet reached mass

product penetration and wide adoption by consumers. Such constraints limit the market acceptance of reality-enhancing technologies, which can reduce the impact of marketing campaigns that use reality-enhancing technology content.

Latency rendering issues and low graphic quality

Latency rendering issues and low graphic quality are some of the most vital technical issues that can negatively impact user experiences. Latency is any delay that happens between when a user takes an action on an application or via a network and when it reaches its destination, which is measured in milliseconds. Latencies can originate in any combination of factors, from the speed of internet access to computational power, device age, and updates. Latency and delay in experiences that enhance real life can badly damage the positive impacts of immersion. Moreover, they may result in disengagement, disorientation, and nausea (Stauffert, Niebling & Latoschik, 2020). Prior literature shows that even very small latencies may cause displeasure, which in the end decreases sales and satisfaction (Basalla et al., 2021). Moreover, low graphic quality can reduce perceived realism and attractiveness, which lowers the effect of content as a marketing tool in general (Kang, Shin & Ponto, 2020). Also, poor graphic quality might remind customers that the experience is only a simulation, which will reduce customer engagement and satisfaction.

Cost and resource intensive nature

Creating reality-enhancing technology content is still in 2024 an expensive process that involves highly technical and creative skills, such as knowledge in 3D modelling, animation, and interactive design (Shehade & Stylianou-Lambert, 2020). Likewise, constantly improving and updating such content can increase the overall cost of the marketing campaigns. Therefore, many companies might find it challenging to create marketing campaigns that involve reality-enhancing technology content, which to date still limits the adoption and usage areas of such technologies significantly (Machala, Chamier-Gliszczyński & Królikowski, 2022).

User adoption and accessibility

Even though reality-enhancing technologies have gained prominent attention from marketing scholars and practitioners, these technologies haven't achieved universal, mass market adoption

yet. Many consumers are still unfamiliar with reality-enhancing technologies and don't have devices to view content in such technologies (Weir et al., 2023). This poses a major challenge to marketers because if they want to launch marketing campaigns that involve reality-enhancing technology content, many individuals cannot be readily exposed to the marketing content. Also, existing research indicates that virtual and augmented reality users complain about the weight and the ergonomics of headsets, which can create problems for users such as those with disabilities (Kazemi & Lee, 2023). In addition to ergonomics, many report motion sickness, nausea, and disorientation, which further limits the adoption of these technologies (Stauffert, Niebling & Latoschik, 2020). Limited adoption leads to fewer opportunities for variety in reality-enhancing technologies, which might trigger satiation or decreasing enjoyment over time since users will have less content to interact with.

Content quality and user experience

The success of reality-enhancing technologies depends on content quality and user experience. If users perceive the content as low quality, then the experience can result in dissatisfaction, lowered telepresence, and negative behavioural attitudes (Lee et al., 2020). Businesses have to pay attention to details and thoroughly test their content before using it in marketing efforts. Low quality content and unsatisfactory user experiences can lower the perceived enjoyment from such experiences, moreover, might trigger satiation and make users seek to immediately end the experience (Lee et al., 2020; Yang & Han, 2021).

Ethics and marketer responsibility

The ethical concerns associated with reality-enhancing technologies are critical and have several dimensions. Extensive data collection involving personal information, location data, and behavioural habits poses a serious threat to privacy (Miller et al., 2020). Users sometimes unintentionally agree to the sharing of their data for targeted advertisements or other exploitative or unauthorized uses. This is why transparent data practices from companies and developers will be important to ensure that users know exactly how their data is being used.

Aside from privacy and data collection concerns, the risk of addiction and mental health problems could arise due to the fact that excessive use may separate users from reality, affecting their mental and interpersonal relationships (Ratcliffe et al., 2021). It is the responsibility of researchers and developers to create balanced experiences that promote healthy usage. Ethical considerations in marketing and advertising are equally important since brands must avoid manipulative or misleading practices that take advantage of the immersive capabilities of these technologies. However, this is a collective responsibility for which users, practitioners, and scholars must become aware and adopt a cautious approach toward such technologies. On this basis, users should be educated about the risks and benefits, practitioners must act within ethical guidelines, and scholars must research and share knowledge concerning their ethical implications.

Satiation

Satiation is among the critical challenges that reality-enhancing technologies face because it can significantly influence product disposal and replacement behaviour (Hou, Jo & Sarigöllü, 2020). This notion refers to reduced enjoyment levels and satisfaction that result from overexposure and overconsumption (Becerril-Castrillejo & Muñoz-Gallego, 2022; Nelson & Redden, 2017). That means when consumers are overexposed to or repeatedly consume the same stimulus, they can experience lower engagement and lower satisfaction levels, which can affect long-term relationships between customers and companies (Olaoke et al., 2021; Gurr & Metag, 2022; Song et al., 2024). To eliminate the negative impact of satiation, marketers constantly need to evaluate their content in terms of novelty, graphic quality, immersion, and relatedness (Lashkova et al., 2020). However, the existing marketing literature currently does not have a way to assess the concept and impacts of satiation in reality-enhancing technologies. Therefore, to understand how satiation functions in reality-enhancing technologies, marketing literature needs to develop a satiation scale specifically designed for such technologies.

Reality-enhancing technologies provide many benefits to both consumers and companies; however, such technologies experience many challenges, limitations, and constraints. This section identified some of the most prominent issues that can influence reality-enhancing technology adoption and usage. Though there are limitations in the current market, virtual reality and

augmented reality technology is the most advanced and affordable it's ever been, and the tools to create immersive environments are becomingly increasingly more popular and affordable for consumers and brands alike. Thanks to novel technological advancements, the quality of such technologies is improving every day (Hamad & Jia, 2022).

2.9 Implications for Marketing Practice and Research

Reality-enhancing technologies are game-changing tools for individual users and marketing strategies, and such technologies have received a notable amount of attention from both marketing practitioners and researchers (Wedel, Bigné & Zhang, 2020). Prior literature has conducted numerous studies to explore how reality-enhancing technologies influence consumer behaviour and decision-making (Jingen Liang & Elliot, 2021; Xi & Hamari, 2021). In parallel, many companies have already employed these technologies to interact with their customers in order to boost satisfaction, sales, and engagement (Arghashi & Yuksel, 2022; Abbas, 2024). However, more research is needed to fully understand how consumers behave in these revolutionary technologies, how brands leverage simulated and virtual experiences, and the ethical responsibility users, practitioners and scholars have to adopt these technologies with a healthy degree of caution. On this basis, this section will discuss and provide implications for marketing research and practice.

Implications for marketing research

Existing literature has employed many relevant consumer behaviour and communication theories and frameworks to understand the impact of reality-enhancing technologies on consumer decision-making. Some of the most prominent theories in reality-enhancing technology and marketing research, such as information processing, Stimulus-Organism-Response framework, push and pull factors, technology acceptance model, and uses and gratifications have been illustrated in this chapter (see section 2.3). Though many theoretical lenses to date have been employed to understand the impact of these technologies, more research is needed to uncover the full impacts and effects of reality-enhancing technologies. More research is also needed to better ground considerations of consequences and downstream effects of new immersive simulated

environments on consumer behaviour. Technological advancements will continue to significantly enhance the capabilities of reality-enhancing technologies, which influence consumer experiences and interactions with brands; therefore, some of the existing research might require replication studies (Eswaran & Bahubalendruni, 2022; Harz, Hohenberg & Homburg, 2022). For instance, integration of artificial intelligence technology with reality-enhancing technologies results in more personalised experiences, which could drive increased enjoyment, interactivity, and engagement (Abrash, 2021; Zimmermann et al., 2023). Integration of artificial intelligence algorithms could significantly increase the impact of reality-enhancing technologies on consumer behaviour and perceptions.

Another important research avenue is the exploration of concepts that can significantly influence the success, adoption, and acceptance of reality-enhancing technologies. For example, satiation has been explored in numerous cases in the context of marketing, yet existing literature regarding satiation in reality-enhancing technologies is scarce. This ubiquitous phenomenon poses critical challenges to marketers because it can be triggered by many reasons, such as overexposure or overconsumption of stimuli, and can directly influence individuals' product disposal and replacement behaviours (Becerril-Castrillejo & Muñoz-Gallego, 2022; Nelson & Redden, 2017; Hou, Jo & Sarigöllü, 2020). What else from non-simulated interactions will be altered by adoption of simulated settings for conducting education, exchange, business, and daily life?

Future research can explore the reasons, outcomes, and how to minimize the negative effects of satiation in reality-enhancing technologies. For instance, overloading too much information on consumers in reality-enhancing technologies might result in satiation, which significantly lowers consumers' perceived enjoyment levels (Jeon & Lee, 2020). Similarly, overexposure or repeated exposure to marketing-oriented stimuli in reality-enhancing technologies can trigger satiation, which might result in boredom and disengagement. Therefore, optimizing the duration and content variety of marketing content might play crucial roles in the impact of marketing campaigns. Also, satiation can lower the positive impact of immersion in reality-enhancing technology experiences by leading to boredom, psychological fatigue, and lowering the sense of novelty (Gurr, Schumann & Metag, 2022; Mikuni et al., 2022; Sguerra, Tran & Hennequin, 2022).

Consequently, future research should investigate the impacts of concepts like satiation in reality-enhancing technologies to unveil numerous beneficial insights.

Developing well-established and validated marketing metrics to assess the impact of reality-enhancing technologies is also an essential project in marketing research. Reality-enhancing technologies alter how individuals interact with each other and process information; therefore, employing existing validated psychometric measurements in reality-enhancing technology-related research might not result in accurate outcomes. On this basis, marketing scholars should develop new ways to measure different concepts in simulated settings. For instance, existing literature has already created multiple scales for satiation; however, they were mainly focused on the physiological aspects of satiation (e.g., food-related studies; Larson, Redden & Elder, 2014; Karalus & Vickers, 2016). Future research should consider creating a scale that can measure individuals' satiation in reality-enhancing technologies.

Marketing scholars who conduct studies in reality-enhancing technologies must also seek to better understand the ethical issues and potential consequences that may arise from the usage of such technologies. To develop robust ethical guidelines, it is important to understand the real impact of these technologies on consumer behaviour and perception. Many problems can arise from utilizing reality-enhancing technologies, such as manipulation of consumers, privacy problems, health problems, and data usage issues (Miller et al., 2020; Ratcliffe et al., 2021). This research suggests that marketers examine these problems because exploring the ethical implications can help scholars to form best marketing research practices and understand how ethics-related concerns influence consumers' behaviour and the usage of such technologies.

The implications mentioned above can be broadly categorised into four groups. First, as the technology advances, the capabilities and effectiveness of such technologies increase; therefore, prior research needs to be updated and verified. Second, psychological concepts that can influence the success, adoption, and acceptance of reality-enhancing technologies, such as satiation, should be carefully examined. What are the impacts of marketer use of augmented and virtual reality tools on consumer psychological responses? Third, marketing research must assess the rise of simulated tools via new psychometric measures designed to measure prominent notions that can

influence the success, adoption, acceptance, and externalities of reality-enhancing technologies. Lastly, scholars should investigate the impact of ethics-oriented concerns on consumer behaviour and ways to observe, catalog and prevent ethics-related problems.

Implications for marketing practice

Reality-enhancing technologies open new horizons in marketing world by allowing users to experience more immersive, interactive, and engaging marketing content from their homes and in the palms of their hands via personal electronic devices (Balasubramanian et al., 2022). As the technologies evolve, they will continue to influence current marketing trends, brand-consumer interactions, and marketing campaigns. One of the most prominent trends in these simulation-based technologies is enhanced personalisation in the experiences. Thanks to the advancements in marketing analytics and artificial intelligence, reality-enhancing technologies offer significantly accurate recommendations that are compelling to consumers. Brands such as Sephora and L'Oreal place augmented reality mirrors in their stores that provide makeup recommendations and allow consumers to try different products on their faces before making any decisions (Tan, Chandukala & Reddy, 2022). Augmented reality applications in retail provide recommendations and give users the opportunity to visualise furniture in their own spaces before decisions to purchase. These interactions reduce perceived risk and product return rates, and moreover boost consumers' satisfaction during experiences. Synthesising artificial intelligence and reality-enhancing technologies further might result in the creation of artificial intelligence-driven virtual reality shopping assistants (Cao, 2021; Zimmermann et al., 2023). These assistants can use artificial intelligence algorithms to predict what users exactly need and their consumer behaviour to offer extremely personalised recommendations. Such interactions with artificial intelligence-driven virtual assistants might boost customer engagement, satisfaction, and increase purchase intention.

A further change that will expand the usage of reality-enhancing technologies is the increasing accessibility and affordability of such technologies. As the popularity of these technologies increases and the power of handheld devices grows, more and more companies enter the reality-enhancing technology market, which results in the creation of new reality-enhancing technology-

related applications, platforms and devices. The last decade saw the most readily available and mass marketed reality-enhancing technology devices launched, from Microsoft HoloLens and Magic Leap One, Google Glass, Oculus Rift, HTC Vive, PlayStation VR, and Oculus Quest 2 (Santi, 2021). Apple's Vision Pro headset launched in 2024 to early adopters, while most consumers have augmented and mixed reality capabilities on their latest mobile devices to overlay shopper items in their homes and settings or get live street directions from Google Maps. Companies are constantly trying to improve the technical aspects of their devices, and because of the competition in the market, the prices of reality-enhancing technology devices are becoming more affordable (Rogers, 2020). Greater accessibility and affordability of reality changing applications will significantly enhance the adoption of these technologies, and broader adoption of such technologies will likewise lead to more extensive integration of reality-enhancing technologies into marketing campaigns.

Virtual and mixed reality applications provide realistic and immersive shopping experiences, which can allow companies to test their shop atmosphere, products, and store layouts. By combining virtual and mixed reality applications with other technologies, such as eye tracking, heart rate monitors, and neuromarketing devices, marketers can better understand how consumers behave in reality-enhancing technologies and how to provide a better user experience to them (Bigne, 2024; Pérez et al., 2024). Yet scholars and practitioners should proceed with caution here. Reality-enhancing technologies can also help companies collect customer data in a more realistic and embedded way; however, marketers should consider and explore the ethical aspects of using such technologies and the collected data. Businesses should review regulatory laws before collecting any form of customer data (Spiegel, 2018).

Metaverse concepts for simulated reality can also drastically influence the usage and adoption of reality-enhancing technologies. This term represents collective virtual environments linked to the physical world (Kim, 2021). The metaverse was created based on the convergence of various technologies that provide multisensory experiences (e.g., reality-enhancing technologies) where users interact with digital environments, objects, and one another via avatars (Ghali, Rather & Khan, 2024). Individuals can satisfy a variety of needs in the Metaverse, from gaming to

shopping, social networking to education (Koochang et al., 2023). Metaverse offers the next level of product visualization where individuals can benefit from virtual try-ons or participate in product demonstrations while significantly lowering marketing costs by saving on logistics and travel. Though similar to what reality-enhancing technologies offer, the Metaverse does this while building communities around brands (Latino et al., 2024; Mohamed et al., 2024). Also in the Metaverse, companies can provide experiences such as playing games and offering limited edition items, which lure many young individuals (Yemenici, 2022; Yoo et al., 2023). Brands from Gucci to Coca-Cola, Chipotle, Puma, Adidas, and Nike have taken their place in the Metaverse to create virtual events and shops to test out novel experiences to engage with their customers (Barrera & Shah, 2023).

The employment of 5G and advancements in edge computing will also enhance increase the capabilities of simulating technologies. 5G increases the speed of connectivity and lowers delays and latency-rendering issues, which enables companies to provide more data-intensive experiences. Reality-enhancing technologies require an unprecedented amount of data, and with 5G, consumers might be able to receive required data without any delay. Also, the demand for reality-enhancing technologies enhances monetization and adoption of 5G (Hazarika & Rahmati, 2023). This symbiotic relationship could significantly boost both technologies' mass adoption and market penetration. Likewise, edge computing allows data to be processed close to the users, further reducing delays and latency problems (Siriwardhana et al., 2021). By lessening the delays and latency issues, these technologies can enhance the positive impact of immersion in reality-enhancing technology experiences and lower the negative impact of psychological effects such as the decreasing enjoyment of satiation.

In ethical marketing, transparency and consumer consent are crucial when providing ethical practices in reality-enhancing technologies (Kaimara, Oikonomou & Deliyannis, 2022). Marketers should, therefore, be in a position to disclose the various ways in which these technologies collect, use, and store personal data. Moreover, the consumer ought to be fully informed before providing his or her consent to the company. Businesses must prioritize privacy safeguards and the limitation of deceptive practices. Therefore, it is important for companies to

have clear ethical guidelines to prevent potential issues. Regular audits and compliance with the guidelines can help overcome such issues and build trust. Only by utilizing ethical guidelines can marketing practitioners responsibly benefit from reality-enhancing technologies while protecting consumers' rights and interests.

Consequently, the contextual marketplace changes described here are anticipated to alter consumer and user experiences and the resulting marketing world by offering more immersive, personalised, and engaging reality-enhancing technology experiences. Likewise, new technologies such as artificial intelligence, 5G, and edge computing will influence the adoption and capabilities of reality-enhancing technologies. Businesses that adopt and employ such technologies will be perceived as pioneers of innovation by offering immersive, interactive, long-lasting, and engaging experiences that lead to satisfaction, loyalty, and increased sales (Boletsis & Karahasanovic, 2020; Han, Bergs & Moorhouse, 2022). As marketing follows consumers and users into the Metaverse and other simulated environments, practitioners and scholars must also maintain a cautious and critical stance to consider how consumers are effected by increasing marketing presence in reality-enhancing tools and spaces.

2.10 Conclusions

This chapter exploring reality-enhancing technologies illustrates that such technologies have prominent effects consumer behaviour and marketing practices. These technologies are identified as one of the most disruptive technologies of the 21st century, and they reshape marketing by launching brands and consumers into interactive, engaging, and immersive user experiences (Bongomin et al., 2020; Hudson et al., 2019). Existing marketing literature has employed several key theories, from information processing theory to technology acceptance and Stimulus-Organism-Response, to uncover how these technologies influence consumers, and how consumers behave in reality-enhancing technology settings (Ambika, Shin & Jain, 2023). However, as the capabilities of these technologies are improving, extant research must be refreshed. Moreover, new concepts and theories in consumer psychology must be explored and tested in reality-enhancing technology-related research to fully uncover the impact of these

technologies on consumer responses. Therefore, marketing research needs to develop new psychometric measures to test different concepts in reality-enhancing technology settings.

Reality-enhancing technologies offer many benefits to both brands and consumers, such as enhanced product visualisation, providing immersive brand experiences, increased retention of experiences, reducing customers' perceived risk, and lowering product return rates (Ebrahimabad et al., 2024; Sun et al., 2022; Tan, Chandukala & Reddy, 2022). As technology advances, new opportunities related to reality-enhancing technologies arise in the marketing world. For instance, the integration of artificial intelligence into reality-enhancing technologies provides more personalised experiences to customers, further enhancing satisfaction, loyalty, engagement, and interactivity. As simulated environments become more common, brands who invest in marketing via reality-enhancing tools will begin to reach parity driving an ever-more rapid embrace of these technologies.

Prior literature has already begun to explore how reality-enhancing technologies alter consumer behaviour and decisions (Meißner et al., 2020; Wedel, Bigné & Zhang, 2020). Yet these technologies still face limitations and challenges, such as technical issues, high costs, latency, delay, disorientation, nausea, and satiation, which all can greatly impact the success, acceptance, and adoption of reality-enhancing technologies (Soliman et al., 2021; Stauffert, Niebling & Latoschik, 2020). Marketing scholars and practitioners should examine these limitations and challenges and also try to find ways of minimizing the negative impact of such problems. For example, one of the most critical problems that marketers face is the concept of satiation, which can be caused by various factors: overexposure, overconsumption, and overloading information (Becerril-Castrillejo & Muñoz-Gallego, 2022; Nelson & Redden, 2017). Therefore, marketing practitioners should try to optimize the duration and variety of their content before launching a marketing campaign to minimize the harmful effects of satiation.

In conclusion, this chapter provides a comprehensive review of reality-enhancing technologies by demonstrating the history of reality-enhancing technologies, definitions, and theoretical frameworks used in existing literature, application cases in the marketing world, impacts on consumer behaviour, challenges and limitations, and implications for future marketing practice

and research. As illustrated in this chapter, reality-enhancing technologies have created many opportunities and challenges for marketing practitioners and scholars. The concept of satiation is one of the most prominent challenges in the marketing world because it significantly impacts product replacement or disposal behaviours, and it can influence the success and adoption of reality-enhancing technologies. Therefore, examining satiation in such technologies can unveil insights for marketing scholars and practitioners. To fill this gap, Chapter 3 next conceptualizes satiation in reality-enhancing technologies as simulated satiation, conducts a proof-of-concept study and creates testable propositions as future research directions.

Preface to Chapter 3: Contributions

The following chapter focuses on and addresses research question 1, which is '*What is simulated satiation?*'. It explains the notion of simulated satiation, conducts a proof-of-concept study and creates nine testable propositions as future research directions.

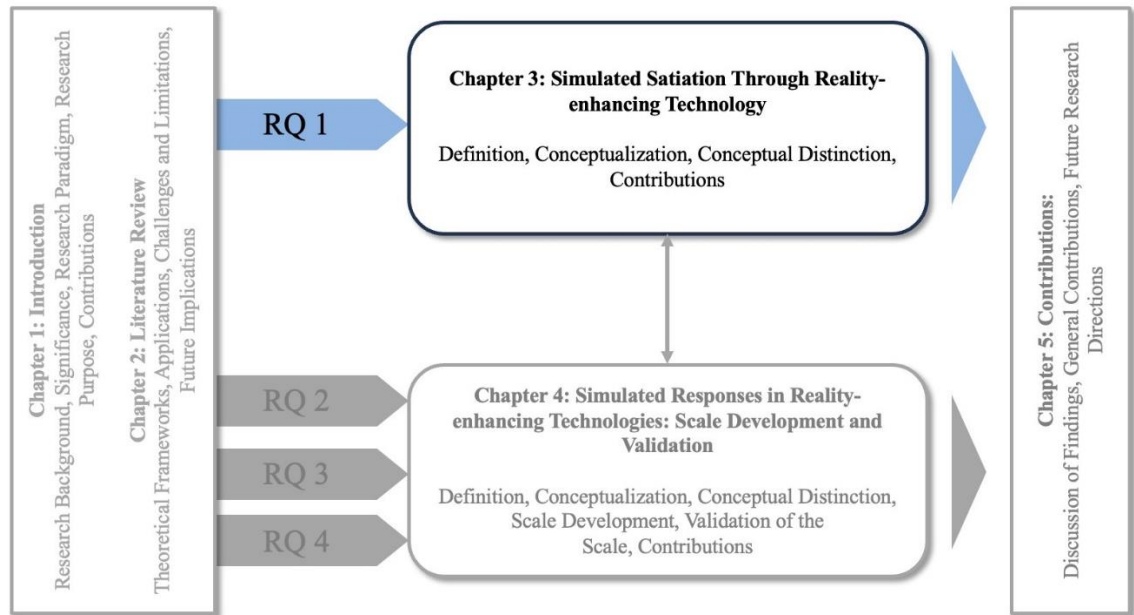


Figure 1.1 Thesis overview.

Existing literature has extensively associated the notion of satiation with physiological factors, and mostly ignored its complex nature that is related to psychological elements (Antón et al., 2018; Park & Jang, 2014; Redden, 2015). Furthermore, current literature overlooked the importance of satiation in simulated environments, such as augmented reality, virtual reality, and mixed reality. To address this gap, this research explores satiation in reality-enhancing technologies and conceptualizes a new theoretical construct called simulated satiation. During the conceptualization process, the research reviewed and benefited from existing literature of marketing, disruptive technologies, reality-enhancing technologies, and consumer behaviour. Additionally, this research created nine testable propositions demonstrating how simulated satiation can influence consumer behaviour in virtual environments and highlighting the necessity of a simulated satiation scale in the marketing literature.

Chapter 3: Simulated Satiation Through Reality-Enhancing Technology

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3.1 Abstract

We define simulated satiation through reality-enhancing technology as *attenuation in perceived benefits that occurs due to repeated or prolonged exposure to vicarious and simulated intermediary sources*. We examine simulated satiation as a factor that underlies consumer experiences with reality-enhancing technologies and present 9 testable propositions. Each proposition is aimed at determining how simulated satiation can unlock implications in terms of engaging consumers for the right amount of time to improve marketing outcomes. We further conduct a proof-of-concept study to test proposition 1, that physiological drivers and sensory overload increases simulated satiation. The empirical results show that shorter (vs. longer) exposure to virtual reality content raises perceived usefulness for VR, which in turn mediates stickiness for VR experiences alongside consumers' subjective well-being. Finally, we carry forward key theoretical contradictions and areas for future empirical testing based on simulated satiation in reality-enhanced environments, including experiences, that are reshaping consumer decision making.

Keywords: Reality-enhancing technology, Satiation, Simulated satiation, Virtual Reality, VR, Vicarious, Consumer Experience, Marketing.

Data Sharing and Data Accessibility Statement — The data is available by the authors upon reasonable request.

Declarations of interest — None.

3.2 Introduction

A shark swam through the living room on a mobile device courtesy of a Google augmented-reality (AR) application, casting a shadow as children shrieked. Within 10 minutes, the excitement faded. A gamer pulled a headset down and was instantly a superhero via a PlayStation virtual-reality (VR) game. Moments later, she sat down abruptly, motion sick. In this research, we seek to better understand the physiological and perceptual boundaries to the benefits of reality-enhancing technologies, charting the first evidence for the term we have coined “simulated satiation”. We contribute to the theoretical development of the factors that underlie consumer experiences with reality-enhancing technology. Moreover, we review the literature on virtual reality experiences, satiation, and vicarious consumption to develop propositions, supported by a proof-of-concept study, that show how these technologies reshape practice and scholarship alongside consumer experiences of marketed products and services.

VR combines kinetic, visual, and audio components in a digital 3D world (Kim et al., 2020) to create an immersive, engaging, and innovative computer-generated atmosphere (Barnes & Pressey, 2012; Bonetti et al., 2018). AR similarly refers to a technology that creates supplementary sensory information, such as objects, avatars and sounds, as an overlay on the real-world (Guttentag, 2010; Wedel et al., 2020). The global market of these virtual environments breached \$27 billion USD in 2018, and is expected to grow to \$209.2 billion USD by 2022 (Statista, 2018). Brands including Volvo, Mercedes, Adidas and Oreo have successfully employed AR/VR technology to allow consumers to observe and interact with products virtually (Chylinski et al., 2020). However, sensory factors in reality-enhancing technologies are altering consumers’ experiences and behaviours, with mixed results (Mishra et al., 2021). Virtual travel hosted on Amazon Explore, launched in 2020, has satisfied consumers who can shop for souvenirs during their interactive tours rather than plan future in-person trips (McMahon, 2020). VR gamers who report motion sickness try to build tolerance via habituation and caution each other to limit playtime to better adapt (Bender & Sung, 2021). Diminished enjoyment, or satiation (Redden, 2015) of these vicarious, simulated experiences can have real effects on marketing outcomes for those who employ virtual campaigns and/or product interactions. Consumer research has, prior to

the present work, yet to investigate how satiation via reality-enhancing experiences affects consumer responses and decision making.

Existing research extensively examines the positive effects of reality enhancing technologies on consumer behaviour and intentions, as brands with VR campaigns gain competitive advantage and are seen as innovative and ground breaking (Farah et al., 2019). However, virtual experiences can cause negative outcomes from disorientation and nausea to reduced intent and satiation (Guttentag, 2010; Seam et al., 2017). Decline in perceived benefits via satiation is a key threat when consumers experience too much of a product or service. Realistic VR experiences can influence individuals to think of real-life visits as repetitious, and such perceptions can decrease visit intentions due to satiation (Deng et al., 2019). Satiation is a ubiquitous phenomenon and a critical challenge for marketers because it directly influences consumers' perceptions and behaviours, such as product replacement or disposal (Chugani et al., 2015; Redden, 2015). Moreover, satiation in simulated experience and product settings is complicated; the literature suggests that not all aspects of AR/VR applications lead to a decline in benefits for consumers. For example, factors that increase presence and immersion can drive positive effects (Hudson et al., 2019; Kang et al., 2020). Considering that individuals can vicariously experience products or services through reality-enhancing technology, the role of vicarious, simulated satiation becomes a vital factor in virtual mediums.

In the current research, we contribute to the literature on factors that underlie consumer experiences with reality-enhancing technologies, namely VR but also augmented and mixed reality applications (AR, MR). Second, drawing from the literature on satiation, reality-enhancing technologies and the role of vicarious experiences in consumption (Ahn et al., 2016), we propose simulated satiation as a key theoretical construct, in determining how to engage consumers for the right amount of time in a reality-enhanced environment to boost marketing outcomes. Research pertaining to how simulated satiation influences the customer journey and consumer decision making process within the context of reality-enhancing technologies is embryonic and requires investigation. In this vein, we examine the theoretical background of simulated satiation via its roots in vicarious experiences and attempt to catalogue which factors influence it. From

this, we contribute to this early literature by developing 9 propositions for future research. Finally, we contribute empirically via a proof-of-concept experimental study that varies duration of exposure in a VR destination experience. This study shows the first known effects of longer (vs. shorter) VR exposure satiation (e.g., independent variable) on both stickiness and subjective well-being (e.g., dependant variables). These relationships are strengthened/attenuated by the VR consumers' perceived usefulness (e.g., mediating variable [underlying causal mechanism]) of the simulated experience. Finally, we provide a future research agenda for simulated satiation in virtual environments.

3.3 Literature Review And Propositions

3.3.1 Reality-enhancing technology

The majority of new technological developments enhance existing product or service efficiency (i.e. sustaining technologies; Kassicieh et al., 2002). However, extraordinary technologies occasionally arise in the market to change consumers' perceived value, presenting unique offerings and features to create a disruption in the market of existing products (i.e. disruptive technologies; Christensen, 2013). For example, cell phones offered an exceptional value proposition and disrupted the market of wired telephones. Disruptive technologies form new products, markets, and business niches (Ab Rahman et al., 2017) including Artificial Intelligence, Internet of Things, Blockchain, 3D Printing, Autonomous Vehicles, 5G, Virtual and Augmented Realities (Christensen, 2013; Loureiro et al., 2019; Rauschnabel, 2021).

Reality-enhancing technology is being utilized across many industries (e.g. education, entertainment, gaming, product design, medical, retail and tourism; Buhalis & Law, 2008; Bonetti et al., 2018). Interestingly, VR has played a key role in marketing, especially in retailing and tourism (Heller et al., 2019). Tourism locations first began to use VR tours as a marketing tool to entice tourists to visit destinations (Guttentag, 2010). In a retailing environment, VR provides benefits including distinct store design, reduced marketing cost and product returns, access to virtual store walk in, and all-angle product viewing (Bonetti et al., 2018; Hilken et al., 2018).

Notably, reality-enhancing technology poses both threats and opportunities to the current retail and tourism environment as well as creating new markets (Deng et al., 2019; de Ruyter et al., 2020; Rauschnabel, 2021). For example, individuals treat holographic AR products as if they physically exist (Rauschnabel, 2018; Carrozzi et al., 2019). Such products could serve as a substitute for physical products. Moreover, considering the potential of AR holograms in the tourism industry, even a sub-standard hotel room can be rendered to look accommodating and luxurious (Rauschnabel, 2021). VR experiences can substitute for real-life tourism experiences (Marasco et al., 2018; Deng et al., 2019), a threat magnified in a pandemic-era of social distancing. Considering the convenient, immersive, and realistic nature of reality-enhancing technology, virtual tourism experiences could attract more individuals compared to real-life experiences (Itani & Hollebeek, 2021).

3.3.2 Satiation

Satiation is a ubiquitous phenomenon that almost every individual experiences in their daily lives (Redden, 2015). For example, eating pizza from a favourite restaurant every night for dinner makes it less tasty, or a toy may not seem as fun for kids after they play with it all day. Satiation has been examined in economics, food science, psychology and marketing and commonly explained as a phenomenon that lowers enjoyment levels of a product/service caused by multiple reasons, such as repeated use or over-consumption (Sevilla & Redden, 2014; Redden, 2015).

Satiation can be positive or negative. Narumi et al. (2012) demonstrate that using AR to modify foods can trigger satiation and help regulate individuals' food intake to fight obesity. Alternatively, satiation can lower consumers' satisfaction regarding a product/service after purchase and directly affects consumers' product replacement or disposal intentions (Galak et al., 2009; Nicolao et al., 2009). As a consequence, satiation creates a critical challenge for marketers who try to enhance marketing loyalty and product usage (Redden, 2015).

Congruently, existing research indicates that satiation is a temporary phenomenon, and there are ways to reduce its influence. For example, Galak et al. (2009) show that individuals immediately recover from the effects of satiation when they remember different stimuli (e.g. recently

consumed) or by inserting time gaps between consuming the same stimuli (Thompson & Spencer, 1966). However, this spontaneous recovery from satiation differs regarding stimuli and consumption rate (Redden, 2015).

Satiation can also occur vicariously (e.g. via indirect experiences; Tobin et al., 2015). An individual may observe another person's goal, and if that goal is achieved, then the observer will also experience goal fulfilment (McCulloch et al., 2011). This psychological process is called vicarious satiation, and it occurs when individuals over-consume or are over-exposed to a stimulus via other individuals' experiences or feelings. Deng et al. (2019) show that during VR experiences, people can perceive virtual museum visits as similar to actual visits, and this perceived similarity can trigger vicarious satiation. In group settings individuals also vicariously satiate from other group members' decisions. For example, the phenomenon of vicarious satiation influences individuals' decisions to consume different products in group environments (Tu & Fishbach 2012).

3.3.3 Simulated satiation

We extend the definition of satiation by referring to vicarious satiation through reality-enhancing technologies as simulated satiation (see Table 3.1). Formally, simulated satiation is *attenuation in perceived benefits that occurs due to repeated or prolonged exposure to vicarious and simulated intermediary sources*. Similarly, it is expected to occur due to perceived and/or physiological changes, and this diminished satisfaction with benefits can occur gradually during repeated or vicarious participation and/or viewing via reality-enhancing technologies (Galak & Redden, 2018). Alternatively, it can occur suddenly in first exposure, as reported by VR gamers (Reddit, 2020).

Table 3.1 Definitions of satiation in the marketing and psychology literature.

<i>Author</i>	<i>Definition</i>
Poor et al. (2012)	A decrease in enjoyment of an experience as exposure to the experience is continued or repeated.
Redden & Galak (2013)	Repeatedly consumed experiences become less enjoyable over time.
Park & Jang (2014)	A decrease in overall enjoyment after repeated exposure to the same stimulus.

Sevilla & Redden (2014)	The process whereby consumers enjoy a stimulus less as they consume more of it.
Redden (2015)	The drop in enjoyment with repeated consumption.
Chugani et al. (2015)	Repeated consumption of products and experiences leads to a reduction in enjoyment over time.
Nelson & Redden (2017)	The drop in enjoyment with repeated consumption, for nearly every experience.
Antón et al. (2018)	Repeated consumption of a single item or repetition of the most affectively relevant stimuli leads to an attenuation of the individual's response.
Lasaleta & Redden (2018)	People experience satiation—the drop in enjoyment that comes with repeated consumption—with virtually any stimulus, such as yogurt, music, or art.
Sevilla et al. (2019)	Feeling full or feeling beyond capacity or desire.
<i>This research</i>	<i>Attenuation in perceived benefits that occurs due to repeated or prolonged exposure to vicarious and simulated intermediary sources.</i>

Satiation can be reduced or enhanced, depending on a marketer's goals, via common methods such as cueing variety (similarity perceptions) or (de)emphasising identity relevance (Boyd & Koles, 2019; Chugani et al., 2015; Deng et al., 2019; Galak et al., 2009; Reutskaja & Hogarth, 2009). This research documents how satiation via vicarious virtual experiences is a key factor for outcomes related to reality-enhancing technologies (e.g., AR/VR/MR), and consequently, decline in marketing effects. For reality-enhancing technologies, vicarious experiences may occur differently, when compared with decreases in enjoyment and benefits over time for more established and sustaining technologies. Therefore, we establish and argue that, despite the novelty of reality-enhancing technologies, consumers can and do experience simulated satiation through vicarious experiences generated via such technology.

Extant literature demonstrates that satiation results from physiological causes such as feeling full (Park & Jang, 2014; Antón et al., 2018). However, two recent studies (Redden, 2015; Galak & Redden, 2018) create a unique taxonomy to explore the antecedents of satiation, including physiological feedback, perceptual changes, and self-reflection. Next, we demonstrate each group of antecedents and their impact on reality-enhancing technology experiences.

3.3.3.1 Physiological drivers of simulated satiation

Physiological antecedents include feedback from individuals' bodies regarding consumption experience (e.g., consuming a huge amount of food makes it less enjoyable to eat more or repeatedly listening to the same music makes it less pleasant; Hunter & Shellenberg, 2011; Mead et al., 2019). Redden (2015) illustrated that "feeling full" represents a signal about the consumption experience, and this signal turns more negative after repeated consumption (Berthoud, 2004; Benelam, 2009). These physiological cues tend to slowly effect the satiation rate in sustaining technology induced experiences (Galak & Redden, 2018).

However, when using reality-enhancing technologies, there is evidence that physiological cues such as motion sickness and bodily response to latency-rendering issues can cause more immediate feedback that grows increasingly negative (Guerreiro et al., 2015). This lends physiological factors from sensory overload a sharper decline in hedonic enjoyment of a virtual experience than via other modes of consumption. That is, simulated satiation is more likely, we theorize, to be driven by physiological feedback than in non-simulated satiation consumption settings. Formally, we propose:

P₁: Physiological drivers will increase simulated satiation, as compared to the same stimulus in real-life settings.

3.3.3.2 Perceptual drivers of simulated satiation

Perceptual antecedents that influence individuals' hedonic decline include stimulus type, social comparison, simulation, perceptual attention and variety (Antón et al., 2018). Nicolao et al. (2009) first show a prominent difference in hedonic decline between material goods and experiences, finding that material products incur higher levels of satiation compared to experiences. In accord, Cox and Cox (2002) demonstrate that more simple stimuli yields increased levels of satiation compared to complex stimuli. For example, exposing individuals to salty food advertisements decreased their enjoyment when they simultaneously consumed salted peanuts (Larson et al., 2014).

Given the differing perceptual elements in reality-enhancing technologies, we propose that in comparison to lesser consumption experiences, simulated satiation will occur at a slower rate.

That is, enjoyment will decay less swiftly for reality-enhancing technologies that build experiences and interactions (vs. material objects) when using computer-generated renderings with complex (vs. simple) stimuli.

Reality-enhancing technology experiences purport perceptual benefits that help prevent erosion of enjoyment (e.g., physical immersion and psychological presence; Guttentag, 2010; Wedel et al., 2020). Immersion is the degree to which an individual perceives a computer simulation as realistic based on sensory inputs, such as hearing or sight (Krishna, 2011). Immersive VR experiences can positively influence behavioural intentions, satisfaction, loyalty, attitudes and perceived informativeness (Li et al., 2003; Hudson et al., 2019; Kang et al., 2020). Presence represents a state of mind that the user feels present in a computer simulation or virtual environment (Schubert et al., 2001). Social richness, realism, and transportation can further drive the feeling of a consumer's presence in a virtual setting (Nagy & Koles, 2014; Diemer et al., 2015). That is, the more realistic and involving a simulated experience, the lower the rate of decay of enjoyment or benefits a consumer might experience. Stated more formally, we propose:

P₂: Perceptual drivers will decrease simulated satiation, as compared to the same stimulus in real-life settings.

3.3.3.3 Self-evaluation drivers of simulated satiation

Physiological and perceptual antecedents to satiation occur based on the consumption itself. However, self-reflection antecedents arise from a process of consumers' self-evaluation regarding current or past consumption (Galak & Redden, 2018). Antón et al. (2018) list such antecedents as special meaning, perceived past variety, quantity monitoring, subjective quantity, and recency. These factors require high levels of cognition regarding individuals themselves and their consumption experience to affect satiation rates (Redden, 2015). For example, considering subjective recency, difficulty remembering past consumption considerably reduces perceived satiation because consumers might believe that they did not consume enough recently (Redden & Galak, 2013).

Individuals also display less satiety regarding items they receive as gifts (Yang & Galak, 2015). This low satiation rate indicates that the special meaning of a stimulus, such as when the stimulus is gifted to a consumer, can influence consumers' satiation levels. Evident in the literature, divergence in cognition affects satiation via the consumption experience (Redden, 2015), which makes cognitive and affective responses a guide for the development of theory of simulated satiation. These self-evaluation drivers of simulated satiation create variance in individuated decay rates for enjoyment of experiences via reality-enhancing technology.

3.3.4 Cognitive and affective experiences

Cognitive customer experiences are often operationalized via an individuals' knowledge and beliefs, and linked to the concept of flow (San Martín & Del Bosque, 2008; Van Noort et al., 2012; Molinillo et al., 2020). Flow represents a cognitive state that renders individuals completely immersed and unaware of time and surroundings, and can occur during online navigation (Novak et al., 2000). In accordance, prior research shows that cognitive states result from an experience of optimal flow which directs individuals' positive and subjective experiences (Hoffman & Novak, 2009; Martin et al., 2015). Rose et al. (2012) explore four antecedents to flow: speed of interactivity, telepresence, skill, and level of challenge. As a consequence, in reality-enhancing technology experiences, the amount of attention paid and cognitive resources devoted to the experience can help achieve higher (or lower) levels of presence, immersion and flow (Baka et al., 2018; Tussyadiah et al., 2018).

An affective state represents attitudes, emotions, and moods (Bagozzi et al., 1999). Rose et al. (2012) demonstrate that perceived benefits, aesthetics, and control prominently influence an individuals' affective state in online shopping contexts. Cognitive and affective experiential states significantly influence other constructs in the customer experience, such as trust, satisfaction and repurchase intent (Bilgihan et al., 2016; Martin et al., 2015).

In a tourism context, researchers found that cognitive and affective responses positively influence attachment regarding VR tourism experiences; however, cognitive responses surpass the effect of affective response in terms of visit intention (Chung et al., 2015; Kim et al., 2020). Cordially, the

literature signals that marketers should employ and promote more cognitive elements than affective ones in VR experiences. In order to confirm this assertion, it might be best to first examine whether flow is either a cognitive or affective dimension, in order to avoid any potential negative effects. More formally, we propose:

P₃: Reality-enhancing technologies that build immersive cognitive states will decrease simulated satiation, and;

P₄: Reality-enhancing technologies that focus more on building attitudes via affective states will decrease simulated satiation.

3.3.5 Increasing or decreasing simulated satiation

Marketing researchers have explored how to reduce the impact of negative effects from declining enjoyment, which has a prominent effect on consumers' decisions (e.g., product replacement, switching intent; Caro & Martínez-de-Albéniz, 2012; Park & Jang, 2014; see Table 3.2). For instance, Chugani et al. (2015) found that individuals' satiation levels decrease if they consume a product that is linked with their self-identity (e.g., university identity or cultural identity). In this vein, if individuals satiate more quickly on a product linked with their self-identity, then they will resist the effects of satiation and experience dissonance. Such dissonance could be considered a type of defence mechanism that protects consumers from the negative aspects of satiation. Though future research will be imperative to this, many of the effects shown in Table 3.2 are anticipated to replicate in reality-enhancing technology consumption and experiences.

Table 3.2 Factors that increase/decrease satiation (adapted from Redden, 2015).

<i>Increases satiation</i>	<i>Decreases satiation</i>
Overconsumption of a stimuli; Nelson & Meyvis (2008); Nelson et al. (2009)	Attention to the amount of consumption; Sevilla & Redden (2014)
Overexposure to a stimuli; Zajonc et al. (1972); Colman et al. (1986); Hunter & Schellenberg (2011)	Cues of variety; Raghunathan & Irwin (2001), Redden (2008); Galak et al. (2009)
Past consumption of a stimuli; Galak et al. (2009); Redden & Galak (2013)	Emotional differentiation regarding a stimuli; Poor et al. (2012)
Sensory-specific aspect of a stimuli; Rolls et al. (1984); Raynor & Epstein (2001)	Identity-consistency of a stimuli; Chugani et al. (2015)
Stimulus complexity; Nicolao et al. (2009)	Less encoding; Brunstrom & Mitchell (2006); Higgs & Woodward (2009); Higgs & Donohoe (2011); Nelson & Redden (2017)

Stimulus strength; O’Sullivan et al. (2010); Finkelstein & Fishbach (2010)	Limited availability of a stimuli; Sevilla & Redden (2014)
Perceived similarity of a stimuli (VR) to real life experience; Deng et al. (2019); Boyd & Koles (2019)	Variety of Consumption; Rolls et al. (1984); Raynor & Epstein (2001); Hetherington et al. (2006)
Repeated consumption or exposure of a stimuli; Thompson & Spencer (1966); Cabanac (1971); Raynor & Epstein (2001); Redden (2008); Galak et al. (2009)	

Satiation arises via several mechanisms; however, two of the most significant and examined ones are habituation and adaptation (Antón et al., 2018). Habituation arises from repeated consumption or exposure and shows both decreased attention levels and hedonic decline for a given stimulus (Redden, 2015). In parallel, adaptation represents a hedonic decline and lowered stimulus intensity that occurs based on past consumption or exposure (Antón et al., 2018; Galak & Redden, 2018). Thus, habituation and adaptation might counteract the impact of sensory overload driven by physiological bodily responses to virtually enhanced environments (Lasaleta & Redden, 2018). Consequently, we purport that habituation aids the experience of enjoyment and perceived benefits from reality-enhancing technologies. Stated formally, we propose:

P₅: Increased habituation to a simulated reality decreases simulated satiation.

3.3.6 The effects of vicarious experiences on simulated satiation

Prior research demonstrates that vicarious experiences influence consumers’ satiety (McCulloch et al., 2011; Tobin et al., 2015). This informs theorizing of simulated satiation as an imagined and/or felt experience driven by reality-enhancing technology. Vicarious experiences can emerge from any information, idea or feeling that the observer receives via an intermediary source (Smith et al., 2005; Ackerman et al., 2009; Marder et al., 2019). Vicarious, even imagined, experiences likewise influence individuals’ perceptions and behaviours. Tobin et al. (2015) show that reward sensitivity and motivation have a prominent effect on vicarious goal satiation. Their research indicates that when individuals observe a completed “have-to” task (e.g. studying), their motivation regarding the same goal decreases and shifts towards “want-to” tasks (e.g. watching a movie). Such goal shifts occur more prominently among people who are more reward sensitive.

Therefore, goals can be fulfilled in reality-enhancing settings, which influence goal pursuit related to or transferred from such settings.

When perceived commonality of identity between an observer and an observed actor is high, then the observer is more likely to vicariously assimilate the protagonist's behaviours (Goldstein & Cialdini, 2007). In parallel, Mobbs et al. (2009) suggest that perceived similarity between a viewer and a contestant influences perceived vicarious reward. Participants in Mobbs' study felt closer and more similar to the socially desirable contestant, showing a prominent relationship between perceived similarity, agreeableness and perceived vicarious reward for the viewer. We propose:

P₆: Reality-enhancing technologies that generate higher rates of similarity for individuals will decrease simulated satiation.

In a related vein, reality-enhancing environments that create complete novelty and drastic differentiation for consumers can reduce the rate of decay of benefit from the experience. That is, when a consumer engages with a vastly different VR world (e.g. historical past, a fictitious world, or an alien planet via VR games), they are less likely to satiate quickly. We argue this is because vicarious nostalgia can prominently enhance brand attitude and behavioural approach goals (Leigh et al., 2006; Marchegiani & Phau, 2011). Vicarious, imagined or felt nostalgia refers to the feeling of yearning for a specific era that was not directly experienced by a person (Goulding, 2002b). Vicarious nostalgia, when not experienced via reality-enhancing technologies, is typically generated from a combination of advertisement stimulated emotions and fantasies regarding a specific time period from the past. Merchant and Rose (2013) explore how brands Chrysler, Chevrolet, Mountain Dew and Wells Fargo Bank use elements of vicarious nostalgia in their advertisement campaigns. Marketing practitioners utilizing reality-enhancing technology could benefit from deploying vicarious nostalgia in their marketing campaigns to enhance the efficiency of their stimuli, decrease hedonic decline, and yield stronger perceptions in consumers' minds. Therefore, we propose:

P₇: Reality-enhanced nostalgia for a past or vastly different reality than typically experienced will decrease simulated satiation.

In a tourism context, there are explicit threats to the consumption of future experiences following immersion in a VR destination tour (Yung & Khoo-Lattimore, 2019). Despite vicarious travel consumption significantly enhancing individuals' intention to visit the destination (Sparks & Browning, 2011), alternate research indicates that such experiences negatively influence consumers' travel plans (Deng et al., 2019; Liu et al., 2019; Marder et al., 2019). Considering the interactive, vivid, realistic, and immersive nature of VR, extant literature demonstrates that individuals can accept VR as a substitute for real-life experiences, such as visiting museums, theme parks and concerts (Guttentag, 2010).

Deng et al. (2019) show how vicarious travel experiences, such as museum or art gallery visits in virtual worlds, can decrease tourists' intention to visit the destination depicted in reality. Vicarious travel consumption that occurs incidentally can also affect consumer behaviour. Marder et al. (2019) show how vicariously experiencing travel-related content can trigger inconsistencies in individuals' minds regarding their self-concepts, such as exploration, leisure and belonging, resulting in compensatory consumption in unrelated non-tourism categories. It is evident that consuming destination-related experiences via VR increases simulated satiation, which in turn drives negative effects towards tourism destinations. Formally, we propose:

P⁸: Experiencing destinations via reality-enhanced technology will increase simulated satiation and decrease visit intent.

Virtually experiencing products is proposed to only improve desire for such products via lessened simulated satiation. In online retail and e-commerce environments, consumers mostly make decisions about their desired products and services based on vicarious experiences (van Esch et al., 2016; van Esch et al., 2019; Kapitan et al., 2021). Such experiences occur in many distinct forms, such as internet-based simulations and direct observation of other individuals' experiences (Smith et al., 2005). These experiences play a crucial role in e-commerce, where human senses such as touch and taste are absent (Heller et al., 2016). Since vicarious evaluation of products is critical, reality-enhancing tools can provide better product evaluation opportunities (Yim et al., 2017). Suh and Lee (2005) argue that virtual reality-based websites help consumers generate more knowledge regarding products, which in turn positively influences purchase behaviour, resulting

in simulated satiation occurring at a lower rate for products (vs. experiences). Formally, we propose:

P₉: Experience of products via reality-enhanced technology will decrease simulated satiation and purchase intent.

3.4 Proof-of-Concept Experimental Study

To demonstrate the ecological validity of simulated satiation, we conducted a proof-of-concept experimental study to explore its potential consequences through operationalizing different dependent variables (e.g., stickiness and subjective well-being), a mediator (e.g., perceived usefulness), and ruling out alternate explanations (e.g., perceived easiness and perceived enjoyment). Importantly, we varied exposure duration to a VR video to probe how sensory overload via physiological drivers (P1) and how consuming experiences (P8) might impact consumer outcomes including intention to engage with VR experiences in the future.

3.5 Method

136 MTurkers (36.8% Female, $M_{Age} = 37.46$, $SD = 10.20$) participated for a small monetary incentive and were randomly assigned to one of two conditions (length of exposure: short [one roller coaster ride] vs. long [five roller coaster rides]). Participants were shown either a short or a long version of a VR roller coaster experience (i.e., <https://youtu.be/hNAbQYU0wpg>).

After exposure, participants were asked to indicate their stickiness—or future repeat intentions for—VR experiences using a three-item scale ($\alpha = .86$; higher scores indicate greater stickiness; Lien, Cao, & Zhou, 2017) and subjective well-being with VR as part of life using a four-item scale ($\alpha = .89$; higher scores indicate greater well-being; Kim et al., 2020).

To capture the underlying mechanism contributing to the differences between short and long exposure, we measured participants' perceived easiness ($\alpha = .75$), perceived usefulness and benefits from the VR experience ($\alpha = .88$), and perceived enjoyment ($\alpha = .87$; Kim et al., 2020; see Appendix C for all measurement items).

3.6 Results and Discussion

Manipulation Check. The analysis of variance showed that our manipulation performed as intended ($M_{Short} = 2.08$, $SD = .85$ vs. $M_{Long} = 4.30$, $SD = .89$, $F(1, 134) = 220.57$, $p < .001$; $\eta^2 = .62$).

The Main Effect of Exposure Satiation. The results of a one-way ANOVA revealed that participants indicated significantly greater stickiness to short (vs. long) VR exposure ($M_{Short} = 5.81$, $SD = .98$ vs. $M_{Long} = 5.06$, $SD = 1.67$, $F(1, 134) = 10.46$, $p = .002$; $\eta^2 = .07$) and greater subjective well-being thereof ($M_{Short} = 5.74$, $SD = .78$ vs. $M_{Long} = 5.23$, $SD = 1.40$, $F(1, 134) = 6.96$, $p = .009$; $\eta^2 = .05$).

The Mediation Effect. To examine tested mediators, we conducted mediation analyses using SPSS PROCESS macro (Hayes, 2018; Model 4, 10,000 bootstrapped samples) with length of exposure as the independent variable, stickiness and subjective well-being as the dependent variables, respectively, and perceived easiness, perceived usefulness, and perceived enjoyment as the mediators.

The analyses yielded a significant total effects model (stickiness: $\beta = -.75$, $SE = .23$, $t = -2.23$, $CI_{95\%}: -.121, -.29$; subjective well-being: $\beta = -.51$, $SE = .19$, $t = -2.64$, $CI_{95\%}: -.88, -.13$). In addition, we found significant mediation effects of perceived usefulness and benefits of VR (stickiness: $\beta = -.43$, $SE = .19$, $CI_{95\%}: -.85, -.10$; subjective well-being: $\beta = -.40$, $SE = .16$, $CI_{95\%}: -.74, -.12$), but not for perceived easiness (stickiness: $\beta = -.03$, $SE = .08$, $CI_{95\%}: -.23, .09$; subjective well-being: $\beta = -.02$, $SE = .04$, $CI_{95\%}: -.13, .04$) or perceived enjoyment (stickiness: $\beta = -.01$, $SE = .04$, $CI_{95\%}: -.10, .05$; subjective well-being: $\beta = -.02$, $SE = .04$, $CI_{95\%}: -.10, .06$), therefore, ruling out these two alternate explanations. Figure 3.1 shows the resulting study framework tested.

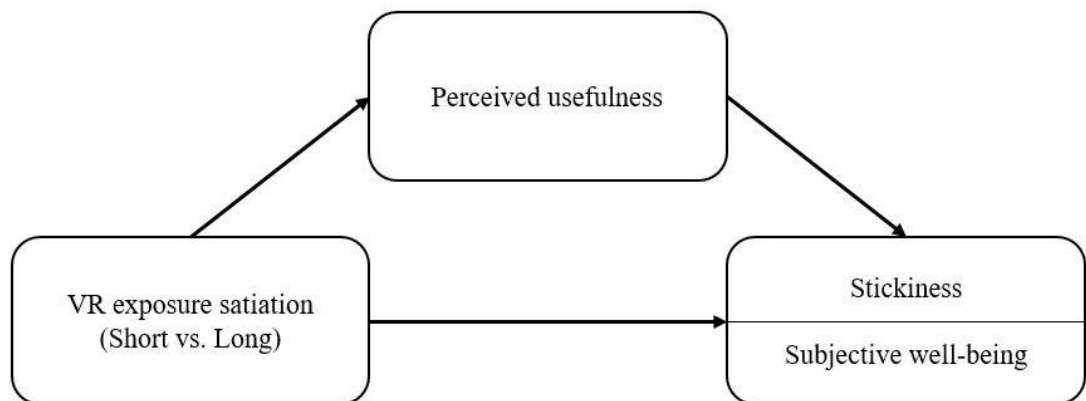


Figure 3.1 Proof-of-concept experimental study framework.

Taken together, these findings show the first initial evidence that physiological factors, operationalized here as overexposure to a VR experience via virtual roller coaster rides, can decrease benefits for consumers. Overall, this initial study is the first known empirical proof-of-concept for simulated satiation. In it, we show (1) consumers report more future use intentions (stickiness) for VR and more subjective well-being for shorter (vs. longer) VR exposure durations, (2) consumers experience differences in perceived benefits from over-consuming a VR experience, and (3) differences in perceived benefits gained from shorter (vs. longer) VR exposure, again, influences the stickiness of VR as a tool and subjective well-being.

3.7 Directions For Future Research

Through proof-of-concept, we begin the process of testing some of our propositions. However, the existence of the novel concept of simulated satiation and all of our developed propositions requires further empirical validation. To aid such validation, we synthesized the literature to create 9 testable propositions to examine where, when and how declining rates of perceived benefits from such experiences affect key consumer and marketing outcomes. To build this line of inquiry, we recommend that a scale to measure individuals' *simulated satiation* in reality-enhanced settings be developed. For example, the empirical study reveals that the perceived usefulness of a VR experience mediated the impact of short (vs. long) exposure on consumer outcomes, but

that feelings of fun and enjoyment in the simulated setting alone did not, and neither did perceptions of ease and simplicity of the simulated environment. Although the empirical results offer some insights, it remains unclear as to exactly what concepts are involved in simulated satiation as a defined higher-order construct. A scale that evaluates simulated satiation and compares and contrasts this construct within a nomological network of related and divergent constructs will be key to understanding its abilities and limitations. Once developed, a simulated satiation scale could be deployed in experiential and non-experiential consumption settings (e.g. tourism and retail) to evaluate the impact of simulated satiation via reality-enhanced technology experiences. Furthermore, simulated satiation could be tested in experimental settings to determine the effects on consumer behaviour.

Our propositions also have competing theoretical explanations for satiation derived from reality-enhanced technologies. These competing explanations give rise to a need for empirical support regarding the true effects of simulated satiation on reality enhanced experiences. In particular, Table 3.3 illustrates 4 key contradictions and inflection points from theory that warrant empirical testing in order to drive the research agenda forward.

Table 3.3 Key theoretical contradictions and areas for future empirical testing.

<i>Propositions</i>	<i>Contradiction</i>
P3 (cognitive) vs. P4 (affective)	Is flow truly a cognitive experience in VR, AR, and MR? Are affective experiences truly a leading driver of attenuation of perceived benefits in virtual worlds?
P1 (physiological) vs. P5 (habituation and adaptation)	Do the physiological effects of immersion deter consumers for extended periods of time, or can adaptation to the virtual environment become a boundary effect to P1?
P8 (virtual experience or virtual destination) vs. P9 (virtual product)	Current theorization shows that reality-enhancement will decrease simulated satiation for product experiences, but increase simulated satiation for destination or tourism experiences. Is this always the case? When do virtual objects and experiences with virtual objects decrease enjoyment and decay purchase or usage intentions for physical products? When does virtual destination tour increase desire to visit actual destinations?
P5 (habituation) vs. P8 (experience or virtual destination)	The literature generates contrasting theoretical explanations for how adaptation and habituation can lessen hedonic decline in simulated environments, and yet virtual destination tourism experience increases satiation and lowers visit intentions. Does this mean tourism marketing can adapt methods that

increase familiarity and accessibility of their destinations without lowering satiation for the experiences? What are the boundary conditions to the effects of vicarious satiation for virtual tours?

Prior research shows that, in a psychological context, satiation resembles an individuals' cognitive and affective responses after repeated consumption or exposure of a stimulus (Poor et al., 2012; Park & Jang, 2014). In reality-enhanced technology settings, the value of psychological features, such as affect and cognition, becomes more substantial. Recent investigations examined cognitive and affective responses to understand how to reduce satiation (Antón et al., 2018). Consequently, the literature is scarce on the effect emotions have on satiation (Poor et al., 2012). To date and the best of our knowledge, there is limited research on cognitive and affective experiences and satiation in virtual mediums. Therefore, in order to extend prior literature, we propose that cognition and affect will influence the relationship between AR, VR or MR exposure and simulated satiation, along with other critical constructs, such as trust, satisfaction and purchase intent (Bilgihan et al., 2016; Martin et al., 2015).

Furthermore, in an experiential context, consumers have the ability to vicariously enjoy a product or service through a digital device without any physical interaction with the stimulus. The extant literature has briefly shown examples of how vicarious satiation could influence consumers' behaviours and decisions, such as goal setting and/or variety seeking in group settings (McCulloch et al., 2011; Tu & Fishbach, 2012). However, the literature regarding vicarious satiation in reality-enhanced environments (e.g. simulated satiation) and how it influences consumers' decision making is under-researched, prompting much needed inquiry.

Lastly, we conducted our proof-of-concept study using desktop VR content as stimuli, which allowed us to engage with diverse participants. Although extant literature supports the effectiveness of 360-degree desktop VR stimuli in simulating an immersive environment, we consider this to be a limitation of our study because it may reduce ecological validity of our findings (Brivio et al., 2021; Eiris et al., 2020). Therefore, we recommend that future research replicate our study by employing fully immersive VR headsets and collecting data via lab experiments.

3.8 Conclusion

This research contributes to the development of theory pertaining to virtual experiences. We propose a theoretical extension of scholarship in marketing and consumption for reality-enhancing technologies in the form of simulated satiation, defined as attenuation in perceived benefits that occurs due to repeated or prolonged exposure to vicarious and simulated intermediary sources. This is the first known work to examine simulated satiation as a factor that underlies consumer experiences with reality-enhancing technologies.

Next, drawing from the literature on satiation, reality-enhancing technologies and the role of vicarious experiences in consumption (Aitken et al., 2019), we present 9 testable propositions. Each proposition is aimed at determining how simulated satiation can unlock implications about engaging consumers for the right amount of time to boost marketing outcomes in reality-enhancing technology mediums. We further conducted a proof-of-concept study to test proposition 1 (see Figure 3.1), and show that lower exposure duration to virtual reality content as a physiological driver of simulation satiation yields increased benefits and usefulness perceptions for VR. In turn, greater perceptions of VR benefits and usefulness then mediate stickiness for VR experiences and consumers' subjective well-being.

Finally, we carry forward key theoretical contradictions and areas for future empirical testing based on simulated satiation in virtual environments, including experiences, that are reshaping consumer decision making. Importantly, although we empirically test how physiological reactions driven by longer (vs. shorter) duration of exposure to a virtual destination experience can reduce perceived benefits for consumers (P_1 , P_8), the roles of immersion, affective states, habituation and adaptation, similarity, nostalgic virtual or augmented environments, and simulated satiation for products are among those waiting to be examined (Antón et al., 2018; Baka et al., 2018; Deng et al., 2019; Kim et al., 2020; Lasaleta & Redden, 2018; Merchant & Rose, 2013; Rauschnabel, 2021; see Table 3.3). This area is ripe for continued theoretical development and empirical testing, and we suggest that our work is the impetus for continued inquiry.

Despite public awareness and market adoption, AR/VR formats still have limitations, such as overheating, inadequate computation capabilities, limited battery life and high latency or delay between action and inaction (Seam et al., 2017). A significant threat for such technologies' efficiency and acceptance is high levels of latency— any delay or discrepancy in loading time of virtual experiences blocks the positive effect of immersion and may even cause physiological issues, such as disorientation and nausea (Einav, 2019). Even small latencies can cause displeasure and ultimately lower sales and satisfaction (Khan, 2015). Alternatively, reality-enhancing technologies have brought many opportunities to people's lives, such as all-angle product viewing, virtual observation of tourism destinations, and access to virtual stores (Bonetti et al., 2018; Hilken et al., 2018). Moreover, such technologies continue to receive continued attention from academia (Huang et al., 2016; Jung et al., 2017).

However, this nascent field has not, before now, generated a clear research agenda for exploring the effects of which factors influence technologies' impact on simulated satiation. We propose the concept of simulated satiation as a key factor to generate insight into AR/VR/MR satisfaction, desire, purchase intent, perceived benefits and enjoyment of simulated experiences. Specifically, in the virtual experience context, consumers could vicariously enjoy a product or service through a digital device (e.g. smartphone, tablet) without having to physically engage or interact with the product or service. However, such experiences may cause simulated satiation, which may reduce intended marketing effects.

This research theoretically puts forth factors that may positively or negatively influence simulated satiation. However, it will be vital for future scholarship on reality-enhancing technologies to explore which factors (cognitive and affective experiences, physiological, perceptual, speed, vicarious experiences) significantly increase or decrease simulated satiation.

3.9 References

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Preface To Chapter 4: Link and Contributions

Chapter 4 addresses research questions 2, 3, and 4. It conceptualizes simulated immersion, which is a dimension of simulated responses along with simulated satiation, and develops a psychometric scale to measure consumers' simulated responses in reality-enhancing technology settings.

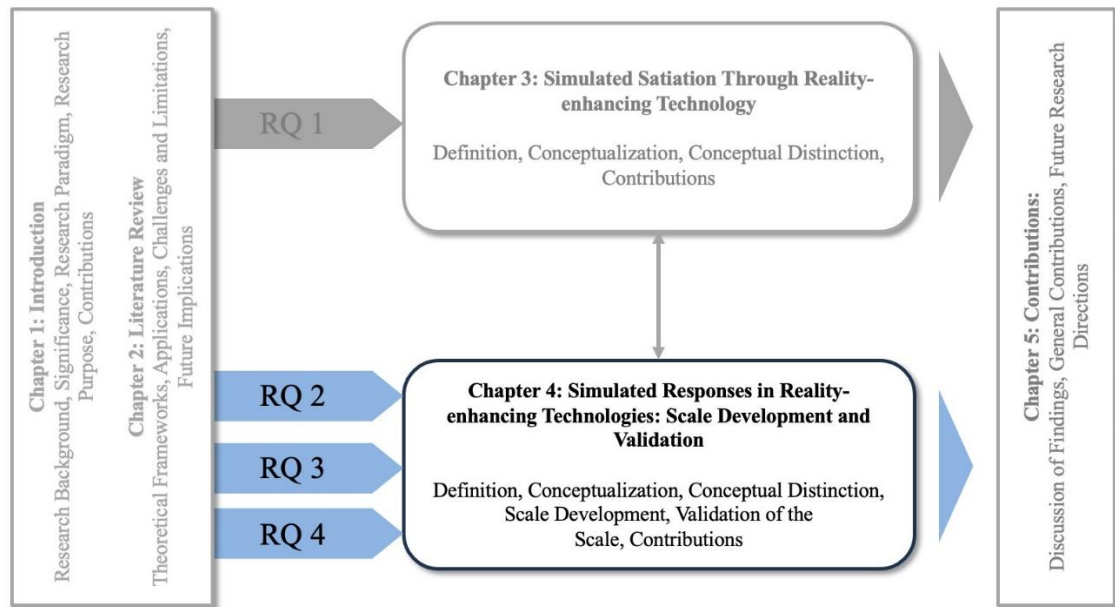


Figure 1.1 Thesis overview.

Upon the conceptualization of simulated satiation and recognition of the need for a scale to measure it in simulated environments, this research proposes another concept called simulated immersion to counter the negative impact of simulated satiation in reality-enhancing technology settings. These two concepts counterbalance each other and together form consumers' simulated responses in reality-enhancing technology experiences. The following chapter first explains the theoretical background of such concepts and then employs a scale development method that is validated by previous literature. Additionally, Chapter 4 also explores how simulated responses impact consumers' perceptions and behaviour in reality-enhancing technologies and provides the first known evidence for the main and moderating effects of simulated responses in a marketing-oriented reality-enhancing technology experience.

Chapter 4: Simulated Responses in Reality-Enhancing

Technologies: Scale Development and Validation

This chapter is currently under second-round review in the *International Journal of Information Management*.

Pala, E., Kapitan, S., & van Esch, P. Simulated responses in reality-enhancing technologies:

Scale Development and Validation. *International Journal of Information Management*

[2nd Review].

4.1 Abstract

Reality-enhancing technologies from virtual reality to augmented and mixed reality influence consumer decisions, yet our understanding of how consumers respond to marketing content using such technologies is nascent. We develop a scale to measure consumers' simulated responses in reality-enhancing technology experiences, resulting in the creation of a 12-item simulated responses scale. Analyses reveal that simulated responses form a multidimensional construct, simulated satiation (6 items) and simulated immersion (6 items), with each dimension considered an independent scale. Consequently, simulated satiation lowers evaluations of augmented reality tools and purchase intent, yet perceptions that enhance simulated immersion raise both responses. The results reveal how content variety and exposure duration interact with simulated satiation and simulated immersion to influence consumers' evaluations and decisions. By employing the simulated responses scale, marketing practitioners can assess the effectiveness of their reality-enhancing technology strategies. The goal is to optimize content variety and exposure duration to achieve better outcomes prior to launching a marketing campaign.

Keywords: Augmented Reality, Immersion, Marketing, Reality-Enhancing Technology, Satiation, Simulated Immersion, Simulated Satiation, Virtual Reality.

“ [Augmented reality] is the direction that I think is far more interesting and promising — for technology and, really, for humanity. AR is designed to add, enhance the things you do as a human being: Being outside, socializing with other people, shopping, playing, having fun. AR can make all those things better.”

John Hanke, Pokémon Go creator, CEO of Niantic Inc.

4.2 Introduction

Over the past decade, new computer-oriented disruptive innovations called reality-enhancing technologies, such as augmented reality (AR) and virtual reality (VR), have gained considerable prominence. AR superimposes additional sensory data, such as objects, sounds, and avatars, onto the physical world. VR differs in that it fully assembles kinetic, visual, and audio elements to create a simulated environment via computer settings (Wedel, Bigné & Zhang, 2020). Mixed reality (MR, i.e., hybrid reality) combines both AR and VR elements in one technological setup (Farshid et al., 2018). Some technologies are seamlessly and easily enabled via an internet-connected mobile device, for instance a maps application that overlays a street view with directions. Others are more involved and require hardware such as mobile devices and headsets to provide immersive, engaging, and realistic experiences to individuals in contexts from gaming and tourism to retail (Kang, Shin & Ponto, 2020; van Esch et al., 2019). In 2021, the global market for reality-enhancing technologies exceeded \$28 billion USD; by 2028, it is projected to reach \$252.16 billion USD (Alsop, 2022).

As reality-enhancing technologies become increasingly popular, marketing scholars are investigating how such technologies influence consumer behaviour and attitudes. Prior research revealed that such technologies are beneficial for both the retail and tourism industries because they provide many benefits, such as interactive marketing campaigns and reduced marketing costs (Heller et al., 2019). Moreover, they significantly enhance individuals' engagement, satisfaction, purchase and visit intentions (Javornik, 2016; Poushneh & Vasquez-Parraga, 2017). However, reality-enhancing technology experiences do not always result in positive outcomes. Such technologies can cause disorientation, nausea, and most importantly, satiation (Deng, Unnava & Lee, 2019; Pala, Kapitan & van Esch, 2022). Disorientation and nausea are physical effects, and individuals can avoid or reduce their negative impact by inserting time breaks or limiting the duration of the experience. Alternatively, satiation is related to both psychological and physiological elements, which is a more complex phenomenon requiring investigation (Redden, 2015; Sevilla, Lu & Kahn, 2019).

The theory of satiation was built on the idea that overconsumption and overexposure reduce consumer joy and satisfaction (Glanzer, 1958). Moreover, satiation poses a critical challenge to businesses because it directly influences consumers' product replacement and disposal behaviour (Redden, 2015). Prior research investigates antecedents and outcomes of satiation in multiple contexts in real-life experiences, such as economics, psychology, and marketing (Sevilla & Redden, 2014; Galak & Redden, 2018). The theory of satiation plays a significant role in marketing; however, literature regarding satiation in reality-enhancing technology settings is nascent. Unlike real-life experiences, consumers can face multiple challenges when using such technologies, which can trigger simulated satiation. For example, latency-rendering issues, low graphic quality, delay, and knowing that the experience is just a simulation can each reduce the enjoyment of simulated experiences (Guerreiro et al., 2015; Pala et al., 2022).

Alternatively, another theoretical concept called immersion in reality-enhancing technologies (i.e., simulated immersion; Suh & Prophet, 2018) can oppose the harmful effects of simulated satiation because it significantly boosts satisfaction, loyalty, and enjoyment (Kang et al., 2020). The theory of immersion indicates that when consumers believe the reality-enhancing technology content has high graphic quality or is realistic, it increases their immersion levels within the simulated environment; however, if consumers believe the content has poor graphic quality, then it triggers satiation in the simulated setting (Wedel et al., 2020). Following this, we propose that (1) simulated satiation and simulated immersion are created in and emerge from simulated, reality-enhancing technology interfaces, and (2) that they counter each other and, together, form consumers' simulated responses. Understanding consumers' simulated responses— responses to the simulated world in reality-enhancing technology mediums— can help marketers and businesses adjust their content and marketing efforts accordingly and redesign marketing campaigns. However, the current literature does not yet have a formal definition or an accompanying psychometric tool for measuring simulated responses in reality-enhancing technology mediums. Therefore, the goal of this research is to develop a scale that measures consumers' simulated responses and test the predictive power of these responses in simulated environments.

We follow rigorous scale development methods and employ five steps to develop a scale of simulated responses, including (1) item generation and content validity, (2) scale purification, (3) scale validation and nomological validity testing, (4) confirmation of the scale structure, and (5) predictive validity testing (Böttger et al., 2017; Churchill, 1979; Kapitan et al., 2019). Item generation, scale validation, and scale confirmation phases among multiple independent samples of consumers resulted in creating and confirming a 12-item simulated responses scale with two dimensions, simulated satiation (6 items) and simulated immersion (6 items). Nomological network analysis reveals that simulated satiation and simulated immersion are related but distinct from existing scales in the marketing literature, such as involvement with the internet and narrative transportation. Finally, we tested the predictive power of the simulated responses scale. In the final study, we vary high (vs. low) content variety and exposure duration in a reality-enhancing AR marketing tool to probe the impact on consumer attitudes and decisions. Results demonstrate that (1) simulated satiation reduces individuals' evaluations of AR tools and product purchase intent, yet (2) conversely, simulated immersion enhances evaluations of AR tools and product purchase intent. Unlike existing immersion research (Sylaiou et al., 2008; Sun et al., 2015), we found that overexposing individuals to reality-enhancing technology marketing content triggers simulated satiation and lowers the positive effects of simulated immersion. Findings contribute to the marketing satiation literature (Redden, 2015; Sevilla, Lu & Kahn, 2019) by revealing that, unlike in real-life experiences, variety in simulated environments interacts with simulated satiation to reduce individuals' perceived enjoyment.

In this work, we create a rigorous, replicable and useful scale measure of simulated responses that marketers and businesses can use to better understand how consumers respond to reality-enhancing marketing content. In addition, we explore how brands can adjust content in terms of variety and exposure duration to launch more effective marketing campaigns, given both simulated satiation and simulated immersion responses. In developing and extending the operationalization of simulated responses, we develop a psychometrically sound measure of a key emerging construct when marketing in simulated environments.

4.3 Literature Review

4.3.1 Reality-enhancing technologies in marketing settings

Reality-enhancing technologies such as VR, AR and MR are used today in gaming, entertainment, medical training, military, retail, and tourism (Barnes, 2016; van Esch et al., 2016; Heller et al., 2016). Such technologies have a critical role in marketing, particularly in tourism and retailing (Heller et al., 2019). Reality-enhancing technologies enhance retailer positions as they provide more immersive brand experiences, reduce marketing costs and product returns, and yield more interactive marketing campaigns featuring all-angle product viewing, distinct store designs, and access to virtual store walk-in (Scholz & Smith, 2016; Bonetti et al., 2018). VR and AR technologies significantly impact consumers' satisfaction, joy, purchase intention, and engagement; moreover, they increase company profits (Pachoulakis & Kapetanakis, 2012; Javornik, 2016; Poushneh & Vasquez-Parraga, 2017). In addition, companies that adopt reality-enhancing technologies are seen as innovative pioneers by competitors and consumers alike (Pantano, 2014).

Major brands including Alibaba, Balenciaga, eBay, North Face and Volvo have created VR stores as a marketing technique to attract consumers and increase product sales and competitiveness (Moorhouse et al., 2018). In the retail industry, VR has created new horizons for business and has positively affected the hedonic value of the shopping experience (Kim & Forsythe, 2008; Mann et al., 2015; Oh, Yoon & Shyu, 2008).

Reality-enhancing technologies also empower tourists to virtually experience destinations, such as hotels, cultural heritage sites, theme parks, and sporting events (Rosedale, 2016). Such technologies, especially VR, allow users to experience the virtually created medium as if the consumer were a part of it. They also help prospective tourists familiarize themselves with unknown destinations (Tussyadiah et al., 2018). In the tourism industry, one of the most crucial issues is that the products are not tangible, and individuals cannot evaluate them before they make an in-person visit (Wan et al., 2007). However, prospective tourists via VR can virtually experience any location they desire, allowing them to make more informed, comfortable, and effective decisions (Yung & Khoo-Lattimore, 2019). To this end, many well-known companies,

for example, Thomas Cook Airlines, Marriott and First Airlines, and Shangri-La Hotels employ VR technology to allure tourists to visit particular travel destinations (Or, 2022).

Reality-enhancing technologies can critically influence consumers' attitudes and decisions regarding products and services (Hudson et al., 2019). For instance, when individuals are about to make a decision regarding products with high economic value, such technologies can reduce perceived risk and anxiety (Manchanda & Deb, 2022). This is because they provide useful information and allow consumers to familiarize themselves with products before the actual purchase or visit (Lee & Oh, 2007; Riar et al., 2021). Reality-enhancing technologies are crucial during the pre-purchase/visit stage because prospective customers are first forming their expectations and impressions about a product or destination. VR can significantly influence particularly this initial assessment role in the decision-making process (Marasco et al., 2018).

However, the success or failure of such technologies depends on consumers' simulated responses to reality-enhancing technology encounters (Moorhouse et al., 2018; Kowalczyk et al., 2021).

Simulated responses in reality-enhancing technology refer to attenuation or rise in perceived benefits that occurs due to repeated or prolonged exposure to vicarious and simulated intermediary sources (Galak & Redden, 2018; Pala et al., 2022). These benefits for consumers include enhanced confidence in decisions and evaluations, along with the potential for enhanced enjoyment in the decision-making process (Bonetti et al., 2018; Kang et al., 2020). Prior research associated attenuation in perceived benefits when using reality-enhancing technologies with the notion of satiation via simulated satiation (Deng et al., 2019; Pala et al., 2022).

We seek to further extend this construct's theorization to include both simulated satiation and simulated immersion as versions of responses in simulated environments. That is, some consumers experience a greater enjoyment of virtual and augmented content. They can be more engrossed and involved in a simulated environment. With increased consumer absorption in a VR or AR experience, we predict that some consumers may experience a rise in perceived benefits in simulated environments.

4.3.2 Simulated Satiation

The theory of satiation indicates that nearly every stimulus becomes less enjoyable and less engaging after overconsumption or overexposure (Becerril-Castrillejo & Muñoz-Gallego, 2022; Nelson & Redden, 2017; Redden, 2008). For instance, watching the same movie over and over—for most people—makes it less entertaining, or going to the same destination for every vacation may not be perceived as exciting as the first time. This omnipresent notion of satiation significantly decreases individuals' satisfaction regarding goods/services and influences product disposal or replacement behaviours (Chugani et al., 2015; Poor et al., 2012). Thus, it severely threatens businesses regarding product usage and brand loyalty (Redden, 2015).

Individuals can experience satiation without being the protagonist of an experience because it can also arise indirectly via observing other individuals' experiences or feelings (Tobin et al., 2015). Prior research calls this phenomenon vicarious satiation and investigates it in multiple contexts, such as goal fulfilment, visit intent, food consumption, and variety-seeking behaviour (McCulloch et al., 2011; Tu & Fishbach, 2012; El-Said & Aziz, 2022; Larson et al., 2014). For instance, in VR experiences, repeated exposure to a stimulus can trigger vicarious satiation and lower intention to visit the destination depicted in VR (Li & Chen, 2019; Manchanda & Debb, 2022). Similarly, the perceived similarity between AR holograms and real-life products can cause vicarious satiation and lower physical product purchases (Rauschnabel, 2018; Carozzi et al., 2019).

Building on the theory of satiation and vicarious experiences, Pala et al. (2022) investigated satiation in reality-enhancing technologies and theorized its key construct, simulated satiation. Simulated satiation is defined as “attenuation in perceived benefits that occurs due to repeated or prolonged exposure to vicarious and simulated intermediary sources.” In parallel with satiation in real-world experiences, simulated satiation occurs based on repetitive overexposure to reality-enhancing content. Understanding and controlling simulated satiation is crucial for marketers regarding content engagement, brand loyalty, and influencing consumers' attitudes and behaviours (Redden, 2015; Sevilla, Lu & Kahn, 2019). Researchers have explored how to control and reduce the harmful effects of satiation (Poor, Duhachek & Krishnan, 2012; Antón, Camarero & Garrido, 2018). But as the construct of simulated satiation develops, the literature has not yet

investigated how to measure simulated satiation and tackle its potential negative effects (Pala et al., 2022). A scale that can measure simulated satiation in reality-enhancing technologies will assist in the advancement of our understanding of the phenomena and contribute to the literature in order to help practitioners overcome its potentially negative effects.

We propose that a related sister concept named simulated immersion is the key component in reality-enhancing technology mediums to counter simulated satiation. This is because, together, they form consumers' simulated responses. By their nature, all reality-enhancing technologies are immersive (Suh & Prophet, 2018; Tom Dieck & Han, 2022). Therefore, along with simulated satiation, we theorize that simulated immersion must be considered in order to unveil consumers' simulated responses in reality-enhancing technology mediums.

4.3.3 Simulated Immersion

The theory of immersion indicates that experiencing a sense of harmony, high involvement, and being a part of a virtual or real-life experience is a meaningful additive to consumer life. This sense of immersion then enhances individuals' positive attitudes and behaviours towards the experience (Cowan & Ketron, 2019; Hansen & Mossberg, 2013; Hudson et al., 2019). For instance, when a tourist turns on Google street view directions as they walk a new city with a directions overlay on their mobile device, the tourist has an AR tour guide framing their view of the city and getting them to their next destination. In tourism and leisure experiences, the importance of immersion is crucial because such experiences are perceived as a secondary reality by consumers. If a consumer does not feel immersed enough, then they will not be able to engage in and become involved with the experience sufficiently (Oh, Fiore & Jeoung, 2007).

In reality-enhancing technology mediums, the notion of immersion differs from immersion in physical experiences because the perceived realism of a virtual experience significantly influences it (Kang, Shin & Ponto, 2020). Thus, in this research, we extend the definition of immersion, by referring to immersion experienced in simulated and augmented environments through reality-enhancing technologies as simulated immersion. Simulated immersion significantly influences satisfaction, loyalty, and enjoyment. It is also one of the primary

components in defining the evaluative nature of customer experience (Kang et al., 2020). User and environment interaction also enhances individuals' perceived simulated immersion (Hudson et al., 2019). This outcome is especially important for VR, AR and MR because, unlike 2D content in online platforms such as websites and social media scrolling, reality-enhancing technologies provide more interactive, wrap-around and surrounding content for their users.

Prior research in immersive technologies mostly compared and contrasted immersion with concepts of presence and flow (Jennett et al., 2008; Guttentag, 2010). However, even though such notions are similar, they are distinct from each other (Lombard & Ditton, 1997). Immersion and presence are kindred terms that have been used interchangeably; however, the most significant difference between them is perceived realism, which increases immersion but does not affect presence in reality-enhanced technology environments (Wedel, Bigné & Zhang, 2020). This indicates that simulated immersion is a broader construct that includes the realism of presence (Hudson et al., 2019). Flow, however, is an intense version of simulated immersion, which makes individuals lose their awareness and self-consciousness about everything but the experience (i.e., a feeling of serenity; Jennett et al., 2008).

High involvement and perceived realism in reality-enhancing technologies increase simulated immersion. However, existing studies demonstrate that spending more time in immersive technologies boosts users' sense of immersion (Sylaiou et al., 2008; Sun et al., 2015). This finding, however, warrants further investigation because it contradicts the satiation literature. Research regarding satiation alternatively emphasizes that overexposure or overconsumption of a stimulus can trigger satiation and thereby lower the positive effects of simulated immersion (Redden, 2008; Tang, Huang & Su, 2022; Pala et al., 2022). Therefore, current marketing literature is nascent on the intersection of satiation and immersion in reality-enhancing technologies to understand consumers' simulated responses.

4.3.4 The Need for a Simulated Responses Scale

Prior research has yet to investigate how simulated satiation and simulated immersion together influence reality-enhancing technology user responses (Pala et al., 2022). Simulated satiation

poses a challenge to businesses in terms of brand loyalty, content engagement, consumer attitudes, and visit/purchase intent (Redden, 2015). On the other hand, simulated immersion boosts satisfaction, loyalty, and enjoyment (Kang et al., 2020). Taken together, the two concepts counter each other, which makes both constructs important for future study of consumers' simulated responses in reality-enhancing technology mediums. Currently, there are no psychometric studies of simulated responses to measure such concepts in the marketing literature, and research regarding satiation in reality-enhancing technologies is scarce (Li & Bailenson, 2018; Zandstra et al., 2020; Le, Chen & Nguyen, 2024; Pala et al., 2022). Therefore, in this research, we develop a scale that can measure consumers' simulated responses in reality-enhancing technologies by employing the concepts of simulated satiation and simulated immersion. The intent of this scale is to act as a tool that helps marketers better assess consumer responses to their efforts to promote their products and services, and enhance loyalty in fast-evolving virtual environments and platforms.

4.4 Development of the Simulated Responses Scale

4.4.1. Study overview

To develop a scale that measures simulated satiation, this research benefited from the rigor of prior validated scale formation methods (Nunnally, 1967; Churchill, 1979; Hinkin, 1998) as well as existing scale development literature (Webb & Peck, 2015; Kapitan et al., 2019). Following this logic, we employed the following five steps to develop the scale: (1) item generation and content validity, (2) scale purification, (3) scale validation and nomological validity test, (4) confirmation of the scale structure, and (5) predictive validity test (Churchill, 1979; Böttger et al., 2017).

First, in study 1, semi-structured interviews were conducted to generate the initial set of items and to understand key elements influencing consumers' satiation levels during reality-enhancing technology experiences. This item generation phase was followed by scale purification in study 2, which resulted in the creation of a 12-item scale that measures individuals' simulated responses via two-subscales, as items loaded in 2 factors called simulated satiation and simulated

immersion. Scale validation was performed in study 3, which validated the findings of study 2 and explored convergent and divergent validity of simulated satiation and simulated immersion subscales within the nomological network of related constructs. Following this, study 4 confirmed via structural equation modelling that the structure of the scales was sound and fit the hypothesized two-factor model. Lastly, study 5 provided evidence of predictive validity of the sub-scales using an augmented reality product exploration task.

In study 5, a predictive validity test, participants evaluated augmented furniture and appliances in their own homes via their digital devices. The results of study 5 revealed that variety and duration of an AR-aided product experience lowers perceived enjoyment for those consumers who are high in simulated satiation, yet increases positive product evaluations and robustness of decision making for those high in simulated immersion.

Table 4.1 Demographic data across five studies.

Studies	1 Item generation & content validity	2 Scale purification	3 Scale validation & nomological validity	4 Confirmation of the scale structure	5 Predictive validity test
Number of participants	14	271	262	269	149
Mean age	31.71	37.42	38.34	36.92	37.90
Gender ratio	85% male	67% male	59% male	61% male	51% male

4.4.2 Study 1: Item generation and content validity

In parallel with rigorous standards set in the scale development literature (Hinkin, 1995; Lynch et al., 2010; Kapitan et al., 2019), the aim of study 1 is to develop a large number of measurement items based on an extensive literature review and semi-structured interviews. Purposive sampling was employed to interview individuals who have used reality-enhancing technologies (AR, VR & MR) within the past three months. During the recruitment process, an online advertisement about the research was published on social media platforms, and participants were selected based on their prospective contribution to the research (Ritchie & Lewis, 2003).

Fourteen interviews were conducted (85.7% male, mean age = 31.71) with reality-enhancing technology users (see Table 4.2 for participant details). The sample aligned with the demographics of those who have extensive VR experience, as more than 70% of VR users tend to be male (Sánchez-Cabrero et al., 2018; Bennett et al., 2021). With the participants' consent, all interviews were voice recorded and transcribed. Prior research advised that data collection via interviews should be stopped after reaching the theoretical saturation point (Boddy, 2016; Saunders et al., 2018; van Esch & van Esch, 2013). Therefore, the qualitative data collection phase concluded after the fourteenth interview due to similar responses from participants, resulting in clear repetition of themes.

Table 4.2 Participant details.

Interviewee Tag	Age	Gender	Years of Experience	Purpose
Interviewee A	38	Male	> 1 year	Entertainment
Interviewee B	31	Male	> 1 year	Entertainment
Interviewee C	28	Male	< 1 year	Digital marketing manager
Interviewee D	25	Male	3 year	Business related
Interviewee E	25	Male	6 years	VR software developer
Interviewee F	45	Male	< 1 year	Entertainment
Interviewee G	28	Male	< 1 year	Business related
Interviewee H	26	Female	< 1 year	Entertainment
Interviewee I	48	Male	> 1 year	Entertainment
Interviewee J	33	Male	7 years	VR software developer
Interviewee K	27	Male	< 1 year	Entertainment
Interviewee L	35	Male	5 years	VR software developer
Interviewee M	30	Male	< 1 year	Digital marketing manager
Interviewee N	25	Female	2 years	Digital transformation consultant

After the interviews, we followed a hybrid coding approach—primarily deductive for the predetermined dimension and inductive for the emergent dimension—of reviewing the transcribed data and categorised quotes to identify key themes and patterns (Fereday & Muir-

Cochrane, 2006; Proudfoot, 2023). The dimension/theme of (1) simulated satiation was central to this research and was predetermined. Based on the analysis, another theme/dimension emerged about reality-enhancing technology experiences, (2) simulated immersion.

Theme 1 was best described by interviewee I, *“over time, your enjoyment and interest [towards VR] is decreasing.”* Participants listed many reasons for this decreased enjoyment, for instance interviewee A stated that *“I think like in terms of like picture quality and things like that like it is cartoonish, does not feel real at all”*; and, interviewee N stressed that *“VR meeting is just boring, and I feel distracted, it is not like the real world.”* Additionally, a majority of participants indicated that physical aspects of reality-enhancing technology experiences, especially VR, cause too much physical discomfort, unease and sometimes even pain for them, and such aspects significantly reduced their VR usage. Interviewee H explained it by saying, *“I feel like my legs would get tired much more and my neck because, as I said before, the VR headset is really heavy.”* Interviewee H further described the physical effects of using VR: *“My eyes feel really tired or like burning sensation in my eyes because I was trying to focus too much”* and *“I am looking around really fast, and everything makes me really dizzy in VR.”*

On the other hand, many participants emphasized the immersive nature of reality-enhancing technology experiences and indicated that such experiences boost involvement and enjoyment levels (theme 2, simulated immersion). As interviewee F pointed out: *“Once you are in it [VR], it keeps you involved.”* Another interviewee stated that *“Enjoyment is why I come back to VR gaming, I think”* and *“the enjoyment never kind of ceases, I mean, VR has a really solid enjoyment factor”* (interviewee A). Some participants highlighted that the interactivity in such experiences is one of the main reasons for them to use reality-enhancing technologies. For example, interviewee F indicated that *“...other friends of mine who are computer savvy, they use their Oculus for work as well, but for me, it is mainly just gaming, social interaction and things like that.”* Also, respondent A explained, *“I am not a super social person in social settings anyway, so for me to go into like the VR environment and maybe wearing a mask of an avatar or something maybe that makes me feel more social or have the ability to be more social...”*. This perceived

interactivity positively influences individuals' immersion, resulting in higher levels of involvement and enjoyment.

4.4.2.1. Study 1 discussion

Interviews resulted in identification of two themes for VR and AR users, including (1) simulated satiation and (2) simulated immersion, which guided the generation of initial measurement items. Based on the literature review and interviews, 115 potential measurement items were created, as recommended in scale development standards (Churchill, 1979; Kapitan & Bhargave, 2013; Webb & Peck, 2015; see Appendix H for initial set of measurement items).

To add further rigor to a study of responses in a new and fast-evolving context and help achieve high content validity, a panel of 7 judges (marketing academics from multiple universities) assessed the representativeness of items (on a scale of 1 = does not represent to 5 = strongly represents) based on the construct and dimensions (Bearden et al., 1989). In this data reduction technique, the items with a mean score lower than three (<3.0) were removed from the list (Böttger et al., 2017).

This process reduced the total number of items from 115 to 49. Next, study 2 tests the remaining 49 items via exploratory factor analyses, evaluating the factor loadings of each item (Hollebeek et al., 2014; Webb & Peck, 2015).

4.4.3 Study 2: scale purification

The purpose of study 2 is to create a reliable and concise simulated responses scale and illustrate its dimensions. To achieve this, 271 adult respondents (mean age = 37.42, 67% male) from the United States were recruited via Amazon MTurk in exchange for a small monetary reward. Participants were first tasked to watch and interact with a virtual 3D tour destination (Waitomo Glow Worm Caves, New Zealand), and then asked to evaluate the 49 items from 1 “strongly disagree” to 7 “strongly agree.” They were then asked to complete demographics and thanked for their time.

4.4.3.1 Study 2 results

Bartlett's test of sphericity ($\chi^2 = 9329.85$, $df = 1176$, $p < .05$) and Kaiser-Meyer-Olkin measure of sampling adequacy (0.93) illustrated that the data satisfies the requirements for factor analysis. Following this, we conducted multiple exploratory factor analyses (EFA) with 49 items by employing different rotation methods, such as Promax, Varimax, and Oblimin, to unveil factors and their total variance illustrations. Among the rotation methods, Oblimin rotation demonstrated the best solution with two factors, simulated satiation (eigenvalue = 13.38) and simulated immersion (eigenvalue = 11.39), which together explained more than 50.54% of the total variance. Other potential factors were discarded, for example, the most potent prospective factor had an eigenvalue of 1.8, which explained only 3.7% of the total variance.

Examining the elbow in a scree plot test is another diagnostic tool and prominent method to interpret eigenvalues and aid item reduction (Heir et al., 2014; Morhart et al., 2015). In study 2, the scree plot analysis emphasized the existence of two significant factors. Following these decision rules, items that did not load on factors 1 and 2 were removed from the data. Furthermore, only the items that were highly loaded were retained for further analysis (≥ 0.7) (Böttger et al., 2017; Kapitan et al., 2019). This process reduced the total number of measurement items from 49 to 12 items.

The remaining 12 items were analysed in terms of wording and their subscale reliabilities (see Table 4.3). The analysis demonstrated that factor 1 composed of items conforming to simulated satiation (6 items, $\alpha = 0.92$) and factor 2 formed the construct of simulated immersion (6 items, $\alpha = 0.85$). Both subscales satisfied the reliability requirements (Nunnally, 1978).

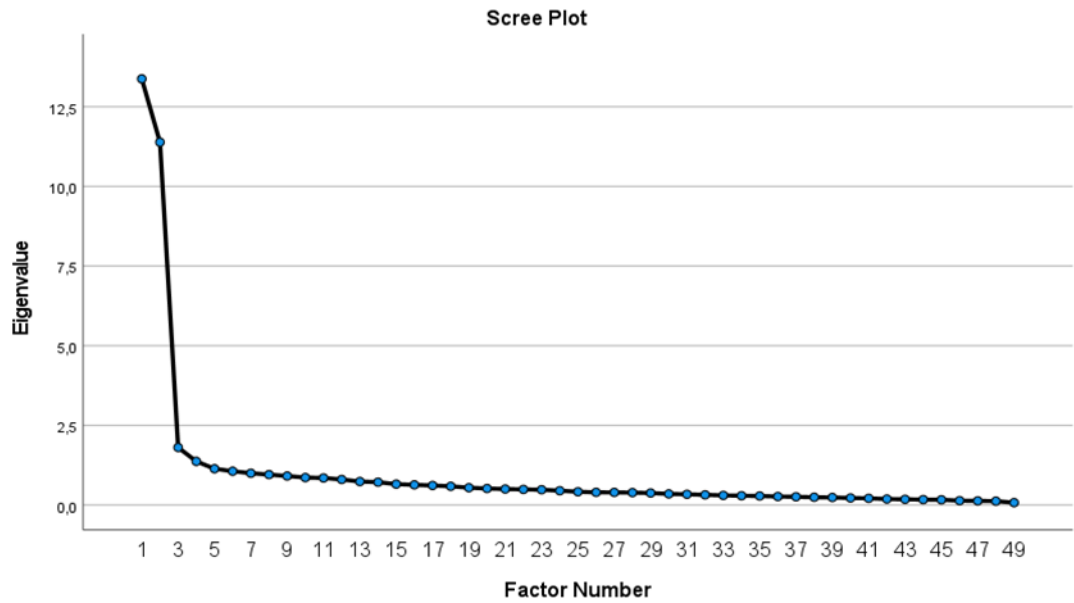


Figure 4.1 Study 2 - Scree plot analysis.

Table 4.3 Study 2: Factor loadings of the 12 items & Cronbach's alpha values of sub-scales.

Item	Value
Factor 1: simulated satiation	
VR and/or AR causes disorientation and nausea.	0.80
VR and/or AR makes me tired.	0.81
I get too sick to spend much time in VR and/or AR worlds.	0.84
VR and/or AR is often disappointing.	0.86
I get bored of VR and/or AR after a while.	0.87
VR and/or AR causes headaches.	0.84
Cronbach's alpha	0.92
Factor 2: simulated immersion	
I can forget my surroundings when I am using VR and/or AR.	0.74
VR and/or AR is interactive.	0.78
I feel like I can almost touch things in VR and/or AR.	0.74
I always feel immersed in a VR and/or AR experience.	0.77
I always look for more VR and/or AR with new content.	0.74
I am always excited to start a new VR and/or AR experience.	0.75
Cronbach's alpha	0.85

4.4.3.2 Study 2 discussion

Study 2 revealed that simulated responses comprise two factors, with 12 total items emerging from the initial sample of 49 items. However, the positioning of the two factors in both the marketing literature and practice requires further investigation (Hollebeek et al., 2014). Next, study 3 examined the convergent and discriminant validities of the simulated satiation and simulated immersion sub-scales compared to existing and validated scales.

4.4.4. Study 3: Scale validation and nomological validity

Study 3 had two purposes: (1) to validate the factor loadings of the 12 items with a new sample, and (2) to explore the convergent and discriminant validities of the identified simulated satiation and simulated immersion sub-scales within the nomological network of related constructs. A sample of 262 adult participants (mean age = 38.34, 59% male) from the United States completed the experiment via Amazon MTurk. Respondents were asked to view a virtual tour destination (same stimuli as study 2) and then rate the 12-item scale from 1 “strongly disagree” to 7 “strongly agree.” Respondents also responded to a series of marketing scales to probe the nomological network of simulated response scale items.

4.4.4.1 Study 3 results

The analysis demonstrated that both Bartlett’s test of sphericity ($\chi^2 = 1655.90$, $df = 66$, $p < .05$) and Kaiser-Meyer-Olkin measure of sampling adequacy (0.87) satisfied the requirements. As in study 2, EFA with Oblimin rotation was carried out, and two factors emerged from the 12 items. These two factors, simulated satiation (eigenvalue = 4.64) and simulated immersion (eigenvalue = 3.02), together explained 63.81% of the total variance. All other potential factors had eigenvalues lower than 1; therefore, they were not considered in further analyses. Replicating study 2, all 12 items were significantly loaded in the same factors, and sub-scale reliabilities of simulated satiation (6 items, $\alpha = 0.91$) and simulated immersion (6 items, $\alpha = 0.85$) both satisfying reliability requirements (Nunnally, 1978). Consequently, the 12-item scale was validated by two different samples, and all further analyses in this research is based on these items.

Even though both sub-scales, simulated satiation and simulated immersion, measure simulated responses together, the relationship between the two sub-scales is weakly and negatively correlated (-0.19). The factor loadings of the measurement items suggest that simulated responses are a multi-dimensional construct, and its subscales can be considered independent scales for future research purposes. This research reinforces the positions of the simulated satiation and simulated immersion sub-scales within the nomological network of related constructs separately.

We employed existing marketing scales to test the nomological validity of the simulated satiation and simulated immersion scales. The seven scales—social media usage (Kumar et al., 2016), involvement with the internet (Schumann et al., 2014), innovativeness (Bruner & Kumar, 2007), flow (Pauwels et al., 2011), narrative transportation (Chang, 2009), game playing enjoyment (Peters & Leshner, 2013), and technology usage discomfort (Zhu et al., 2007)—were chosen due to their similar representation of concepts of interest to the study of simulated responses in digital settings. These scales were anticipated to show interrelationships that reveal more about the constructs of simulated satiation and simulated immersion.

To test how simulated responses differ from existing psychological measures, we next examined the correlation values between two sub-scales and the previously mentioned seven existing scales (see Table 4.4 for the convergent & discriminant validity correlations). Results indicated that simulated satiation was not significantly related to involvement with the internet ($r = 0.03$, $p > .05$). This means the construct of satiation does not overlap with level of involvement, experience, and importance of the internet in a respondent's life. Meanwhile, the simulated immersion sub-scale was not related to the technology usage discomfort scale ($r = 0.10$, $p > .05$), which is expected because discomfort with technology involves an increased focus on difficulties and failures in using tech devices. Therefore, the analysis revealed that both sub-scales are distinct from the aforementioned validated scales and provided evidence for discriminant validity.

Table 4.4 Convergent & discriminant validity correlations.

Scale name	Simulated satiation	Simulated immersion	Scale source
<i>Convergent validity</i>			
Social media usage	$r = 0.15^*$	$r = 0.41^{**}$	Kumar et al., 2016
Innovativeness	$r = 0.24^{**}$	$r = 0.39^{**}$	Bruner & Kumar, 20
Flow	$r = 0.35^{**}$	$r = 0.33^{**}$	Pauwels et al., 2011
Narrative transportation	$r = 0.34^{**}$	$r = 0.55^{**}$	Chang, 2009
Game playing enjoyment	$r = -0.38^{**}$	$r = 0.31^{**}$	Peters & Leshner. 2013
<i>Divergent validity</i>			
Internet involvement	$r = 0.03$	$r = 0.57^{**}$	Schumann et al., 2014
Technology usage discomfort	$r = 0.46^{**}$	$r = 0.10$	Zhu et al., 2007

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

Alternatively, as novel scales, both simulated satiation and simulated immersion should be grounded with existing validated scales in the marketing literature. Correlations were analysed to examine convergent validity for both sub-scales. The results show that simulated satiation is weakly correlated with social media usage ($r = 0.15$, $p = .05$ $p < .05$) and innovativeness ($r = 0.24$, $p = .01$ $p < .05$). Simulated satiation is also moderately and positively correlated with technology usage discomfort ($r = 0.46$, $p = .01$ $p < .05$), flow ($r = 0.35$, $p = .01$ $p < .05$) and narrative transportation ($r = 0.34$, $p = .01$ $p < .05$), whilst moderately yet negatively related to game playing enjoyment ($r = -0.38$, $p = .01$ $p < .05$). These results indicate that simulated satiation, as a decrease in enjoyment in reality-enhancing environments, is related to increased use of social media and increased purchase of new devices. Likewise, the greater discomfort and the more a respondent expects tech failure, and the more vivid and lost in simulated surroundings they tend to feel, the greater the simulated satiation. Finally, the less a respondent enjoys playing games or finds pleasure in games, the more simulated satiation they experience.

Likewise, simulated immersion was moderately related to game playing enjoyment ($r = 0.31$, $p = .01$ $p < .05$), social media usage ($r = 0.41$, $p = .01$ $p < .05$), involvement with the internet ($r = 0.57$, $p = .01$ $p < .05$), innovativeness ($r = 0.39$, $p = .01$ $p < .05$), flow ($r = 0.33$, $p = .01$ $p < .05$), and narrative transportation ($r = 0.55$, $p = .01$ $p < .05$). This means that simulated immersion, which is high when a respondent experiences greater absorption, interactivity and perceived realism in a reality-enhanced experience, fits in a nomological network of involvement with digital life. That is, the more simulated immersion a respondent reports, the more likely they are to report higher game playing enjoyment, greater use of social media, greater perceived importance and experience with using the internet, greater desire to own the latest device, higher perception of flow and time flying by, and enhanced mental and emotional involvement in the experience.

We note that none of the correlation values between the two sub-scales and seven existing scales were strongly correlated, therefore supporting the convergent validity of both the simulated satiation and simulated immersion constructs (Akoglu, 2018).

4.4.4.2 Study 3 discussion

Study 3 validated the newly developed 12-item simulated responses scale with a new sample. Correlation values provided support for convergent and divergent validities for both sub-scales. This means simulated responses and its sub-scales are distinct from existing validated scales in the marketing literature. The factor loadings of the measurement items in study 3 replicated those of study 2. On this basis, we propose that simulated responses are a multi-dimensional construct, and its two factors, simulated satiation and simulated immersion, can be considered as independent scales for future research. However, even though the 12-item simulated responses scale is validated by two different samples (studies 2 & 3) and its nomological network is tested, further analysis regarding scale structure (uni-dimensional vs. multi-dimensional) requires further investigation (Böttger et al., 2017). Therefore, in the following experiment (study 4), we tested the structure of the 12-item simulated responses scale by conducting a confirmatory factor analysis (CFA) using structural equation modelling (SEM).

4.4.5 Study 4: Scale confirmation

The aim of study 4 is to test the scale structure to confirm the two-factor model and probe whether data from a new sample fits the proposed model. Replicating studies 2 and 3, a new online panel consisting of 269 adult participants (mean age = 36.92, 61% male) from the United States were recruited via Amazon MTurk. Participants were asked to fill out the 12-item scale (1 = strongly disagree & 7 = strongly agree) after they watched a virtual tour destination in reality-enhancing technology settings.

Exploratory analyses from prior studies indicated that the 12 items load on two factors. On this basis, study 4 employed a 2-factor solution to confirm the scale structure utilizing CFA with structural equation modelling.

4.4.5.1 Study 4 results

The goodness of fit index (GFI = 0.92) with the proposed model ($\chi^2 = 160.08$, $df = 53$, $p < .05$) revealed that the data fits the two-factor solution. However, extant research emphasized that GFI and chi-square indices are not enough to confirm the scale structure; therefore, other indices must also be validated (Kapitan & Bhargave, 2013; Morhart et al., 2015). The analysis demonstrated

that adjusted GFI (AGFI = 0.88), Tucker-Lewis index (TLI = 0.93), and normed fit index (NFI = 0.92) values were close to 0.95, which demonstrated good model fit (Schumacker & Lomax, 2004). Consequently, the analysis revealed that the data fit the proposed model well.

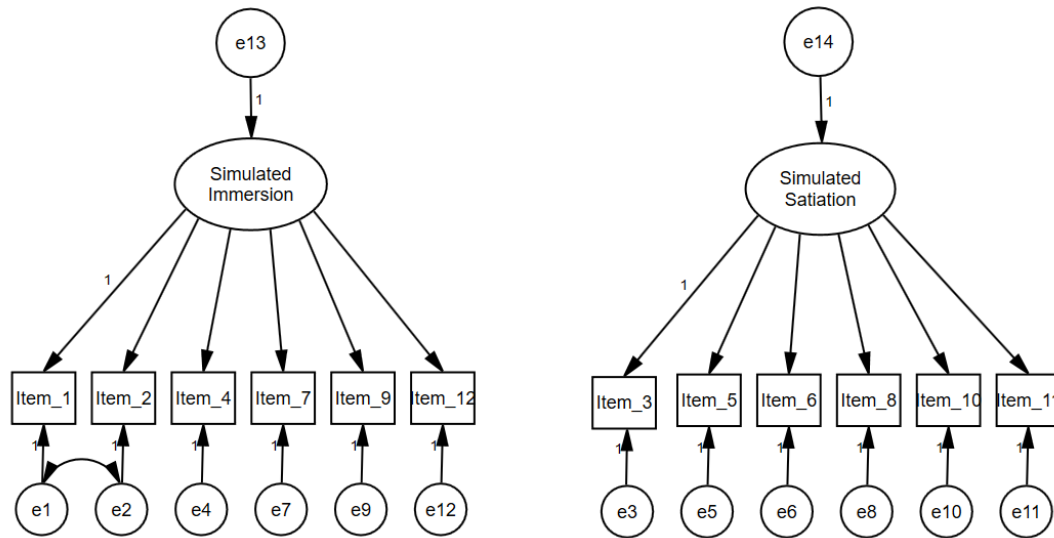


Figure 4.2 SEM – two-factor solution.

Table 4.5 Confirmatory factor analysis fit indices.

Fit Index	Value for Model
χ^2	160.08, $p < .05$
GFI	0.92
AGFI	0.88
TLI	0.93
NFI	0.92

4.4.5.2 Study 4 discussion

In Study 4, scale confirmation provided further support for the proposed two-factor model and revealed the multi-dimensional nature of the simulated responses scale. In this model, the factors of simulated responses (simulated satiation and simulated immersion) can be considered independent scales, and they measure the primary construct together. However, to complete the steps of scale development (Churchill, 1979; Webb & Peck, 2015; Kapitan et al., 2019), the predictive validity of the newly developed scale requires testing. Next, in Study 5, we examined the predictive power of the two sub-scales.

4.4.6 Study 5: Predictive Validity Test

Study 5 examines the predictive power of the 12-item simulated responses scale and its dimensions. Prior research suggests that greater content variety or viewing many different products, settings, and experiences in one sitting is anticipated to influence simulated responses (Sun et al., 2015; Redden, 2015; Sevilla et al., 2019). Likewise, duration, which varies over time of exposure in reality-enhancing technology experiences, is also predicted to influence simulated satiation and simulated immersion (Pala et al., 2022).

In this study, we test the impact of simulated satiation and simulated immersion on consumer decisions in different augmented reality-aided product viewings. We first predict that higher reported levels of simulated satiation will decrease responses to augmented reality tools (H_1) and that higher reported levels of simulated immersion will conversely increase evaluations given the use of augmented reality tools (H_2). We further expect that higher levels of simulated satiation form a boundary condition when consumers are exposed to a higher (vs. lower) content variety (H_3), which should interact with lower enjoyment to reduce purchase intent, and likewise lower the perceived usefulness of AR and attitude towards AR (see Figure 4.2). Finally, we anticipate that higher simulated immersion levels should interact with higher (vs. lower) AR exposure duration (H_4), which is expected to translate to higher enjoyment, purchase intent, perceived usefulness of AR, and attitude towards AR.

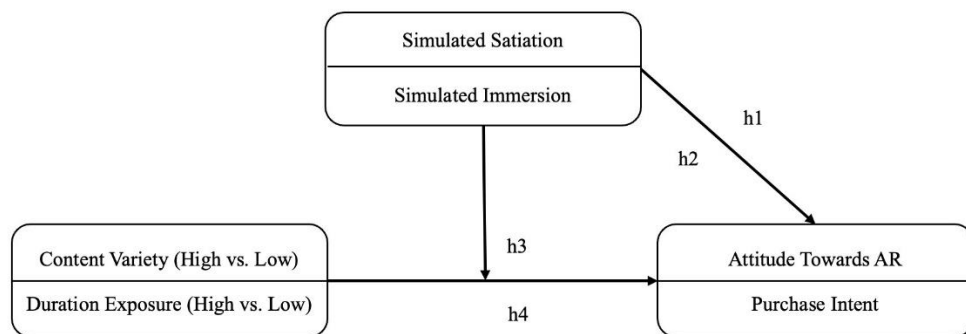


Figure 4.3 Conceptual model.

Participants. To test the proposed relationships, we employed a panel of 149 adult participants (mean age = 37.90, 51% male) from the United States via Amazon MTurk. They were randomly assigned to a 2 (content variety: high vs. low) x 2 (exposure duration: high vs. low) between-subjects design. Participants were then tasked with (1) experiencing and interacting with AR

products in their own environments via their preferred digital device and then (2) uploading screenshots for each AR product that they viewed.

Stimuli and procedures. In this study, AR exposure was varied by content variety and duration, and then participants responded to the 12-item simulated responses scale before reporting their purchase intent and their attitude toward the AR experience. Appendix I shows the full study set.

Respondents were first asked to use an augmented reality app developed as an add-on to INHAABIT AR's website (INHAABIT, 2022). Inhaabit includes a list of 6 products, mostly appliances and furniture, which can be simulated and superimposed in a participants' space via the camera function on a mobile device. We asked participants to focus on 1 or 3 products. To manipulate AR exposure by content variety, participants viewed either 1 product in the low-content variety condition (e.g., a coffee machine) or 3 products in the high-content variety condition (e.g., a coffee machine, a barstool, and a chair). We also manipulated duration of the experience. Participants either viewed each product in one spot in their environment and took a screen capture of the product in one position (low exposure duration) or viewed each product in three locations within their environment, taking a screen capture of each product in three positions (high exposure duration). Figure 4.3 shows an example of the chair and screen grabs showing response to study instructions to place the chair in 3 locations. Next, participants were asked to evaluate the AR experience by reporting their perceived enjoyment, purchase intent, perceived usefulness of the AR tool and attitude towards AR.

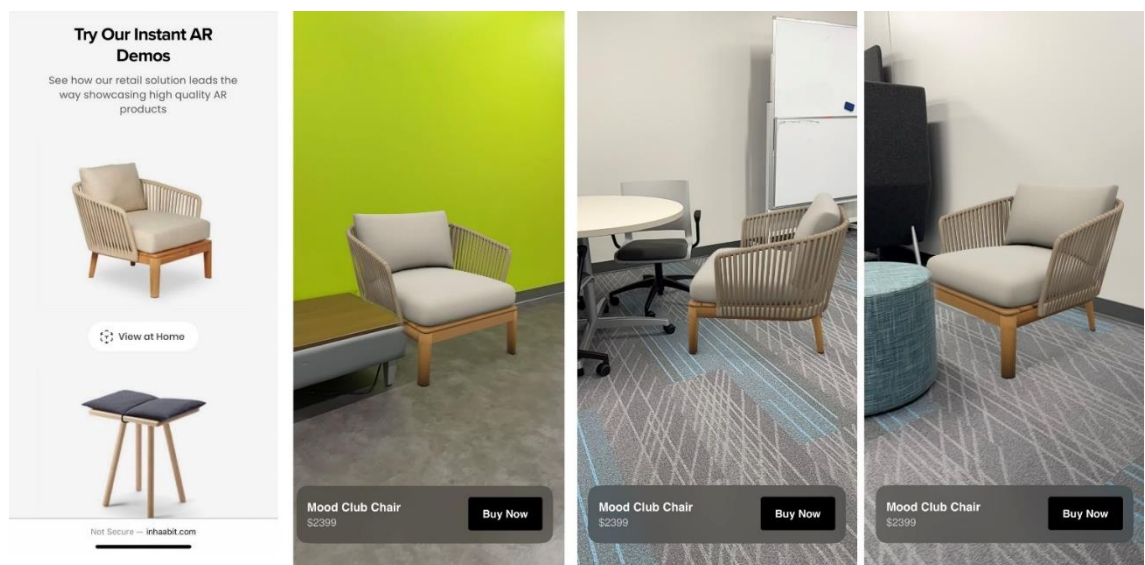


Figure 4.4 Example screenshots of products in augmented reality settings.

4.4.6.1 Study 5 results

Main effects. Similar to previous experiments, simulated satiation and simulated immersion subscales satisfied the reliability requirements ($\alpha = 0.89$, $\alpha = 0.83$ respectively). Following this, a regression analysis was conducted to test the main effects of both subscales on dependent variables. Supporting H₁, the analysis demonstrated that simulated satiation had negative significant effects on perceived enjoyment ($\beta = -.39$, $t(1,147) = -5.39$, $p < .001$), purchase intent ($\beta = -.31$, $t(1,147) = -4.19$, $p < .001$), perceived usefulness of AR ($\beta = -.35$, $t(1,147) = -4.77$, $p < .001$) and attitude towards AR ($\beta = -.33$, $t(1,147) = -4.41$, $p < .001$).

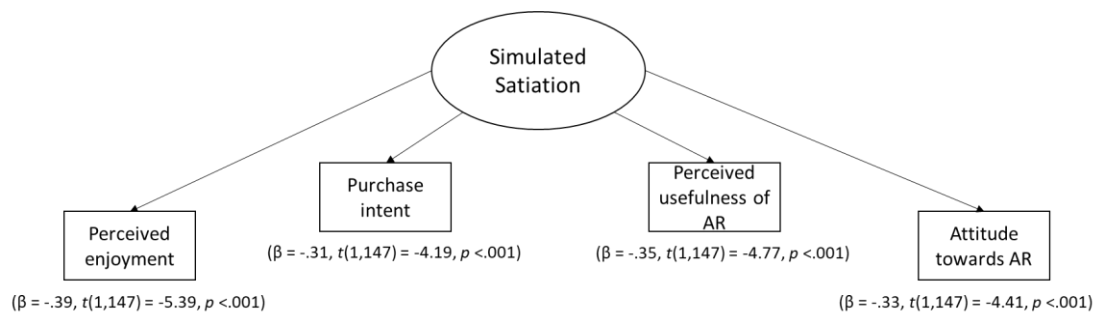


Figure 4.5 Simulated satiation related main effects.

Alternatively, confirming H₂, simulated immersion had positive significant effects on perceived enjoyment ($\beta = .67$, $t(1,147) = 8.50$, $p < .001$), purchase intent ($\beta = .58$, $t(1,147) = 7.20$, $p < .001$), perceived usefulness ($\beta = .69$, $t(1,147) = 8.78$, $p < .001$) and impact on consumers' decisions ($\beta = .64$, $t(1,147) = 8.01$, $p < .001$). Next, we examined the interaction effects between the conditions and dependent variables.

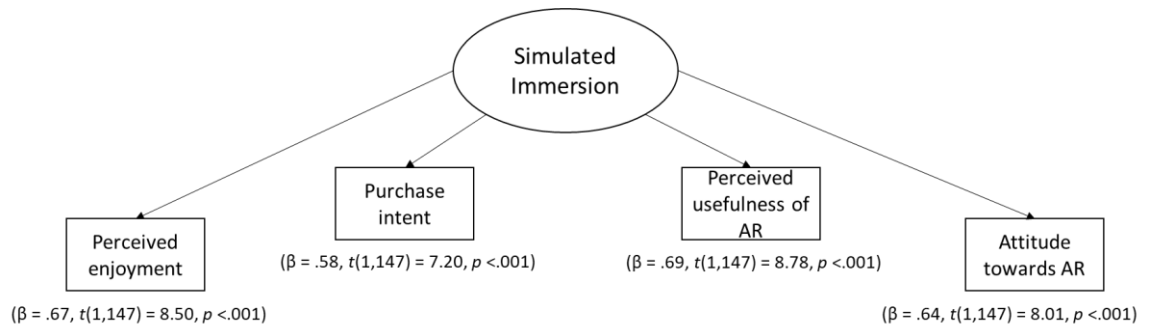


Figure 4.6 Simulated immersion related main effects.

Perceived enjoyment. Confirming H₃, we observed a significant interaction between simulated satiation and increased content variety on decreased perceived enjoyment ($\beta = -.53, t(3,84) = -2.73, p < .01$). Conditional effects show that this was only significant ($\beta = -1.07, t(1,84) = 2.66, p < .01$) at high levels of simulated satiation ($M = 4.17$). Likewise, there was a significant interaction between simulated satiation and higher content variety and exposure duration which lowered consumers' perceived enjoyment ($\beta = -.46, t(3,72) = -2.44, p = .02$). Conditional effects of the focal predictor show that only at high levels of simulated satiation ($M = 3.78$) was the effect significant ($\beta = -1.03, t(1,72) = 2.80, p < .01$). The results indicate that increased duration and variety negatively interact with high levels of simulated satiation to reduce consumers' perceived enjoyment in AR experiences, providing initial support for both H₃ and H₄.

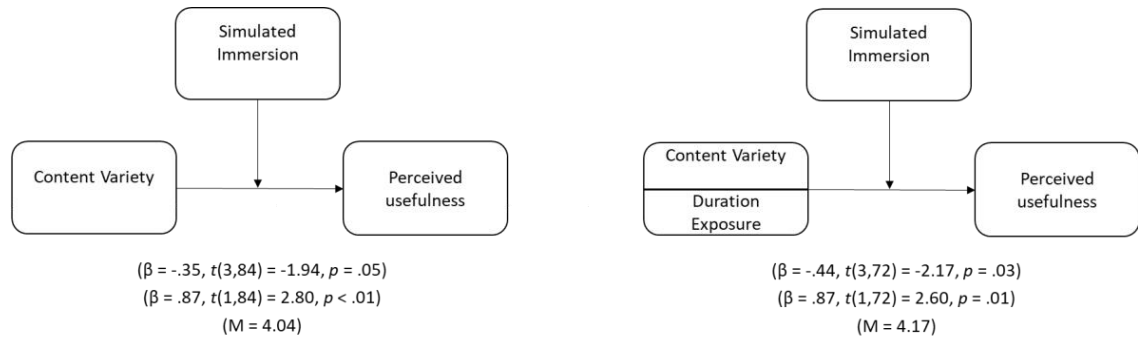


Figure 4.7 Perceived enjoyment related interaction effects.

Perceived usefulness. There was a significant interaction between simulated immersion and high content variety, resulting in lower perceived usefulness of AR ($\beta = -.35, t(3,84) = -1.94, p = .05$). Conditional effects of the focal predictor showed that only at low levels of simulated immersion ($M = 4.04$) was the effect significant ($\beta = .87, t(1,84) = 2.80, p < .01$), confirming H₃. Further analysis revealed a significant interaction between simulated immersion and higher content variety and exposure duration, lowering the perceived usefulness of the AR tool ($\beta = -.44, t(3,72) = -2.17, p = .03$). Conditional effects show that this effect was only significant ($\beta = .87, t(1,72) = 2.60, p = .01$) at low levels of simulated immersion ($M = 4.17$). Therefore, it can be concluded that increased content variety and high exposure duration negatively interact with low levels of

simulated immersion to reduce the perceived usefulness of AR experiences, confirming H₃ and H₄.

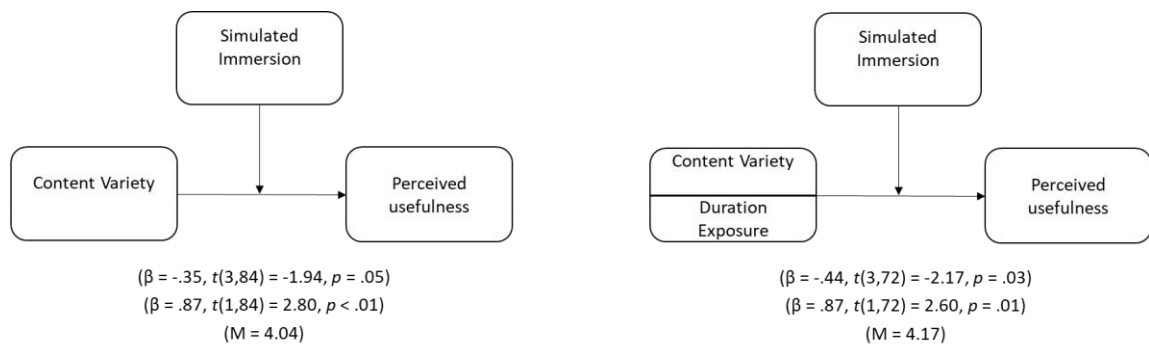


Figure 4.8 Perceived usefulness related interaction effects.

Attitude towards AR. Analysis revealed a significant interaction between simulated immersion and high content variety which lowers consumers' attitude towards AR ($\beta = -.37, t(3,84) = -2.10, p = .04$). Conditional effects of the focal predictor showed that only at low levels of simulated immersion ($M = 4.04$) was the effect significant ($\beta = .73, t(1,84) = 2.61, p = .01$). This demonstrated that reported lower levels of simulated immersion interact with variety to reduce individuals' attitude towards AR, adding further evidence in support of H₃ and H₄.

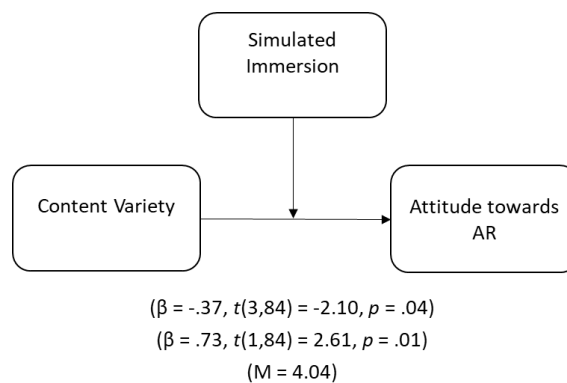


Figure 4.9 Attitude towards AR related interaction effect.

Purchase intention. A marginal and directional interaction was also found between simulated immersion and exposure duration on product purchase intention ($\beta = .47, t(3,67) = 1.74, p = .08$). Conditional analyses showed that this effect was only significantly evidenced ($\beta = -.92, t(1,67) = -2.18, p = .03$) at low levels of simulated immersion ($M = 4.16$). That is, increased duration in AR exposure directionally interacts with high levels of simulated immersion and enhances

consumers' purchase intentions. Though a marginal initial finding, this reveals that product purchase intention might vary as AR tool use in marketing increases in duration.

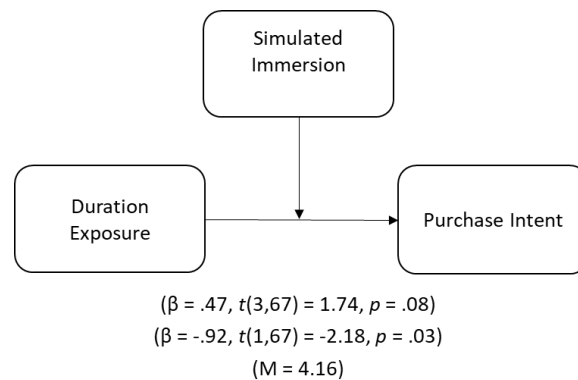


Figure 2 Purchase intention related interaction effect.

4.4.6.2 Study 5 discussion

Study 5 examined the predictive power of simulated satiation and simulated immersion. The results provided the first known evidence for the main and moderating effects of simulated responses in a marketing-oriented reality-enhancing experience. That is, simulated satiation significantly lowers consumers' product purchase intent, along with their perceptions of enjoyment, usefulness, and attitude towards an AR tool used for marketing purposes. On the contrary, simulated immersion significantly enhances product purchase intent and individuals' perceived enjoyment, usefulness, and attitude towards the same AR tool used for marketing.

Simulated responses also moderate attributes of the AR tool experience when used to view products. That is, variability in content variety and in exposure duration interact with high simulated satiation to significantly lower consumers' perceived enjoyment. Likewise, low simulated immersion significantly and negatively interacts with high content variety and high exposure duration to reduce perceived usefulness of and attitude towards the AR tool. Higher levels of simulated immersion also directionally interact with high exposure duration to enhance consumers' purchase intention— yet this finding is marginal and warrants further investigation.

4.5 Discussion and Contributions

The aim of this research was to develop a scale to measure consumers' simulated responses in reality-enhancing technology settings. We conducted exploratory interviews to generate an initial

list of items and tested their representativeness via expert judge evaluations. We employed multiple data reduction techniques across four studies to create a concise, 12-item simulated responses scale with two distinct dimensions, simulated satiation (6 items) and simulated immersion (6 items). Nomological validity tests showed that both dimensions of simulated responses are linked to but distinct from existing scales in the marketing literature, such as technology usage discomfort and game-playing enjoyment. In study 5, we further tested the predictive power of simulated satiation and simulated immersion. Simulated satiation overall lowers evaluations of AR tools and purchase intent, while simulated immersion raises evaluations of AR tools and purchase intention.

Theoretical contributions. Our predictive test of simulated responses in consumer behaviour (study 5) further showed that simulated satiation negatively moderates the relationship between increased duration and perceived enjoyment in AR experiences. That is, when individuals are exposed to longer AR experiences, and have higher simulated satiation, their enjoyment levels decrease. This outcome aligns with the existing satiation literature and our predictions (Redden, 2008; Manchanda & Debb, 2022).

In addition, simulated satiation also negatively moderates the relationship between high content variety and perceived enjoyment. This means that the more content variety individuals are exposed to in AR experiences and the higher their simulated satiation, the lower enjoyment levels they report. However, this interaction contradicts the extant literature, specifically because the satiation literature often indicates that variety in real-life experiences decreases satiation (Redden, 2015; Sevilla, Lu & Kahn, 2019). Study 5 also revealed that low levels of simulated immersion and higher content variety and exposure duration negatively interact to reduce the perceived usefulness of and attitude towards AR tools in marketing. Again, these interactions are counter-intuitive to prior research, which found in real-life settings that duration increases immersion in experiences (Sylaiou et al., 2008; Sun et al., 2015). Following this line of inquiry, it can be concluded that unlike in real-life experiences, variety in reality-enhancing technologies interacts with higher satiation to lower consumers' perceived enjoyment of AR, VR and MR tools used for marketing purposes. The present findings are tantalizing in their demonstration of noted

differential effects in simulated environments via reality-enhancing technology. This work then contributes to the emerging scholarship on the ways in which consumers satiate differently in reality-enhancing experiences than in physical experiences.

Overall, we find that overexposure to a reality-enhancing stimulus can trigger simulated satiation and likewise lower the positive effects of simulated immersion. Simulated responses in this way can and do counterintuitively contradict prior research findings drawn from non-simulated settings. Yet in other findings, we see alignment with literature on in-person experiences. For instance, the negative relationship between increased variety and simulated immersion aligns with prior research, as exposure to multiple stimuli can lower consumer involvement, directly reducing immersion levels (Hudson et al., 2019). Alternatively, simulated immersion significantly and positively interacts with high exposure duration to marginally enhance consumers' purchase intention. When AR users spend more time viewing products in reality-enhancing technology settings, their involvement levels increase, and they develop a better understanding of products, resulting in higher intention to purchase the products.

Managerial contributions. Satiation creates a vital challenge to marketing practitioners. The present research shows decision-makers can eliminate or reduce its harmful effects by boosting or triggering consumers' perceived immersion. On this basis, the simulated responses scale allows marketers to adjust and optimize features of their reality-enhancing technology content— via duration, variety of offerings, and/or the amount of information provided— to get the most effective results before launching any marketing campaign. By employing the simulated responses scale and evaluating the content, businesses will have the power to forecast the impact of their content and eliminate undesired outcomes, such as ineffective or repelling marketing content. Using optimum content will help businesses communicate with their customers efficiently and achieve their desired objectives, such as increased engagement, profit, and sales.

When marketing teams create multiple pieces of content, considering simulated responses can help decision-makers evaluate content effectiveness quickly. Our scale can also help firms assess whether their offering performs better in AR, VR, or MR settings. For instance, service-related content may function better in VR settings, such as hotels or virtual museums, because individuals

may prefer seeing the service in its original settings instead of viewing the virtually augmented offering in their location. Alternatively, product-related content may create better results in AR settings because individuals can see the items in their own physical environment. Therefore, businesses can benefit from factoring in simulated responses while selecting the most effective technology in their marketing tools suite and tech stack in order to increase effectiveness and reduce costs.

This research shows that longer exposure duration interacts with high simulated satiation and low simulated immersion to lower attitudes for an AR marketing tool. Consumers who get less enjoyment from using simulated tools react negatively to marketers asking them to devote more time to an AR, VR, or MR experience. However, greater duration in the use of an AR tool does not significantly interact with high simulated immersion, either. This means consumers who gain greater benefits from simulated reality tools likewise do not desire to spend more time in simulated marketing content experiences. These initial findings show that duration could be the key to determining attitudes and effectiveness of the use of reality-enhancing tools in relation to purchase intent, yet the implications of this must be examined further.

4.6 Limitations, Future Research Directions and Conclusions

This research is subject to limitations. First, the quantitative data was gathered entirely from the United States, which offers some initial constraints to generalisability. The U.S. is a highly developed country where technological innovations are adopted and introduced more easily, and participants' familiarity with reality-enhancing technologies can play a significant role in the results. Therefore, we recommend marketing scholars continue to test the simulated responses scale with data from different countries. Cross-cultural behavioural comparisons of simulated responses could unearth new avenues for the role of and use of reality-enhancing tools in marketing. Second, in this research, we rely on tourism-related and retail-related stimuli to test simulated responses. Future studies should use other stimuli, such as gaming and entertainment, for more hedonistic purposes to further test the generalisability of the results.

In this research, we tested content variety and exposure duration as manipulations of AR tool usage. Yet other aspects of AR, VR, and MR settings are anticipated to yield differing product purchase intent and attitude towards the use of reality-enhancing tools. Research on satiation in simulated settings shows that novelty and habituation of a virtual experience, along with perceptions of nostalgia embedded in a reality-enhancing setting, might interact with simulated responses to determine consumer attitudes and behaviours (Antón et al., 2018; Lasaleta & Redden, 2018; Pala et al., 2022; Redden, 2015).

Although the simulated responses scale shows enduring individual differences that are traits in many consumers, future research may also show ways to temporarily prime states of more (vs. less) immersion to yield stronger attitudes for and purchase intent for offerings in VR, AR and MR settings. Future work should probe for underlying effects in this way using mediation models. Individual differences in involvement, along with manipulations that prime differing cognitive and affective states, can mediate the impact of reality-enhancing environments on simulated responses such as satiation and immersion (Bilgihan et al., 2016; Pala et al., 2022; Poor et al., 2012).

Understanding consumer responses is crucial for marketing scholarship. We conceptualise and probe simulated responses and provide empirical evidence by testing a newly developed scale's predictive power. The contribution of this research is broader, however, with a goal to serve as a leverage point for marketing scholars and firms to conduct studies of consumer behaviour responses and marketing campaigns via reality-enhancing technologies.

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Chapter 5: Conclusion

5.1 Introduction

Reality-enhancing technologies have found application areas in fields from education to entertainment, and from product design to medical treatment (Bonetti et al., 2018). Notably, such technologies play a revolutionizing role in marketing, especially tourism and retail (Heller et al., 2019). Virtual reality, augmented and mixed reality technologies provide immersive, engaging, and realistic experiences to individuals, and many well-known brands from Volvo, Mercedes, Adidas, Shangri-La Hotels, and Marriott to Thomas Cook Airlines have already adopted reality-enhancing technologies in their marketing mix (Chylinski et al., 2020; Or, 2022). However, a ubiquitous phenomenon called satiation poses a critical threat to companies that wish to use such technologies in their marketing efforts (Chugani et al., 2015; Redden, 2015).

The notion of satiation refers to the diminished enjoyment levels of a stimulus as a result of overexposure or overconsumption (Becerril-Castrillejo & Muñoz-Gallego, 2022; Nelson & Redden, 2017; Redden, 2008). The present research refers to satiation in reality-enhancing technology experiences as simulated satiation and treats it as a different construct because simulated satiation can occur in such technology experiences for a number of different reasons, such as latency-rendering issues, low graphic quality, delay, and knowing that the experience is just a simulation (Guerreiro et al., 2015). To counter the negative effects of simulated satiation, this research proposed a further theoretically driven construct of simulated immersion. Immersion in reality-enhancing technologies can oppose the negative impact of simulated satiation as it enhances consumers' enjoyment levels, satisfaction, and loyalty (Kang et al., 2020; Suh & Prophet, 2018). On this basis, this research proposes that these two constructs together form consumers' simulated responses in reality-enhancing technology settings. Understanding both constructs and how they influence consumers' behaviour and attitudes toward reality-enhancing technology content can provide invaluable insights to marketing practitioners and scholars. However, this work is the first in the existing literature to create a psychometric tool for measuring consumers' simulated responses to such technologies.

The purpose of the current thesis was to fill the gap in the literature by creating a scale that can measure consumers' simulated responses in reality-enhancing technologies. To this end, the present research posed four research questions:

RQ1. What is simulated satiation?

RQ2. What is simulated immersion, and how does it mitigate the negative effects of simulated satiation?

RQ3. How should simulated responses (simulated satiation and simulated immersion) be measured in reality-enhancing technology settings?

RQ4. How do simulated responses (simulated satiation and simulated immersion) impact consumers' perceived enjoyment, purchase intent, perceived usefulness and attitude towards reality-enhancing technologies?

This chapter evaluates and addresses each of the research questions and provides theoretical, managerial, and methodological contributions of this thesis. Finally, the chapter concludes with limitations and future research agenda.

5.2 Review of Research Questions

This section will sequentially explain each of the research questions illustrated in Chapter 1, and formally address how these questions were resolved. At the close of this chapter, this thesis will explore potential areas for future research, including new questions raised in the process of conducting this thesis.

5.2.1 Research Question 1

RQ1: What is Simulated Satiation?

Simulated satiation is a theory-based construct developed from prior research spanning virtual reality, satiation, cognitive and affective experiences and vicarious consumption. This construct builds on the theory of satiation, which represents hedonic decline that consumers feel when exposed to the same stimulus repeatedly in real-life experiences, and explores how it influences

consumers in reality-enhancing technology experiences. Similar to how eating the same food every day can reduce hedonic enjoyment and satisfaction, the main premise of the concept of simulated satiation is that repetition or overexposure to the same reality-enhancing technology content can reduce consumer satisfaction and interest. As formally stated in Chapter 3, simulated satiation in reality-enhancing technology experiences refers to “*attenuation in perceived benefits that occurs due to repeated or prolonged exposure to vicarious and simulated intermediary sources*” (Pala, Kapitan & van Esch, 2022).

Prior research mostly indicates that satiation occurs based on physiological drivers, such as feeling of fullness (Park & Jang, 2014; Antón et al., 2018). However, two extant studies have created a unique taxonomy and illustrated that when exploring satiation, focusing solely on consumers’ physiology overlooks the complex nature of satiation (Redden, 2015; Galak & Redden, 2018). This taxonomy identified three distinct antecedents of the notion of satiation, which are physiological feedback, perceptual changes, and self-reflection.

i. Simulated satiation is strongly related to *physiological feedback* that individuals receive during reality-enhancing technology experiences. For instance, motion sickness, discomfort, and bodily responses to latency-rendering issues can lead to more immediate feedback, resulting in lower hedonic enjoyment (Guerreiro et al., 2015).

ii. *Perceptual factors*, such as stimulus type, social comparison, perceptual attention and variety, also significantly influence the concept of simulated satiation and the rate at which consumers’ enjoyment declines (Antón et al., 2018). Unlike physical goods, which triggers higher levels of satiation than experiences, reality-enhancing technology experiences provide perceptual benefits, such as physical immersion and psychological presence, which intervenes in the decline in the enjoyment. The immersive nature of reality-enhancing technologies can positively influence behavioural intentions and satisfaction, diminishing the negative effects of satiation (Kang et al., 2020; Nicolao et al., 2009).

iii. *Self-reflection drivers* of simulated satiation are related to consumers’ evaluation regarding their past or current experiences. Factors such as perceived past variety, subjective quantity and

recency can prominently impact consumers' enjoyment levels and satisfaction. For example, if a consumer perceives that he or she has already experienced a tourism destination in a virtual reality setting, then the consumer may perceive the real-life visit as repetitious and, therefore, may quickly lose interest (Deng et al., 2019).

In contrast to real-life experiences, individuals who employ reality-enhancing technology experiences via VR or AR may encounter various problems that can lead to simulated satiation, such as latency-rendering issues, low graphic quality, delays, and the awareness that the experience is only a simulation (Guerreiro et al., 2015). Simulated satiation poses a critical challenge to businesses and marketers because it can directly reduce consumers' enjoyment levels and satisfaction, and moreover, trigger product replacement or disposal behaviour (Galak et al., 2009; Nicolao et al., 2009). As reality enhancing technologies become more commercially available, unveiling how consumers experience simulated satiation in reality-enhancing technology settings and identifying the factors that contribute to this notion will be essential for marketers who want to enhance virtual reality content engagement and satisfaction.

5.2.2 Research Question 2

RQ2: What is simulated immersion, and how does it mitigate the negative effects of simulated satiation?

Reality-enhancing technologies, such as augmented reality, virtual reality, and mixed reality, have attracted significant attention from consumers and businesses due to their unique ability to provide immersive experiences in various contexts, such as gaming, shopping and traveling. According to the theory of immersion, a sense of harmony, high involvement, and being part of an experience lead individuals to experience immersion (Hudson et al., 2019). The concept of immersion in reality-enhancing technology mediums is different from immersion in physical experiences because the perceived realism of virtual experiences significantly influences it (Kang, Shin & Ponto, 2020). Following this, this research extends the theoretical definition of immersion by conceptualising 'simulated immersion' for experiences through reality-enhancing technologies.

Simulated immersion refers to the extent to which a person feels the computer simulation is real, based on sensory inputs such as hearing or sight (Krishna, 2011).

Existing research in immersive technologies has predominantly compared and contrasted immersion with concepts of presence and flow (Jennett et al., 2008; Guttentag, 2010). Despite the similarities between immersion and presence, often used interchangeably by many scholars, it is crucial to distinguish the difference between them. The key distinction lies in perceived realism, which enhances immersion but does not necessarily impact presence in reality-enhanced technology environments (Wedel, Bigné & Zhang, 2020). In simpler terms, simulated immersion is a broader term that encompasses the concept of presence (Hudson et al., 2019). On the other hand, flow represents an intensified version of simulated immersion, leading individuals to lose awareness of time, surroundings, and self-consciousness, and instead, focus solely on the experience, akin to a feeling of serenity (Jennett et al., 2008).

In reality-enhancing technology settings, many factors such as content variety and exposure duration can significantly influence individuals' simulated immersion levels. For instance, existing literature indicates that spending more time in reality-enhancing technology experiences can enhance the sense of immersion (Sylaiou et al., 2008; Sun et al., 2015). However, this statement contradicts the concept of simulated satiation, which suggests that overexposure or overconsumption of a stimulus can lead to satiation and diminish the positive effects of immersion (Redden, 2008; Tang, Huang & Su, 2022). As stated throughout this research, simulated satiation creates challenges for businesses, diminishing brand loyalty, content engagement, consumer attitudes, and visit/purchase intent (Redden, 2015). In contrast, simulated immersion enhances satisfaction, loyalty, and enjoyment (Kang et al., 2020).

The success or failure of reality-enhancing technologies relies on consumers' simulated responses to encounters with such technologies (Moorhouse et al., 2018; Kowalczyk et al., 2021). As formally stated in Chapter 4, simulated responses in reality-enhancing technology experiences refer to attenuation or rise in perceived benefits that occurs due to repeated or prolonged exposure to vicarious and simulated intermediary sources. Enhanced confidence in evaluations and decisions as well as increased enjoyment in the decision-making process can be listed as some of

the benefits that consumers receive, and they all are significantly linked to simulated immersion (Bonetti et al., 2018; Kang et al., 2020). On the other hand, this research and others links reduction in perceived benefits when using reality-enhancing technologies to the concept of satiation through simulated satiation (Deng et al., 2019). Taken together, these two concepts counteract each other, highlighting the significance of understanding both constructs to unveil how consumers react to marketing content in reality-enhancing technology mediums. Research on satiation in reality-enhancing technologies is scarce (Zandstra et al., 2020; Le, Chen & Nguyen, 2024). Consequently, one of the objectives of this thesis is to ensure development of a measure of how consumers respond to marketing content in simulated settings, and to explore how these simulated responses influence consumer decisions and perceptions.

5.2.3 Research Question 3

RQ3: How should simulated responses (simulated satiation and simulated immersion) be measured in reality-enhancing technology settings?

To develop a scale for measuring simulated satiation and simulated immersion, this research reviewed existing validated methods for scale formation (Nunnally, 1967; Churchill, 1979; Hinkin, 1998) and benefited from existing scale development literature (Webb & Peck, 2015; Kapitan et al., 2019). As described in Chapter 4, this approach guided the research on adopting a systematic five-step process for scale development via: (1) item generation and content validity, (2) scale purification, (3) scale validation and nomological validity test, (4) confirmation of the scale structure, and (5) predictive validity test (Churchill, 1979; Böttger et al., 2017).

In the first step, study 1 employed semi-structured interviews to generate the initial set of measurement items and understand important elements influencing consumers' satiation and immersion levels in reality-enhancing technology experiences. Subsequently, study 2 focused on scale purification, resulting in the creation of a 12-item scale that measures individuals' simulated responses via two-subscales, as items loaded in 2 factors called simulated satiation and simulated immersion.

Study 3 centred on scale validation and the interrelationships between existing construct and the new scale, validating the findings of study 2 while exploring convergent and divergent validity of the simulated satiation and simulated immersion subscales within the nomological network of related constructs. Following this, study 4 employed structural equation modelling to confirm that the structure of the scales was sound and fits the hypothesized two-factor model of consumer simulated responses via simulated satiation and simulated immersion (vs. a uni-dimensional model).

Finally, study 5 conducted a predictive validity test by having participants evaluate simulated AR products in their own homes through digital devices. Results from study 5 revealed that the variety and duration of an augmented reality-aided product experience led to decreased perceived enjoyment for individuals high in simulated satiation. In contrast, AR-aided product exposure increased positive product evaluations and the robustness of decision-making for those high in simulated immersion.

All told, this research developed and validated a 12-item scale to measure consumers' simulated responses in reality-enhancing technology settings. The scale includes two dimensions: simulated satiation and simulated immersion, which are distinct from existing marketing scales. Additionally, study 5 from Chapter 4 clearly illustrated that simulated satiation lowers evaluations of AR tools and purchase intent overall, while simulated immersion raises evaluations of AR tools and purchase intention.

5.2.4 Research Question 4

RQ4: How do simulated responses (simulated satiation and simulated immersion) impact consumers' perceived enjoyment, purchase intent, perceived usefulness and attitude towards reality-enhancing technologies?

Chapter 4 addressed this question and provides the first known evidence for the main and moderating effects of simulated responses in a marketing-oriented reality-enhancing technology experience. This thesis explored the predictive power of the 12-item simulated responses scale and its dimensions. Existing literature suggests that an increased content variety, which is

observing diverse products, settings, and experiences in a single session, is expected to impact simulated responses (Sun et al., 2015; Redden, 2015; Sevilla et al., 2019). Similarly, the duration of exposure in reality-enhancing technology experiences is predicted to influence simulated satiation and simulated immersion, as tested and shown in the proof-of-concept study in Chapter 3. Building on these ideas, four hypotheses were formulated.

In Chapter 4, the research tested the influence of simulated satiation and simulated immersion on consumer decision-making in various augmented reality-aided product viewings. The first hypothesis suggested that higher reported levels of simulated satiation would decrease responses to augmented reality tools (H1), while higher reported levels of simulated immersion would conversely enhance evaluations following the use of augmented reality tools (H2). Additionally, it was hypothesized (H3) that higher simulated satiation levels form a boundary condition when consumers encounter higher (vs. lower) content variety in reality-enhancing technology experiences, which interacts with lower enjoyment, reduces purchase intent and lowers the perceived usefulness and attitude towards AR. Furthermore, it was hypothesized that high levels of simulated immersion interact with extended (vs. shorter) AR exposure durations (H4), leading to heightened enjoyment, purchase intent, perceived usefulness of AR, and attitude towards AR.

The results of this research provided evidence for the predictive power of the newly developed simulated responses scale as well as illustrated how the subdimensions of the simulated responses, simulated satiation and simulated immersion, influence consumer decisions and perceptions. Specifically, simulated satiation significantly diminishes consumers' intention to purchase a product, along with their perceived enjoyment, perceived usefulness of AR, and attitude towards an AR tool employed for marketing purposes. Conversely, simulated immersion significantly enhances product purchase intent and individuals' perceived enjoyment, perceived usefulness of AR, and attitude towards AR.

Simulated responses also act as moderators in the attributes of the AR tool experience when employed for product viewing. Notably, high content variety and exposure duration interact with high simulated satiation, resulting in a significant decrease in consumers' perceived enjoyment. Similarly, low simulated immersion exhibits a significant and adverse interaction with high

content variety and high exposure duration, leading to a reduction in perceived usefulness and attitude towards the AR tool. Higher levels of simulated immersion also tend to interact with extended exposure duration, increasing consumers' purchase intention; however, this finding is marginal and warrants further investigation.

5.3 Review of Research Purpose

This section synthesizes the outcomes derived from the four research questions and delves into the primary aim of this research. This thesis commenced with the following research objective:

“Conceptualization of simulated satiation and simulated immersion constructs, and the creation of a scale capable of measuring consumers' simulated responses in reality-enhancing technology settings to explore the impact of simulated satiation and simulated immersion on consumers' perceptions and behaviour in reality-enhancing technologies.”

This research introduced theory-driven concepts, namely simulated satiation and simulated immersion, which together constitute consumers' simulated responses. Simulated satiation poses a significant challenge for marketers as it diminishes hedonic enjoyment and satisfaction, and it is associated with increased product replacement or disposal behaviour (Galak et al., 2009; Nicolao et al., 2009). The subsequent exploration of simulated immersion presents a broader perspective, aiming to understand how immersive experiences counter the harmful effects of simulated satiation. Existing research indicates that simulated immersion enhances satisfaction, loyalty, and enjoyment, providing a positive counterbalance to the challenges posed by simulated satiation (Kang et al., 2020).

From theorization of these, this research developed a scale measuring consumers' responses to simulated satiation and simulated immersion. The detailed five-step process for scale development is outlined, involving item generation and content validity, scale purification, scale validation and nomological validity test, confirmation of the scale structure, and predictive validity test (Churchill, 1979; Böttger et al., 2017). Finally, the research unveiled the impact of simulated satiation and simulated immersion on consumer perceptions and behaviour in reality-enhancing technologies. Simulated satiation diminishes consumers' purchase intent and overall

evaluation of reality-enhancing technology tools, while simulated immersion enhances these aspects.

5.4 Theoretical, Managerial and Methodological Contributions

This research enhances scholarly and practical understanding of marketing, reality-enhancing technologies, disruptive technologies, and consumer behaviour. Consequently, it offers substantial theoretical insights and managerial implications for scholars, managers, and the business world concerning simulated responses in reality-enhancing technology platforms. The following sections explore these, before further motivating a larger research agenda to carry this dialog further as the existence of simulated environments and the way consumers respond in simulated settings question much extant marketing theory and scholarship.

5.4.1 Theoretical Contributions

This research contributes to the marketing literature by conceptualizing theory-based constructs simulated satiation and simulated immersion, which together constitute consumers' simulated responses in reality-enhancing technologies. At the centre of the theoretical foundation of this thesis is the introduction of the concept of simulated satiation, which is attenuation in perceived benefits that occurs due to repeated or prolonged exposure to vicarious and simulated intermediary sources. By exploring simulated satiation, this research enhances the understanding of consumer interactions with reality-enhancing technologies, thus advancing the field of marketing, disruptive technologies and consumer behaviour.

Chapter 3 advanced 9 testable propositions to illustrate how simulated satiation can have differential influences on consumers' behaviour, engagement and decisions and, consequently, shape marketing outcomes within reality-enhancing technology mediums. In one test via the proof-of-concept study in chapter 3, the research found that shorter exposure duration (vs. longer) to virtual reality content acts as a physiological driver of simulated satiation to increase benefits and usefulness for virtual reality tools. These perceptions serve as mediators, influencing the stickiness and uptake of virtual reality experiences and contributing to consumers' subjective well-being.

This thesis also illustrated key theoretical contradictions in need of empirical testing, encouraging researchers to explore the impacts of immersion, affective states, habituation, adaptation, similarity, nostalgic virtual or augmented environments on simulated satiation. In so doing, the body of this thesis demonstrates a rich theoretical field that has many research opportunities waiting to be explored.

By employing a newly developed scale, this research provides the first evidence for the main and moderating effects of simulated responses generated in marketing-oriented reality-enhancing experiences. Chapter 4 illustrates that simulated satiation has a significant negative impact on consumers' intention to purchase a product. Following exposure to a simulated environment, consumers whose simulated responses are high on feeling disappointment, boredom, feeling tired or experiences headaches and nausea (high simulated satiation) are drained by the experience. In this way, then, satiation in simulated environments used for marketing reduces enjoyment, makes consumers question the perceived usefulness of the AR tool, and lowers attitudes toward the tool when used for marketing purposes. But there is a counteracting response when consumers respond to simulated settings by reporting they feel like they can touch things, feel more interactive and immersed (high simulated immersion) and instead find new energy in simulated environments. Such responses show how simulated immersion significantly boosts product purchase intent, along with individuals' perceived enjoyment, perceived usefulness of AR, and attitude towards AR.

The duality of simulated responses offers up an intriguing lens and driving force for future research. In short, some consumers feel energized when marketing tools integrate simulated settings and some consumers feel exhausted, sick and drained, their resources tapped. The divergent responses are key to understanding how and when to deploy simulated worlds and reality-enhancing technologies, which at the time of this thesis writing includes virtual reality, augmented reality, and mixed reality applications but in the future may involve whole-scale holograms or more vivid and involving 3D worlds mediated by technology. What is key is that consumers have a variety of responses along the spectrum from satiation to immersion in these reality-enhanced simulations, and that this initial work shows how deep these responses to

simulated stimuli can be. For instance, this thesis demonstrates that simulated responses moderate attributes of an AR experience when participants view products. High content variety and increased exposure duration negatively interact with simulated satiation, reducing enjoyment. In the same way, low simulated immersion likewise negatively interacts with lots of content variety and long exposure to content in AR, lowering the attitude towards the AR tool. Yet, high levels of simulated immersion so far positively interact with higher levels of exposure duration, resulting in (directionally and marginally) enhanced levels of purchase intention. There is much more investigation needed. This thesis provides the framework and basis for investing responses in technology usage when it bends and alters reality via screens and technology mediators. This has a large and present impact on marketing tools, technology stacks and platforms, and strategic adoption of these tools, which this thesis addresses next.

But it also points to larger implications for consumer behaviour as a whole, which motivates the research agenda ahead in section 4.5. That's because this thesis integrates marketing, disruptive technologies, satiation, immersion, and consumer behaviour to conceptualize, create a scale, and empirically test simulated responses—a novel framework that encompasses simulated satiation and simulated immersion. Therefore, the theoretical contributions of this research provide valuable insights and serve as a useful tool for marketing scholars conducting research on reality-enhancing technologies and marketing.

5.4.2 Managerial Implications

This research explores how satiation and immersion work in reality enhancing technology settings. The simulated responses scale itself is a useful tool for marketing practitioners who want to adjust and optimize their marketing content in terms of duration, amount of information, and variety before actually using the content in their marketing mix. Businesses who pilot test their content with the constructs of satiation and immersion in simulated responses in mind will have an opportunity to measure the effectiveness and avoid undesired outcomes, such as inefficient or off-putting marketing content. Additionally, by balancing the levels of immersion and satiation, marketers will have a chance to create sustained interest for their product or services without

overwhelming their customers. Employing optimum content should then enhance the effectiveness of communication between businesses and their customers, enabling them to achieve desired goals, including boosted engagement, profitability, and sales.

Understanding consumers' simulated responses in reality-enhancing technology settings can also lead to development of better targeted advertising, which can enhance engagement and satisfaction. By employing the newly developed scale to test content, marketers can gain insights into how certain market segments react to content, and how to better personalize content for key segments. For those experiencers who are energized in simulated settings, creating more options to interact with products and offerings via VR, AR and MR may enhance touchpoints and boost performance. Yet considering that some consumers are drained and exhausted by more and more VR or AR tasks helps agile marketers develop distinct campaigns, e-commerce and touchpoint marketing for those who satiate more easily on reality-enhanced content. Even developing a "want more" button can help marketers better integrate responses to offer more to only those market segments who self-select more simulated content. By unveiling such critical insights, businesses will have better chance to focus their marketing efforts on certain segments of the market.

The simulated responses scale can also assist marketers in terms of determining whether their offerings perform better in augmented reality, virtual reality, or mixed reality mediums. For example, consumers may prefer viewing a product oriented content in AR mediums, such as a sofa or fridge, because they can see the product in their own physical surroundings. On the other hand, service-related content might create better outcomes in virtual reality mediums, such as art galleries or theme parks, because consumers may not accept viewing the content in their own personal space as an augmented experience. On this basis, content creators, businesses and marketers can benefit from the simulated responses scale to choose the optimal technological medium for their marketing campaigns in order to enhance their engagement, interaction, and effectiveness.

When marketing teams generate multiple content formats, the simulated responses scale can provide an opportunity for decision makers to quickly evaluate the effectiveness of each content. This rapid evaluation process will result in more informed decision-making when selecting the

best content, as well as helping businesses save significant amount of time. Therefore, employing simulated responses can optimize workflow within marketing departments, allowing marketers to focus on generating more relevant content that can enhance efficiency of the marketing campaigns.

As a final consideration for practice, this thesis demonstrates that increased exposure duration interacts with high simulated satiation to reduce consumers' enjoyment levels when using reality-enhancing technologies. This means that individuals who derive less enjoyment from reality-enhancing tools react more negatively when marketing practitioners ask them to commit more time to the experience via such tools. On the other hand, increasing the duration of reality-enhancing technologies does not significantly interact with higher levels of simulated immersion, as shown in Chapter 4's study 5. This suggests that so far, the threshold to amplify effects of VR, AR or MR marketing tools has not yet been found. My research shows that even when individuals receive enhanced advantages from reality-enhancing technology tools, they still do not want to dedicate more time to simulated marketing content experiences. Consequently, this thesis suggests that exposure duration plays a critical role in the efficiency of the marketing content, and it can influence consumers' decisions and perceptions in reality-enhancing technologies.

5.4.3 Methodological Implications

The present research examines consumer responses from a novel perspective, combining the concepts of satiation and immersion. Prior literature generally explores the impact of satiation and immersion separately. This research demonstrates that the newly developed simulated responses scale allows scholars and marketers to gain a better understanding of consumer responses compared to focusing only on satiation or immersion in reality-enhancing technologies.

During the predictive validity test in Chapter 4's study 5, this research used an innovative approach to assess responses to marketing stimuli in reality-enhanced settings. Since there is little literature that examines simulated marketing environments, there was not much prior literature on which to base study design. Some studies in the past ask participants to explore a terrain, such as a grocery store, while wearing a VR headset, or try to control individuals' food intake by

employing augmented reality to alter the size of food virtually (Lombart et al., 2019; Narumi et al., 2012). Yet this type of data collection is costly in terms of (1) time, (2) availability of a dedicated research lab on campus, (3) specially designed software interfaces, (4) access to costly headsets, and (5) uptake of data collection involving in-person responses especially in an era of post-pandemic, social distancing and general reluctance to prioritize in-person appointments in work, life and campus settings. Finally, though useful for experimental inquiry, such VR settings in labs are not realistic to how most consumers will interact with marketing tools that have reality-enhancing features. Thus, in study 5, this research developed an approach that allowed for ease of access to respondents who prefer virtual interactions and aided realism in how consumers use and access marketing tools with reality-enhanced technology.

In study 5 in Chapter 4, respondents interacted with AR products in their own spaces via their devices and uploaded a screenshot for each product with which they digitally interacted. The AR platform was provided via a link in an online study set. Participants were tasked to focus on 1 or 3 products to manipulate content variety and viewed each product either in one location in their space or in three different locations to manipulate exposure duration. For each product and position, the participants took a screenshot with their digital devices. Afterwards, the participants uploaded these screenshots into the online study form. Then, the augmented reality experience was evaluated by the participants, showing the enjoyment, purchase intent, perceived usefulness of the AR tool, and attitude towards the AR. This new methodology enables the collection of data generated in participants' natural environments through their own digital devices, enhancing the generalizability of the responses and the authenticity of interactions with AR products.

Considering the benefits and potential of this new method, this research encourages scholars to use this novel method in their research. This method can easily be applied to other reality-enhancing technology-related research, including studies on virtual and augmented reality gaming, virtual experiential marketing, and virtual museum visits. In this method, first of all, the variables to be manipulated have to be determined; for instance, content variety and duration of exposure. In step 2, participants should be randomly assigned to different conditions in which they experience various reality-enhancing technology content. In step 3, depending on the

research objectives, participants should be tasked with taking screenshots of their interactions with the reality-enhancing technology experiences in various ways, such as different locations or numbers. Finally, in step 4, participants must upload screenshots to survey platforms or send them directly to the researcher.

Based on the research objectives, researchers can change the variables that are going to be manipulated. For instance, in step 2, this research manipulated content variety and exposure duration; however, researchers may want to manipulate other variables such as repeated exposure or stimulus complexity. Additionally, researchers may want to explore the impact of location on consumers' experiences. Therefore, in step 3, researchers may ask consumers to interact with reality-enhancing technologies at different locations and take screenshots. For instance, a researcher might want to explore how consumers react to augmented reality gaming in their home settings versus outdoors. Consequently, by employing this novel method, future research can enhance the literature's knowledge regarding consumer behaviour and technology interactions.

5.5 Limitations and Future Research Directions

This thesis paves the way for multiple research opportunities but is also subject to natural limitations that emerge as part of research design, context, and focus. The exploration and conceptualisation of the term 'simulated satiation' in Chapter 3 resulted in nine testable propositions and recognition of an important gap in the literature—the absence of a measure of consumers' simulated satiation in reality-enhancing technologies. All nine testable propositions provide a research avenue for marketing scholars who wish to explore how simulated satiation in reality-enhancing technologies influences consumers' decisions and perceptions. Subsequently, to address this gap in the literature, Chapter 4 was designed to develop a scale for measuring simulated satiation and its counter concept, simulated immersion. Together, these concepts form consumers' simulated responses in reality-enhancing technology settings.

The first limitation of this research is that all the quantitative data that was used throughout the thesis was collected from the United States. This raises concerns regarding the generalizability of the outcomes, since the United States is a highly developed country and individuals' purchasing

power is significantly higher than the majority of the rest of the world. Additionally, the population of the United States is significantly more familiar with high-technology products and their technology adoption rates are also high. Therefore, the outcomes of this research might differ in less developed parts of the world. Considering this limitation, this thesis recommends marketing researchers to test the simulated responses scale and collect data from multiple countries. Conducting cross-cultural studies can unveil new research opportunities and enhance the generalizability of the simulated responses scale at the same time.

Another limitation is that the quantitative data in this research were collected via the Amazon MTurk platform. Even though the platform offers many benefits to researchers, such as a large and diverse participant pool, ease of access, speed of data collection, and reasonable cost, it also creates several challenges, like self-selection bias, high attrition rates, and inconsistent English language fluency (Aguinis et al., 2021). Therefore, future research should collect data through lab experiments or field studies to test the findings of this research.

Furthermore, this research primarily used tourism and retail oriented stimuli to develop the scale and test its validity. This limitation constrains the applicability of the results to other fields. That is why future studies should consider employing the simulated responses scale in alternative settings, such as gaming and entertainment, to fully understand its potential.

Moreover, although this research shows that enduring individual traits are related to simulated satiation or simulated immersion, future research may want to explore how to temporarily prime the state of immersion and reduce the state of satiation to enhance consumers' purchase intentions and perceptions in reality-enhancing technology settings. Unveiling such an important insight would provide many opportunities for marketing practitioners.

While developing the scale, this research manipulated content variety and exposure duration in reality-enhancing technologies. Such variables play a critical role when consumers form their simulated responses, and manipulating these variables provides valuable insights. However, in order to fully understand the potential of the simulated responses scale, future studies should explore the relationships between consumers' simulated responses and other prospective

variables, such as the perceived similarity between the virtual and real experience, novelty, nostalgia, and cognitive and affective states.

Additionally, the primary goal of this research is to create a scale that can measure consumers' simulated responses in reality-enhancing technologies. While doing so, this research focused on the similarities of such technologies. However, it must be acknowledged that there are several main differences between virtual reality and augmented reality technologies, perhaps most notably their levels of immersion. Therefore, future research should investigate how the differing immersive capabilities between virtual reality and augmented reality can influence consumers' simulated responses in reality-enhancing technologies.

Lastly, the ethical aspects of utilizing reality-enhancing technologies present several critical research areas. One of the most noticeable is transparency in data practices. The ways through which companies can ensure that users know what is going on regarding data collection and usage can create trust between users and companies. Therefore, future research should explore how disclosing information about data transparency rules influences consumers' behaviours and attitudes. Another important area is the potential addiction and mental health risks associated with long-term use of reality-enhancing technologies. Future research should create usage guidelines regarding balanced usage and ways to reduce these risks. Additionally, exploitative marketing targeted at children or people with cognitive disorders needs to be explored. This requires examining the long-term effects of using these technologies and creating ethical boundaries. Finally, existing regulations, laws, and frameworks need to be carefully examined, and new policies regarding ethical concerns should be proposed.

These research directions arise as a way to resolve limitations of the current study set. Yet next, this research considers how marketer use of simulated environments has divergent impact on consumer response, from energizing those who experience higher simulated immersion to depleting the energy of those who experience higher simulation satiation. This involves a larger consideration of how these divergent responses to reality-enhancing technologies impact consumer behaviour and marketing literature on a larger scale. In this vein, this thesis offers a research agenda to drive future scholarship and theorization.

5.6 Research Agenda

In this section, three core consumer behaviour concepts— information processing theory, Stimulus-Organism-Response (S-O-R) framework, and push and pull factors theory— are identified as being challenged by the rise in use of reality-enhancing technologies in an increasingly platform-driven, digital, and virtually rendered world. As one of the most novel disruptive technologies, reality-enhancing technologies have significantly altered— and will continue to alter— how consumers interact with each other and with the marketplace, and how marketers respond (Bonetti et al., 2018; Heller et al., 2019; Kang et al., 2020). By conceptualizing the dimensions of simulated responses, developing a measure of them, and showing initial tests of impact, this thesis has made clear contributions to the marketing literature. However, fully understanding consumers' simulated responses in such technologies and benefiting from them requires more research. Aside from conceptualization and scale development, more theory-oriented research is a must. To this end, this section identifies several gaps in the literature and presents future research avenues vital to continued study of the impacts of marketing tools in reality-enhancing technologies and platforms.

The following sections attempt to illustrate clear research objectives and the corresponding methodology for conducting research for each objective. Since reality-enhancing technology has significantly changed consumers' information processing, shopping behavior, and tourism decisions, this research identifies three distinct theories to create twenty promising research objectives. First, information processing theory and related theoretical frameworks, such as heuristic and systematic processing, nudge theory, and the elaboration likelihood model, are explained, and eleven research objectives are formed to identify the interaction of simulated responses and consumers' information processing. Second, the Stimulus-Organism-Response framework is discussed, and five research objectives are created to illustrate the possible impact of simulated responses on retailing. Finally, the push and pull factors theory is used to create four research objectives to illustrate the impact of simulated responses on tourism marketing.

Information processing theory

Reality-enhancing technologies provide new ways to deliver marketing messages, and this research highlights the importance of consumers' simulated responses in such technology experiences. Incorporating information processing theory to understand how consumers perceive, interpret, and remember information can provide invaluable insights. McGuire (1969) created a framework and identified five steps in information processing: exposure, attention, comprehension, conviction, and action. Later, he modified the model to eight steps, including exposure, perception, comprehension, agreement, retention, retrieval, decision-making, and action (McGuire, 1976). Howard and Sheth (1969) identified five steps, including attention, brand comprehension, attitude, intention and purchase. In another work, Blackwell et al. (2001) proposed another model with five components: exposure, attention, comprehension, acceptance, and retention. Recently, Yu and Natori (2020) developed the 4A model of information processing, which lists awareness, attention, affection, and action as elements of their framework. Though the steps change based on the specific research needs and context, by employing this theory marketing researchers and practitioners can optimize their content to design marketing campaigns that enhance learning and retention, boost engagement, and more efficiently educate customers about the products and services. Exposure to information via augmented reality and other enhancing technology, for instance, changes everything about how a consumer might process this information and what steps occur in the traditional sales funnel to motivate consumer action. This is especially the case when consumers show, as they do in this thesis, patterns of heightened interaction and embrace of simulated environments (simulated immersion) or patterns of exhaustion and disappointment with simulated environments (simulated satiation).

Implementing heuristic and systematic information processing model might also unveil numerous beneficial insights into simulated responses research. This model proposes that individuals think about information in two distinct ways: heuristic processing, which is usually linked to System 1 thinking, and systematic processing, which is linked to System 2 thinking (Chen & Chaiken, 1999; Morewedge & Kahneman, 2010; Norman, 2009). Heuristic processing is fast, requires less mental work, and does not require too much knowledge to evaluate the information; moreover, it can be considered as automatic (Chaiken & Ledgerwood, 2012). Heuristic information processing, in the

marketing context, refers to the way consumer choices are based on product packaging, colours, familiarity with brands, or even something as simple as emotional appeal from the ad (Chaiken, 1980; Tan et al., 2021). Those who are more immersed in a simulated environment might also have more heuristic processing or a greater response to affective information, for example.

On the contrary, systematic processing is slow, deep, and analytical in thinking. People undertake systematic thinking through the careful evaluation of information, evaluation of alternatives, and assessment of the pros and cons of the products (Zheng et al., 2024). In marketing contexts, people use systematic thinking when making a high-involvement purchase, such as purchasing a car, which might require comparing alternatives. Those who are more satiated in simulated settings are perhaps the consumers who evaluate marketing content presented in augmented reality settings with more critical, cognitive lenses. Reality-enhancing technologies have changed the way people process information, and the exploration of the interaction between simulated responses and heuristic and systematic information processing model can thus potentially yield many prominent outcomes for both marketing practitioners and business decision-makers.

Nudge theory might also be useful in understanding how simulated responses interact with environmental factors to influence consumer choices within reality-enhancing technologies. According to this theory, interventions like nudges that do not restrict consumer choices can be effective in changing the nature of consumers' decision-making without making them aware of this intervention (Cai, 2020). The main purpose of nudges is to lead consumers toward more preferred decisions without limiting their freedom of choice (Djupegot & Hensen, 2020; Vermeulen, 2022). This theory was created by Thaler and Sunstein (2008) and has already seen wide application in the fields of politics, tourism, business, and economics (Olya et al., 2023). Marketing literature can benefit from nudge theory in the context of simulated responses. Nudge theory, when applied with simulated responses, can help researchers understand how to design immersive experiences that subtly lead consumers' behaviour and choice toward predetermined objectives.

Elaboration likelihood model can also be a useful tool when applied to simulated responses within reality-enhancing technology research. This model suggests that there are two routes of

persuasion: the central route and the peripheral route (Kitchen et al., 2014). The central route requires higher cognition, where consumers carefully assess the marketing message. When individuals are motivated and carefully examine the message, they are more likely to be persuaded by strong arguments (O’Keefe, 2013). On the other hand, persuasion through the peripheral route occurs when individuals’ cognition levels are low and they are persuaded by superficial elements instead of the actual message (Kerr et al., 2015). Concisely, the elaboration likelihood model examines consumers’ information processing by focusing on the routes taken, individuals’ motivation, and ability to process the message. To pave the way for researchers and marketing practitioners, the present thesis has identified several research objectives and demonstrated the potential methodologies that can be employed to conduct substantial research in each proposed direction.

Table 5.1 Information processing theory related research agenda.

Theory	Research Objectives	Prospective Methodology
Information processing theory	Research Objective 1: Simulated immersion influences attention capture and retention in unknown ways. Research must examine how simulated immersion modifies consumers’ information prioritization.	Methodology: Researchers can employ eye-tracking or heart rate variability to assess attention and engagement in immersive vs non-immersive settings.
	Research Objective 2: Consumers’ comprehension and acceptance of information provided in highly immersive or satiating environments are unknown. Researchers can assess whether consumers comprehend, accept, and interpret messages differently in reality-enhancing technologies and real-world settings.	Methodology: Researchers can conduct surveys or interviews after exposing consumers to messages and measure believability, acceptance and interpretation.
	Research Objective 3: Understanding the impact of simulated responses on the long-term retention and ease of retrieval of marketing information can provide numerous benefits. Research must explore whether simulated responses (simulated satiation vs. simulated immersion) affect memory retention directly and significantly.	Methodology: Researchers must conduct longitudinal studies to track how information is remembered and utilized over time.

Research Objective 4: Consumers might perceive reality-enhancing technologies differently, such as manipulation or enhancement. Researchers must examine whether simulated immersion reduces consumers' ethical considerations and makes them perceive such technologies more positively.

Research Objective 5: Culture might play a significant role regarding attitudes and perceptions towards reality-enhancing technology experiences. Research must examine the impact of cultural differences on simulated satiation and simulated immersion.

Research Objective 6: Research regarding how simulated responses influence consumer decision-making is nascent. Therefore, understanding how simulated responses influence heuristic (System 1) vs. systematic (System 2) processing can yield very beneficial outcomes.

Research Objective 7: Researchers might want to investigate whether heuristic (vs. systematic) processing, triggered by simulated immersion (vs. satiation), leads to a stronger connection with the brand and ultimately results in enhanced brand loyalty.

Research Objective 8: Understanding how the principles of nudge theory can work in highly satiating and highly immersive environments can provide useful insights.

Research Objective 9: Exploration of the impact of nudges in reality-enhancing technologies and their influence on consumers' purchase intent and engagement in highly immersive and satiating experiences can allow businesses to optimize content in their marketing mix.

Methodology: Researchers can conduct qualitative studies, such as focus groups to gather data after exposing participants to reality-enhancing technology experiences.

Methodology: Researchers must conduct cross-cultural studies that has participants from various backgrounds or cultures to assess how culture influences simulated responses in reality-enhancing technologies.

Methodology: Researchers must observe and analyse how consumers engage in heuristic and systematic processing when exposed to highly satiating and highly immersive reality-enhancing technology experiences.

Methodology: Researchers must expose participants to highly satiating and highly immersive marketing content while assessing their processing routes. Afterwards, brand connections and loyalty must be evaluated.

Methodology: Researchers must employ a mixed-method approach, combining qualitative user experience studies with quantitative analysis, to test various nudging strategies in highly immersive and highly satiating reality-enhancing technology settings.

Methodology: Researchers must conduct observations and surveys to assess the effectiveness of nudges in terms of influencing consumers' purchase intent and engagement in reality-enhancing technologies while considering simulated responses.

Research Objective 10: Simulated immersion in reality-enhancing technologies has the potential to lead to more durable attitude changes (central route) compared to simulated satiation, which might lead to short-term persuasion (peripheral route). Researchers must explore the impact of simulated responses on the duration of attitude changes.

Methodology: Researchers must employ an experimental design where participants are exposed to information about a product or service in highly immersive and satiating settings. Following this, researchers must assess changes in attitudes immediately and after a specified time interval by employing surveys to measure engagement and persuasion depth.

Research Objective 11: High levels of involvement (vs. low) have the potential to influence the impact of simulated immersion (vs. simulated satiation) through the central route of persuasion (vs. peripheral). Researchers should explore whether this interaction results in more enhanced and enduring attitude changes.

Methodology: Researchers must use a between-subject design to manipulate involvement (high vs. low) and simulated responses (simulated immersion vs. simulated satiation). They must also employ surveys to assess participants' processing routes (central vs. peripheral).

Stimulus-Organism-Response framework

The Stimulus-Organism-Response (S-O-R) Framework is a highly useful tool for understanding simulated responses, especially in the context of retail. Existing literature has highlighted the predictive power of this framework regarding how customers react to novel stimuli (Gao & Bai, 2014; Laato et al., 2020; Peng & Kim, 2014; Vieira, 2013). S-O-R is a well-established framework that was conceptualized by Mehrabian & Russell (1974). The authors indicated that in a shopping environment, stimuli (a product on a shelf with a price tag) influence organisms (consumers), which leads to responses (purchase). This flexible framework can allow researchers to work on many different research objectives and test them in various ways. For instance, Eroglu et al. (2001) employed the S-O-R Framework to investigate whether the atmospheric qualities of online retailing mediate the relationship between environmental cues and shopping outcomes. McKinney (2004) emphasized via S-O-R that consumers' internal motivations for internet shopping are different compared to shopping in-person, and these motivations can influence shopping satisfaction. Similarly, reality-enhancing technology experiences in the context of retail are quite different from those (1) in-person and in-store and (2) via online e-commerce shopping experiences. Such technologies provide immersive computer-simulated experiences that allow

consumers to interact with products in various ways, display them in their own physical space, viewing products from all angles (Scholz & Smith, 2016; Bonetti et al., 2018).

Certain issues in reality-enhancing technologies cannot be experienced in-person and via online shopping experiences, such as latency-rendering issues, low graphic quality, and the awareness that the experience is just a simulation (Guerreiro et al., 2015). Consequently, this framework can be a useful tool when researchers want to understand how simulated responses in reality-enhancing technology settings interact with other variables to influence consumers' perceptions, decisions, and purchase intent. This thesis proposes several research objectives and illustrate prospective methodologies for how simulated responses can be utilized in the S-O-R Framework below.

Table 5.2 Stimulus-Organism-Response Framework related research agenda.

Theory	Research Objectives	Prospective Methodology
Stimulus-Organism-Response Framework	Research Objective 12: Cognitive state has an unexplored impact on simulated responses. Researchers must examine this impact and the subsequent effects on consumers' attitudes and purchase decisions.	Methodology: Researchers must prime participants' cognitive state before exposing them to highly satiating or highly immersing marketing content in reality-enhancing technologies. Afterwards, researchers should measure the impact of cognitive state on simulated responses and the subsequent effects on consumer attitudes and purchase intentions.
	Research Objective 13: Affective state has an unexplored impact on simulated responses. Researchers must examine this impact and the subsequent effects on consumers' attitudes and purchase decisions.	Methodology: Researchers must prime participants' affective state before exposing them to highly satiating or highly immersing marketing content in reality-enhancing technologies. Afterwards, researchers should measure the impact of affective state on simulated responses and the subsequent effects on consumer attitudes and purchase intentions.
	Research Objective 14: Simulated responses in reality-enhancing technology retail experiences might have a significant impact on consumers' trust towards the company depicted in the experience. Researchers must	Methodology: Researchers can employ experiments that allow participants to experience immersive (vs. satiating) virtual shopping environments. Afterwards, a survey should be

explore this impact and its influence on customer loyalty.

conducted to measure consumers' trust towards the company depicted in the experience and consumers' customer loyalty.

Research Objective 15: Simulated responses in reality-enhancing technology retail experiences might have a significant impact on consumers' perceived user-experience quality toward shopping platforms that provide the experience. Researchers must explore this impact and its influence on customer loyalty and advocacy.

Methodology: Researchers can employ experiments that allow participants to experience immersive (vs. satiating) virtual shopping environments. Afterwards, a survey should be conducted to measure consumers' loyalty, advocacy, and perceived user-experience quality toward shopping platforms that provide the experience.

Research Objective 16: Simulated responses in reality-enhancing technology retail experiences might have a significant impact on consumers' psychological ownership of products depicted in the experience. Researchers must explore this impact and its influence on purchase intent.

Methodology: Researchers can employ experiments that allow participants to experience immersive (vs. satiating) virtual shopping environments. Afterwards, a survey should be conducted to measure psychological ownership toward the products depicted in the experience and consumers' purchase intentions.

Push and pull factors theory

Reality-enhancing technology experiences can significantly influence consumers' tourism behaviour and perceptions of destinations (Deng et al., 2019; Heller et al., 2019). Employing push and pull factors theory and examining its interaction with simulated responses to understand individuals' visiting behaviour can provide extremely beneficial outcomes. This theoretical framework was originally developed by Dann (1977) and explains individuals' visiting motivations. The theory indicates that two dimensions influence individuals' travel habits: push factors and pull factors. The underlying mechanism suggests that individuals travel because they are pushed by their internal motivations and pulled by the attributes of the destination (i.e., perceptions toward the destination; Arowosafe et al., 2022, Cha et al., 1995). Existing literature has illustrated various elements for the push and pull factors; however, there is no consensus on the items. For instance, Crompton (1979) identified several push factors such as escape, self-exploration, prestige, and relaxation, and pull factors such as budget, facilities, culture, and

history. In another work, Uysal and Jurowski (1994) list push factors as re-experiencing family and togetherness, sports, and escape, and pull factors such as entertainment, nature, heritage, and inexpensive costs. In more recent years, Antara and Prameswari (2018) explore push and pull factors in the context of tourism in Bali and listed the push factors as community, climate, recreation opportunities, security, and hygiene, and pull factors as stemming from interpersonal, culture, status, and personal development. As can be seen, the theoretical framework is quite flexible and can be adapted easily based on the research objectives and the destination.

The Push and Pull theoretical framework is a well-established theory in terms of explaining individuals' tourism motivations and decisions to visit tourism destinations and can be easily incorporated into research regarding simulated responses (Allaberganov & Preko, 2022; Cengizci et al., 2020). Following this, the thesis identifies four research objectives and explains prospective methodologies regarding how simulated responses can be incorporated into the push and pull factors theory below.

Table 5.3 Push and pull factors theory related research agenda.

Theory	Research Objectives	Prospective Methodology
Push & Pull Theory	Research Objective 17: Simulated responses can influence consumers' motivations (push factors) towards a tourism destination. Exploring how simulated satiation and simulated immersion mediate the relationship between push factors and the intention to visit the destination depicted in the reality-enhancing technology experience might provide invaluable insights.	Methodology: A mixed-methods approach fits well with this research objective. Researchers can first conduct interviews regarding individuals' motivations to visit certain tourism destinations. Afterwards, surveys can be conducted to assess the mediation effect.
	Research Objective 18: Simulated responses can influence consumers' perceptions (pull factors) towards a tourism destination. Exploring how simulated satiation and simulated immersion mediate the relationship between pull factors and the intention to visit the destination depicted in the reality-enhancing technology experience might provide invaluable insights.	Methodology: A mixed-methods approach fits well with this research objective. Researchers can first conduct interviews regarding individuals' perceptions to visit certain tourism destinations. Afterwards, surveys can be conducted to assess the mediation effect.
	Research Objective 19: Researchers must examine how simulated responses can be leveraged to enhance destination loyalty. Push and pull factors can shape	Methodology: Researchers must employ mixed-method studies, including interviews that measure destination loyalty. Afterwards,

travellers' perceptions of authenticity and uniqueness regarding a destination. Therefore, researchers should explore how simulated responses interact with push and pull factors and influence destination loyalty.

surveys must be conducted to evaluate the impact of simulated responses on destination loyalty while considering various push and pull factors.

Research Objective 20: Overcrowded tourism destinations are causing disruption in many locations and sometimes causing harm to endangered tourism sites. Researchers must explore how to mitigate the negative effects of overcrowding and overtourism through reality-enhancing technology experiences. Future research should conduct studies and explore how simulated responses can lower tourism in endangered sites by incorporating push and pull factors into experiments.

Methodology: Researchers must conduct experimental studies to assess how simulated responses influence tourists' decisions to visit endangered sites, considering both push and pull factors.

5.7 Conclusion

In summary, this thesis investigates the concept of simulated responses in reality-enhancing technology settings to unveil its dimensions, develop a scale, and understand its impact on consumers. To this end, the present thesis formulates four research questions and employs a mixed-method research design. After conducting multiple studies, the results demonstrate that simulated responses are a multi-dimensional construct, and its dimensions include simulated satiation and simulated immersion. Existing validated scale development methods are employed to purify the scale, confirm its structure, and test its nomological validity. The last step in the process, the predictive validity test, illustrates that simulated satiation significantly lowers consumers' evaluations of AR tools and purchase intent, and conversely, simulated immersion enhances evaluations of AR tools and purchase intention.

This research contributes to the fields of marketing, disruptive technologies, reality-enhancing technologies, and consumer behaviour by conceptualizing simulated responses and developing a scale that can measure consumers' simulated responses in reality-enhancing technology settings. The main goal of this research is to better understand how consumers respond to marketing content in reality-enhancing technologies in terms of satiation and immersion. Existing research explores the effects of such concepts via in-person experiences; however, how satiation and

immersion influence consumers in reality-enhancing technologies is nascent. Across this thesis project, this research finds that consumers have two clear responses to marketing experiences via simulated environments. Some consumers feel depleted by simulated environments, feeling exhausted, bored and even physically sick from overexposure to reality-enhancing technology experiences, reporting high simulated satiation. Yet other consumers respond with more energy as they experience interactivity and feel they can nearly touch simulated objects, reporting high simulated immersion. The findings of this research can be used as a leverage point by future researchers who wish to conduct studies regarding simulated responses in different contexts. The conceptualisation and developed scale of simulated responses only sets the first stone for understanding simulated responses in reality-enhancing technologies, and more research is necessary to unveil its full impact.

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Appendices

Appendix A: First Ethics Approval



Auckland University of Technology Ethics Committee (AUTEC)

Auckland University of Technology
D-88, Private Bag 92006, Auckland 1142, NZ
T: +64 9 921 9999 ext. 8316
E: ethics@aut.ac.nz
www.aut.ac.nz/researchethics

13 October 2021

Sommer Kapitan
Faculty of Business Economics and Law

Dear Sommer

Re Ethics Application: **21/373 The Effect of Virtual Reality and Simulated Satiation on Consumer Decision Making**

Thank you for providing evidence as requested, which satisfies the points raised by the Auckland University of Technology Ethics Committee (AUTEC).

Your ethics application has been approved in stages for three years until 13 October 2024.

This approval is for the initial interview stage of the study only. Full information about the survey and the later stages of the study need to be provided to and approved by AUTEC before participants are recruited and data is collected.

1. The research is to be undertaken in accordance with the [Auckland University of Technology Code of Conduct for Research](#) and as approved by AUTEC in this application.
2. A progress report is due annually on the anniversary of the approval date, using the EA2 form.
3. A final report is due at the expiration of the approval period, or, upon completion of project, using the EA3 form.
4. Any amendments to the project must be approved by AUTEC prior to being implemented. Amendments can be requested using the EA2 form.
5. Any serious or unexpected adverse events must be reported to AUTEC Secretariat as a matter of priority.
6. Any unforeseen events that might affect continued ethical acceptability of the project should also be reported to the AUTEC Secretariat as a matter of priority.
7. It is your responsibility to ensure that the spelling and grammar of documents being provided to participants or external organisations is of a high standard and that all the dates on the documents are updated.
8. AUTEC grants ethical approval only. You are responsible for obtaining management approval for access for your research from any institution or organisation at which your research is being conducted and you need to meet all ethical, legal, public health, and locality obligations or requirements for the jurisdictions in which the research is being undertaken.

Please quote the application number and title on all future correspondence related to this project.

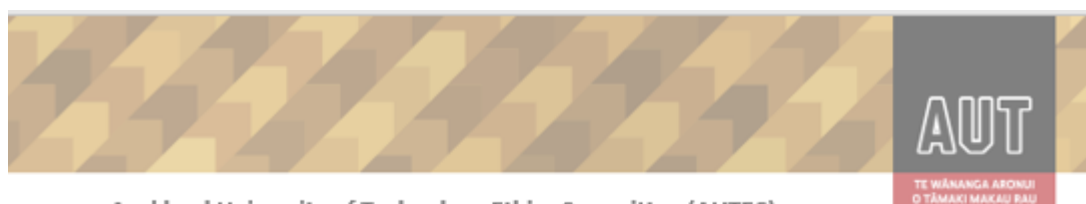
For any enquiries please contact ethics@aut.ac.nz. The forms mentioned above are available online through <http://www.aut.ac.nz/research/researchethics>

(This is a computer-generated letter for which no signature is required)

The AUTEC Secretariat
Auckland University of Technology Ethics Committee

Cc: Eroipala11@gmail.com

Appendix B: Second Ethics Approval



Auckland University of Technology Ethics Committee (AUTC)

Auckland University of Technology
D-88, Private Bag 92006, Auckland 1142, NZ
T: +64 9 921 9999 ext. 8316
E: ethics@aut.ac.nz
www.aut.ac.nz/researchethics

17 March 2022

Sommer Kapitan
Faculty of Business Economics and Law

Dear Sommer

Re Ethics Application: **21/373 The Effect of Virtual Reality and Simulated Satiation on Consumer Decision Making**

Thank you for providing evidence as requested, which satisfies the points raised by the Auckland University of Technology Ethics Committee (AUTC).

Your ethics application has been approved in stages for three years until 16 March 2025.

This approval is for the first of three online surveys using Amazon MTurk in the second stage of the study. The finalised remaining two surveys need to be provided to and approved by AUTC before participants are recruited and data is collected.

Non-Standard Conditions of Approval

1. Please send through the finalised survey showing the Information Sheet as the first block (instead of at the end and separate as it currently is).

Non-standard conditions must be completed before commencing your study. Non-standard conditions do not need to be reviewed by AUTC before commencing your study.

Standard Conditions of Approval

1. The research is to be undertaken in accordance with the [Auckland University of Technology Code of Conduct for Research](#) and as approved by AUTC in this application.
2. A progress report is due annually on the anniversary of the approval date, using the EA2 form.
3. A final report is due at the expiration of the approval period, or, upon completion of project, using the EA3 form.
4. Any amendments to the project must be approved by AUTC prior to being implemented. Amendments can be requested using the EA2 form.
5. Any serious or unexpected adverse events must be reported to AUTC Secretariat as a matter of priority.
6. Any unforeseen events that might affect continued ethical acceptability of the project should also be reported to the AUTC Secretariat as a matter of priority.
7. It is your responsibility to ensure that the spelling and grammar of documents being provided to participants or external organisations is of a high standard and that all the dates on the documents are updated.
8. AUTC grants ethical approval only. You are responsible for obtaining management approval for access for your research from any institution or organisation at which your research is being conducted and you need to meet all ethical, legal, public health, and locality obligations or requirements for the jurisdictions in which the research is being undertaken.

Please quote the application number and title on all future correspondence related to this project.

For any enquiries please contact ethics@aut.ac.nz. The forms mentioned above are available online through <http://www.aut.ac.nz/research/researchethics>

(This is a computer-generated letter for which no signature is required)

The AUTC Secretariat
Auckland University of Technology Ethics Committee

Cc: Erolpala11@gmail.com

Appendix C: Measurement Items Used in Proof-of-Concept Study

(Chapter 3 – Manuscript 1)

Stickiness (Lien, Cao, & Zhou, 2017; 1 = Strongly disagree, 7 = Strongly agree)

1. I would stay a longer time on viewing a VR experience.
2. I would visit a VR experience as often as I can.
3. I intend to view a VR experience every time it is possible.

Perceived easiness (Kim, Lee, & Jung, 2020; 1 = Strongly disagree, 7 = Strongly agree)

1. It is easy for me to understand how to manipulate the VR experience.
2. Using the VR experience does not require a lot of mental effort.
3. I think that using the VR experience is simple.
4. I find that it is easy to get what I want when I am using the VR experience.

Perceived usefulness (Kim, Lee, & Jung, 2020; 1 = Strongly disagree, 7 = Strongly agree)

1. I gain knowledge from using the VR experience.
2. Using the VR experience is useful to collect information.
3. Using the VR experience is beneficial.
4. Using the VR experience allows me to form friendships with other users.

Perceived enjoyment (Kim, Lee, & Jung, 2020; 1 = Strongly disagree, 7 = Strongly agree)

1. Using the VR experience is enjoyable for me.
2. Using the VR experience is pleasurable for me.
3. Using the VR experience is fun for me.
4. Using the VR experience keeps me happy.

Subjective well-being (Kim, Lee, & Jung, 2020; 1 = Strongly disagree, 7 = Strongly agree)

1. Using the VR experience is part of my ideal life.
2. The conditions of my life at using the VR experience are excellent.
3. I am satisfied with my life when I am using the VR experience.
4. So far, I have gotten the important things I want by using the VR experience.

Appendix D: Qualitative Study Recruitment Ad



Recruitment Ad

Do you like reality-enhancing technologies? Did you recently have a virtual reality (VR) experience? Help us understand which factors trigger the notion of satiation in VR experiences via an interview. (Please contact us via erol.pala@autuni.ac.nz)

Please note that individuals who are over 18 years old and had a virtual reality experience within the last three months can participate in this research project.



Appendix E: Oral Consent Protocol



Oral Consent Protocol

Project title: *The Effect of Virtual Reality and Simulated Satiation on Consumer Decision Making*

Project Supervisor: *Dr Sommer Kapitan & Dr Patrick van Esch*

Researcher: *Erol Pala*

The participant joins the videoconference

☐ Do you agree me recording your consent to participate?

If they agree, then the record function will be activated and they will be asked the following:

☐ Have you read and understood the information provided about this research project in the Information Sheet dated 09.09.2021?

☐ Do you have any questions about the research?

☐ Do you understand that notes will be taken during the interviews and that the interview will also be audio-recorded and transcribed?

☐ Do you understand that taking part in this study is voluntary (your choice) and that you may withdraw from the study at any time without being disadvantaged in any way?

☐ Do you understand that if you withdraw from the study then you will be offered the choice between having any data that is identifiable as belonging to you removed or allowing it to continue to be used? However, once the findings have been produced, removal of your data may not be possible.

☐ Do you agree to take part in this research?

☐ Do you wish to receive a summary of the research findings? (please tick one): Yes ☐ No ☐

☐ Do you want me to send you a copy of the audio recording for this consent? Yes ☐ No ☐

☐ Please confirm you name and contact details

Participant's name:

Participant's Contact Details (if appropriate):

.....
.....
.....
.....

I will now turn off the recording of the Consent and then will start a separate recording for the interview.

Approved by the Auckland University of Technology Ethics Committee on *type the date on which the final approval was granted* AUTEK Reference number *type the AUTEK reference number*

Note: The Participant should retain a copy of this form.

Appendix F: Participant Information Sheet



Participant Information Sheet

Date Information Sheet Produced:

09.09.2021

Project Title

The Effect of Virtual Reality and Simulated Satiation on Consumer Decision Making

An Invitation

Dear participant, you are invited to participate in a doctoral research. This research project is being conducted by Erol Pala at Auckland University of Technology.

What is the purpose of this research?

The objective of this study is to examine the impact of simulated satiation on consumer decision making on namely virtual reality (VR) but also augmented and mixed reality applications (AR, MR). The findings of this research may be used for academic publications and presentations.

Why am I being invited to participate in this research?

You are being invited to participate in this research because you are over 18 years old and you have used virtual or augmented reality (VR & AR) applications within the past three months.

How do I agree to participate in this research?

If you agree to participate in this research project, please completely read this information sheet and indicate your intention to participate in this research via e-mail to the primary researcher "erol.pala@aut.ac.nz". Please note that indicating your intention to participate in this research will not be taken as initial consent to participate in this project. Regarding the consent, we will follow oral consent protocol and will ask you to indicate your consent orally during the interview (your consent to participate in this research will be voice recorded online before the interview commences). Also, please remember that your participation in this research is voluntary (it is your choice) and whether or not you choose to participate will neither advantage nor disadvantage you. You are able to withdraw from the study at any time. If you choose to withdraw from the study, then you will be offered the choice between having any data that is identifiable as belonging to you removed or allowing it to continue to be used. However, once the findings have been produced, removal of your data may not be possible.

What will happen in this research?

The procedure involves an online interview that will take approximately 30 minutes. The interview will be about individuals' satiation levels in reality-enhancing platforms and how they influence consumers' decisions. This is a semi-structured interview, so questions will be asked as they occur and some questions may be asked in different order, as the conversation progresses.

What are the discomforts and risks?

This research will not create any risk to the participants. You will not be identifiable in the outcome of the research and our questions will not target any personal or sensitive topics. Also, the interview guide is designed to eliminate potential discomfort that you may experience. Besides, you will have the right to terminate the interview at any time you want.

How will my privacy be protected?

Your responses will be strictly confidential and we will not share your personal information with any third parties. The results of the study will be used for academic purposes only and you will not be identifiable in the outcome of the research.

What are the costs of participating in this research?

The only cost of participating in this research is your valuable time. The online interview will take approximately 30 minutes.

What opportunity do I have to consider this invitation?

You will have one month to consider this invitation.

Will I receive feedback on the results of this research?

If you would like to receive feedback regarding the outcome of this research, please indicate it during the interviews.

What do I do if I have concerns about this research?

If you have any concerns about this research, please contact project supervisor Dr Sommer Kapitan via e-mail (sommer.kapitan@aut.ac.nz) or telephone (+649 921 9999 ext. 5131).

Whom do I contact for further information about this research?

Please keep this Information Sheet for your future reference. You are also able to contact the research team as follows:

Researcher Contact Details:

Erol Pala - erol.pala@autuni.ac.nz

Project Supervisor Contact Details:

Sommer Kapitan - sommer.kapitan@aut.ac.nz

Patrick van Esch - pvanesch@kennesaw.edu

Approved by the Auckland University of Technology Ethics Committee on *type the date final ethics approval was granted*, AUTC Reference number *type the reference number*.

Appendix G: Interview Guide

Participants will be asked a series of open-ended questions to probe more understanding regarding the notion of satiation in reality-enhancing technology experiences.

The order of questions for the interviews is not predetermined; therefore, questions will be asked as they arise, and they may be asked in a different order as the conversation progresses.

These indicative questions serve as a guide for the researcher.

1. Describe a recent experience with virtual reality or augmented reality. What was it like? What did you use to access the technology?
2. How often have you used virtual reality or augmented reality? How long have you used these technologies? When and where do you have an opportunity to use these technologies?
3. How enjoyable are virtual reality and/or augment reality experiences, overall?
4. Why do you tend to stop using the VR or AR device? When do you know you've "had enough" of the experience?
5. What does it feel like when you have "had enough" of the VR or AR experience? Do you think that's the same for your friends or family who use VR and AR devices, too?
6. Do you use the same tools often or do you prefer variety for these VR and AR experiences? Do you like to repeat use of a tool, or is once or twice enough?

Appendix H: Initial Set of Measurement Items (Chapter 4 – Manuscript 2)

115 measurement items were generated based on the literature review and online semi-structured interviews.

“Please rate the following items based on your recent virtual reality experiences.”

1. After I use VR and/or AR, the experience bleeds into reality.
2. After I use VR and/or AR, the experience can get mixed up with real life.
3. Doing things in VR and/or AR with friends is fun.
4. I always feel immersed in a VR and/or AR experience.
5. I always look for more VR and/or AR with new content.
6. I am always excited to start a new VR and/or AR experience.
7. I am excited when I find a VR and/or AR experiences with improved graphics.
8. I am happiest revisiting the same VR and/or AR experiences.
9. I am more likely to buy more and do more if the VR and/or AR is interesting to me.
10. I am most drawn to a VR and/or AR setting that is like real life.
11. I am passionate about trying new VR and/or AR experiences.
12. I am the first to know about the latest VR and/or AR.
13. I can forget my surroundings when I am using VR and/or AR.
14. I can forget the time when I am using VR and/or AR.
15. I cannot satisfy my need for touch in virtual experiences.
16. I don't care if I make friends using VR and/or AR.
17. I don't get too invested in VR and/or AR experiences.
18. I don't mind if VR and/or AR doesn't change much.
19. I don't need new VR and/or AR experiences.
20. I don't want to use VR and/or AR if I am not interacting with other individuals.
21. I feel like I can almost touch things in VR and/or AR.
22. I feel part of the scene in VR and/or AR.
23. I get more enjoyment when I find new content and experience in VR and/or AR.
24. I get most excited to visit places, times and world that aren't real.
25. I get sick of VR and/or AR.
26. I get too sick to spend much time in VR and/or AR worlds.
27. I give up on a VR and/or AR experience if I don't see many people there.

28. I got bored of VR and/or AR after a while.
29. I like to keep up with the latest trends in VR and/or AR.
30. I love to find new VR and/or AR experiences.
31. I meet new people in VR and/or AR experiences.
32. I never really get ill when I join VR and/or AR.
33. I never think of VR and/or AR as “just a simulation.”
34. I often experience delays when using VR and/or AR.
35. I often think of VR and/or AR as feeling just like real life.
36. I search for a variety of VR and/or AR experiences.
37. I spend too much time in VR and/or AR worlds.
38. I use VR and/or AR as a place that I socialise.
39. I wish I could spend more time in VR and/or AR worlds.
40. I wish I made more friends via VR and/or AR experiences.
41. I worry I am too invested in VR and/or AR experiences.
42. I’m always ready to try the latest VR and/or AR.
43. If avatars of my friends look similar to my friends’ real faces, then I would feel more realistic.
44. It can be difficult to process VR and/or AR experiences.
45. Meeting new people in VR and/or AR is fun.
46. My excitement in VR and/or AR experiences fades over time.
47. My work and home responsibilities keep me from using VR and/or AR.
48. Remembering that VR and/or AR is “just a simulation” makes me less excited.
49. The longer I use VR and/or AR, the less excitement I feel.
50. The more often I use VR and/or AR, the less excitement I feel.
51. Time flies when I am using VR and/or AR.
52. VR and/or AR adds visible value to the experience.
53. VR and/or AR allows me to better view products and services.
54. VR and/or AR can a substitute for real life tourism.
55. VR and/or AR can drain battery fast.
56. VR and/or AR can have poor graphic quality problems.
57. VR and/or AR causes a stomach-ache.
58. VR and/or AR causes disorientation and nausea.
59. VR and/or AR causes headache.
60. VR and/or AR devices can have bad battery life.
61. VR and/or AR does not restrict my location during the experience.
62. VR and/or AR freezes often.
63. VR and/or AR headset cause pain in my eyes.
64. VR and/or AR headsets are not ergonomic.

65. VR and/or AR headsets are too heavy.
66. VR and/or AR helps me to make decisions regarding products and services.
67. VR and/or AR is always evolving.
68. VR and/or AR is as tiring as real-life work-out.
69. VR and/or AR is endless.
70. VR and/or AR is informative when viewing products and services.
71. VR and/or AR is interactive.
72. VR and/or AR is intimidating for beginners.
73. VR and/or AR is often amazing.
74. VR and/or AR is often boring.
75. VR and/or AR is often brilliant.
76. VR and/or AR is often disappointing.
77. VR and/or AR is often enjoyable.
78. VR and/or AR is often epic.
79. VR and/or AR is often exciting.
80. VR and/or AR is often extraordinary.
81. VR and/or AR is often frustrating.
82. VR and/or AR is often fulfilling.
83. VR and/or AR is often fun.
84. VR and/or AR is often good.
85. VR and/or AR is often great.
86. VR and/or AR is often impressive.
87. VR and/or AR is often incredible.
88. VR and/or AR is often inspiring.
89. VR and/or AR is often interesting.
90. VR and/or AR is often magnificent.
91. VR and/or AR is often mind blowing.
92. VR and/or AR is often nice.
93. VR and/or AR is often out of this world.
94. VR and/or AR is often phenomenal.
95. VR and/or AR is often pleasing.
96. VR and/or AR is often promising.
97. VR and/or AR is often remarkable.
98. VR and/or AR is often satisfying.
99. VR and/or AR is often surprising.
100. VR and/or AR is psychologically overwhelming.
101. VR and/or AR is realistic.
102. VR and/or AR is the future.

103. VR and/or AR loads too slowly.
104. VR and/or AR makes can be addictive.
105. VR and/or AR makes me dizzy.
106. VR and/or AR makes me feel exhausted.
107. VR and/or AR makes me feel involved during the experience.
108. VR and/or AR makes me tired.
109. VR and/or AR makes me worry about my mental health.
110. VR and/or AR makes me worry about my physical health.
111. VR and/or AR makes my body fatigued.
112. VR and/or AR takes up too much data and storage.
113. When I am using VR and/or AR, I feel I am present in the experience.
114. When I am using VR and/or AR, I feel like I am really there.
115. When VR and/or AR experience is unlike real life today, I am more excited.

Appendix I: Predictive Validity Test Questionnaire

Welcome to the virtual reality & augmented reality study

The objective of this study is to examine the impact of simulated satiation on consumer decision making on namely virtual reality (VR) but also augmented and mixed reality applications (AR, MR). The findings of this research may be used for academic publications and presentations.

We seek respondents who are over 18 years old, and you have used virtual or augmented reality (VR & AR) applications within the past three months.

How do I agree to participate in this research?

If you agree to participate in this research project, please read this information sheet and complete the following survey. Completion of the survey will demonstrate your consent to participate in this research project. Also, please remember that your participation in this research is voluntary (it is your choice) and whether or not you choose to participate will neither advantage nor disadvantage you. You are able to withdraw from the study at any time. However, once the survey has been submitted, the data is not able to be withdrawn from the research.

What do I do if I have concerns about this research?

Any concerns regarding the nature of this project should be notified in the first instance to the Project Supervisor Dr Sommer Kapitan, sommer.kapitan@aut.ac.nz, (+649) 921 9999 ext. 5131.

Concerns regarding the conduct of the research should be notified to the Executive Secretary of AUTECH, ethics@aut.ac.nz, (+649) 921 9999 ext. 6038.

Whom do I contact for further information about this research?

Please keep this Information Sheet for your future reference. You are also able to contact the research team as follows:

Researcher Contact Details:

Erol Pala - erol.pala@aut.ac.nz

Project Supervisor Contact Details:

Sommer Kapitan - sommer.kapitan@aut.ac.nz

Patrick van Esch - pvanesch@kennesaw.edu

Approved by the Auckland University of Technology Ethics Committee on 17.03.2022, AUTECH Reference number 21/373.

Do you agree to participate in this research?

- ☐ Yes, I agree.
 - ☐ No, I disagree.
-

This questionnaire requires mobile device usage in order to view the products in augmented reality settings. Are you viewing this survey via your mobile devices (e.g. smart phones or tablet computers)?

- ☐ Yes
 - ☐ No
-

Have you used a virtual reality device or application within the past 3 months?

- ☐ Yes
 - ☐ No
 - ☐ Unsure
-

Have you used an augmented reality device or application within the past 3 months?

- ☐ Yes
 - ☐ No
 - ☐ Unsure
-

Description

PART 1

This study on augmented reality experiences has 2 parts.

First, we will ask you to visit a website and view certain products in augmented reality settings.

Afterwards, you will be asked to demonstrate your thoughts regarding the items that

you viewed. Please note that it is required to take screenshots of the requested items in AR settings and upload the images in the following pages!

Please click the arrows below to continue the study.

Condition 1 (1 product, 1 position)

Please carefully read the following instructions.

In this phase, we would like you to visit a website and complete the following steps:

1. Scroll down the page to see 6 product demos
2. Click "view at home" to see the **coffee machine** in your space



3. Take **1 screenshot** of the coffee machine to upload below

Remember we need to see your screenshot! In order to complete this study, you must **complete step 3**. That means **you need to take 1 valid screenshot of the coffee machine in your space.**

Please visit [INHAABIT AR](#) to view the **coffee machine** in augmented reality.

Please upload a screenshot of the **coffee machine in your space**.

Just to check, does the uploaded screenshot show the **coffee machine in your own space** (your room or where you are sitting)?

- ☐ Yes! This shows the coffee machine in my own space
- ☐ No! It just shows the coffee machine
- ☐ No! I didn't upload a screenshot

Thank you for viewing the products in AR settings. Please rate the following based on the AR experience you just had.

	1 Strongly disagree	2	3	4 Neutral	5	6	7 Strongly agree
Viewing products in AR is a fun thing to do.	☐	☐	☐	☐	☐	☐	☐
I am interested in purchasing products that I viewed in AR.	☐	☐	☐	☐	☐	☐	☐
I am willing to purchase products that I viewed in AR.	☐	☐	☐	☐	☐	☐	☐
I would recommend this AR experience.	☐	☐	☐	☐	☐	☐	☐
The AR experience allowed me to evaluate the product in a better way.	☐	☐	☐	☐	☐	☐	☐
The AR experience would help me to make a more robust decision.	☐	☐	☐	☐	☐	☐	☐

Are you currently shopping for a new coffee machine?

- ☐ Yes
- ☐ No

Are you currently shopping for any new furniture?

- ☐ Yes
- ☐ No

Condition 2 (1 product, 3 positions)

Please carefully read the following instructions.

In this phase, we would like you to visit a website and complete the following steps:

1. Scroll down the page to see 6 product demos
2. Click "view at home" to see the **coffee machine** in your space



3. Please take 3 screenshots of the coffee machine in different locations in your space.

(How do I take 3 screenshots?

After you take a screenshot, move the coffee machine around to another view, and take another screenshot. Then again, move the coffee machine to another spot, and take a third screenshot. Done!)

Remember we need to see your screenshots! In order to complete this study, you must **complete step 3**. That means **you need to take 3 valid screenshots of the coffee machine in 3 different locations in your space.**

Please visit [INHAABIT AR](#) to view the **coffee machine** in augmented reality.

Please upload screenshot 1 of the **coffee machine in your space**.

Please upload screenshot 2 of the **coffee machine in your space**.

Please upload screenshot 3 of the **coffee machine in your space**.

Just to check, do the uploaded screenshots show the **coffee machine in your own space** (your room or where you are sitting)?

- ☐ Yes! These show the coffee machine in my own space
- ☐ No! They just show the coffee machine
- ☐ No! I didn't upload any screenshots

Thank you for viewing the products in AR settings. Please rate the following based on the AR experience you just had.

	1 Strongly disagree	2	3	4 Neutral	5	6	7 Strongly agree
Viewing products in AR is a fun thing to do.	☐	☐	☐	☐	☐	☐	☐
I am interested in purchasing products that I viewed in AR.	☐	☐	☐	☐	☐	☐	☐
I am willing to purchase products that I viewed in AR.	☐	☐	☐	☐	☐	☐	☐
I would recommend this AR experience.	☐	☐	☐	☐	☐	☐	☐
The AR experience allowed me to evaluate the product in a better way.	☐	☐	☐	☐	☐	☐	☐
The AR experience would help me to make a more robust decision.	☐	☐	☐	☐	☐	☐	☐

Are you currently shopping for a new coffee machine?

- ☐ Yes
- ☐ No

Are you currently shopping for any new furniture?

☐ Yes

☐ No

Condition 3 (3 products, 1 position)

Please carefully read the following instructions.

In this phase, we would like you to visit a website and complete the following steps:

1. Scroll down the page to see 6 product demos
2. Click "view at home" to see the **coffee machine** in your space



3. Take **1 screenshot** of the coffee machine to upload below

Remember we need to see your screenshot! In order to complete this study, you must **complete step 3**. That means **you need to take 1 valid screenshot of the coffee machine in your space.**

Please visit [INHAABIT AR](#) to view the **coffee machine** in augmented reality.

Please upload a screenshot of the **coffee machine in your space**.

Just to check, does the uploaded screenshot show the **coffee machine in your own space** (your room or where you are sitting)?

- ☐ Yes! This shows the coffee machine in my own space
 - ☐ No! It just shows the coffee machine
 - ☐ No! I didn't upload a screenshot
-

1. Next, please view an additional product from this website.
2. Click "view at home" to see the **chair** in your space



3. Take **1 screenshot** of the chair to upload below

Remember we need to see your screenshot! In order to complete this study, you must **complete step 3**. That means **you need to take 1 valid screenshot of the chair in your space.**

Please visit [INHAABIT AR](#) to view the **chair** in augmented reality.

Please upload a screenshot of the **chair in your space**.

Just to check, does the uploaded screenshot show the **chair in your own space** (your room or where you are sitting)?

- ☐ Yes! This shows the chair in my own space
 - ☐ No! It just shows the chair
 - ☐ No! I didn't upload a screenshot
-

1. Next, please view an additional product from this website.

2. Click "view at home" to see the **bar stool** in your space



3. Take **1 screenshot** of the bar stool to upload below

Remember we need to see your screenshot! In order to complete this study, you must **complete step 3**. That means **you need to take 1 valid screenshot of the bar stool in your space.**

Please visit [INHAABIT AR](#) to view the **bar stool** in augmented reality.

Please upload a screenshot of the **bar stool in your space**.

Just to check, does the uploaded screenshot show the **bar stool in your own space** (your room or where you are sitting)?

- ☐ Yes! This shows the bar stool in my own space
- ☐ No! It just shows the bar stool
- ☐ No! I didn't upload a screenshot

Thank you for viewing the products in AR settings. Please rate the following based on the AR experience you just had.

	1 Strongly disagree	2	3	4 Neutral	5	6	7 Strongly agree
Viewing products in AR is a fun thing to do.	☐	☐	☐	☐	☐	☐	☐

	1 Strongly disagree	2	3	4 Neutral	5	6	7 Strongly agree
I am interested in purchasing products that I viewed in AR.	☐	☐	☐	☐	☐	☐	☐
I am willing to purchase products that I viewed in AR.	☐	☐	☐	☐	☐	☐	☐
I would recommend this AR experience.	☐	☐	☐	☐	☐	☐	☐
The AR experience allowed me to evaluate the product in a better way.	☐	☐	☐	☐	☐	☐	☐
The AR experience would help me to make a more robust decision.	☐	☐	☐	☐	☐	☐	☐

Are you currently shopping for a new coffee machine?

- ☐ Yes
- ☐ No

Are you currently shopping for any new furniture?

- ☐ Yes
- ☐ No

Condition 4 (3 products, 3 positions)

Please carefully read the following instructions.

In this phase, we would like you to visit a website and complete the following steps:

1. Scroll down the page to see 6 product demos
2. Click "view at home" to see the coffee machine in your space



3. Please take 3 screenshots of the coffee machine in different locations in your space.

(How do I take 3 screenshots?

After you take a screenshot, move the coffee machine around to another view, and take another screenshot. Then again, move the coffee machine to another spot, and take a third screenshot. Done!)

Remember we need to see your screenshots! In order to complete this study, you must **complete step 3**. That means you need to **take 3 valid screenshots of the coffee machine in 3 different locations in your space**.

Please visit [INHAABIT AR](#) to view the **coffee machine** in augmented reality.

Please upload a screenshot 1 of the **coffee machine in your space**.

Please upload a screenshot 2 of the **coffee machine in your space**.

Please upload a screenshot 3 of the **coffee machine in your space**.

Just to check, do the uploaded screenshots show the **coffee machine in your own space** (your room or where you are sitting)?

- ☐ Yes! These show the coffee machine in my own space
 - ☐ No! They just show the coffee machine
 - ☐ No! I didn't upload a screenshot
-

1. Next, please view an additional product from this website.
2. Click "view at home" to see the **chair** in your space



3. Please take 3 screenshots of the chair in different locations in your space.

(How do I take 3 screenshots?

After you take a screenshot, move the item around to another view, and take another screenshot. Then again, move the item to another spot, and take a third screenshot. Done!)

Remember we need to see your screenshots! In order to complete this study, you must **complete step 3**. That means you need to **take 3 valid screenshots of the chair in 3 different locations in your space.**

Please visit [INHAABIT AR](#) to view the **chair** in augmented reality.

Please upload screenshot 1 of the **chair in your space**.

Please upload screenshot 2 of the **chair in your space**.

Please upload screenshot 3 of the **chair in your space**.

Just to check, do the uploaded screenshots show the **chair in your own space** (your room or where you are sitting)?

- ☐ Yes! These show the chair in my own space
 - ☐ No! They just show the chair
 - ☐ No! I didn't upload a screenshot
-

1. Next, please view an additional product from this website.
2. Click "view at home" to see the **bar stool** in your space



3. Please take 3 screenshots of the bar stool in different locations in your space.

(How do I take 3 screenshots?

After you take a screenshot, move the item around to another view, and take another screenshot. Then again, move the item to another spot, and take a third screenshot. Done!)

Remember we need to see your screenshots! In order to complete this study, you must **complete step 3**. That means you need to **take 3 valid screenshots of the bar stool in 3 different locations in your space**.

Please visit [INHAABIT AR](#) to view the **bar stool** in augmented reality.

Please upload screenshot 1 of the **bar stool in your space**.

Please upload screenshot 2 of the **bar stool in your space**.

Please upload screenshot 3 of the **bar stool in your space**.

Just to check, do the uploaded screenshots show the **bar stool in your own space** (your room or where you are sitting)?

- ☐ Yes! These show the bar stool in my own space
- ☐ No! They just show the bar stool
- ☐ No! I didn't upload a screenshot

Thank you for viewing the products in AR settings. Please rate the following based on the AR experience you just had.

	1 Strongly disagree	2	3	4 Neutral	5	6	7 Strongly agree
Viewing products in AR is a fun thing to do.	☐	☐	☐	☐	☐	☐	☐
I am interested in purchasing products that I viewed in AR.	☐	☐	☐	☐	☐	☐	☐
I am willing to purchase products that I viewed in AR.	☐	☐	☐	☐	☐	☐	☐

14/20

	1 Strongly disagree	2	3	4 Neutral	5	6	7 Strongly agree
I would recommend this AR experience.	☐	☐	☐	☐	☐	☐	☐
The AR experience allowed me to evaluate the product in a better way.	☐	☐	☐	☐	☐	☐	☐
The AR experience would help me to make a more robust decision.	☐	☐	☐	☐	☐	☐	☐

Are you currently shopping for a new coffee machine?

- ☐ Yes
- ☐ No

Are you currently shopping for any new furniture?

- ☐ Yes
- ☐ No

Statement

PART 2

Thank you for viewing part 1. In the next part of this study, we are interested in your feelings and thoughts.

Please consider all your recent experiences with any reality enhancing technology. That can include this virtual tour, any time you have played games, shopped, or looked up information and used virtual reality (VR) and/or mixed reality and augmented reality (MR, AR).

Please click the arrow below to continue.

Set of Items

Reflect on your recent experiences with VR (virtual reality), AR (augmented reality) and/or mixed reality (MR) devices and technology. Please read the statements that follow and indicate whether you agree or disagree with each statement. Remember there is no “right” or “wrong” answer, and we only seek the answer that best fits your response.

	1 Strongly disagree	2	3	4 Neutral	5	6	7 Strongly agree
I can forget my surroundings when I am using VR/AR.	☐	☐	☐	☐	☐	☐	☐
VR/AR is interactive.	☐	☐	☐	☐	☐	☐	☐
VR/AR causes disorientation and nausea.	☐	☐	☐	☐	☐	☐	☐
I feel like I can almost touch things in VR/AR.	☐	☐	☐	☐	☐	☐	☐
	1 Strongly disagree	2	3	4 Neutral	5	6	7 Strongly agree
VR/AR makes me tired.	☐	☐	☐	☐	☐	☐	☐
I get too sick to spend much time in VR/AR worlds.	☐	☐	☐	☐	☐	☐	☐
I always feel immersed in a VR/AR experience.	☐	☐	☐	☐	☐	☐	☐
VR/AR is often disappointing.	☐	☐	☐	☐	☐	☐	☐
	1 Strongly disagree	2	3	4 Neutral	5	6	7 Strongly agree
I always look for more VR/AR with new content.	☐	☐	☐	☐	☐	☐	☐
I get bored of VR/AR after a while.	☐	☐	☐	☐	☐	☐	☐
VR/AR causes headaches.	☐	☐	☐	☐	☐	☐	☐

	1 Strongly disagree	2	3	4 Neutral	5	6	7 Strongly agree
I am always excited to start a new VR/AR experience.	☐	☐	☐	☐	☐	☐	☐

Convergent

Please read the statements that follow and indicate whether you agree or disagree with each statement.

Reflect on your recent AR/VR experiences:

	1 Strongly disagree	2	3	4 Neutral	5	6	7 Strongly agree
I was deeply engrossed in the previous VR/AR experience.	☐	☐	☐	☐	☐	☐	☐
I was absorbed intently into the previous VR/AR experience.	☐	☐	☐	☐	☐	☐	☐
My attention was focused on the previous VR/AR experience.	☐	☐	☐	☐	☐	☐	☐
I concentrated fully on the previous VR/AR experience.	☐	☐	☐	☐	☐	☐	☐
Please select number 3	☐	☐	☐	☐	☐	☐	☐

Please read the statements that follow and indicate whether you agree or disagree with each statement.

Reflect on your recent AR/VR experiences:

	1 Strongly disagree	2	3 Neutral	4	5 Strongly agree
I felt like the VR/AR experience was actually there in the real world.	☐	☐	☐	☐	☐
It was as though the true location of the VR/AR experience had shifted into the real-world environment.	☐	☐	☐	☐	☐
I felt like the VR/AR experience meshed with the real-world surroundings.	☐	☐	☐	☐	☐

	1 Strongly disagree	2	3 Neutral	4	5 Strongly agree
Please select two as an attention check.	☐	☐	☐	☐	☐
It seemed as if the VR/AR experience actually took part in the action in the real world.	☐	☐	☐	☐	☐

	1 Strongly disagree	2	3 Neutral	4	5 Strongly agree
I had the impression that I could be active with the VR/AR experience in the real world.	☐	☐	☐	☐	☐
I felt like I could move the objects of VR/AR experience around in the real world.	☐	☐	☐	☐	☐
The VR/AR experience gave me the feeling I could do things with it.	☐	☐	☐	☐	☐
It seemed to me that I could do whatever I wanted with VR/AR technology.	☐	☐	☐	☐	☐

Please read the statements that follow and indicate whether you agree or disagree with each statement.

Reflect on your previous online gaming experiences:

	1 Strongly disagree	2	3	4 Neutral	5	6	7 Strongly agree
Playing games is exciting.	☐	☐	☐	☐	☐	☐	☐
I enjoy playing games.	☐	☐	☐	☐	☐	☐	☐
Playing games gives me a lot of pleasure.	☐	☐	☐	☐	☐	☐	☐
Please select number 2	☐	☐	☐	☐	☐	☐	☐

Divergent

Please read the statements that follow and indicate whether you agree or disagree with each statement.

	1 Strongly disagree	2	3	4 Neutral	5	6	7 Strongly agree
When I get technical support from a company of a high-tech product or service, I sometimes feel as if I am being taken advantage of by someone who knows more than I do.	☐	☐	☐	☐	☐	☐	☐
If I buy a high-tech product or service, I prefer to have the basic model over one with a lot of extra features.	☐	☐	☐	☐	☐	☐	☐
It is embarrassing when I have trouble with a high-tech gadget while people are watching.	☐	☐	☐	☐	☐	☐	☐
Technology always seems to fail at the worst possible time.	☐	☐	☐	☐	☐	☐	☐

Demographics

Please indicate your age.

Please indicate your gender.

- ☐ Female
☐ Male
☐ Non-binary
☐ Prefer not to say

Closing

Thanks a bunch!!

You have now completed the task. Please copy and paste this random number as your "completion code" on the HIT page on MTurk:

`${e://Field/Random%20ID}`

Thank you for your participation! if you have any questions about your participation in this study, please contact the researcher via the MTurk platform.

If you would like to see the results of this academic research, please visit the following URL: <https://www.linkedin.com/in/erolpala/>. Please remember that it may take several months to publish the outcome of the research.

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