Consumer behaviour towards emerging smart technologies and its consequences for business environments

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A thesis submitted in accordance with the University's requirements for the degree
Doctor of Business Administration

I. Declaration

I declare that the work in this thesis was carried out in accordance with the regulations of the University of Worcester and is original except where indicated by specific reference in the text. No part of the research has been submitted as part of any other academic award. The thesis has not been presented to any other educational institution in the United Kingdom or overseas. Any views expressed throughout the thesis are those of the author and in no way represent those of the University.

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II. Abstract

The investigation of consumer behaviour with regards to technology usage and adoption accounts for a longstanding field of marketing research. Traditionally, research took emphasis on understanding technology acceptance or beneficial points which lead consumers to the adoption of technology. In addition, the perspective to understand stronger ties between individuals and technology – and therefore a rather strict adoption behaviour – was found to be barely addressed in the literature. Pertaining this to the potential consequences arising for companies, it can be substantiated that increased bonds between consumers and technologies lead them to be eminently forced to integrate the specific technology into their own business environment – in order to retain or attract customers. This led to the identification of a research gap in terms of understanding the influence of negatively associated aspects in the consumer sphere – complemented by deficiencies in terms understanding whether informing about negative considerations from a company's side leads consumers to change their behaviour towards the specific technology.

With respect to previously stated considerations, it was found that digital technologies are used as a means to substantiate decisions in terms of approaching a specific business environment. In this regard, it was derived that virtual assistants, accounting for an emerging and contemporarily used technology in the private sphere, are subject to guide or also control individuals' choice of the distinctive venue to approach – probably causing companies, who are not integrating or maintaining these technologies, to forfeit customer potential. Therefore, the research aimed to understand reasons substantiating the adoption of virtual assistants from the professional and consumer perspective as well as to draw conclusions about the influence of negatively associated measures, complemented by approaching to deduce insights about the potential to inform individuals about them.

In terms of theoretical foundations, traditional as well as relatively new theories are discussed, namely: the rational choice and actor-network theory as well as the theory of

planned behaviour and technology-acceptance theories, traditionally emphasising objective arguments for technology adoption. These theories were complemented by a multiplicity of factors, which can be related to theoretical underpinnings such as bounded rationality, consumer-driven demand for integrated solutions, information avoidance or paradoxical behaviour. These indications led to the consideration that ties between individuals and technologies are probably beyond the lines of rational assessments, culminating in hypothesising traditionally negatively associated measures to have no or a contradictory extent, considering that, for example, the empowerment towards technologies may lead individuals to feel vulnerable in case of not being able to use them.

In advance of conducting this research, casual insights from the perspective of professionals and non-professionals provided the foundation of investigations – respectively claiming to be forced to integrate digital solutions or indicating to adopt technologies like virtual assistants without further reflection. Under the consideration that the professional insights were given from the restaurant sector, this research was determined to be contextualised to this specific industrial field – complemented by aligning investigations with the United Kingdom.

In terms of the adopted methodology, it was determined to premise this research project on partial least squares structural equation modelling, the positivist paradigm as well as quantitative data inquiry through a self-administered online questionnaire. This means of data collection led to substantiate the data analysis on a cleaned sample of 259 responses. Subsequently, the model-bound analysis of generated data revealed that adoption intention accounts for a major facet of consumer behaviour towards virtual assistants, while switching intention, in contrast, was found be of negligible nature. In addition, it was deduced that traditional risk assessments have no major emphasis, complemented by the finding that active or conscious evaluations have no significant influence. This culminated in the confirmation of a rather strict adoption of virtual assistants, which can be reflected in leading to a dependency of professionals seeking the fulfilment of customer requirements. Besides this, the model analysis implicated that the idea to inform individuals about virtual assistants' potential disbenefits cannot be

advised for professionals. In contrast, personalisation attempts were found to open some potential for the mitigation of virtual assistants' influences. In respect to theory, the research gave emphasis for understanding that the ties between individuals and virtual assistants are subject to lead to rather non-reflective behaviour. In addition, the potential of not being able to use the specific technology was found to create unwelcome emotional states – or being associated with missing potentially relevant information. This revealed a perspective which could be understood to be, at least in part, of a rather diametrical nature – in contrast to traditional approaches investigating the behaviour towards technology.

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IV. List of Abbreviations

VA	Virtual assistants
UTAUT	Unified theory of acceptance and use of technology
TAM	Technology acceptance model
RQ	Research question
RO	Research objective
ANT	Actor-Network-Theory
CGM	Consumer-generated media
ICT	Information and communication technology
GIS	Geographical information system
AI	Artificial intelligence
SEM	Structural equation modelling
PLS	Partial least square

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1.0 Introduction

> *"There is this broad, broad recognition of how technology is enabling new things. Companies that never paid attention to computers in any form now see digital technology as creating threats and opportunities for them." – Bill Gates*

This chapter evinces the elementary basis of this research, comprising the research gap and problem statement, research aims, questions and objectives, justification of the research as well as stating the structure and an overview of chapters.

1.1 Introduction, Research Gap, and Problem Statement

The number of communication and information devices is continuously increasing, stimulating the ubiquitous availability of information in everyday life. Even though it can be assumed that the use of smartphones is a cultural phenomenon that varies from country to country, statistics indicate that the total number of devices in use is expected to rise globally. While prognoses state that, until 2023, about 6.8 billion people are expected to use smartphones across the globe (O'Dea, 2022), the United Kingdom is anticipated to reach a number of 64 million users, which could be understood as statistically having about one smartphone per inhabitant (Laricchia, 2022; Urmersbach, 2023). Despite these numbers are indicating an increased usage of technology in everyday life, other technological solutions, like virtual assistants, further complement these estimations, leading to an anticipated number of 8 billion of such devices to be in use by 2024 on a global scale (Grewal *et al.*, 2022). This strong indication on market penetration finds reflection in terms of the share of these smart devices in households, considering that about 39% of households in the United Kingdom in 2021 (Sims and Gaynor, 2022). This is complemented by context-specific numbers, considering that about half of a US-based survey's respondents showed two different behavioural emphasis with respect to voice assistants, claiming to be interested in using them at restaurant venues to receive menu information as well as to strive for voice search in

order to identify the most suitable restaurant. This strong proportion of participants intending to search for restaurants through voice interfaces is further underpinned by about a quarter of participants sharing the consideration to follow the information presented to them (Yext, 2018). Even though its applicability to the UK could be subject of further discourse, other contemporary sources support the technology's relevance with respect to voice-initiated actions, stating that over 8 in 10 consumers from the UK used voice commands to interact with technological devices in September 2021. In this regard, searching purposes are described to account for one of the major purposes of using virtual assistants (Meredith, 2021). In consequence, it can be claimed that virtual assistants have major influence on determining the most appealing solution across a variety of opportunities – emphasising the context-related relevance of understanding virtual assistants as means to approach a specific restaurant venue.

In academic literature, attempts like the unified theory of acceptance and use of technology (UTAUT), its successor UTAUT2, or its predecessor, the technology acceptance model (TAM), account for a longstanding tradition, predominantly focussing on understanding the elements of individuals' acceptance and behaviour in relation to technology. Originating from investigations by Davis in the late 1980s, the initial theory, continuously enhanced over the succeeding decades, still questions essentials like performance or effort expectancy (Ma and Liu, 2005; Jeon, Sung and Kim, 2020; Tamilmani *et al.*, 2021). Even though these exemplary measures of using and accepting technology have a profound basis, it can be questioned whether their applicability is universally relevant in modern times, considering that consumers probably have a plethora of alternatives of instantly available technologies in many areas of everyday life (Lam and Law, 2019). In this regard, it can be assumed that technologies that prove difficult to use will likely be rejected, leading consumers to seek for alternatives. This indication is supported by a number of authors, currently seeking investigating other approaches, such as the rational choice theory or the theory of planned behaviour, in line with contemporary digital technologies. From a general perspective, it can be assumed that individuals tend to make rational choices on using technologies for the purpose of

finding most appealing solutions, based on their current motivations and related needs (Ajzen, 2011; Chen *et al.*, 2019; Herfeld, 2022; Rabassa, Sabri and Spaletta, 2022).

Technologies have become essential tools of modern life, enabling consumers to instantly find and compare information, apparently enabling them to make better choices across service- or product-related environments (Gummerus *et al.*, 2019; Lee, Chua and Han, 2020; Murray, Jin and Martin, 2022). Even though, as indicated by previous UTAUT-theories, authors strongly agree on benefits of technology, literature appears to be barely addressing drawbacks, like potential threats or unpleasant emotional states (Chen *et al.*, 2019; Javed *et al.*, 2022; Malodia *et al.*, 2022).

In order to investigate behaviour towards technologies and the consequences they bring, the relatively new, but ubiquitously appearing systems, virtual assistants, have been chosen to form the core of this investigation. For academic backgrounds, the research is aimed at strengthening the perspective on digital technologies, contributing to current discussions and leveraging attempts distant from traditional technology-acceptance theories. Complementary, psychological and behavioural factors, which are currently barely addressed in context- and technology-related literature, are investigated in more depth, opening potential for other researchers, intending to approach research in a similar direction (Augusto, Godinho and Torres, 2019; Kursan Milaković, 2021; Mejía-Trejo, 2021).

In general, as previously indicated, it can be asserted that traditional research predominantly investigates why and how consumers and companies adopt contemporary digital technologies – like virtual assistants – rather than what consequences this adoption potentially causes on a long-term perspective. At the same time, it can be asked whether consumers behave reflective towards issuing potential risks or drawbacks of technologies, noting that contemporary articles, like Kunkel and Wischmeyer (2020), Schöchli (2022) or Schütt (2022), indicate that consumers have become accustomed to digital solutions, partially leading into incalculable or unpredictable consequences for companies in hospitality or service, especially applying to restaurant contexts, as

approached within this research project. Aligning these considerations with previously stated discussions on the potentially mitigated awareness for plausible negative consequences of adopting contemporary technologies, a gap can be identified in terms of understanding the influence of contextual (or motivational) as well as rational reasons for adoption and attitude towards emerging technologies.

In order to determine the relevance of prior experience with virtual assistants, the developed research framework is contrasting two diametrical outcome variables on the base of Malodia *et al.* (2022). These outcome variables are adoption and switching intention, looking at the respective emphasis of both behavioural intentions. This was further determined on the consideration that behavioural extents are a matter of traditional theories like rational choice, planned behaviour or decision-making, requiring individuals to assess different alternatives in order to determine a certain, usually consistent behaviour (Idris *et al.*, 2016; Abu-Alkeir, 2020; Nickerson, 2021; D'Souza, 2022). In addition, relating vulnerability and resilience to adoption intention was determined to be a key issue in order to determine whether individuals might be receptive for information against using virtual assistants (Kursan Milaković, 2021).

1.1 Justification for the Research

Digital and connected technologies are increasingly having an impact on modern life, regardless of whether used in professional or private surroundings. Considering emerging technological solutions, like virtual assistants and the application of voice interfaces, for the purpose of controlling actions or receiving information, a virtual presence is subject to be in close proximity to consumers at any time (Petit, Velasco and Spence, 2019). Even though research strongly agrees on evaluating the acceptance of technology and the advantages of services, the influence of being informed about – and consequently gaining awareness for – potential negative consequences that the adoption of virtual assistants may cause is barely addressed in literature (Augusto, Godinho and Torres, 2019; Chen

et al., 2019; Malodia *et al.*, 2022; Yoon and Oh, 2022). Therefore, the research is intended to counterbalance rational reasons and their consequences for the development of attitudes towards this widely used technology (Xu *et al.*, 2020; Reza, Amir and Kazmi, 2021; Grewal *et al.*, 2022).

From the business perspective, casual conversations with professionals from the travel and tourism industry in 2021 indicated that the dependency on digital service solutions is a major topic for the entire industry. In this regard, the professionals stated that companies are often forced to implement and maintain market leading technological services in order to stay competitive. Even though professionals currently focus on delivery and order applications because companies are required to pay high charges (in some cases about one third of their sales revenues), it can be deduced that other digital services have the potential to raise comparable issues – considering market power and consumers' demand for integrated digital applications. These issues are supported by contemporary sources, stating that there is an 'unhealthy dependency', in relation to charges companies are required to pay for the commission of orders or for being featured. The issues companies face by using these technologies are leading to an area of tension, requiring them to evaluate between potentially missing customers and severe direct monetary disadvantages thus lowering their profits. Even though it could be queried whether this is limited to platforms commissioning orders, contemporary literature shows that related grievances also apply to the example of hotel booking platforms. Although this might well argue for the specific investigation of these platforms, virtual assistants were chosen as the technology for investigation due to their potential ubiquitous and intrusive appearance in everyday life, enabling consumers to use them for a variety of purposes in contrast to the functional scope of order commissioning services (Rawassizadeh *et al.*, 2019; Kunkel and Wischmeyer, 2020; Business Insider, 2021; Givoni and Schütt, 2021; Schütt, 2022). In this regard, it can be noted that applications appear to be free of charge to consumers, even though they are likely 'paying' with their personal data, which can lead to rational concerns and other perceived downsides of using these technologies. In contrast, consumers are required to evaluate technologies on the basis of benefits and gained experience, which is potentially opening an area of tension from the customer perspective

– even though it might be disputed whether there is a tendency to consciously balance positive and negative elements. Even though consumers strongly agree on their benefits, it can be concluded that technologies limit their abilities to investigate available services – in this case, available restaurant offers. This issue is complemented by the business model of market leading technology companies, generating revenue by enabling restaurants and other businesses to post advertisements, highlighting companies, which are paying for eye-catching positions on digital service touchpoints. In this regard, it can be examined whether consumers tend to retain a positive attitude towards using specific digital services – even if they are (or become) aware of potential rational drawbacks like only receiving limited offers or growing privacy concerns, owing the increasing visibility of potential privacy issues due to new interfaces, like voice capturing, occur (Spence and Piqueras-Fiszman, 2013; Chen *et al.*, 2019; Bayer *et al.*, 2020; Martin *et al.*, 2020; Warnke, 2021; Grewal *et al.*, 2022). In this regard, another issue was identified to arise from using virtual assistants, again stimulated by casual impressions – but from the perspective of virtual assistant users. These conversations revealed that users apparently rationalised the usage of virtual assistants by claiming that technology is ubiquitous in modern times as well as saying to never have experienced any consequence of usage. In this regard, another rationalisation of the usage of virtual assistants was related to modern social media platforms, considering that people partly stated that they saw personalised advertisements on social media channels after inquiring information on search platforms. These casual impressions provided additional insights into the behaviour towards virtual assistants, giving indications for limited behavioural reflection and stronger ties between individuals and these technologies – offering further justification for this research.

This research is intended to offer guidance for professionals, evaluating the implementation of new technologies at consumer encounters, potentially considering campaigning against these technologies instead of striving for implementing or maintaining them. Therefore, the research setting is intended to evaluate, how rational assumptions influence consumers' attitudes to the virtual assistant services here investigated – as well as to what extent this attitude is impacting two opposing behavioural

intentions. This is complemented by personalisation and attempts to derive the influence of situational elements as well as actively rationalising or reacting against undesirable consequences.

1.2 Research Aims, Questions, and Objectives

In general, conducting research and writing a research project is always based on the intention to contribute to contemporary knowledge. Solving issues, which are oriented towards real-world-problems and specifically, contributing to overcoming problems, related to economic practice as well as to previously generated knowledge, is the basis of writing a practice-oriented research (Kowalkowski *et al.*, 2017). Therefore, the following aims, questions and objectives are targeted at practical issues, discussed in the justification chapter.

Aims: The overarching aim of this research is to develop and test a structural model, which is intended to support professional and academic marketing environments with respect to behavioural intentions through virtual assistants, accounting for a technology of emerging significance for professionals. The developed model is intended to provide proof for potentially stronger ties between individuals and virtual assistants as well as to give advice for professionals considering informing or campaigning against using this technology. In addition, the model is determined to provide impressions about context-specific behavioural intentions as well as to figure out, whether and to what extent personalised means might support professionals when attempting to limit the potential influence of virtual assistants by approaching to guide their customers. In addition, the research aims to understand the influences of rationalisation and reactance, which are subject to explain partly paradoxical appearing behaviour to some extent – as insights provided in the justification chapter indicate.

From a general, theoretical stance, investigations conducted for this research aim to contribute to the literature field of digital technologies, rational choice, theory of planned behaviour as well as consumer behaviour and service or, specifically, hospitality and marketing. Alongside that, the research is intended to provide guidance for professionals from the hospitality and especially the restaurant sector, who are assessing and comparing the implementation or maintenance of digital services. Specifically, this research is intended to derive potential recommendations, whether ideas like campaigning against using these technologies could be advisable for the purpose of limiting potential negative consequences for professionals. These negative consequences are identified to be probably grounded on a potential dependency towards technology integration – as claimed by professionals and indicated by non-professionals, as discussed in the justification chapter. Therefore, the research aims for the closer understanding of reasons for a rather mandatory appearing integration and usage of virtual assistants from, giving attention to the association between the specific technology, companies, and consumers. This is fulfilled through testing the hypothesised framework from the angle of consumers, making use of a self-administered online questionnaire, considering this way of data collection to enable the drawing of conclusions from a large, cross-sectional sample in order to find generalisability for a wider population.

Questions: Research questions are cornerstones of conducting a research project, requiring the author to thoroughly investigate the literature and carve out gaps in existing knowledge. Therefore, a literature review needs to be carried out on the basis of ideas, which are usually related to a practical observation or implicit perceptions – shaped and concretised over time (Saunders, Lewis and Thornhill, 2019). In relation to the practical and academic influences justifying this research and its aims, the research questions are stated as follows:

Table 1: Research questions

RQ	Question
1	To what extent do vulnerability, transparency, privacy concerns and opportunity costs influence the attitude towards virtual assistants?
2	To what extent does rationalisation mediate the association between attitude towards virtual assistants and, respectively, transparency and privacy concerns?
3	To what extent does reactance mediate the association between attitude towards virtual assistants and, respectively, opportunity costs and vulnerability?
4	To what extent does attitude towards virtual assistants influence switching and adoption intention – mediated by personalisation?
5	To what extent do utilitarian and hedonic dining value influence switching and adoption intention?
6	To what extent does variety-seeking intention influence personalisation (moderated by motivational intensity)?
7	To what extent does resilience influence rationalisation?
8	To what extent do resilience and vulnerability influence adoption intention?

Objectives: In general, identifying and developing objectives is a fundamental underpinning of conducting research, shaping the path of how to answer research questions and, in consequence, achieve the specific aim of the entire research (Saunders, Lewis and Thornhill, 2019). Objectives guiding this research – related to previous research questions – are stated in the following table:

Table 2: Research objectives

RO	Objective
1	To investigate, to what degree traditional arguments against technology are applying to virtual assistants. This objective is intended to potentially enable to derive, whether actively stating drawbacks influences the attitude towards, and, in consequence, the adoption of virtual assistants.
2	To investigate, to what degree the active process of rationalisation influences the attitude towards virtual assistants. This objective is considered to enable to derive whether active deliberation is taking place with regards to the specific technology.
3	To investigate, to what degree actively reacting against potential drawbacks takes place with respect to virtual assistants.
4	To investigate, to what degree the attitude gained towards virtual assistants has an influence on behavioural intentions, to figure out, what role personalisation has as well as to contrast the extents of switching and adoption intention.
5	To derive, whether situational elements are in effect in case of considering using virtual assistants for the identification of the most suitable restaurant.
6	To investigate, whether variety-seeking could be limited by offering personalised means as well as to find indications, whether being diligent in terms of seeking for suitable restaurant alternatives leads to strive for personalisation.
7	To investigate the degree of the influence of the personality trait resilience, accounting for the ability to withstand negative influences, on the active assessment of negatively associated issues.
8	To derive, whether actively campaigning against virtual assistants could be promising for practice, considering vulnerability and resilience to be key prerequisites of stating information against these technologies.

1.3 Structure of the Research and Overview of Chapters

This research is structured into seven different chapters. The introduction chapter sets out the considerations for the research, including aims, questions and objectives, the research gap, the justification of the research as well as this sub-chapter.

Chapter 2 consists of an extensive literature review, pointing out the research context and further considering underpinning theories. These theories were identified through a literature search and a continuously reworked understanding of issues and concepts. This is complemented by an investigation of virtual assistants, leading to further findings and arguments throughout the research.

In chapter 3, the research framework for later structural equation modelling and its analysis as well as its conceptual figure are set out, complemented by a discussion on applied variables and developed hypotheses, which are tested in chapter 6. Chapter 6 further addresses the overarching model fit. Chapter 3 points out relationships between variables and how they are considered to contribute to the conceptual research framework. This is enhanced in chapter 4, stating the research design as well as methods applied throughout this research. This chapter initially discusses the philosophical stance and its aligned application in data inquiry. In this connection, the application of structural equation modelling (SEM) for testing and analysing the conceptual framework is set out and explained. Chapter 4 further discusses issues around the use of surveys as the tool for collecting the underpinning data; the pre- and pilot phases; as well as an assessment of the recruitment strategy through crowdsourcing.

Consecutively, chapter 5 gives an initial overview of the main data analysis stage and applied measures. These introductory steps are followed by regular tests, striving for the application of contemporary statistical investigations and latest recommended measures – followed by, as previously stated, model fit and hypotheses testing. The final chapter, chapter 7, concludes the research by discussing findings as well as implications for both theory and practice.

1.4 Research Design and Methodology

The research is based on the positivism paradigm, leading to approach data collection and analysis in a quantitative and deductive way. These elements meshed into structural equation modelling (SEM), accounting for a longstanding tradition in marketing and consumer-related research. In terms of the emphasis of SEM, partial least squares (PLS) was identified to be the method of choice, grounded on approaching the predictive confirmation of the developed model as well as enabling to analyse complex systems of relationships. This key consideration, requiring the analysis of a rather complex system of behaviour-related issues, was identified on the base of the nature of human interactions and aligned consumption behaviour. Linking to this, data inquiry via an anonymous questionnaire-based survey in an online format was determined to be approached in order to recruit a large-scale sample under given constraints as well as to ensure full anonymity by strict separation of the systems respectively used for recruitment and data collection. The questionnaire as well as its way of distribution was pre- and pilot-tested prior to setting up the main data collection stage on the designated crowdsourcing platform. In terms of the required sample size, the R-squared method was determined to be capitalised, leading to a retrospective assessment after the completion of the main data collection. The following table offers a short overview of the applied research design and corresponding methods:

Table 3: Overview of research design and methods

Design/method	**Specific design/method**
Research paradigm:	Positivism
Approach:	Quantitative and deductive
Analysis:	Structural Equation Modelling (PLS)
Data inquiry:	Pre- and pilot-tested questionnaire
Survey/recruitment:	Anonymous online questionnaire/crowdsourcing
Sample size:	Retrospectively, R-squared

2.0 Literature Review

The literature review is undertaken in order to investigate the context of this research, to draw parallels in terms of technology adoption from service perspectives, and to explore theoretical underpinnings which are identified to be promising in order to determine the core of the research.

2.1 Research Context

In general, the term ‘context’ can be understood as schematic construct, enabling the framing of findings along a scaffolding (Illes, 2001) or “the situation within something exists or happens, and that can help explain it” (Cambridge University Press, 2022). The following sub-chapters are issued to discuss the research context, the industry’s challenges as well as the role of technology.

2.1.1 Challenges and Opportunities

The restaurant industry – partially discussed using the terminology food service industry – is expected to generate growth by reacting to current trends in society (Walkup, 2002; Jayaraman, 2014). The customer tends to select food offers and service environments by obtaining information about expected conditions like quality or nutritional value at a faster pace and with a high degree of confidence (Friddle, Mangaraj and Kinsey, 2001). In this regard, optimised processes and instantly available information need to be fitted to customer demands and their expectations (Su and Zhang, 2008). Furthermore, optimising the entire strategy of serving food is anticipated to be a closer form of collaboration between distributors, manufacturers and operators along the entire food chain (McIntosh *et al.*, 2010; Sbicca *et al.*, 2019; Li, Du and Wei, 2020; Chrysanthopoulou *et al.*, 2022; Peng *et al.*, 2022). This issue is further complemented by combining industrial

experience, strategic decisions as well as dining expertise from the perspective of consumers and companies, which is intended to create an efficient, technologically optimised and customisable industry (Friddle, Mangaraj and Kinsey, 2001).

In terms of dining behaviour, another factor is related to societal changes. In this respect, Min and Min (2013) argue that some socially related groups, like families, rarely dine together owing to reasons of modern lifestyle, which causes a growing diversification of restaurant forms on the general market. Flexibility in terms of current food, service or health trends is another factor, which aims to foster growth. This can be achieved by increasing the variety of potential menus, enabling consumers to choose across several menus, which can be related to perceived increased health support or other factors important for consumers.

From a general perspective, the restaurant industry is concluded to be sensitive to economic crisis, for example due to setting pressure on the recruitment of suitable staff members for serving or for background and back-of-house work. In times of recession, workers are looking for jobs and restaurant management has the opportunity to select from potential staff, while in strong economic times staff requirements cannot be completely filled. Therefore, the pressure on businesses increases in terms of generally integrating technologies or order systems at the dining encounters as well as enhancing people development and creating benefits for staff members. Skill shortage is forecast to be a severe factor due to the entire industry is focussing on increased competition by new innovations, technologies and an increasing number of businesses across all industries (Auberry, Faulkenburg and Linares, 2019).

Relating investigations previously referred to Lester (2020), it can be concluded that people are not only expecting qualitative ingredients but especially favour restaurants which seek technological innovation and offer them at consumer encounters. In this regard, it is stated that keeping up with the pace of new developments is a requirement of reducing the influence of high market competition: Stating the importance of innovation, Doolin (2013) directly contextualises market persistence with the attempt to innovate. In

this context, generally creating something new to customers is evaluated to be most significant, striving for product innovation, new developments like technology or offering new product categories, which have not been part of the enterprise's efforts before. Therefore, a familiar market player, grocery stores, increased pressure on the restaurant service industry by offering prepared, already cooked meals – which can be seen as setting additional pressure on the restaurant market.

Bergstrom, Parendo and Sonstelie (2016) not only describe the restaurant industry to be highly competitive, but also difficult in terms of successfully opening a business, reporting that a quarter of all new enterprises fail within their first year of offering services. Furthermore, only fifty percent of restaurants are expected to continue in business for more than three years. The high potential of failure is mainly considered to be related to personality and expectation management, figuring out a number of founders being overconfident and overoptimistic in terms of the expectations they appear to hold. In this context, age and life experience are factors, creating a more realistic image about one's own performance and capabilities in relation to meeting market demand. Factors like figuring out value expectations and the most suitable price for products on the market, in combination with the ability to attract customers, are skills highly reliant on individual personality. In the same way, Glazer (2016) points out that founding an independent restaurant is much more of a struggle than becoming part of a restaurant chain. While independent restaurants are likely to close business more often, restaurant chains generate persistent growth. This is described as owing to factors like a lack of capacity for investment in marketing and failure to adapt to customer needs. Examples are keeping the interior up to date or introducing a food delivery services. Investigating related business settings, Glazer (2016) further describes that, in terms of independent restaurants, restaurants with varied menus and bakery-snack restaurants are the most likely to be successful, followed by ethnic food and seafood restaurants in terms of casual dining, even though it is highly probable that this varies between different countries.

2.1.2 Technology-mediated Decision-making

In order to understand changes taking place in preparing food and serving food, Brüsemeister (2007) considers a society-driven impact, leading to the acceleration of the speed, quality and efficiency food has to be available. This societal impact is indicated by the fact that stating principles like efficiency and predictability are becoming increasingly relevant to restaurant services. This aspiration for efficiency especially refers to restaurant environments but also to nearly all other areas of everyday life like work, education, travel, leisure, nutrition, or family. Brüsemeister (2007) further writes that individuals become more commodious in terms of decision-making, expecting companies to set up a system in which crucial elements are predefined. Warwick (1999) extends these statements to attempting to transfer regular or traditional effort to instruments and technology, which can be understood as key elements of the societal trend of approaches to the use of contemporary technologies (Mansell, 2021).

Regarding general satisfaction in terms of being a customer at restaurants, Ryu, Lee and Gon Kim, (2012) state that taste and pricing information are important factors for being successful and appealing to consumers, but in case of increased local or general competition, other factors like the appearance of the physical environment have a prevailing force for restaurant selection. In this regard, the consumer is looking for receiving a reliable and consistent food quality together with a high level of service in a comfortable and appealing atmosphere. This combination of factors constitutes the complex framework of elements that restaurant businesses have to ensure in order to generate customer satisfaction and loyalty. In contrast to these factors, Baldwin, Wilberforce and Kapur (2011) state that selling points like having an environmentally friendly image or publicising their environmental efforts lead a certain restaurant to being chosen, and therefore succeeding in competition on the market. In this context, Baldwin, Wilberforce and Kapur (2011) further indicate a significant proportion of consumers who are expected to choose a restaurant striving for environmental advantages – even in situations where they have to increase effort in terms of distance or other potentially inconvenient circumstances. The factors, on which a number of consumers demand

transparency, are for example procurement and related waste, storage or used resources, like water or energy. In addition, factors like the amount of used disposable materials or energy and supplies for operating rooms are stated to probably become relevant for consumers. Taken together, these factors might support decision-making regarding probably attending a certain restaurant – underpinned by the possible use of digital technologies to investigate them before reaching a decision (Baldwin, Wilberforce and Kapur, 2011; Pereira *et al.*, 2022).

Alongside the need to take into account myriad factors that influence the possible selection of a specific restaurant, keeping individuals loyal to the enterprise is a vital issue. In this regard, Han, Back and Kim (2011) projected knowledge from other consumer-related sectors, identifying four different factors, which underline consumers' intentions to refrain from switching and keeping visiting a certain restaurant: Switching costs, lack of alternatives, which are stated to be negative factors and relational investments, or, in contrast, benefits and service recovery, accounting for positive influences. In terms of switching costs, Han, Back and Kim (2011) state that, complementary to time and effort, psychological investments like uncertainty or undesirable consequences as well as direct financial or economic costs are key drivers of being retained to a specific environment. In terms of a lack of alternatives, Han, Back and Kim (2011) describe the general availability of a vibrant market environment in terms of investigating suitable alternatives from the stance of consumers, while relational investments aim at directly understanding personal relations between enterprise and consumer. This last point is usually promoted by a high degree of interaction, communication and measures like enabling the customer to feel being someone special or awarding other benefits. In addition, in terms of service recovery, Han, Back and Kim (2011) focus on generally optimising service quality and being able to react to consumer demand instantly, partially in order to resolve potential dissatisfaction.

Previous discussions indicate one central issue, which can be seen as shaping consumers' perceptions by leveraging and exchanging information. In this regard, a strong relationship between digital communication and information technologies, like

virtual assistants, and hospitality service environments, like restaurants, can be considered to be essential (Xu, Siegrist and Hartmann, 2021; Cao *et al.*, 2022).

2.1.3 Context

In general, the hospitality and, more specifically, the restaurant market is facing severe changes, which can be shown by contemporary statistics from the United Kingdom: While in 2013 about 167.000 hospitality companies existed across the UK, the number of businesses increased to about 223.000 until 2020, including about 172.000 restaurant services, originating from a level of 147.000 in 2013 (Statista Research Department, 2015; Hutton, Irvine and Foley, 2022). From a general point of view, the entire restaurant sector accounted for one of the most significant elements of the entire economy with a share of about 20% and a turnover of about £105bn. In addition, statistics show that the sector's market size was characterised by a relatively consistent market size between 2012 and 2022 (FDF, 2020; Statista, 2022).

Throughout this research, the UK restaurant service market is set as the framework of investigation. The reason for contextualising this research to the entire restaurant market rather than approaching specific elements is based on Banerjee and Poddar (2021) and professional studies by a business association (DEHOGA, 2019). Even though multiple categorisation attempts exist in restaurant-related contexts, the relevance of structuring restaurants by dishes or internal structures can be scrutinised in case the consumer perspective is intended to be leveraged. This indication can be derived from blurring lines between categories, especially where companies are attempting to align with customer expectations: Companies are often struggling in terms of positioning their efforts within a specific category. In order to leverage the perspectives of consumers, it can be assumed that restaurant categories are not their most significant domain, as considered by Banerjee and Poddar (2021), who, for example, state that even categorised, chain-related restaurants should find responses to regional differences, which have the potential to cross category boundaries. Examining the restaurant market on a general level, it

becomes clear that some companies struggle to define a distinctive category, which is leading to mixed definitions like combining café, bar, and restaurant or the combination of food and drink services, considering that restaurant settings potentially have emphasis on one of both (DEHOGA, 2019; Hutton, Irvine and Foley, 2022).

Aggregating previous discussions points to three fundamental issues, which shape the importance of the context applied throughout this research: the restaurant sector in the UK accounts for a strong part of the entire economy; market environments are becoming increasingly complex; and the consumer has an increased demand for (digital) information about the individual service or product. This last point shows the importance of developing the integration of digital solutions, especially in terms of understanding them as touchpoints at consumer encounters (Kask, Fitterer and Anselm, 2019).

2.2 Theoretical Background

This chapter provides an overview of the underpinning considerations and theories from the academic as well as the practical position. Therefore, a variety of contemporary investigations from service-related theories are discussed to determine why and how consumers tend to adopt virtual assistants. This perspective is complemented by those of individual companies, potentially assessing whether to integrate virtual assistants into their processes.

2.2.1 Consumers' and Professionals' Perspective on Technology-driven Services

This sub-chapter investigates virtual assistants from service quality and experience perspectives, including related theories like value creation, indicating how virtual assistants are contributing to service environments and decision-making as well as what parallels can be derived for understanding the adoption of – and attitude towards – these technologies.

2.2.1.1 Approach for Integrated Services

One of the most contemporary research studies in terms of virtual assistants was published by Grewal *et al.* (2022) – aligning the influence of these specific technologies with the customer journey. Virtual assistants are approaching a thematic area of digital-enabled communication, which is severely intrusive in terms of private environments, usually being available at any time to the individual user. Even though Grewal *et al.* (2022) included the general process of experiencing services into their own research, the study revealed open issues in terms of more closely understanding this specific digital technology within the consumer sphere and, in general, service environments.

One of the most crucial and traditional concepts at service encounters is associated with the term 'customer journey', being investigated across an extensive bandwidth of service sectors (Wali and Nwokah, 2017; Yachin, 2018; Herhausen *et al.*, 2019). Even though 'customer journey' emphasises the customer's point of view, indications from relationship management, customer experience, managerial perspectives, and other contextual elements are required in order to gain an understanding about the path customers are undertaking at the intersection between their demand and companies (Voorhees *et al.*, 2017). Extending the view on customer journey, Tax, McCutcheon and Wilkinson (2013) introduce the service delivery network (SDN) concept, creating awareness of the need of manifold providers and means to interact in order to deliver a full customer journey. In this

regard, the interaction of service providers is stated to be a significant element for an integrated delivery of the entire journey that customers experience. This point relates to the view that service providers create the framework of using and experiencing services for customers, which requires them to substantially frame and order components of the overall service. By introducing the SDN concept, Tax, McCutcheon and Wilkinson (2013) integrated the traditional network theory, accepting that contemporary services are constructed on an essential network of efficiently connected services and providers in order to be successful within the individual sector. In contrast to this overarching or general attempt, Nam and Kannan (2020) support a process-driven perspective, which is related to individual demand. This three-stage process, created on the pillars of the customer journey process by Lemon and Verhoef (2016), integrates a loop of stages by moving from the from the experience prior to the individual purchase, to the purchase phase itself, and to events after the physical handover of products. Even though this approach is at a rather general level for understanding services, the investigation by Grewal *et al.* (2022) relates the customer journey framework to virtual assistants, leading into a macro-perspective, which considers the instant feedback offered by these technologies. Considering this in regard to the investigations by Lemon and Verhoef (2016) or Tax, McCutcheon and Wilkinson (2013) as well as from a closer, contextual perspective, virtual assistants can be understood as cornerstones of service networks, which are probably of mandatory nature to guide customers through the entire journey of integrated experiences. In this regard, it can be assumed that virtual assistants, even though often being considered as smart devices for the conduction of search processes (prior to a certain decision), have the potential to spread their influence across the entire customer journey – requiring an extensive network of aligned, integrated services (Tax, McCutcheon and Wilkinson, 2013; Sarhan, 2014; Lemon and Verhoef, 2016; Cao *et al.*, 2022). In sum, these examples provide that virtual assistants are subject to be key elements in consumer spheres, giving proof for the dependency claimed by professionals from a perspective of service networks.

In terms of the customer journey approach, the rather mandatory appearing integration of virtual assistants could be linked to another significant characteristic of services,

customer value. In this regard, Kuehnl, Jozic and Homburg (2019) point out that an effective customer journey design – as far as companies can influence it – directly contributes to the value perceived by individuals. Emphasising that a common, broadly accepted definition about the customer journey has not been found, because of the need for adjustments across myriad practical backgrounds, Kuehnl, Jozic and Homburg (2019) admit that measuring the efficiency of customer journeys is also difficult due to a high number of touchpoints between customer and company – stimulated by increasingly digitalised market environments. This unpredictable appearance of touchpoints throughout customer journeys can be understood as driving the requirement to integrate surrounding theories into the contextual scope: while an effective customer journey design applies to the entire chain of processes that customers perceive along a variety of touchpoints, features for identification shape the attitude about certain specifications, which can be contrasted by stimuli like for example logos or designs. Hence, it can be assumed that using specific virtual assistants could partly be grounded on familiarity with symbols of identification. Similarly, the customer experience concept is said to apply to individual, intrinsic factors, which are related to company offerings like services or the physical settings of shops. In general, understanding and creating customer value is becoming more important to companies, triggered by an increasing degree of complexity of market environments – additionally driven by digital information technologies like virtual assistants (Kuehnl, Jozic and Homburg, 2019; McLean, Osei-Frimpong and Barhorst, 2021). Being aware of increasing digital requirements throughout customer journey frameworks, Vakulenko *et al.* (2019) add digital, electronic indications, stating e-customer journeys to become more relevant. This extension of traditional journey-related literature is applied to online-shopping environments, requiring validation from the stage of choosing the most promising e-retailer to the physical handover of the product, including potential return or claim processes. Aligning this with Herhausen *et al.* (2019), it can be concluded that digital technologies have a potential to disrupt and restructure traditional means of interaction between customers and companies, requiring to maintain a bandwidth of platforms in order to be appealing to customers. Considering this in respect of virtual assistants, companies need to be aware that these technologies have become significant touchpoints to the customer, requiring professionals to find answers on

efficiently integrating these technologies into their processes (Grewal *et al.*, 2022). In the same way, it can be noted that offering digital touchpoints leads to a form of empowering customers to contribute to designing and personalising their entire journey, even though it can lead to different goal-orientation, supporting variety-seeking efforts (Herhausen *et al.*, 2019).

Integrating virtual assistants at customer encounters can further be seen from a process-driven perspective: the general efforts companies need to invest in order to approach customers are conducted within an entire service ecosystem, consisting of experiential topics, technology-driven process automation and agent experience. This last factor in particular, agent experience, is usually said to focus on engaging employees to be highly communicative and active (Gomes, 2019), but it could be extended to digital solutions like virtual assistants, when considering them as means for a substitution of human interaction (Buravenkova *et al.*, 2018; Poushneh, 2021). The links between customer experience and being highly communicative and active need to be close in order to guarantee a high level of satisfaction. In terms of potentially mitigated satisfaction, a high level of frustration has been expressed by customers having to contact multiple sources of information instead of being able to solve issues by contacting a single customer representative (Gomes, 2019). Even though this issue focusses on human representatives, it can be seen that consumers tend to prefer having a single point of contact in order to fulfil certain tasks, generally demanding to receive a high level of efficiency in terms of services. Therefore, modern service providers consequently offer a wide range of analysis and content, implementing new artificial intelligence technologies at consumer encounters. This leads to the assumption that the usage of virtual assistants is triggered by convenience and efficiency (Lucia-Palacios and Pérez-López, 2021), requiring only a single point of representation to fulfil distinctive tasks. In consequence, it can be assumed that adoption behaviour in terms of virtual assistants could further be explained by focal points like simplicity or efficiency.

2.2.1.2 Data Exchange, Knowledge, and Collaboration

In general, technologies are tending to engage customers along their entire journey, having a severe impact on informing decisions across the entire market space (Bag et al., 2021). From a professional point of view, Brousell (2012) condensed approaching consumers to five separate key points, explaining the many influences companies are required to handle in order to be appealing to consumers:

- Engaging customers
- Work with active employees
- Use analytics
- Facilitate used technologies
- Understand that satisfied customers represent a monetary opportunity

In alignment with Bag *et al.* (2022), Brousell (2012) indicates the relevance of technology-mediated customer engagement, emphasising that companies need to listen to customer feedback through the use of surveys, listening to calls, or generally obtaining potential feedback, using and aggregating a variety of means in order to optimise systems and processes. In addition, encouraging employees to be active and become familiar key persons, who strive to understanding the individual customer's will in detail, is mentioned to be a pillar of being successful in modern times. In this regard, Brousell (2012) states that professionals strongly agree on outsourcing the communication between companies and customers, but directly opposes this approach as barely goal-leading. This could be understood as an indicator for moving to integrate virtual assistants as a way to ensure stronger efficiency in communicating with customers by using these technological interfaces, additionally when considering them as a source of analytical data (Mekni, 2021; Sprengholz and Betsch, 2022). In terms of analytics, companies are seeking to generate knowledge about their customers and predict their actions in order to maximise communication to the necessary levels. In this regard, general parallels can be drawn between seeking to generate knowledge about customers and efficiently maintaining a wide number of platforms as a source of information. Especially, integrating virtual

assistants for communication purposes can be identified to account for an essential pillar of usage, even though this needs to be considered in relation to viability and the investment required (Akhtar, 2011; Brousell, 2012; Warren, 2014). Even though the literature offers strong proof of the benefits of using or maintaining digital technologies like virtual assistants, especially in terms of understanding them as a mean to strengthening the bonds between individuals and companies, it can be questioned whether these actions could be mitigated in cases where consumers are attempting to create further awareness about how their data is probably being used, or whether technologies, which are highly intrusive in terms of the private sphere, might make them vulnerable to an unknown audience. This issue can be understood to be especially applying to virtual assistants, even more when considering companies may be stakeholders in terms of gathering and analysing data – while offering a simple voice interface to consumers, only requiring asking for a certain information or service (Burt, 2019; Bolton *et al.*, 2021; Del Bucchia *et al.*, 2021; Lucia-Palacios and Pérez-López, 2021). These examples indicate a rather complex perspective to be required for the understanding of virtual assistants, considering that they likely emphasise the perception of negative consequences or uncertainties due to being rather intrusive within the private sphere but, in contrast, offering potential benefits like the simplification of actions for individuals. In contrast, companies could approach the integration of virtual assistants due to perceiving them to be valuable tools for getting additional insights into consumer clientele. This can be considered to open an area of tension, leading to further discuss the relevance of data, the generation of knowledge and the potential consequences arising for individuals.

Knowledge generation and application for the purpose of fulfilling tasks efficiently or to imitate human actions is a key issue for artificial intelligence (accounting for a technological basis of virtual assistants), also expressed by the term machine learning (Volkmar, Fischer and Reinecke, 2022). As indicated by various authors like Bolisani, Paiola and Scarso (2013), Blut *et al.* (2014), Savic, Lawton Smith and Bournakis (2020), knowledge generation is the key driver of fostering competitive advantage and successfully maintaining market position. Even though the company-related perspective

of grasping knowledge about perceptions, requirements and other factors from individuals is considered to be highly important, the knowledge customers are generating in reverse is another significant factor. This point is made by Naderi, Paswan and Guzman (2018), hypothesising that chain restaurants are potentially facing competitive advantage due to the deep standardisation of indicators like (service) processes, appearance or food quality, which could also be associated with the standardisation of technologies – reinforcing the importance of finding integrated solutions. This basic factor can be fulfilled by virtual assistants due to probably offering all the required information throughout a single interface (Johnston *et al.*, 2014). In addition, according to Yang (2017), generating knowledge from a customer perspective is not only based on the (technology-)mediated communication between company and customer, but also the collaboration between customers, enabling them to find comprehensive information about service environments, for example in order to evaluate and compare possible venues to visit. Yang (2017) investigated this point in the context of restaurant service, claiming that word-of-mouth is of increased importance – especially due to being instantly accessible in real time owing to the prevalence of social media and internet usage. This trend is founded on the ability to create digital content by individuals, finding attention in the term consumer-generated media (CGM) (Varkaris and Neuhofer, 2017; Mohamed, Rachid and Younes, 2021). In general, consumer-generated media is deemed to be an evolving trend, referring to the popularity of this type of media on online platforms, often competing with personal word-of-mouth statements and professional, authority-led reviews. Emerging digital-enabled information and communication technologies, like virtual assistants, additionally stimulated the general attention for the relevance of electronic word-of-mouth owing to making information ubiquitously and instantly available (Jeong and Jang, 2011; Yang, 2017; Massai, Nesi and Pantaleo, 2019; Melumad *et al.*, 2020; Dwivedi *et al.*, 2021). In this regard, it can be assumed that, when considering virtual assistants to be tools to substantiate decisions, adoption behaviour might partly stem from the perception that information issued through virtual assistants is appropriate and reliable due to probably being aggregated from a variety of sources. Hence getting deeper insights into the perspectives associated with knowledge generation as well as into how this knowledge is applied at consumer interfaces is identified to be reasonable.

From a general point of view, the generation of knowledge and its alignment towards the different stakeholders is considered to be driven from three angles: the managerial or business-related perspective; the inter-customer exchange of knowledge; and the acquisition of generated knowledge, integrating sources such as from the consulting sector (Zhao, Zhou and Huesig, 2010; Blut *et al.*, 2014; Mohamed, Rachid and Younes, 2021). Gupta, Mejia and Kajikawa (2019) align the exchange of knowledge to overarching ecosystems, explaining that knowledge serves as the key pillar for keeping a business ecosystem as well as its integrated haptic and non-haptic systems vital. This can be considered as an additional frame for understanding the relevance of virtual assistants in terms of their potential to appear ubiquitously within individuals' private spheres. In consequence, companies need to implement, maintain, integrate and connect digital solutions – regardless of whether they are accessible to the public or are used for internal purposes. In addition, the integration of manifold digital technologies throughout internal and external processes – considering them as sources of knowledge – is mentioned to create a motivation, opportunity, and ability framework, which is directly emphasises organisational learning and continuous improvement. These factors are said to directly influence innovative approaches, which lead to becoming more appealing to potential customers seeking for new experiences (Ben Arfi and Hikkerova, 2019; Kautish and Khare, 2022). In consequence, it can be assumed that maintaining potential information sources like virtual assistants and other digital solutions is not exclusively a matter of understanding the customer and regular processes but further it can be seen as a drive for the improvement of conducting business from a general perspective. This can additionally be related to manifold sources investigating consumer data and knowledge generation by considering different terminologies like analytics, foresight, prediction or big data (Franks, 2010; Bradlow *et al.*, 2017; Li *et al.*, 2019; Baye and Sapi, 2020). Bradlow *et al.* (2017) contend that the move towards collecting data has the potential to become more valuable for companies when they attempt to dig down to personalised, individual levels, for example by analysing data across multiple available platforms. This can partially be a means for individualising pricing, products or marketing strategies on the basis of knowledge maximisation and application, associated with rapidly increasing revenue due to the ability to approach customers on emotional levels – stimulating

feelings like product attention. Therefore, the currency of data needs to be ensured – based on a potential of changing individual demand, requirements and behaviour over time. In this regard it needs to be noted that identifying the most suitable and useful data sets has become a task of increased complexity, due to the improved ability of systems to collect data to extensive levels, which then has the potential to lead to ranges of non-usable data (Mugge, Schoormans and Schifferstein, 2009; Bradlow *et al.*, 2017). The point of using and evaluating most promising sets of data is investigated by Lim *et al.* (2019), paying special attention to the generation of customer value, which is directly linked to the enhancement of the overall experience customers associate with products or companies (Palmer, 2010). Relating this to virtual assistants supports the value contribution associated with new AI-based services like virtual assistants, influencing the overall service perception of customers, which can be claimed to be stronger due to an imitated human-like appearance in contrast to other technologies (Hoyer *et al.*, 2020).

In terms of attempting to obtain data-driven insights on individual or personal levels (Bradlow *et al.*, 2017), Miguéis, Camanho and Falcão e Cunha (2012) state a contradictory perspective, which could be understood as an issue of feasibility, leveraging the attempt to form segments of customers. For the purpose of forming segments, Miguéis, Camanho and Falcão e Cunha (2012) point out the importance of interrogating data and creating information, which can be based on occupation, income, gender, age or location, leading to an understanding of customers' lifestyles. In terms of relating this to virtual assistants, it can be questioned, whether users are entirely aware of how their data is used, and the potential privacy threats they face owing to the fact that virtual assistants analyse and identify patterns of the individual's life and lifestyle (Chung and Lee, 2018).

For the purpose of achieving a high level of perceived service value by the generation, analysis and use of data, Lim *et al.* (2019) created a process-driven perspective, showing the permeation that data collection is subject to have when considering the bandwidth of potentially available sources, often stated to be of limited transparency to customers. This article emphasises the improvement of existing services but also argues the creation of

new touchpoints and services to be crucial for the purpose of retaining customers. Considering technologies like virtual assistants to be touchpoints at consumer encounters (Kautish and Khare, 2022), this further indicates a potential need to offer these services to customers – even though it can be queried whether their adoption might not exclusively propel the "freedom to find fresh and innovative solutions for customers" (Lim *et al.*, 2019; p.109), with a view to developing own solutions, which are distinct from those offered by competitors. The development of own software or technological solutions is understood to usually be rather expensive, often not fulfilling the intended outcome (Lim *et al.*, 2019; Sneed and Prentner, 2020). Therefore, it can further be goal-leading to develop virtual assistant 'skills', which have become key technological functions – within the technological framework issued by VA providers. These functions enable individuals to fulfil certain tasks like ordering a table at the designated restaurant (Kaplan, 2017), ordering the delivery of food (White, 2018) or the intended dish after taking a seat at the individual venue (AboutAmazon.com, 2017). In any case, it can be assumed that the development of skills needs to fulfil the associated tasks accurately in order to attract and retain customers to these solutions. In this regard, it can be noted that the quality of services – and consequently their adoption – is often lacking, which can be understood as a symptom of opening the skill development platforms to larger audiences, creating vast numbers of skills, often leading to limited usage. Therefore, it is suggested for companies to directly involve intended users throughout test and development stages (White, 2018).

Loshin and Reifer (2013) discuss information and data application to be central for strengthening customer centricity, potentially leading to an increased level of positive customer experience, which is valued to extend customer lifetimes, satisfaction and, in consequence, profitability. Being aware that value creation is the cornerstone of customer and company interaction, Loshin and Reifer (2013) argue that companies should not aim to thoroughly differentiate between customer and company, but rather to understand the symbiosis that customer value and company value are creating. Centralising value creation in order to foster economical outcomes like profitability or competition-related advantages, López-Cabarcos, Srinivasan and Vázquez-Rodríguez (2020) point out the

need for companies to be aware of tacit and explicit knowledge. This point is complemented by the awareness that customer-related knowledge is potentially on a tacit level and needs to be coded and structured in order to be investigated for business purposes. Even though the co-existence of tacit and explicit knowledge is said to be discussed within business organisations, the ability to translate from tacit to explicit knowledge is believed to open up the potential for granting additional value to both sides. This additional value refers to the idea that tacit knowledge is potentially more important for business success than explicit, due to providing deeper insights on the individual customer's requirements (López-Cabarcos, Srinivasan and Vázquez-Rodríguez, 2020). These issues are supporting the deep insights that virtual assistant providers are gathering where consumers use their services (Chung and Lee, 2018).

Digital technologies and knowledge are generally in a condition of permanent exchange, enhancing and complementing one another. In modern times, companies are required to instantly react to market changes and to continuously investigate their market environment. The development of digital technologies and the data sets these technologies offer require organisational learning, the creation of a learning culture within organisations and, probably, transferring from manually conducted processes to digital service approaches, aiming to intensify the relationship between customer and company (Schumann and Tittmann, 2015). This idea of knowledge generation is aimed at user-centricity, which is crucial for services. In highly digital environments, this approach is enabled by the interaction of a variety of digital devices, information and physical settings, using generated knowledge to shape services by applying rules. The composition of factors like devices and information enables companies to "offer context-aware knowledge-based services, where context awareness plays an important role in enabling automatic modification of the system to reconfigure the services based on the context" (Kibria *et al.*, 2015; p. 24054). Artificial intelligence – as the cornerstone of virtual assistants – directly supports this underpinning, considering deep learning attempts as a subset of efforts (Baskaran *et al.*, 2021). Pappas *et al.* (2018) advocate for the use of business analytics and big data, which are crucial for generating knowledge, enabling digital approaches, and becoming more appealing to individuals. Directly assuming that

information and communication technologies are central to a rapidly changing society- and business-related demand, Pappas *et al.* (2018) further point out that, due to the increased potential of sharing knowledge by digital means, knowledge is becoming available to a vast number of people through digital services, technologies and media-generation platforms. Therefore, knowledge, driven by digital data collection, is generated and aggregated from a number of sources, facing increased and instant availability to larger audiences. Analysing and shaping gained knowledge and its underpinning information is the basis of approaches like business analytics and big data – mentioned to be used for trying to influence behaviour or attitude of groups as well as individuals. Additionally, Pappas *et al.* (2018) suggest understanding customers as co-creators of value by giving them the opportunity to participate in developing services. In this regard, companies are required to create a framework, which enables customers to transfer information and knowledge to companies by digital technologies, giving companies a more profound basis for digital processes and changes in service settings. Therefore, implementing digital tools in organisational surroundings, proposed by Marion and Fixson (2021), is crucial for business success due to how it empowers people to collaborate and potentially create a framework, which in turn enables the management of knowledge derived from diverse participants within the business environment. Aggregating these findings, it can be concluded that digital technologies, like virtual assistants, provide value to customers by instantly giving feedback as well as enabling them to directly contribute to service settings, even though not being fully aware of having an active role through the shaping of service provision. In addition, it can be concluded that these technologies, and especially the data sets they offer, can contribute to multiple characteristics across the entire, collaborative network of services.

This discussion points out the relevance of data collection through technological means like virtual assistants, giving attention to analyse behaviour in order to find appealing and accurate solutions beyond generic lines like categorising customers. In this regard, individual approaches to consumers are subject to be a matter of discourse in order to attract them on personal levels as well as to keep stronger contact between individuals and companies. This leads to involve individuals to stronger degrees, enabling them to

influence the service environment in order to create additional value. This kind of value co-creation is subject to contribute to the empowerment of individuals, being able to gain proficient knowledge in order to better substantiate decisions.

2.2.1.3 Individual Approaches of Service Provision

The previous discussion deduced that virtual assistants probably lead to empower individuals by enabling them to create additional value in service environment. Emphasising the need for this element of VA-integration in service environments, fostered by direct and indirect collaboration between companies and customers, Kamalaldin *et al.* (2020) describe that service enhancement can be achieved by exchanging competences, knowledge and experience. This can be fulfilled through digitalisation, which can be combined with servitisation in order to leverage a customer-company-relationship approach instead of a product-centric view. The concept of servitisation, in both general and specific terms, is currently not well understood, partly relating to the transformational attempt to shift from product-centric to service-centric views on conducting business, intending to create growth (Kowalkowski *et al.*, 2017). In this context a more service-centric perspective is mentioned to centralise customer requirements of service provision, in the same way attempting to achieve customisation. In addition, Kowalkowski *et al.* (2017) indicate that the direct exchange between different companies enables facilitating the fulfilment of service transformation and stronger customer-orientation, often supported by external advisors and, in part, underpinned by digital systems.

From a general standpoint, digital-enabled customer-oriented management, especially the continuously shaped understanding and adoption of service insights, is considered to be a key factor of generating success of service organisations. This understanding is directly supported by information and communication technologies, providing the ability to shape background operations as well as supporting customer perception of service quality (Brida, Moreno-Izquierdo and Zapata-Aguirre, 2016). This further supports indications in terms of understanding processes in an integrated manner, which probably

led to the example of developing restaurant pre-order systems for cars, allowing customers to order intended meals while driving to the specific restaurant (Marston, 2019). The integration of processes and systems is often said to be delivered by customer-relationship-management tools (CRM), being a technology, which allows “the organisation-wide sharing and gathering of information on customers, and coordinates actions based on that knowledge” (Chuang and Lin, 2013; p. 274). Chuang and Lin (2013), in addition, point out that knowledge is a central asset, arguing that CRM systems can be used as mediating tool, supporting organisations to “obtain knowledge of their customers and swiftly respond to customer demands to thereby achieve personalised marketing” (Chuang and Lin, 2013; p. 279). This discussion indicates that virtual assistants and other technologies, often linked to CRM-technologies, could strengthen integrated approaches in marketing, as, for example, discussed by Jones (2018). From the general marketing perspective, offering or adopting virtual assistants could be guided by the statement that “well-adopted technology is more likely to make consumers brand loyal” (Hasan, Shams and Rahman, 2021; p. 593).

2.2.1.4 Technology-driven Touchpoints

Previous discussions suggest that virtual assistants have the effect of blurring boundaries between individuals and companies, which can further be related to understanding how customers perceive the presence of companies and their offers. In this regard, authors like Aichner and Gruber (2017) introduce the term ‘touchpoint’ (partly mentioned above), claiming this to be “relatively new to academic literature” (Aichner and Gruber, 2017; p. 131). Even though this term can be utilised to offer an important perspective for practice, the literature barely addressed the use and management of touchpoints from an academic perspective. Touchpoints are approaching interfaces between the individual company and a person or group, which can be direct or indirect, leveraged by direct or indirect person-to-person communication and interaction, or by technological means (Aichner and Gruber, 2017). In recent times in particular, companies need to be aware that customer-to-customer interaction, fostered by social media and other channels of

communication, is facilitating word-of-mouth exchange, which is usually outside the company's control. In order to mitigate the risk of potential negative word-of-mouth, companies are often engaging in ongoing contact with customers, which can be far beyond the recent consumption of a product or service. These actions are intended to positively shape factors such as experience-related perceptions, which are, in consequence, intended to lead to retention of customers (Aoki *et al.*, 2019).

Presenting comparable positions, Herhausen *et al.* (2019) mention that touchpoints have an ambivalent character in terms of their appearance, being directly in line with technological developments. In addition, a higher number of (well-maintained) touchpoints is shown to strengthen the retention of customers, which might contradict Aoki *et al.* (2019), who consider narrowing down the number of touchpoints in order to be more efficient. Even though digital technologies are referred to in a variety of literature sources, which are discussing touchpoints, only few narrow down the concept of touchpoints to the term 'digital touchpoints'. This term is for example investigated by Hallikainen, Alamäki and Laukkanen (2019), Bakhtieva (2017) or Balaji and Rao (2018), generally relating the term to marketing or company-related strategies or, more specifically, to customer segmentation or channels. Even though touchpoints focus on mediating the interaction between companies and customers (De Keyser *et al.*, 2020), this can only be seen as indicative, considering a strong market penetration of touchpoints beyond the control of individual companies (Aoki *et al.*, 2019). Considering contemporary technologies like virtual assistants to partly rely on socially generated data as well as to some extent offer recommendations, it can be assumed that their influence is significant across a variety of user groups – especially when considering the increasing popularity of these technological services (Bozanta and Kutlu, 2017; Massai, Nesi and Pantaleo, 2019).

In general, Aoki *et al.* (2019) differentiate between four different types of touchpoints, setting out these categories:

- Company-initiated touchpoints, which are mainly related to direct messages from companies, in-store information, websites, or posts on social media networks
- Intrinsic touchpoints, accounting for direct or indirect product offers
- Unexpected touchpoints, which are mainly received information from media, word-of-mouth from the offline social environment or electronic word-of-mouth from a larger community
- Customer-initiated touchpoints like using smartphone applications or following social media accounts

Keywords like unexpected or customer-initiated indicate companies' limited control over the effects touchpoints like virtual assistants generate, despite directly influencing their business activity. From the practical stance, Aoki *et al.* (2019) relate the aggregated effects of touchpoints to a variety of outcomes, like shaping perceptions or guiding behaviour – which can be compared with Malodia *et al.* (2022), who argue that people partially avoid or postpone using virtual assistants, especially for highly intrusive purposes, due to them causing unpleasant feelings.

In conclusion, the touchpoint-related discussion reveals that virtual assistants can be understood to account for integrated touchpoints, partially being out of sight or control of individual companies with respect to the ways consumers interact with these technologies as well as in terms of how or what information is acquired through them. This leads to another potential risk for professionals, considering that information about their companies could be inaccurate or inappropriately negative in case of not maintaining the digital technology collecting it. Hence virtual assistants can be understood as directing companies to a rather mandatory degree of maintenance or integration, especially when considering them to guide behaviour and perceptions of customers. In addition, some indications in terms of a limited influence of VA can be deduced, considering that individuals partly showed avoidance behaviour. Therefore, a further discussion in terms of their direct influence on guiding individuals is determined to be goal leading.

2.2.1.5 Technology-mediated Guidance of Consumers

In line with previous discussions, technologies like virtual assistants, being premised on artificial intelligence, can be understood as recommendation systems, which support and individuals by offering personalised recommendations and guiding their decision-making processes through a bandwidth of opportunities, underpinned by a large number of information sources. These recommendations are based on user profiles and knowledge generated from social, individual, and other sources of content. While the social stance is focused on knowledge from the direct surrounding or characteristics of users (e.g., demographics or categorised behaviour), the individual- and content-related stance is focussing on areas like stated preferences or tracking – for example, whether the consumer followed the recommendation issued by the individual system in order to help determine the probability of future ones (Burke and Ramezani, 2011). In this regard, highly individualised approaches are crucial, enabling consumers to focus on likely relevant information and avoiding being overloaded with information. Therefore, recommendation systems (like virtual assistants) attempt to aggregate various sources of information in order to determine individual user interests, although it must be pointed out that these systems are only as reliable or goal-delivering as their technological basis enables them to be – led by algorithms (Li *et al.*, 2019; Bermes, 2021; Bunjak, Černe and Popovič, 2021). Ricci, Rokach and Shapira (2015) state that recommendation systems are mainly approaching consumers with little personal experience in the designated area, but, considering the increasing number of virtual assistants, it can be assumed that other reasons, like the facilitation of tasks, could potentially reduce this indication, leading also experienced users to ask for recommendations (Grewal *et al.*, 2022).

In general, the influence of virtual assistants is limited by the perceived probability of having success with requests for personalised recommendations or the scarcity of available and transmittable information – partially making consumers feel uncertain owing to them not being informed that they are only receiving limited information, or have insufficiently fulfilled the designated task insufficiently (Rafailidis and Manolopoulos, 2019; Li and Yanagisawa, 2021). This indication leads Rafailidis and Manolopoulos

(2019) to discuss, whether virtual assistants are real recommendation systems due to being, for example, limited by the language processing levels, which are often less substantial in contrast to information issued by human beings, although it must be conceded that this gap will probably be closed by continuous improvement over time.

Aligning the previous discussions on receiving information or recommendations through virtual assistants can generally be related to perceiving a high level of quality and trust in the information, but it could also be related to conformity with others, leading to a social impact and a collective opinion (Domenico *et al.*, 2021) – further propelled by anthropomorphic appearance (Mishra and Shukla, 2020). This is strengthened if one notes that the underpinning technology of virtual assistants, artificial intelligence, is often associated with the replacement of human beings for conducting actions – but that actions like decision-making or the creation of perceptions normally require the application of human intelligence (Mishra and Shukla, 2020). In this regard, it can be assumed that consumers might – at least in part – strictly or unthinkingly follow the recommendations of virtual assistants, especially in cases where they trust its manufacturer, complemented by having had positive experiences with previously following previous advice from using these technologies (Bawack, Wamba and Carillo, 2021).

The characteristic of virtual assistants, anthropomorphism (Mishra and Shukla, 2020), previously referred to, is partially also described by the term humanness (Grewal *et al.*, 2022), further leading to discussions about imitating an ambivalent social presence. This underpinning of virtual assistants is discussed by Oh, Bailenson and Welch (2018) in an integrated way, leading to the following points for understanding their influence on consumers in this specific area:

- Social presence is associated with the degree to which the users of technologies perceive that they are interacting with a real person or generally being with another person

- From the society-related perspectives, the influence of technology as a social presence has increased due to the technology's transition from specialist usage to home usage
- Consumers tend to subjectively associate the social presence, emitted by technology, with having insights to the emotions and thoughts of real persons
- The social presence of technologies is potentially limited by the discrepancy between verbal and non-verbal communication
- Consumers' personality traits influence how they experience the virtual presence of technology
- The social presence of technology can be associated with its own personality
- The availability of limited communication features and the physical appearance of devices restricts the perception of the social presence
- The social presence of technologies and its positive communication outcomes tend to attract and convince consumers in terms of their choices made through adopting the technology
- Interactivity-features (e.g., direct feedback), audio quality, haptic feedback, and the physical appearance through screens or robots leads to an increased perception of a social presence

In summary, the investigation by Oh, Bailenson and Welch (2018) suggests that virtual assistants foster a habituation effect, driven by their ubiquitous appearance or interactivity, even though this influence may be limited in case interfaces are constrained. This last point could lead to the assumption that virtual assistants are more socially present where they provide information through a display, a feature only partially offered by providers (Youn *et al.*, 2021). In addition, Oh, Bailenson and Welch (2018) propose a sensory property for virtual assistants, which can be better understood by comparing it to the limitation of online shopping, where consumers cannot touch, feel, try or smell the designated product before making their purchase decision (Daroch, Nagrath and Gupta, 2021) – although this might partially be overcome by personalisation features (Pappas, Giannakos and Chrissikopoulos, 2012). In addition, it can be concluded that the information density in task-oriented dialogues (Giulianelli, Sinclair and Fernández, 2021) can be a major issue in the voice-initiated fulfilment of tasks through virtual assistants.

This leads to the assumption that these tasks and, in consequence, the experiences of consumers, are limited on sensory levels, but also by the processing abilities through the limited density of spoken words.

Further to previous points, it can be noted that some sources criticise traditional literature by arguing that investigations towards the (technology-related) behaviour of consumers is predominantly driven by emphasising the perspective of companies – rather than directly attempting to seek consumer opinion and related feedback. Even though this criticism might be justified to some extent, it can be shown that literature and professionals aim to reflect individual perspectives, essentially on the basis of peoples' motivations and needs (Parasuraman, 2013; Lemon and Verhoef, 2016; McColl-Kennedy *et al.*, 2019; Xie, Li and Keh, 2020; Aw *et al.*, 2022). These needs can be extrapolated from the individual, personalised perspective to general assumptions and patterns, like offering easily accessible digital services, which deliver information instantly (Hermsen *et al.*, 2016; Huettner, Boyacı and Akçay, 2019). In addition, it can be considered whether individuals tend to use digital technologies for the (efficiency-driven) purpose of increasing the time free for other potentially more important tasks in life – even though this may seem contradictory, given that, in general, the time spent using technology without goal-orientation rapidly increases (Garhammer, 2002; Brynjolfsson and McAfee, 2016). This issue can be understood as an effect of finding relaxation or amusement through the use of digital technologies – for example, associating undirected, hedonic web browsing to the approach for relaxation (Rezaei *et al.*, 2016). At its extreme, the use of internet-connected, or more generally, digital, devices can be related to contemporary psychological issues like addiction, leading to excessive use of technologies (Lozano-Blasco, Robres and Sánchez, 2022). This can, for example, result in fear- or stress-related issues when the frequently used technology is not available (van Deursen *et al.*, 2015).

Based on the discussions throughout previous sections, it can be assumed that customers prioritise convenience when making choices. Even though this statement may appear rather of generic appearance, it can be understood to pervade across a number

of areas of the literature, considering, for example, that consumers tend to seek for integrated solutions in order to solve immediate issues – as indicated by authors like Brousell (2012) and Gomes (2019). In this regard, discussions on information costs emphasise that customers tend to use opportunities, which appear to require less effort than others, perceiving simple access to information and for the fulfilment of tasks to be more appealing than those requiring the investment of a higher degree of endeavour (Huettner, Boyacı and Akçay, 2019). In this connection, it can be seen that (frequently) using technologies, like virtual assistants, partially needs to be considered to be based on factors beyond objective reasons or habitual behaviour (van Deursen *et al.*, 2015; Rezaei *et al.*, 2016; Lozano-Blasco, Robres and Sánchez, 2022). This emphasises to give further attention to reasons leading to the adoption of virtual assistants beyond rationality.

Seeing the use of virtual assistants as being driven by the associated characteristics of efficiency and convenience, as likely objective factors for gathering information and instantly fulfilling impending tasks – instead of trying other means such as asking human beings – can also be understood as a symptom of humanness and ubiquitous availability. In this regard, it can be further be claimed that individuals tend to use virtual assistants due to potentially seeing these device-enabled services as a kind of social partner or friend. Even though this is considered to be rather a parallel, it could be assumed that the success of modern video producers can be partially explained by making people feel personally addressed notwithstanding that they offer the convenience of watching videos independently of restrictions of time or place (Hermsen *et al.*, 2016; Aw *et al.*, 2022; Grewal *et al.*, 2022). In general, this consideration is promoted by the anthropomorphic appearance of virtual assistants, probably increasing individuals' perception of them interacting with someone or something familiar, even though the extent of this effect might be barely measurable (Melumad *et al.*, 2020). Further, it can be questioned whether this perception is generally applicable to technology users, owing to the fact that attempting to imitate a kind of social relationship might potentially be perceived to be too intrusive or inadequate, especially if this is associated with service providers and their influence. This assumption is based on the parallel from research into loyalty programmes, which argues

that consumers perceive that they lose control because companies may be violating inherent social norms when they try to simulate a stronger relationship (Ding *et al.*, 2021).

In addition to the points discussed above regarding technology addiction (Lozano-Blasco, Robres and Sánchez, 2022), it can be claimed that digital technologies are shaping habitual behaviour, which is predominantly related to stimulated as well as automatic and unaware actions. Should people perceive that the initial decision to use a digital technology is successful, they are likely to increase the frequency with which they use this specific means. Consequently, using a certain technology appears to increase well-being, even though negative influences, like increased levels of stress, are often carelessly set aside. In general, there is a tendency to cope with negative feelings from other circumstances in life by turning to the use of technologies, even though paradoxical effects can be assumed, due to potentially replacing negative emotional states from other processes in life with technology-related concerns or feelings. In this regard, individual personality traits are considered to account for a decisive role in terms of handling digital services (van Deursen *et al.*, 2015; Augusto, Godinho and Torres, 2019; Echeverri and Salomonson, 2019; Jaspers and Pearson, 2022). In consequence, using technologies can be seen from manifold perspectives, also being underpinned by adaptive learning or personality, considering that using them shapes habits where they are seen to shape efficiency of fulfilling individual needs and tasks, which, in turn, contribute to rapidly increasing timeframes spent on using digital technologies (Hopkins, 2007; Brynjolfsson and McAfee, 2016; Riegger *et al.*, 2021). Another, collateral, perspective is discussed to be based on neurocognitive mechanisms, suggesting that digital technologies trigger the same habitual processes as other essential actions in everyday life – as for example tooth brushing (Bayer and LaRose, 2018), even though some mechanisms of usage can be related to psychological issues. These issues are for example depression, anxiety or loneliness, even though it can be queried whether or to what degree this applies to virtual assistants, considering their, previously discussed, influence on perceived social presence (Oh, Bailenson and Welch, 2018).

In summary, the discussions show that manifold elements of adoption behaviour exist. This behaviour can be explained by factors as, for instance, addressing consumers on personal levels, being associated with efficiency, or having become integrated parts of service environments. Notwithstanding these rather rational factors, literature partly provides evidence for adoption behaviour beyond the lines of rationality. In addition, the previous literature reveals that people tend to adopt virtual assistants, even though being aware of potential disbenefits like privacy issues. This reveals the complexity of behaviour towards virtual assistants, which can, to some extent, be understood to lead to an area of tension in terms of assessing risk and benefit of adoption – complemented by the potential to behave irrational or unconsciously. In consequence, discussions on rational underpinnings, traditional technology- and decision-related attempts as well as indications providing reasoning for limited rationality are identified to account for contributing forces.

2.2.2 Rational Choice, Bounded Rationality, and Technology Acceptance

Chen *et al.* (2019) address the rational choice theory, taking the view that when consumers make decisions, they tend to balance the benefits and risks with the intention of being rational in behavioural outcomes. This approach ignores impulsive decision-making, believing that consumers will make explicit and goal-oriented deliberations for decision-making purposes. This theory found its renaissance in the 1990s, predominantly investigated in the area of sociology, even though it was subject to some criticism in terms of its accuracy, due to the manifold appearance of influences on decisions, leading to a basis of limited applicability (Manzo, 2013). Even though this theory finds its limitations, it can be seen as a part of decision-making processes, which can be complemented through alignment with a variety of other theoretical approaches, such as intention-related theories (Lee, Chua and Han, 2020). Decision-making is a widely investigated field of research, finding cognitive, habitual, and affective bases for investigation. In this context, the cognitive decision-making process is associated with rationality, which only partially

applies to an integrated understanding of decision-making, owing to situations often requiring predominantly emotional or spontaneous decisions. These situations require consumers to make decisions, probably when they are not fully aware of every potentially underlying consideration, which could be done in advance of the individual decision. In contrast, the rational perspective expects consumers to give thorough considerations to their decisions and the ensuing consequences (Bangsa and Schlegelmilch, 2020). This divergence between being entirely aware and spontaneity or emotionality is partially complemented by intuition, which involves making decisions without being entirely informed, or being uncertain, partly affected by the individual decision maker's cognitive limitations. This idea is described as bounded rationality, postulating that consumers approach limited optimal outcomes of decisions owing to inadequate knowledge (Ortega and Hernández, 2018; Julmi, 2019). Jones (1999) limits the influence of rationality to the achievement of satisfactory levels in cases where needs or motivations are met by available options. This further indicates the increased complexity from the operational stance, given the requirement of understanding the estimated or intended levels of individuals' outcomes and the limited ability to fulfil multiple tasks in parallel to a satisfying degree – complemented by entirely understanding connected purposes. Even though these underpinnings demonstrate that rationality is limited by knowledge or efficiency-oriented behaviour, situational as well as motivational indications are present (Reyna and Rivers, 2008; Jarcho, Berkman and Lieberman, 2011; Moore *et al.*, 2012).

In general, decision-making is one of the most significant issues in human life, requiring the balancing of a variety of considerations, prior to any decision about a specific service or product (Abu-Alkeir, 2020). The academic field of consumer behaviour research and consumer decision-making has a long history, leading back to Cox et al. in the 1980s, who set out a five-stage model, which was subsequently adapted by various authors (Erasmus, Boshoff and Rousseau, 2010; Dudovskiy, 2013). Even though the model is based on purchasing decisions, adaptation to restaurant or service selection is feasible, given that the decision to visit a certain service venue requires an equivalent estimation process (Legohérel, Hsu and Daucé, 2015).

The consumer decision-making process is elementary investigated to rely on the following stages:

Figure 1: Consumer decision-making process (source: Abu-Alkeir (2020); Kotler and Keller (2012))

In technology-related contexts, authors strongly agree on the unified theory of acceptance and use of technology (UTAUT), which has its roots in the technology acceptance model (TAM) (Jeon, Sung and Kim, 2020). Other authors like Uphaus, Ehlers and Rau (2019), for example, use the successor theory, UTAUT2 in order to investigate the intention to use a specific technological service. Even though this theory is strongly accepted and well considered across multiple contexts, some recent criticism of the theory can be acknowledged, even though this is barely addressed within the literature: Considering the contemporary market environment and a bandwidth of offered, consumer-related technology, other factors than facilitating conditions, performance estimations or the related effort expectancy can be claimed to be potentially more relevant to consumers. This assessment is based on the nature of modern technologies, having achieved maturity, and therefore being performant, intuitive in usage, or requiring little instruction in terms of how to use them. The hugely accelerated speed of devices, as well as the speed of connections over the internet, like next generation smartphones, are underpinning these considerations (Jæger *et al.*, 2016; Rodriguez *et al.*, 2019; Klisenko and Serral Asensio, 2022). In consequence, it can be assumed that the tradition of investigating single technologies across UTAUT-related dimensions could be more expedient for newly developed technologies rather than aligning with existing ones. The initial UTAUT model, originated from Venkatesh in 2003, was developed to evaluate the use behaviour of customers in relation to specific technologies. This model relates person- or group-specific criteria to the dimensions performance expectancy, effort expectancy, social influence and facilitating conditions, leading to an overall assessment

of specific technologies. The investigation of a variety of sources showed that these dimensions usually influence each other across different contexts (e.g., Taherdoost, 2018). The UTAUT model, published shortly after the millennium, is based on the technology acceptance model (TAM) developed by Davis et al. in 1989, founding a longstanding tradition of inquiry and investigation – probably meeting the requirements of the early times of technological developments (Kokkinou and Cranage, 2015). In conclusion, considering the maturity of contemporary technology as well as, additionally, considering consecutive solutions, like skills (Malodia *et al.*, 2022), it can be concluded that other theories, like consumer- or context-related approaches might be more promising in understanding highly mature technologies.

Following this reconsideration of previous technology approaches, linking the rational choice theory to behavioural outcomes in relation to specific technologies, might provide a more promising basis for technologies like virtual assistants. Even though there is some information about relating the rational choice theory to a variety of contexts, it is relatively novel in digital spheres (Logan, Bright and Grau, 2018). In this regard, technology can be understood as a tool for guiding specific decisions (Pereira *et al.*, 2022), even though it can be questioned whether its influence across a decision-making process might be more significant, considering that intending using the technology for the specific purpose already requires a prior decision.

In general, the rational choice theory is strongly accepted throughout the social sciences and their derivates which investigate human behaviour. Even though the theory is widely critiqued in the literature, for example the argument that people need to be fully informed about the area of the decisions being made, it can prove worthwhile to apply the theory in some areas. This critique might be based on sources, which are applying the rational choice theory to areas like political science, in which people are probably not entirely informed about a number of variables (Benson and Dresdow, 2015; Daniel and Watermann, 2018; Herfeld, 2022). In the context of digital technologies, it can be assumed that people are widely aware of their choices, given that issues like privacy concerns or perceived costs (Chen *et al.*, 2019) have a comparable nature throughout

different technologies. Even though there is strong evidence across the research that risk- and perception-related factors influence individual choices, combinatory decision models, balancing risks against benefits, are barely investigated in the consumer behaviour literature (Featherman *et al.*, 2021).

Essentially, rational choice assumes that people calculate the outcome of their decisions, balancing benefits against negative considerations (Nickerson, 2021). Therefore, the positive as well as the negative perspective on the rational choice theory is evaluated across the developed model, underpinned by an investigation of variables – following at a later stage of this research.

2.2.3 Theory of Planned Behaviour

The theory of planned behaviour (TPB) is strongly related to decision-making where individuals are able to choose between available options (D'Souza, 2022). The author Ajzen (2011) reflected his own theory of planned behaviour, originally introduced in 1985. This theory instituted a long tradition of understanding behaviour in the spectrum of psychology and became a significant underpinning of understanding human decision-making. Comparable to the rational choice theory, the theory of planned behaviour addresses the outcome of decisions, leading to an attitude towards behaviour, which is based on balancing negative as well as positive expected outcomes. This assessment is initially based on external factors like demographics or other individual characteristics, as the following scheme indicates (Idris *et al.*, 2016).

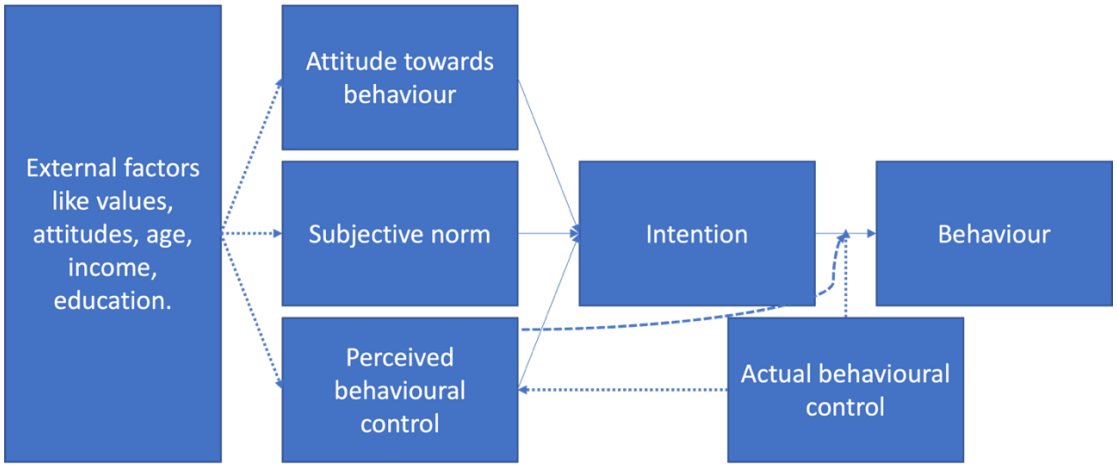

Figure 2: Scheme of the theory of planned behaviour (source: own, based on Sobótka, 2011; cited in Idris et al. (2016))

The theory has found criticism for not thoroughly addressing unconscious mental processes. This criticism relates to the fact that the theory minimally includes affective or cognitive elements of human behaviour, which are considered to be important in order to derive answers about why human beings act in a particular way. The emotional, subjective or perception-related stance emphasises that individuals do not entirely plan their behaviour. Even though they usually seek to achieve goal-oriented outcomes of actions, it can be questioned whether the behaviour is entirely in the individual's control, taking account of externally stimulated or impulsive actions. In addition to the attitude towards the particular behaviour and behavioural control, the theory claims that subjective norms underpin intentions, which is what produces the real behavioural outcome. Other factors of TPB are related to the influence of past behaviour, habits and individual issues, which derive from individuals' personality traits (Ajzen, 2011). Applying this theory as well as its criticism to virtual assistants, it can be assumed that virtual assistants might influence planning and further potentially impose some control over individuals' behaviour (Hasan, Shams and Rahman, 2021).

2.2.4 Technology's Influence on Choice, the Paradox-of-Choice-Effect, and Consumer Freedom

Freedom is a core element of life, usually leading to positively associated emotional conditions like the overall degree of satisfaction or happiness. In general, the concept of freedom and the intrinsic perceptions aligned with freedom are scarcely addressed in the context of consumption, where external conditions like offering variety to create freedom of choice are traditionally emphasised. Even though it can be a matter of debate what degree of freedom might be the most promising, the literature usually correlates freedom with hedonic elements of consumption, nurturing happiness and leading to well-being. In order to understand the concept, several paths to freedom can be differentiated, understanding "freedom from" as the ability to be independent from stress or discomfort, while "freedom to" is associated with the ability to shape the individual circumstances of one's life. Both underpinnings of freedom are common in terms of self-orientation and the perception to account for something usual or matter of fact but diverge in terms of their relationship to emotional arousal and associated activity. In this regard, being free from negative influences like stress leads to less emotional arousal than the potential of freedom to do things. In addition, the concept can be understood as being highly contextual, aiming for different perspectives in terms of associated activities, for example showing that food and beverage consumption motivation, rather than having multiple choices available, is central to relaxation (Gaston-Breton, Sørensen and Thomsen, 2020).

In relation to restaurant choice and decision-making, Jung *et al.* (2015) make the criticism that the forced balancing of diverse considerations for reaching final decisions is barely addressed in the literature. This study shows that decision-making is more oriented to price and perceived quality characteristics than to situations in which consumers are required to elaborately consider a bandwidth of potential trade-offs against benefits. In this regard, the terminology "tyranny of choice" (Jung *et al.*, 2015; p. 88) indicates that narrowing down choice probably leads to positively associated perceptions. In this way, it can be argued that choosing the most appropriate restaurant might partially appear to be an elusive task, which supports using technology for this purpose since it tends to

reduce this negatively associated facet to more concrete levels (Massai, Nesi and Pantaleo, 2019). Even though Jung *et al.* (2015) do not directly consider the influence of reinforcing the decision-making process by using technological means, it can be assumed that limiting choice – consequently limiting the freedom of choice – is a positively associated issue in case of potentially perceiving an overabundance of opportunities. This can be aligned with the indications by Li *et al.* (2019), showing that people are probably overwhelmed when they are overloaded with information. This leads to an area of tension between the demand for having multiple options and perceiving decision-making processes as difficult owing to being required to differentiate vast areas of information as a consequence of multiple options. This leads to a paradox-of-choice effect, which might propel the adoption of technologies for decision-making tasks despite probably being aware of limited choice (Wallace, Ross and Davies, 2003; Wenzel and Kastlunger, 2015; Kulshreshtha and Sharma, 2022).

The paradox of choice theory concludes that the potential overload of choice might lead to make poor choices or to undesirable emotional states like feelings of powerless or confusion, despite variety of options usually being considered positive. In addition, huge numbers of options often lead to dissatisfaction with previous actions and the evaluated characteristics which shaped them (Oulasvirta, Hukkinen and Schwartz, 2009). These issues can be related to understanding the psychological cost of choice in contrast to consumption-related utility maximisation, usually leading to requiring rational decision-making from the individual consumer. This issue is complemented by cognitive processes which partially realise that options are limited, leading to increased curiosity and to lead to proper investigation of the possibilities available, in turn seeing these options as more special or significant, even though there is a risk of this meaning that some options are disregarded should the limited option not be perceived to be appropriate or attractive (Wenzel and Kastlunger, 2015). Further to these considerations, in addition to lowered effort and costs, the potential postponement of consequences associated with a certain decision might also prompt a desire for multiple options, even though this might lead to confirm decisions by using technology – partially further underpinned by the anonymity

that is perceived when collecting internet-related information (Lim, Zo and Lee, 2011; Reed, Kaplan and Brewer, 2012; Nikolaev and Bennett, 2016; Melumad *et al.*, 2020).

In contrast to previous points, another significant attribute of having restricted opportunities, consequently leading to the limitation of freedom, is impelled by the penetration of data-driven technologies in modern society. In modern times, society often requires the adoption of certain technologies in order to maintain a high degree of participation within the (digital) social environment. This participation is often connected to being forced to disclose data, even though it potentially leads to concerns after publishing the individual set of data (Sætra, 2019). Comparing these issues with traditional communication models, it can be argued that commanding virtual assistants is not only a form of action and response, but further an issue of self-revelation, underpinned by perceiving to interact with a humanlike being, potentially related to the social environment (Röhner and Schütz, 2016; Tsarkov, Enikeev and Samsonovich, 2021). Complementary, it can be important to consumers having clarity about whether virtual assistant providers collect and analyse their current location, with a view to deducing behaviour-related patterns (Park and Jang, 2014; Uphaus, Ehlers and Rau, 2019). In consequence, it can be assumed that consumers are limited in terms of their freedom of choice due to potentially attempting to validate their choices in terms of social adequacy. In addition, virtual assistants are partially attempting to gain or imitate a social relationship with individuals, leading to the assumption that emotions, usually applying to human beings, are partially emerging with these technologies, potentially limiting decision-making due to attempting to make choices socially acceptable despite not directly interacting with a real social being (Tsarkov, Enikeev and Samsonovich, 2021). These issues are complemented by striving for a more human-like appearance in virtual assistants, leading individuals to being partly constrained in terms of perceiving the virtual assistant as an artificial construct – potentially evaluating decisions made with the support of virtual assistants to be the most suitable. Aligning this with human learning abilities, e.g., in terms of communicative skills or facial expressions, mitigated by using virtual assistants instead of directly communicating with human beings, might lead to inappropriate situational behaviour (Aeschlimann *et al.*, 2020). The social influence of

using virtual assistants could also be related to attempting to achieve commitment with others, for example, due to believing that there is a mutual reason for making a distinctive choice (Gaudou, Herzig and Longin, 2006). In this regard, virtual assistants are partly described as becoming virtual social actors, attempting to understand the emotional state of humans as well as seeking to imitate social behaviour to a high degree by learning from past decisions (Samsonovich and Eidlin, 2021).

From the perspective of advertisement and campaigns, perceived freedom as well as perceived control, simplicity and reduced effort are significantly influencing behavioural outcomes, for example, encouraging the adoption of technologies – although this adoption intention is probably influenced by previous experience (Bennett, Vijaygopal and Kottasz, 2019). This conclusion can be applied to the relationship between knowledge and freedom. Leeson (2008) states that freedom of unrestrained information sources is leading to increased knowledge and, in consequence, individuals' knowledge, demonstrating that sources of information could generally be influenced due to attempting to control attitudinal and behavioural outcomes. Considering this example in regard to paid advertisements on information sources like virtual assistants, it can be assumed that highlighted information decreases the knowledge and awareness of consumers and therefore restricts their individual freedom – even though consumers are probably aware of receiving paid information, which is, for example, often achieved on social media platforms by attaching labels like 'sponsored' to consumers (Zarouali *et al.*, 2021).

Melumad *et al.* (2020) a related research paper, which emphasises how various technologies influence consumer decision-making processes. In this regard, the interface and the purpose of the individual technology is said to be significant, considering that increased sensory feedback, like seeing information on screens, or haptically receiving feedback, makes people feel more familiar with their devices. Even though this potentially mitigates the influence of voice-controlled virtual assistants, in contrast to, for example, screen-related services, it can be assumed that this effect is moderated by the efficiency aligned with the use of the individual technology or the hedonic or utilitarian intention of dining (Ryu, Han and Jang, 2010; Lucia-Palacios and Pérez-López, 2021). In general,

Melumad *et al.* (2020) further state that technologies are influencing how consumers conduct decision-making processes, how they interact with others and, especially, their way of thinking – consequently making attempts to gain understanding of market activities more complex. This complexity can, for example, be complemented by attempting to guide decisions through digital technologies – instead of attempting to determine them, even though it can be assumed that lines between these perspectives tend to be blurred. This approach could be related to making individuals feel that they are retaining control throughout the decision-making process (Meißner *et al.*, 2020), leading to a decreased sense of vulnerability (Hill and Sharma, 2020). In consequence, it can be critically assumed that virtual assistants limit the freedom of consumers by attempting to reduce the potential awareness of having restricted opportunities, resulting in mitigating reactance against decision-making through virtual assistants (Laurin, Kay and Fitzsimons, 2012; Melumad *et al.*, 2020). Melumad *et al.* (2020) further indicate that service providers are permanently attempting to enhance the algorithms underpinning their technologies, aiming to make people feel more strongly personally addressed, consequently leading to stronger adoption as well as a perception of the technology as natural or obvious. This permanent enhancement can be associated with interpreting and analysing the consumer on a personal level, as well as potentially fostering non-reflected trust, while stimulating the usage of technology for information seeking. In this regard, it can be critically suggested that users of digital technologies are becoming partly restricted to the imagination as well as the directed developments of service providers. This could further be interpreted as limiting the abilities of consumers to critically interpret information provided, focussing on knowledge gained through external means rather than investing effort into thinking for themselves. This effect is additionally driven by the decreased rationality of consumers, evaluating technologies and digitally mediated information from a more strongly irrational point of view. From a critical stance, this opens room for discussion as to whether the stronger ties between digital technologies and human beings lead to increased probability of being controlled by the technology, instead of to factually control the individual device (Newcomb and Harlow, 1986; Huang, 2018; Melumad *et al.*, 2020). In addition, it can be concluded that consumers have limited opportunities through the necessity of choosing across available virtual assistant skills for the fulfilment of tasks,

which can be understood as being restricted to knowledge about these applications or to the tasks they enable to fulfil (Ballester Pla and Hernández, 2012; Rawassizadeh *et al.*, 2019).

Along similar lines, Klesel *et al.* (2019) investigated freedom of choice in terms of enabling employees to choose between several devices in company surroundings, stating that companies are more appealing to potential employees where they offer the ability to choose between several devices, or offer bring-your-own-device policies. This investigation is, in parallel, indicating that consumers probably feel self-determined, empowered and more confident when performing tasks with their own technologies. Further, this investigation not only emphasises that consumers need to feel in control of making choices, but more particularly that technology stimulates strong emotional bonds to individuals – probably disrupting traditional decision-making processes (Klesel *et al.*, 2019; Melumad *et al.*, 2020; Mansell, 2021). In addition, this discussion might contribute generally to investigations about offering voice assistants within hospitality venues (Cao *et al.*, 2022; Fan, Lu and Mao, 2022), probably making consumers feel more convinced about using technologies (in situ) when enabling them to use their own devices (e.g., by offering interfaces).

2.2.5 The Empowerment-Vulnerability Paradox

Del Bucchia *et al.* (2021) discuss the influence of digital technologies in consumption journeys, arguing that consumers are expected to play an increasingly active part in communicative practice throughout the marketing sphere. In general, voice-initiated, virtual assistants are enabling customers to feel being empowered by their usage (Kudina and Coeckelbergh, 2021). Customer empowerment is a form of customer orientation, leveraging the individual customer's abilities to shape their individual perception towards using the company's resources. Enabling customers to take over control of processes which were traditionally shaped and conducted by companies is believed to enhance competitive advantage by positively influencing the customers' perception of control –

consequently resulting in a higher degree of loyalty. Even though this is leads companies to require to make greater effort to understand and respond to customer requirements, this can be seen as a force for strengthening the individual company's position at encounters, driven by additionally learning about their customer clientele (Fuchs and Schreier, 2011). In addition to previous indications, customer empowerment is underpinned by various other factors like personalisation or customisation as well as the collaboration-related co-creation of value. Therefore, it can be concluded that developing individual features by enabling customers to contribute to their individual service environment is a form of empowerment, not only often applying to brick-and-mortar environments but also already constituting a key element of virtual assistants (Benedetto, Cremonesi and Parenti, 2019; Xie, Li and Keh, 2020).

In general, virtual assistants directly strengthen the empowerment of customers, due to their roots in artificial intelligence – enabling a digital, virtual machine to learn about the customer directly without further interference, even though these automatically conducted learning processes are probably not necessarily apparent to individuals (Tajdini, 2021; Kautish and Khare, 2022). The high level of automatism that virtual assistants, and their underpinning artificial intelligence technology, is based on is consequently delivering the convenience that customers associate with using them, replacing manual, human processes to a high degree at the customer- but also at the company-level, which can be understood as promoting the perceived value of this technology (Pranic and Roehl, 2012; Huettner, Boyacı and Akçay, 2019; Cao *et al.*, 2022). From the perspective of evaluating the integration of virtual assistants in hospitality settings, it can be asserted that this form of empowerment needs to be evaluated from different angles, due to the fact that these specific technologies are usually offered by external and independent providers (Cao *et al.*, 2022; Grewal *et al.*, 2022), added to which their algorithms usually only enable companies to develop technological skills within the technological framework provided by the service provider (McLean, Osei-Frimpong and Barhorst, 2021). In this regard, it can be assumed that consumers as well as restaurant services are partially diminishing their own power by adopting virtual assistants. Del Bucchia *et al.* (2021) describe that, in general, technologies adopted in consumer journeys lead to mixed emotions due to

creating a number of benefits by enabling them to fulfil tasks instantly when appropriate – despite also generating a contrary position, which can be understood as vulnerability. More specifically, "techno-mediated consumption journeys generate perceptions of freedom, ubiquity, and power […] but consumers also fear technology-based interactions because they reduce efficacy […], increase fatigue, anxiety, frustration, risk, and create a sense of being overwhelmed" (Del Bucchia *et al.*, 2021; p. 630). This indication on the paradoxical perspective technologies like virtual assistants are connected with is complementary considered by Yap, Xu and Tan (2021), who discuss that technology enables to empower individuals but also increases their level of vulnerability.

2.2.6 The Privacy Paradox and Information Avoidance

Barth and de Jong (2017) investigated the privacy paradox in mobile computing in an integrated manner, partially aligning this theory with user decision-making. The privacy paradox emphasises that users tend to disregard traditional privacy concerns and use the technology, which can be estimated to lead to an incremental disruption of their usual and individual privacy perceptions. This paradoxical effect is propelled by individual experience-based attitudes towards technologies, perceiving them to be rather beneficial rather than potentially causing risk or harm – leading to increased insouciance in terms of disclosing information. Barth and de Jong (2017) further relate the general willingness to disclose information to the following points:

- Heuristics (willingness to access or process necessary information, partially limited by cognitive abilities),
- Situational cues (contextual or social),
- Over- or underestimation of risks,
- Gratification (partially gained instantly),
- Time inconsistency (barely available time to make thorough decisions about what is appropriate),

- Cognitive absorption (a kind of being caught in the use of technology, not thoroughly experiencing the surrounding),
- Habitual use (using the technology regularly, shaping habits),
- Risk diffusion (not thoroughly being aware about potential risks).

These underpinnings of the privacy paradox can be directly applied to virtual assistants, in addition to which it may be noted that the desire for gratification is satisfied by the instant granting of verbal or action-related feedback, as well as the general communicative function (Barth and de Jong, 2017; Rawassizadeh *et al.*, 2019). In addition, it can be assumed that this gratification and communication behaviour of virtual assistants leads to a perception of increased humanness, creating a more intrusive amount of cognitive absorption and social cues, consequently decreasing risk awareness – complemented by perceiving information issued through these technologies to be as trustworthy as those received from human beings (Barth and de Jong, 2017; Hoyer *et al.*, 2020; Hasan, Shams and Rahman, 2021).

Issues around privacy, and the paradoxical behaviours consumers tend to adopt, could be addressed in conjunction with perceived transparency and its dependency on knowledge. Burt (2019) postulates that increased transparency, in terms of artificial intelligence source codes and machine learning, increases the probability of these technologies being invaded, creating a transparency paradox, which could be understood as an argument for companies to limit the transparency of technological developments. From the perspective of consumers, the terminology transparency paradox could be related to the interplay of rationalisation, knowledge, and transparency, assuming that knowledge is a central driver of attitude and behaviour. The following parallels lead to consideration of a transparency-knowledge paradox, based on the assumption that increased transparency may be unwelcome to users, partly not wanting to be informed about potential threats like the potential violation of privacy or other issues like being controlled. This assumption is based on analogous behaviour, for example discussed by Huang (2018), Espinosa and Stoop (2021) or Laukkanen and Kiviniemi (2010). These articles put forward that consumers partly resist being informed about negative influences, often underpinned by the cognitive dissonance theory, which emphasises the

understanding of differences between attitude and behaviour. In this regard, regular behaviour is changed, often due to not taking into account the effort required or the real potential size of the consequences. This can further be described as a learning process, recognising the gradual and long-term change from the previous goal-leading or appropriate behaviour to new behaviour (Jarcho, Berkman and Lieberman, 2011). In consequence, this leads to habitual behaviour, continuing while ignoring past concerns, metaphorically forming a bullwhip effect (Hopkins, 2007; Elbert and Scharf, 2015; van Deursen *et al.*, 2015).

2.2.7 Actor-Network-Theory

The previous discussion about service networks, studied by Tax, McCutcheon and Wilkinson, (2013), contributes to an integrated perspective about the strong demand for the adoption of digital technologies. This research shows that technologies benefit when they aim for integrated service delivery, countering the increasingly fragmented appearance of services and the large number of digital encounters available. Considering that service environments are highly dependent on the aggregated performance of actors and activities (Finsterwalder *et al.*, 2017), it can be assumed that, next to human actors, modern digital technologies are increasingly contributing to the entire service network. In this regard it can be assumed that virtual assistants are partly replacing human beings, given that artificial intelligence is becoming more complex, particularly as we approach the stage, where users no longer realise that they are interacting with a machine (Savin-Baden and Burden, 2019). From the perspective of general business interactions, Kot and Leszczyński (2020) contend that services, which are based on artificial intelligence, can be actors in the entire service process, calling for a new understanding of the influence on guest-host interactions within a network. Even though not directly relating their investigations to the Actor-Network-Theory, the previous indications lead to take the theoretical underpinnings of this theory into closer consideration.

The Actor-Network-Theory (ANT) was introduced in the 1970s and has often been developed in connection with communication theories through the evolving literature. Its underpinning assumption is that actors influence a network in general, changing the shape of an integrated network, based on the need for all actors to work together in order to fulfil the network's designated tasks (Bencherki, 2017). In terms of virtual assistants, Carnemolla (2018) related ANT to the Internet-of-Things (IoT) by discussing smart home solutions in care. Even though this is the application of ANT to a significantly different context, it can be concluded that virtual assistants are developing beyond their limitations of being only assistive or complementary solutions but are seeking to become an essential actor to keep a service network vital. This underpinning of technology and especially virtual assistants, in combination with ANT, does not necessarily apply to all users, but comes into play around the initial decision whether to adopt the specific technology, and potentially getting used to it (Outila and Kiuru, 2021). Therefore, it can be assumed that adopting a virtual assistant inevitably means introducing an actor into the entire service network, creating an integrated network of available services. In addition, it can be seen that virtual assistants have a disruptive effect in terms of service environments, but they also create a strong dependency, making the service network only appear to be completed where these emerging technologies are adopted.

2.2.8 Virtual Assistants

Virtual assistants are widely valued technologies, which can, for example, be understood to be appreciated for the convenience of not being required to physically interact with devices as commands ad questions can be put verbally. Therefore, these smart devices need to recognise and record the voice of consumers, instantly analysing captured words so as to be able to directly state responses or to initiate specific actions. Even though consumers widely perceive their benefits, the drawbacks of these technologies, like privacy concerns, are imminent issues (Jain *et al.*, 2022; Szczuka *et al.*, 2022). Based on artificial intelligence technology, the device manufacturer Apple released its virtual assistant 'Siri' in 2011, followed by equivalent products of other companies, instantly

raising concerns about potential security and privacy breaches, which can be related to their ubiquitous presence or voice interfaces (Austerjost *et al.*, 2018).

Examining the example of Google – being one of the major technology companies offering virtual assistants – two essential factors in relation to their influence on consumer behaviour can be postulated (Meißner *et al.*, 2020; Jain *et al.*, 2022; Sprengholz and Betsch, 2022):

- First, virtual assistants probably influence freedom of choice, which can be reasoned from the existence of restaurant recommendation capabilities, proposing certain restaurants after simply asking for them.
- Second, the function to recommend restaurants, initiated by voice, potentially influences consumers on numerous levels and in many places, due to being available on stationary and mobile devices.

Both of these points about virtual assistants are complemented by contemporary sources, which state that providers combined these technologies across integrated platforms in order to grant additional value to consumers. This can, for example, be related to enabling consumers to be navigated while, in parallel, performing other tasks like sending text messages or investigating nearby offers. Even though these sources discuss a bandwidth of apparently beneficial functions, like instantly receiving information about points of interest (e.g., restaurants) or not substantially getting distracted from current tasks like driving, a discussion on significant potential drawbacks or the awareness of individuals for potentially less desirable influences, appears to be barely addressed (Schalkwyk *et al.*, 2010; Meißner *et al.*, 2020; Liang, Lin and Hou, 2021; Othman, 2021).

In consequence – considering theoretical bases like rational choice (Wittek, 2013) and investigations on intentions, attitude or behavioural outcomes like reactance or rationalisation (Ajzen, 2011; Laurin, Kay and Fitzsimons, 2012; Mak, Nickerson and Sim, 2015), it can be considered whether consumers perceive benefits to outweigh possible disbenefits or, in contrast, whether potential negative consequences lead to a tendency to attempt to (as far as possible or entirely) avoid the influence of specific technologies

like virtual assistants. In this regard, it can be noted that virtual assistant service providers describe their application in order to eliminate potential concerns, for example by stating that only a specific activation phrase or term can initialise voice recording, even though partly limiting this statement by stating that voice records are subject to being recorded a short period of time in advance in order not to miss essential contexts (Google, 2022). This leads to requiring a high level of trust because the information and processing is very much out of users' control (Hasan, Shams and Rahman, 2021). Even though it can be seen that companies are striving to explain how data, especially voice records, are used, it can be assumed that public awareness of potential negative consequences exists, which can be based on various news sources which discuss hacked voice assistants or the transcription of voice: in this regard, some authors find analogies to bugs, stating that voice assistants (potentially) spy on consumers, even though this might be a matter of individual perspectives. In addition, news sources discuss whether information and voice records, generated by voice assistants, could be used by authorities to prevent offences (Osswald, 2018; Biselli, 2019; Hoppenstedt, 2019). Even though it could be a matter of debate whether the outcomes of potential usage of data could be positively or negatively perceived, these discussions might have contributed to uncertainty about potential drawbacks aligned with these service technologies. In addition, public discussions in terms of lacking transparency about third-country data submissions could have underpinned some transparency issues or concerns from the consumer perspective, as shown by current articles of news agencies (Tagesschau, 2022).

In general, from the academic perspective, research variously uses the terminology of smart personal assistants, voice assistants, digital assistants or virtual assistants (Austerjost *et al.*, 2018; Winkler, Söllner and Leimeister, 2021; Aw *et al.*, 2022; Beeler, Zablah and Rapp, 2022), despite appearing to have a common appeal, which could pose the question whether closer definitions or delimitations might be expedient. The following table displays the literature found about the specific technology:

Table 4: Key literature on virtual assistants

Source and terminology	Described antecedents	Approach to assistants
Austerjost *et al.* (2018) Virtual assistants	Artificial intelligence, natural language processing, cloud	Voice-user interface: Deriving potential for controlling laboratory instruments; investigation based on virtual assistants existing in consumer surroundings, enabling the extension of human-machine interaction to non-haptic interfaces, customisation of skills
Aw *et al.*, (2022) Digital voice assistants	Artificial intelligence, Internet-of-Things	Digital voice assistants transforming customer experience; direct communication; current developments attempting to design assistants as human-like, simplifying personalisation, becoming ubiquitous (e.g., smartphones, smart speakers, vehicles)
Winkler, Söllner and Leimeister (2021) Smart personal assistants	Increased speed of changing organisational environments, Artificial intelligence, cloud, algorithms	Enabling problem-solving, discussing potential to create more individual support for students by shaping assistants, giving verbal and visual feedback; assistants making recommendations to students; convenient personalisation of skills due to requiring little technical knowledge
Poushneh (2021) Voice assistants	Artificial intelligence, algorithms	Voice assistants are a kind of voice-enabled artificial intelligence; revolutionising consumer consumption culture; AI (as the basis of voice assistants) is attempting to imitate human cognitive functions, characteristics, and personalities; problem solving and learning; enabling support for daily tasks like sending

		messages, ordering food or initiating calls; influence on decision-making and opinions
Rabassa, Sabri and Spaletta (2022) Voice assistants	Natural language processing, artificial intelligence, algorithms, wireless data services	Relation to conversational commerce; voice assistants may be biased, potentially leading consumers to make non-optimal decisions; consumers are outsourcing decision-making to algorithms – having positively and negatively associated impacts on decision-making on product buying; studies showed that most consumers tend to select the first item offered
Bawack, Wamba and Carillo (2021) Voice assistants	Artificial intelligence, shopping platforms, algorithms	Speech is associated with personality traits, e.g., aggression or sensation seeking; consumers receive additional information due to tone and pitch – offering more information than text-only based channels; voice shopping platforms are enabled to provide personalised services; influence on consumer and shopping experience
Gulati, Ishaan and Dass (2020) Voice assistants	Internet-of-Things, cloud platforms	Implementation of contemporary, domestic assistants into cars in order to support drivers with disabilities; integration of smartphones with Google Assistant in order to command cars by voice, physically steering the car
Mishra, Shukla and Sharma (2022) Smart voice assistants	Internet penetration; artificial intelligence; human-technology interaction	Assistants provide functional, hedonic and symbolic benefits to users; dissemination of smart voice assistants triggered by COVID-19 crisis, enabling social interaction without physically appearance; enabling the shaping of offers to consumers; personalisation; use is prevalent on smartphones rather than smart speakers

Fan, Lu and Mao (2022) Voice assistants	Automated technologies; artificial intelligence;	Hospitality background; in-room technologies; voice assistants and touch panels; automated social presence theory; interactive guest services; reduction of human errors; voice interaction as part of social presence, whereas screen-reading implies loneliness; automated social presence as the next level of development – replacing tasks, which were previously conducted by human beings; voice assistants are anthropomorphic, while touch panels are non-human-like self-service technologies
Fernandes and Oliveira (2021) Voice assistants	Artificial intelligence; ubiquitous appearance; automated technologies; anthropomorphism	Learning user's preferences; integration on mobile devices; human-like traits; existing without physical appearance – no effort to read or hold a device required; processing requests in real time; low barriers for using technology exist; learning about consumers and their motivations; data interpretation and learning required
Javed *et al.* (2022) Voice-controlled systems/voice assistants	Internet-of-Things, algorithms	Application for personal identification/verification, biometric security; vulnerability of systems to be potentially misused; spoofing of voice data; threat of voice being cloned in order to operate systems (e.g., opening doors), replaying commands e.g., simply recorded by hidden devices; increased threat of 'deep fakes' and other potential attempts at fraud
Malodia *et al.* (2022) Voice assistants	Artificial intelligence; natural language	Avoidance of using voice assistants for business purposes; research on avoidance/rejection/postponement of AI-related products is rare; consumers stick to know

	processing; algorithms	technologies rather than adopting new ones; research linked to decision avoidance; bias and resistance in relation to innovative products exist, e.g., due to overload of information; suggestion to increase the comfort of using technologies to achieve higher levels of adoption

Independently of discussions about the nomenclature, the previous table shows a variety of approaches towards virtual assistants in the literature – further supporting the conclusion that the literature predominantly emphasises potential benefits, as is reflected in barely addressing drawbacks and consumers' awareness of negative influences (Austerjost *et al.*, 2018; Gulati, Ishaan and Dass, 2020; Fernandes and Oliveira, 2021; Javed *et al.*, 2022). In addition, considering the manifold contexts virtual assistants can be used, the table gives evidence for the permeation of these technologies – complemented by focussing on the understanding on how behaviour can potentially be influenced in case of attempting to guide individuals to approach other means for the substantiation of decisions, for example by highlighting disbenefits. In terms of negative perspectives, Javed *et al.* (2022), for example, consider that biometric information is vulnerable to being misused – applying to the interface and authentication method of voice-controlled devices. This study demonstrates that voice-initiated devices and the fulfilment of could be misused by criminals in order to access rooms or conduct other fraudulent actions. This is complemented by Malodia *et al.* (2022), investigating drawbacks and uncertainties associated with these technologies in relation to avoidance, rejection or procrastination from the perspective of decision avoidance. In terms of the further consideration of decision-making, Rabassa, Sabri and Spaletta (2022) emphasise a tendency to strictly follow recommendations issued by virtual assistants. This can be understood as an indicator, offering additional justification to look at the potential issues arising when not thoroughly understanding unreflective adoption of the specific technology. In addition, the table shows that authors strongly agree on the influence of the human-like appearance of virtual assistants, providing the perspective to consider that

individuals may tend to feel addressed on emotional or personal levels (Bawack, Wamba and Carillo, 2021; Aw *et al.*, 2022; Fan, Lu and Mao, 2022).

From a technological standpoint, another central theme relating to virtual assistants is that authors strongly agree on that the technology is built on the foundations of artificial intelligence, the Internet-of-Things, ubiquitous computing, natural language processing and algorithms, but only partly considering cloud technology to their investigations (Austerjost *et al.*, 2018; Gulati, Ishaan and Dass, 2020; Winkler, Söllner and Leimeister, 2021; Rabassa, Sabri and Spaletta, 2022). Even though this inconsistency could be based only on the issue of saving captured data, it probably suggests the high level of complexity that these assistive technologies are based on, requiring permanent rethinking which can, for example, based on emerging functions and the perpetual redesign of this technology (Perez Garcia, Saffon Lopez and Donis, 2018). Gulati, Ishaan and Dass (2020), for example, investigate using voice assistants for actions beyond their current scope (like asking the systems to play music or to prepare shopping lists), assuming that voice-enabled commands could have the potential of steering cars. This way of applying the technology might be promising from the beneficial point of view but requires consumers to strictly trust and rely on voice-initiated actions because they raise questions in terms of physical integrity. Even though this approach could be thought to be rather utopian in practice, it indicates extends which could be achieved through continuously developing these technologies. Another, probably more realistic, idea is discussed by Fan, Lu and Mao (2022), who describe how, in hospitality surroundings, voice assistants could be used in order to limit the need to touch surfaces, which is also considered to be a key reason for their market penetration during the recent pandemic (Mishra, Shukla and Sharma, 2022).

2.3 Conclusion of the Literature Review

The previous chapter offered a far-reaching review of the literature, which offered to explain why consumers tend to adopt technologies with respect to virtual assistants. This review is based on the perspective of consumer behaviour, technology, objective reasons, or personal preferences. In addition, a number of theories were derived, generally assuming that consumers tend to adopt the technology stimulated by the potential to increase convenience or the tendency to perceive virtual assistants to be a relevant or required part of integrated service environments. Even though the literature review provides insights into the limitations of virtual assistants, it can be derived that individuals tend to adopt them rather intuitively or on the base of stimulated attitude gained over time – as, for example, learning-related literature indicates. In terms of limitations, it can be derived that the information density of spoken words is rather confined in contrast to visual, screen-bound devices. This is complemented by strong ties due to being fulfilled on the basis of integrated platforms, leading to equal sources of information across several technologies. These findings not only lead to derive an intuitive but also to a situational adoption of virtual assistants, probably approaching the use of other devices in case the information density is identified to be lacking.

In addition, it can be concluded that virtual assistants have the potential to disrupt traditional theories, for example driven by imitating human behaviour, shaping habits, personalisation, being perceived as mandatory actors within service environments, and especially limited consideration of potential drawbacks. These findings indicate that ties between individuals and virtual assistants are subject to be closer, partly leading to unwelcome feelings in case the individual technology is not available or within the reach of individuals. Although both business and consumer perspectives are leveraged, the company-driven adoption of virtual assistants and other technologies is seen to be predominantly based on data analysis, evaluated competitive advantages, or the refinement of processes. In contrast, the consumer perspective has a rather complex appearance, considering, for example, social aspects, bounded rationality, or adaptive learning. In consequence, in terms of traditional theories, it can be understood that

acceptance-, service- or behaviour-related theories probably reveal a digest of reasons leading consumers to approach using virtual assistants.

In general, the literature provides that behaviours and prior decisions are limited by the individual level of knowledge and, subsequently, restricted awareness about potential consequences. In addition, it can be concluded that individuals' traditional risk assessments, or related concerns, are probably not entirely applying to virtual assistants – potentially complemented by limited reflection in terms of the situational adoption, leading to deduce a tendency to adopt these technologies without active deliberation.

3.0 Conceptual Framework, Variables and Hypotheses

The concepts and their application to the research framework are set out in the following table in order to give an initial overview drawn from the more detailed discussion in this chapter. Grönroos and Voima (2013) claim, in this case using value as an example, that the literature often lacks close definitions of concepts, stressing that the understanding of terms and underlying concepts is highly contextual. This leads to the aggregation of key sources, with a view to achieving a contextual understanding, rather than providing a clear definition.

Variables applied within the research framework were identified by the investigation of existing literature discussing paradoxical and technology-related behaviour as well as by the discussion of situational, contextual, and rational reasons for and against technology adoption. From a general perspective, the initial consideration of increased power of these technologies over consumer behaviour as well as the required reflection of this behaviour from the perspective of companies led to the overarching assumption that consumers tend to adopt virtual assistants and other technologies with limited active deliberation. This was supported by academic literature, discussing technology-related, paradoxical behaviour as well as assessments, which lead to actual behave differently from traditional assessments and protective behaviour (Barth and de Jong, 2017; Pallant *et al.*, 2022). This led to the integration of privacy concerns, which was complemented by transparency, based on the consideration that this topic is frequently discussed in the news, potentially leading to mitigated awareness or information avoidance as well as potential consequences in becoming dulled in regard to traditional risk assessments (Huang, 2018; Bermes, 2021; Bolton *et al.*, 2021). In this regard, the variable transparency is considered as a factor which is positively associated with virtual assistants. This factor can be assumed to be based on their familiar or human-like appearance (Lin, Lobo and Leckie, 2017; Pallant *et al.*, 2022). In addition, opportunity costs were determined to be inquired due to accounting for an essential part of decision-making as well as enabling to directly integrate contextual underpinnings (missing relevant information for restaurant decision-making) (Spiller, 2011; Chen *et al.*, 2019).

These elements were complemented by the construct vulnerability, which is considered to show whether individuals may tend to feel a kind of empowerment through virtual assistants (e.g., having more opportunities when using technology for decision-making) (Yap, Xu and Tan, 2021) and might become vulnerable when the technology is potentially not available – as it was considered on the base of casual conversations in the justification chapter.

In terms of the constructs transparency and privacy concerns as well as opportunity costs and vulnerability, the research model respectively integrates the constructs rationalisation and reactance to the individual sets of constructs. Laurin, Kay and Fitzsimons (2012) and Narwal and Rai (2022) consider rationalisation and reactance as forces complementing each other, respectively accounting for a way of actively addressing morality as well as the active assessment of potential limitations of personal freedom. In terms of rationalisation, the decisive factor for the integration of this construct – as a mediator between transparency and attitude – was to determine whether consumers might partly perceive virtual assistants' data usage to be transparent due to understanding the usage of these technologies rather as a matter of fact or due to limiting transparency to a rather superficial degree. In addition, rationalisation was used as a mediator for the path between privacy concerns and attitude, considering that casual conversations showed a tendency of individuals to put negative considerations aside, not making active deliberations like whether there is necessity to rationalise or not. In this regard, it was further considered that rationalisation could be influenced by the character trait resilience due to accounting for an element leading to avoid the circumstance being responsible for negative consequences (Kursan Milaković, 2021), which could show that rationalisation can also be explained by a general trait, not only requiring a specific situation. In terms of reactance, the model is intended to provide insights into whether opportunity costs and vulnerability lead to react against potential issues, considering that reactance might be in effect when potentially not being able to use virtual assistants and therefore feeling vulnerable or perceiving to be limited in terms of choice. These considerations were made on the base some indications in literature (e.g., Barth and de Jong, 2017; Yap, Xu and

Tan, 2021) and the casual conversations with non-professionals giving additional justification for this research.

In addition, the concept of motivational intensity was integrated. This construct is approaching the extent to which individuals conduct specific situational actions (Feng and Papi, 2020). This construct is used as a moderator between variety-seeking and personalisation, considering that highly personal means like virtual assistants (Rawassizadeh *et al.*, 2019) could be determined to be relevant tools for being diligent in terms of investigating the most suitable restaurant when seeking for variety and, in consequence, to be solutions which substantiate decision-making (Pereira *et al.*, 2022). This situational usage of personalised solutions is subsequently giving additional reason for the integration of variety-seeking, accounting for the motivation to alternate between restaurants (Lee, Chua and Han, 2020) which could be interpreted as using virtual assistants in case of aspiring for variety. The two variables, motivational intensity and variety-seeking, are considered to draw conclusions in terms of potentially using virtual assistants rather as a matter of fact, or whether maintaining personalised virtual assistants or means like personalised advertising on integrated platforms could be promising in order to limit variety-seeking (Park, 2004; Schalkwyk *et al.*, 2010; Rawassizadeh *et al.*, 2019; Shin, Kim and Severt, 2019; Lee, Chua and Han, 2020; Melumad *et al.*, 2020). In this regard, the model is intended to test, whether the will to seek for variety could be influenced by the stimulation of motivational intensity by approaching personalisation. In terms of personalisation, the increased role of addressing consumers on personal levels (Melumad *et al.*, 2020) was another element leading to the integration of this concept, underpinned by the potential personal, social, or human-like perception of virtual assistants (Cao *et al.*, 2022; Fan, Lu and Mao, 2022; Grewal *et al.*, 2022). In this regard, personalisation is associated to switching and adoption intention, considering that personalisation could lead to avoid virtual assistants in case the moderation of personalisation is in effect with respect to switching intention. This was determined to potentially offer a chance for companies to use personal means to potentially stimulate switching behaviour as well as to, as previously described, derive, whether variety-seeking can be influenced.

In this regard, the comparison of switching and adoption intention as outcome variables is determined on the base of Malodia *et al.* (2022), who investigated the rejection of virtual assistants in contrast to their adoption. Abstracting this base of comparison was determined on the base of the consideration to potentially inform individuals about drawbacks of technology use in order to potentially stimulate switching from using virtual assistants. This consideration is complemented by the underpinning that balancing rational factors and approaching a usually diametrical behavioural extent is a pillar of decision-making, rational choice, or planned behaviour (Idris *et al.*, 2016; Abu-Alkeir, 2020; Nickerson, 2021; D'Souza, 2022). Further, it is being related to the direct effects of resilience and vulnerability on adoption intention, understanding these factors to be prerequisites of being successful in informing individuals about drawbacks of virtual assistants – as well as to potentially stimulate reflective behaviour (Augusto, Godinho and Torres, 2019; Kursan Milaković, 2021). In terms of resilience, this variable was integrated under the consideration that individual character traits guide assessments as well as behaviour (Augusto, Godinho and Torres, 2019; Toti, Diallo and Huaman-Ramirez, 2021; Narwal and Rai, 2022). In this regard, Kursan Milaković (2021) – also taking vulnerability into account – implicates that companies should attempt to contribute to resilience and vulnerability through the communication of information about undesirable consequences as well as through offering ideas to handle them. This approach considers the adaptability of consumers by the provision of opportunities and chances, which could be imagined as a pillar of the consideration to potentially campaign against virtual assistants, for example by stressing the positive effects of avoidance. In consequence, resilience and vulnerability can be understood as prerequisites of the potential attempt to inform consumers about potential drawbacks from the professional perspective, considering that "[companies] can gain awareness of consumers' vulnerability and resilience levels and thus adapt their marketing and communication strategies for a better purchase experience" (Kursan Milaković, 2021; p. 15).

In addition to the other constructs, hedonic and utilitarian dining value were integrated, considering that behaviour as well as the assessment of arguments rely on the individual technology as well as the context the technology is used. The contextual underpinning

can be understood as a parallel to traditional decision-making attempts, complemented by the motivational perspective, strongly agreed throughout literature (Moore *et al.*, 2012; Barth and de Jong, 2017; Ortega and Hernández, 2018; Lee, Chua and Han, 2020). In terms of dining value, it was considered to provide indications for professionals, whether the adoption of virtual assistants is more relevant for restaurants predominantly visited for hedonic or utilitarian purposes (Park, 2004; Ryu, Han and Jang, 2010; Shin, Kim and Severt, 2019). In addition, this was considered to provide evidence for whether – and to what extent – specific contexts are required or whether virtual assistants are adopted rather as a matter of fact, not requiring a specific context. This is further reasoned on the provision of additional insights for practice but also on the assumption that intuitive adoption may be rather prevailing than contextual. Even though this justifies the link of both dining values to adoption intention, it was considered that contextual usage of means (Barth and de Jong, 2017) might also influence switching intention, considering that individuals could strive for alternatives offered by companies.

Another factor to take into account could be the application of control variables. Even though authors like Klarmann and Feurer (2018) put emphasis on the benefits of integrating control variables in marketing research, they also state that researchers tend to report them rather than to approach their use. In this regard, even though this might be subject to the individual perspective, it was determined to report them (in the demographic and behaviour-related characteristics sections) but not to directly integrate them into the analysis. This is grounded on the base of this research, looking at consumer behaviour towards virtual assistants on a general base and considering that this behaviour has potential effects for companies. In this regard, the research is intended to provide additional insights like whether to inform individuals about potential drawbacks of virtual assistants or not. Complementary, it is taken into account that the research context is focussing on the restaurant industry on a general level. In this regard it can be annotated that, even though being integrated as factors to determine the relevance of a specific context for adoption or switching behaviour, hedonic and utilitarian dining value might offer some additional insights, which could also be fulfilled through the integration of

restaurant-related behaviour. In consequence, it was determined to not directly integrate control variables into the research framework.

The figure below illustrates the conceptual framework underpinning this research, further substantiated on the base of the following investigation of variables.

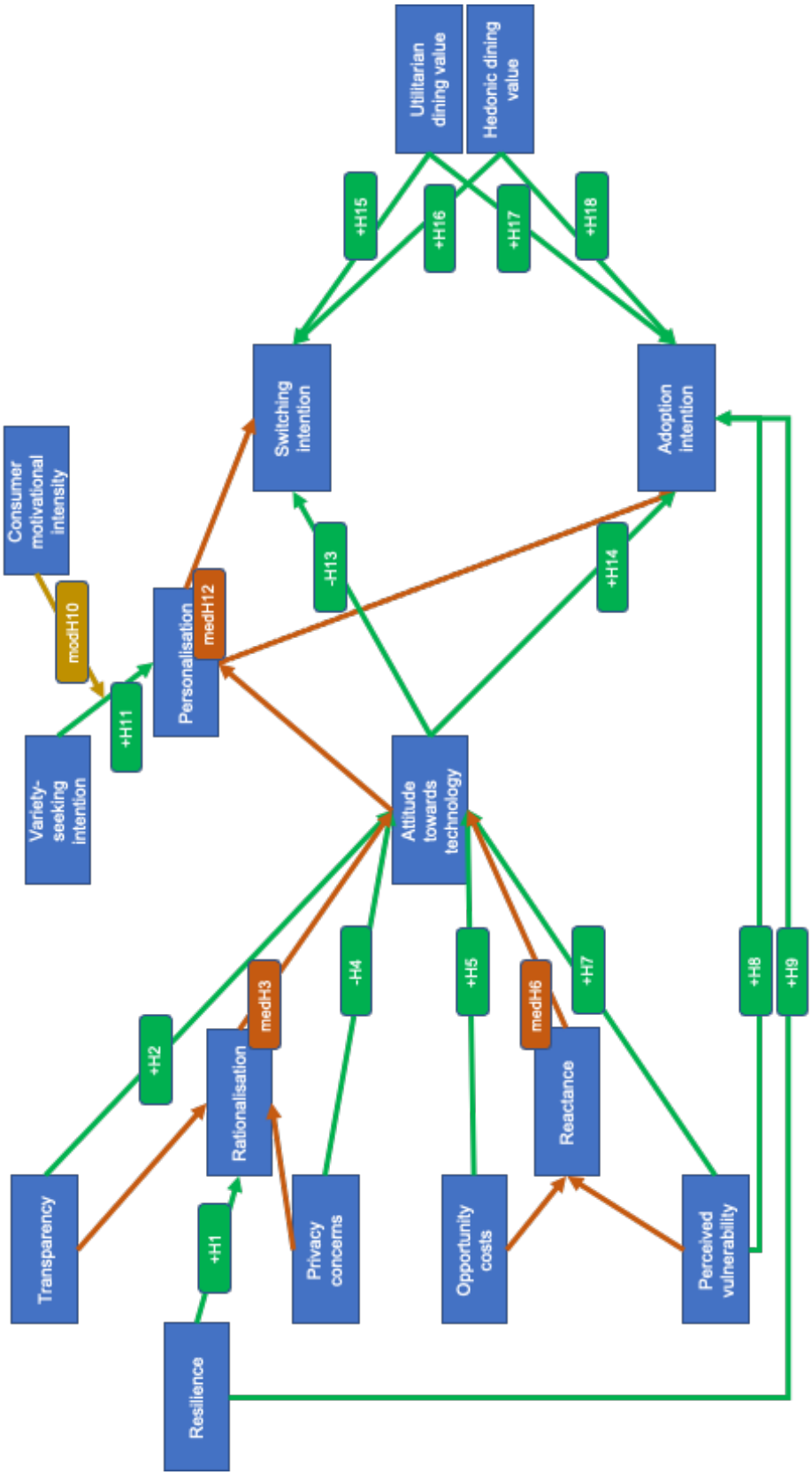

Figure 3: Conceptual framework and hypotheses

The following table offers an overview on the concepts applied and their contextual understanding:

Table 5: Table of concepts/variables

Concept	Contextual application of concepts	Key authors
Resilience	Consumers' general ability to continue with actions and processes even though the surrounding conditions are less optimal.	Augusto, Godinho and Torres, 2019; Guthrie, Fosso-Wamba and Arnaud, 2021; Kursan Milaković, 2021
Transparency	Depth of understanding of how private data is used by technological service providers.	Pallant *et al.*, 2022
Rationalisation	Consumers' (active and conscious) perception that the benefits of technology usage are exceeding potential negative outcomes, even though services could be evaluated to be improper from a moral stance.	Laurin, Kay and Fitzsimons, 2012; Narwal and Rai, 2022
Privacy concerns	Level of concerns and potential awareness in terms of the intrusion of service providers (or companies in general) and potentially unknown audiences into the private sphere – stimulated by actively or passively issuing data through service providers' digital offers.	
Opportunity costs	Potential of missing alternatives, which are associated with using a digital technology in order to fulfil current tasks like actively inquiring for information.	Chen *et al.*, 2019
Reactance	Consumers' perception of technology usage restricting freedom, leading to avoidance behaviour.	Laurin, Kay and Fitzsimons, 2012; Chen *et al.*, 2019

Perceived vulnerability	Consumers' restricted access to (or knowledge about) alternatives in conjunction with their perceived control of resources, causing potential harm due to feeling influenced.	Shi *et al.*, 2017; Hill and Sharma, 2020; Kursan Milaković, 2021
Consumer motivational intensity	Emphasis on conducting specific actions, which is shaped by the current motivational state.	Feng and Papi, 2020
Variety-seeking intention	Intention to alternate between available (restaurant) options in order to investigate services which are different from known or habitual variants.	Bravo and Libaque-Saenz, 2017
Personalisation	Approaching to find personalised services, potentially leading to the adoption of technological means, which are used due to being associated with the fulfilment of current needs and motivations on individual levels.	Ball, Coelho and Vilares, 2006
Attitude towards technology (VA)	Aggregated opinion towards the specific technology (virtual assistants), being shaped by multiple influences like previous experience of using the technology or the awareness of potential positive or negative effects it might cause.	Al-Debei, Akroush and Ashouri, 2015; Feng *et al.*, 2019
Value → Utilitarian or hedonic dining value	Value is a complex system of the delivery of resources and processes within a service context, underpinned by consumer perceptions. Perceived outcome of dining in conjunction with current motivations, leading to	Grönroos and Voima, 2013; Kim *et al.*, 2018; Taylor, DiPietro and So, 2018; Shin, Kim and Severt, 2019; Jang

	behaviour (e.g., related to aiming for efficiency or entertainment).	and Cho, 2022; Pallant *et al.*, 2022
Adoption intention	Assumed probability of choosing a specific technology.	Cao *et al.*, 2022
Switching intention	Assumed probability of avoiding using a specific technology and of switching to an alternative.	Han, Kim and Hyun, 2011; Cao *et al.*, 2022

The following sub-chapters are presented for the development of hypotheses as well as applied variables in relation to the previously stated research framework, and the overview of concepts. As they are considered to have an overarching characteristic, the hypotheses are set out prior to the in-depth discussion of individual variables.

From a general perspective, the previous literature review chapter provides strong evidence that digital technologies and especially virtual assistants have a certain power to disrupt traditional assumptions of behaviour or decision-making, which leads to potentially have a strongly positive general attitude towards virtual assistants as well as well as to intuitive adoption. This is assumed lead to probably not requiring a specific situation or context as well as probably considering positive effects to be of greater importance than negative ones. In consequence, hypotheses reflect traditional, literature-related reasoning, while null hypotheses describe their rejection.
The hypotheses- and variables-related sub-chapters are stated in the logic of listing hypotheses, followed by literature-based reasoning.

The following sub-chapters discuss the hypotheses listed below.

Table 6: Table of hypotheses

H1	Resilience positively influences rationalisation
H2	Transparency positively influences attitude towards technology
H3	Rationalisation mediates the association between attitude towards technology and a) transparency and b) privacy concerns
H4	Privacy concerns negatively influence attitude towards technology
H5	Opportunity costs positively influence attitude towards technology
H6	Reactance mediates the association between attitude towards technology and a) opportunity costs and b) perceived vulnerability
H7	Perceived vulnerability positively influences attitude towards technology
H8	Perceived vulnerability positively influences adoption intention
H9	Resilience positively influences adoption intention
H10	Consumer motivational intensity moderates the association between variety-seeking intention and personalisation
H11	Variety-seeking intention positively influences personalisation
H12	Personalisation mediates the association between attitude towards technology and a) switching intention and b) adoption intention
H13	Attitude towards technology negatively influences switching intention
H14	Attitude towards technology positively influences adoption intention
H15	Utilitarian dining value positively influences switching intention
H16	Hedonic dining value positively influences switching intention
H17	Utilitarian dining value positively influences adoption intention
H18	Hedonic dining value positively influences adoption intention

H1: The attention for resilience is relatively novel in consumer-related fields, partially investigated in relation to vulnerability and purchase intentions. Researchers call for closer investigation of resilience in relation to consumer investigation, claiming major gaps in the academic literature (Kursan Milaković, 2021; Mejía-Trejo, 2021). Resilience

theory can be understood as the ability of human beings to recover from failures and unpleasant circumstances as well as individual's capability to handle struggling situations. The resilience personality trait is based on motivational factors, which are of an intrinsic and an extrinsic nature. Because resilience directly influences consumers' prospective actions, it can be understood as a valuable topic for consumption- and marketing-related literature (Kursan Milaković, 2021). Considering this recent statement to be promising, the investigation of resilience in relation to consumer decision-making has a reasonable justification, understanding resilience to leverage a cornerstone for an individual consumer's selection of means for the fulfilment of a certain, and currently present, need. Because few investigations which merge consumer- and resilience-related theories exist, psychology-based sources are probably required in order to close potential gaps; this is reinforced by the concept's multidimensional and complex appearance – further enabling its application across multiple contexts (Lagacé-Roy *et al.*, 2017). From a general point of view, resilience is based on research work on stress, finding interest in psychology, neuroscience, medicine, and other related fields, creating various approaches for interdisciplinary investigations. Even though being predominantly understood as a character trait, it also is partly understood as an outcome of actions or a process, influencing an individual's life significantly (Southwick *et al.*, 2014), leading to be based on long-term experiences of individuals, reinforcing their ability to cope with specific, negatively associated situations (Gooding and Harris, 2020). This consideration leads to assume that resilience has a positive effect on actively rationalising potentially negative consequences, which can be understood as a supportive force of rational decision-making or planned behaviour (Ajzen, 2011; Proudfoot and Kay, 2014; Julmi, 2019; Kursan Milaković, 2021), hence:

H1: Resilience positively influences rationalisation

H2: From a general point of view, transparency is a major issue for consumers, not only demanding to receive a bandwidth of information about products and services (Lin, Lobo and Leckie, 2017) but also to be informed about how their data is used by companies

(Pallant *et al.*, 2022). In this regard, virtual assistants are usually considered to be in an area of tension between traditional risk assessments and positive outcomes associated with the use of these technologies (Cao *et al.*, 2022). In this regard, Pallant *et al.* (2022) state that consumers tend to set pressure on companies in order to become aware of how their data is used and collected, leading to require a data privacy statement to mitigate unwelcome feelings against using technology. In addition, it can be assumed that individuals potentially assess the transparency associated with using technologies in a generally positive way due to its assessment could be influenced by frequent usage, information avoidance, striving for personalised technologies or bounded rationality, partly stimulated by the human-like appearance of virtual assistants (Ballester Pla and Hernández, 2012; Karwatzki *et al.*, 2017; Julmi, 2019; Cao *et al.*, 2022; Grewal *et al.*, 2022), hence it can be assumed that the positively measured construct has a positive influence on attitude towards technology:

H2: Transparency positively influences attitude towards technology

H3: Rationalisation is a topic which can be traced back to Ernest Jones, who established this concept as a cornerstone of modern research in 1908. Throughout the last century, the theory became strongly accepted throughout the literature, creating a psychological explanation for choices which are made even though restrictions and threats to individual freedom exist. Therefore, human beings downplay the importance of potentially negative outcomes of their decision-related behaviour, actively giving increased attention to the positive effects it may cause (Cherepanov, Feddersen and Sandroni, 2013; Proudfoot and Kay, 2014). Even though rationalisation is widely discussed across a variety of research articles, it is important to carefully differentiate between the psychology-related terminology and other areas like product line rationalisation (Giovannini *et al.*, 2014) or supply chain rationalisation (Mendonça and Adăscăliței, 2020), which use the same wording but target outcomes in terms of economic efficiency. Although a thorough investigation in terms of the number of available sources proved elusive, because of the existence of related terminologies in the sphere of economic rationalisation (Giovannini

et al., 2014; Mendonça and Adăscăliței, 2020), some key literature was found, set out in the following table:

Table 7: Rationalisation in the literature

Source	Background	Approach to rationalisation
Tsang (2002)	Rationalisation of immoral or evil behaviour	Situational factors influence rationalisation because individuals try to start with smaller instances of immoral behaviour, increasing the extent piecewise. Individuals perceive themselves to be on a morally superior level, understanding their own behaviour to be more appropriate than the behaviour of others.
Narwal and Rai (2022)	Moral considerations of 'pay-what-you-want' pricing	A higher degree of moral disengagement is underpinned by personality traits like cynicism or self-enhancement; not identifying fixed rules encourages attempting to find guidance within the social environment and related norms; mutual norms and believes lead to inner pressure, attempting to find acceptable solutions.
Mulder and van Dijk (2020)	Moral rationalisation in relation to one's own moral identity (high/low)	Minor exceptions of questionable or real unethical behaviour can lead to decreased levels of awareness of unethical behaviour; the inner moral identity has significant influence on future behaviour, being influenced by learning effects
Hindriks (2014)	Rationalisation in alignment with temporal emotional states and justification of behaviour	Criticism of subjective sentimentalism (periodic emotional distortion), stating that temporal states like cognitive dissonance are required to be still balanced on reasoning,

		even though the reasoning process might be shortened.
Schwitzgebel and Ellis (2016)	Rationalisation in the context of biased results due to internal and external considerations influencing their decisions	Rationalisation can be influenced by many factors like self-interest to reach certain decisions.
McHugh *et al.* (2020)	Occurrence of incalculable moral actions due to not thoroughly addressing potential harm or benefits	People not being aware of the consequences of their actions due to moral weakness (non-aware actions due to limited moral justification).
Di Carlo (2022)	Deviant, immoral behaviour in groups like companies	People not being aware of the consequences non-ethical behaviour can cause owing to irrationality or limited knowledge; leadership is responsible for creating group-feeling to mitigate employees' immoral behaviour of employees
Lowe, Reckers and Sauciuc (2018)	Individuals disengaging from their regular moral identity.	Opportunities which are opening the potential to behave unethically lead people to strive for moral standards, constraining ethical behaviour. Discomfort of ethical behaviour leads to internal conflicts about previous behaviour.

Even though the previous table provides that rationalisation is strongly accepted throughout the literature, one of its central underpinnings is insufficiently investigated: because rationalisation is based on actions and their decision-related, former emphasis, it is probably guided by rational considerations as well as gained, experiential attitude. Therefore, rationalisation has a time- and learning-related element, based on one's own or observed actions, informing future behaviour. In consequence, it can be assumed that

rationalising previous actions might lead to the rational consideration of future actions – despite possibly having perceived these actions to be inappropriate in the past (Cushman, 2020; Mayrhofer and Matthes, 2020). In addition, the table shows that the awareness for moral justification is subject to be mitigated in case of not being aware about potential consequences associated with immoral behaviour, complemented by the fact that people, at least in part, do not address moral dimensions in case of considering own interests to be prevailing forces (Schwitzgebel and Ellis, 2016; McHugh *et al.*, 2020). Further, the table gives evidence that authors traditionally approach understanding the rationalisation of own behaviour, barely addressing the rationalisation of the behaviour of others – potentially being 'imposed' or accounting for an inevitable consequence of behaviour. Squaring this to the usage of virtual assistants, it can be assumed that – in case of not actively rationalising their potential influences – using these technologies is approached because of lacking awareness of consequences or not being willing to be informed about the behaviour of others, grounded on emphasising the outcome associated with using these technologies.

In general, rationalisation is underpinned by rational – but also irrational – decisions in consumer-related spheres, leveraging the basis for a set or chain of behavioural outcomes. This is complemented by aiming to (at least) balance between the anticipated social acceptance of actions and one's own attitude, guided by cognitive and affective motivations. Consumers' behaviour-related rationalisation is usually surplus-oriented, balancing negative and positive effects – despite the fact that a proper evaluation can be limited by other psychological issues or personality traits (Markin, 1979).

In order to differentiate the concept, rationalisation is partly discussed as moral rationalisation or moral disengagement, and partly as moral justification, suggesting that finding an integrated understanding of rationalisation is difficult to grasp. Even though integrated approaches are lacking, it can be seen that limiting the influence of regular, moral concerns is essential for understanding the approach (Mulder and van Dijk, 2020; Narwal and Rai, 2022). The previous table details a variety of sources which investigated the concept of rationalisation. In this regard, it can be noted that, even though moral

judgments may be discussed with others, like group members (e.g., Schwitzgebel and Ellis, 2016), the rationalisation of potential immoral behaviour of others is barely investigated – in contrast to the rationalisation of own, individual behaviour. This could be another perspective on concerns or transparency in terms of considerations like privacy intrusion correlated with digital technology (Chen *et al.*, 2019; Martin *et al.*, 2020). Even though transparency and privacy concerns are assumed to have a direct influence on the attitude towards virtual assistants, it can be anticipated that individuals partly tend to actively rationalise potential transparency issues or privacy concerns, hence:

H3: Rationalisation mediates the association between attitude towards technology and a) transparency and b) privacy concerns

H4: Considering privacy concerns and modern technologies, contemporary sources like newspapers or blogs partly take a rather critical perspective: Warnke (2021) criticises one of the technology market leader's terms of service, stating that users are forced to agree on new regulatory frameworks in order not to be confronted with a severe reduction of available options. Specifically, this article points out that consumers are required to agree to the collection of their current location, which is mentioned to be required to keep service quality. In general, service providers' tendency to change their terms of use regularly is claimed to be a potential issue, which leads consumers to accepting them without further deliberation. Even though Warnke (2021) states that service providers say that they will not connect personal data and other data such as the current location, users might feel concerned about their personal data, as investigated by Chen *et al.* (2019), who state that privacy concerns are "the potential loss of control over personal information when released to a firm" (Chen *et al.*, 2019; p. 54). In the same way, considering contemporary regulations like the policy-related opt-in/opt-out condition (Bouckaert and Degryse, 2006) – in direct comparison – might raise questions about the way users have to agree on terms of services or being entirely aware on what they agreed on. In addition, by using services, people are partially confronted with the risk of violating terms and conditions without their intention or knowledge, which is argued by contemporary sources (Minor,

2021) probably leading to uncertainty, which might contribute to greater awareness of concerns (Sterz, 2018). Sterz (2018) further addresses privacy concerns, stating that these concerns are an issue of a lack of information provision, creating uncertainty among users (Chen *et al.*, 2019; Pallant *et al.*, 2022).

In conjunction with the discussion within the literature review chapter, Lam and Law (2019) consider offering individual experiences to customers to be a competitive advantage, which can be achieved by enhancing digital technologies, using generated knowledge about customers. Because they gain deep insights into how customers behave in service surroundings, businesses to some extent offer free of charge technologies and applications, attempting to provide additional touchpoints to consumers. In this context, technology allows businesses to collect and investigate data, which has the potential to shape services to customer demand, but also to be perceived negatively owing to intrusion into the private sphere (Chen *et al.*, 2019; Lam and Law, 2019; Cao *et al.*, 2022). These factors are often framed by less obvious appearing interfaces or the mediation of communication by a technology solution, which is not offered by the individual company (Trabucchi, Buganza and Pellizzoni, 2017). A number of sources explore customer or consumer data, using different terminologies like analytics or foresight (Franks, 2010; Baye and Sapi, 2020; Li *et al.*, 2020). In addition, Bradlow *et al.* (2017) state that the penetration of data collection has the potential to become more valuable for companies when trying to track down to individual levels. Even though these discussions reveal reasons, why companies seek to collect data, it can be assumed that consumers are aware of its potential misuse, which leads them to being unwilling to offer this data due to not being certain about how companies use their data, as considered by Chen *et al.* (2019) or Cao *et al.* (2022). Hence it can be assumed that privacy concerns have a negative influence on the attitude associated with the individual technology:

H4: Privacy concerns negatively influence attitude towards technology

H5: Chen *et al.* (2019) and Choi, Park and Moon (2022) argue that opportunity costs are unfavourable consequences to consumers, potentially triggered by perceiving to be controlled or limited owing to missing other relevant or important information, which could be useful for the investigation of opportunities. In this regard, Cabrera-Sánchez and Villarejo-Ramos (2020) further claim that search-related opportunity costs are barely addressed in the literature – even though, considering other contexts, a pattern of evaluation can be recognised between the identification of scarcity of choice and making a specific decision (Gill, Griffin and Hesketh, 2013; Schillinger, 2020). Considering virtual assistants, it can be assumed that opportunity costs lead to contradictory aspects in terms of decision-making. This could be related to perceive virtual assistants as a mean supporting decisions and opening opportunities, which would be rather few in case of not using them (Laurin, Kay and Fitzsimons, 2012; Melumad *et al.*, 2020). Therefore, it can be assumed that opportunity costs arise in case of attempting to avoid using virtual assistants, leading to perceive potential technological limitations to be a rather positive and welcome consequence. This leads to a logic of raising opportunity costs in case of not using technology, creating a rather positive perspective and gaining a positive attitude towards virtual assistants, hence:

H5: Opportunity costs positively influence attitude towards technology

H6: Reactance is a psychological factor in the field of behaviour (Kang, Piao and Ko, 2021), which is barely investigated in the field of hospitality. Even though there is some essential literature about consumer reactance in general, its application to the context of hospitality and especially restaurants is subject to open investigations (supported by the numbers found in a literature search, as indicated in the table below). Amarnath and Jaidev (2021) published a holistic literature analysis of the concept of reactance in regard to consumers. In order to find answers on the application and relevance of reactance, Amarnath and Jaidev (2021) conducted a literature search of several academic databases for the period 2000-2020, indicating that reactance is a broadly accepted and discussed theory. The small amount of literature available in the context-related fields is

confirmed by conducting a contemporary literature search in regard to hospitality and, more specifically, to restaurants, showing the following numbers across academic databases:

Table 8: Context-related search of reactance literature across databases in 2022

Fixed search terms, combined with the operator "AND"		**UW library services**	**Emerald insight**	**Sage journals**
Consumer reactance	Restaurant	10	16	7
Reactance	Restaurant	23	137	103
Consumer reactance	Hospitality	2	13	22
Reactance	Hospitality	28	141	247

The numbers of articles found across the three databases indicate that reactance is an evolving topic in restaurant and hospitality contexts, currently not thoroughly discussed in the literature.

The foundation of psychological reactance dates back to 1966, being originally developed by Jack Brehm. The concept was developed by scrutinising traditional behaviourism, motivation or stimulus-response and other theories, like social behaviour, giving attention to the complexity of human actions within the previously available literature and theories. Essentially, reactance is an emotional condition, which focuses on keeping personal freedom as a consequence of feeling treated in behavioural modes which are perceived to be inadequate. The consequence of this emphasis of assessment finds its amplitude in accepting the behavioural circumstances or to react against them by entirely avoiding any potential element which might cause their continued existence (Miron and Brehm, 2006). These emotion-driven consequences predominantly find their application in business in relation to buying behaviour, leading customers to investigate the most attractive option or to entirely avoid making choices (Song, Noone and Mattila, 2017). In order to avoid the potential influence of reactance, consumers need to perceive that the

choice is in their control, not feeling that they are being forced into a certain direction by companies. This point is essential to consumers as well as companies, as it shows the existence of an area of tension between company-related efforts to convince the consumer and potentially causing reactance (Trump, 2016; Song, Noone and Mattila, 2017).

The following figure by Wendlandt and Schrader (2007) shows a narrow perspective on reactance, indicating that reactance requires significance- and threat-related evaluation, leading to mental and behavioural effects. This figure also shows that reactance affects final, behavioural or attitudinal outcomes instead of directly accounting for them.

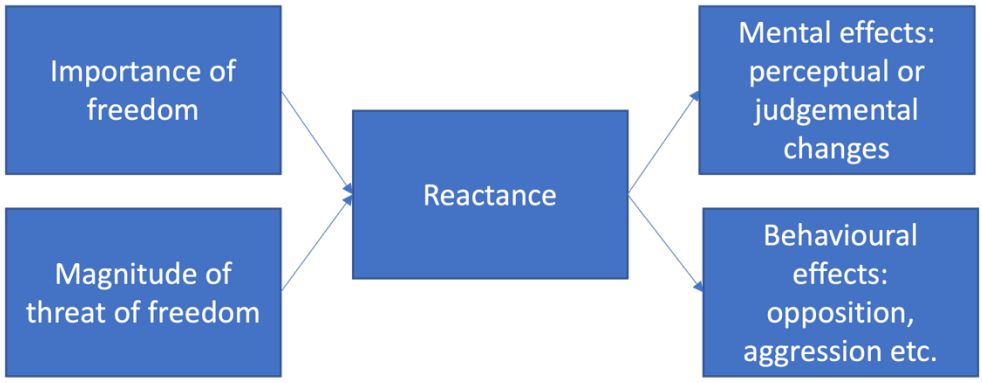

Figure 4: Essentials of reactance theory (own, source: Wendlandt and Schrader, 2007)

The following table details the key literature which discusses reactance in hospitality or, more precisely, restaurant contexts:

Table 9: Literature on reactance in hospitality (H) or more specifically restaurant (R) context literature

	Source	Background	Approach to Reactance
R	Quester and Steyer (2010)	Consumer demand for variety of ordering food/beverages, group-related vs. individual goals	Choice-prediction in group-settings; unanimity; freedom of choice is threatened by group; should members of the group strongly agree on certain meals, individuals tend to disrupt group

			opinion, making individual choices more significant.
H	Wang, Krishna and McFerran (2017)	Hotel requests consumers to save resources, e.g., electricity or heating	The (high/low) price image of the hotel, the visibility of expensive environmental means by the hotel itself and the active request for consumer effort influences whether the consumer is reactant to conduct resource conservation.
R	Wansink and Hanks (2014)	Restaurant food consumption, balancing the offering of unhealthy food (child education/obesity background)	Only reducing menu sizes of unhealthy food fosters overeating due to reactance becoming stronger – rules are perceived to be too restrictive. Additionally offering healthy food, balancing the amount of healthy and unhealthy, food reduces reactance and overeating.
R	Jerez-Jerez, Melewar and Foroudi (2021)	Employer brand, extraversion in relation to occupational identity of servers with consequence on workforce and staff turnover	Stereotype reactance: employees confronted with stereotypes tend to behave in a way which is in the direct opposite of the stereotype, attempting to avoid meeting the stereotype. Stereotype reactance variable is tested to be independent from occupational identity.
R	Zeinstra *et al.* (2010)	Children's' individual consumption of vegetables in relation to variety	Reactance behaviour on eating vegetables is stronger when available food alternatives are few; higher intrinsic motivation and feeling of autonomy lead to eating vegetables rather than highly restricted food variety. Having no choice resulted in eating fewer vegetables for highly reactant children.

R	Ku and Hsu (2015)	(Restaurant) service customers in relation to co-creation/participation in the service area	Low-reactant vs. high-reactant customers: Low-reactant customers are more likely to participate in co-creation due to perceived group responsibility, depending on the type of invitation to participate. Request to participate in the service environment can be perceived as a threat to personal autonomy. Example: “May we invite you to play your part in keeping our premises clean and tidy?” (unilateral invitation) or “If you notice that our premises seem dirty or untidy, please do not hesitate to tell us. We will take the necessary action” (reciprocal invitation) (Ku and Hsu, 2015; p. 280) – the reciprocal version tends to limit the influence of reactance.
R	Trump (2016)	Restaurant customers using price promotions (coupons)	Restrictive coupon conditions, like short validity, are perceived as the companies’ attempt to limit individual freedom of choice, fostering reactance, creating a negative attitude towards the company.
R	Tang, Yang and He (2022)	Restaurant consumers receiving unsolicited recommendations on smartphones; smartphone as consumers’ personal territory	Consideration (not thoroughly investigated) that consumers potentially become reactant when receiving offers in their personal area (smartphone) in unsolicited ways.

R	Kang, Piao and Ko (2021)	Restaurant customers' behaviour on restrictions for COVID-19 prevention	Reactance in reference to messages (wording), telling the customer to follow rules. Telling about what other customers usually do creates less reactance than stating 'have to' messages. Threat to personal freedom is reduced in case of telling people about the behaviour of others. Reactance/perceived threat to freedom is lower among older than younger customers.
R	Dyussembayeva *et al.* (2022)	Explicit requests for tipping influences restaurant customers' tip size	When employees are explicitly asking for tip, customers feel disturbed in their individual autonomy, creating a higher degree of psychological reactance. In order to gain higher tips, customers have to feel that they are in control of their actions.
H	Song, Noone and Mattila (2017)	Variable booking rates, enabling customers to select among rates in relation to restrictions like being non-refundable	Individualism vs. collectivism: consumers from individualistic cultures perceive restriction-related rates to be a greater threat to personal freedom.

The above lists a variety of sources, which are discussing reactance theory predominantly in the context of restaurants. The bandwidth of literature ranges from a single consideration of reactance (e.g., Tang, Yang and He, 2022) to few papers, which have reactance as their central topic of investigation (e.g, Kang, Piao and Ko, 2021). The stated papers show some central issues, authors strongly agree on: influencing the behaviour of individuals is depending on a variety of internal and external factors like the social

environment (e.g., Quester and Steyer, 2010) or the perceived threat to personal freedom (e.g., Dyussembayeva *et al.*, 2022). Even though the authors strongly agree on the need to perceive action or information in advance of gaining reactance, the relation to (technological) stimuli or, for example, the stimulus-action-response (S-O-R) theory is predominantly absent from these academic publications (Ku and Hsu, 2015; Amarnath and Jaidev, 2021). Miron and Brehm (2006) state that the author "Festinger had constructed a theory that assumed an inner motivational process rather than assuming that all influences between stimuli and behaviour were simple and direct" (Miron and Brehm, 2006; p. 3). Even though this raises the question whether one attempt is more appropriate than the other, aligning the integrated model approach on consumer reactance by Amarnath and Jaidev (2021), leads to a basis of balancing both sides, which can be exemplified by the quote "[the] stimulus-organism-response (SOR) framework clearly links the influences of a trigger on consumers' response, mediated by their cognition and emotion" (Amarnath and Jaidev, 2021; p. 43). The table further shows that reactance is a topic, which is subject to manifold internal and external influences, which could be understood as symptom of behaviour shaped over time. Therefore, virtual assistants can be considered as forces stimulating rather unaware processes – like potentially disregarding negatively associated issues – through shaping internal behaviour. Further, the table provides indications that individuals may not be willing to be actively informed about information about virtual assistants, potentially reacting against the source of information rather than the technology itself, as for example shown by Dyussembayeva *et al.* (2022).

Wang, Krishna and McFerran (2017) investigate how consumers' perception and evaluation of the effort conducted by the business environment influences their individual behaviour. In addition, Quester and Steyer (2010) claim that the social influence of groups has an influence on whether reactance emerges or not. This finding is made more precise by Wendlandt and Schrader (2007), specifying that reactance does not occur when the limitation of freedom is socially accepted or expected. Additionally, Wendlandt and Schrader (2007) state that differentiation exists between state (or situational) and trait

reactance. The latter terminology argues for a view of highly reactant consumers, finding its roots in individual personality traits.

From a general perspective, the previous table illustrates two elementary patterns in terms of understanding reactance in restaurant and hospitality contexts:

- Alignment with the social surrounding (e.g., perceived appropriateness of food selection).
- Potential discord with the company's (limited) offers, restrictions and the communication between company and consumer.

These two essential patterns support the stimuli-related attempt by Amarnath and Jaidev (2021), considering that stimulation is required in order to finally reach a specific action or to shape intrinsic, experience-related attitudes. This is complemented by strongly agreeing on pillars in terms of a potential threat against being able to behave freely, which accounts for a rather active initiation of reactance, propelled by potential consequences in terms of decisional or attitudinal freedom, perceived behavioural intrusion or the explicit, intrinsic motivation of protecting an existing level of freedom (Ratcliff, 2021). Due to reactance is a influenced by the importance of freedom (Wendlandt and Schrader, 2007), it can be assumed that individuals might react against lacking opportunities in case of potentially not using virtual assistants but could also perceive to be vulnerable, supported by the empowerment-vulnerability paradox (Fuchs and Schreier, 2011; Del Bucchia *et al.*, 2021; Kudina and Coeckelbergh, 2021). Hence, it can be assumed that reactance serves as a mediator between attitude towards technology and, respectively, opportunity costs or perceived vulnerability:

H6: Reactance mediates the association between attitude towards technology and a) opportunity costs and b) perceived vulnerability

H7-8: It can be argued that a perception of limited control is another underpinning of technologies, which can lead to a perception of vulnerability, limiting the technology-

mediated, rational investigation of information. Vulnerability in consumer spheres can be characterised as a kind of powerlessness because individual safety or well-being are potentially at risk. In general, the perception of vulnerability is a personal and internal process, which leads consumers to feel the unwelcome consequences of actions becoming effective – forcing consumers to attempt to avoid non-positive feelings by changing their behaviour (Shi *et al.*, 2017; Chen *et al.*, 2019). This can be related to decision-making, additionally leading consumers into a direction, which makes them feel concerned about making the right choice – due to this choice could cause an increased lack of control, probably being an inevitable consequence of using digital technologies (Aguirre *et al.*, 2015). Therefore, vulnerability can traditionally be understood as an influence, which appears in situations in which consumers feel that digital technologies limit their freedom to choose across alternatives or generally restrict their abilities.

Regarding the relationship between vulnerability and consumers, Kursan Milaković (2021) states that those consumers more likely to be economically, physically, or psychologically injured, are more vulnerable. From the psychological point of view, vulnerability is caused by the perception of threats, leading consumers to attempt to protect themselves from potential unwelcome influences. In product-related environments, knowledge, promotion, social and emotional pressure, policies, as well as limited ability to compare offers are stated to be dimensions of vulnerability. For practice, Kursan Milaković (2021) describes that companies could adjust their communication strategies when vulnerability is in effect, attempting to influence consumers' degree of vulnerability. In terms of potential issues like knowledge generation, Kursan Milaković (2021), further relates vulnerability to purchasing decisions, claiming that a reduced ability to access information, lacking resources and, in consequence, insufficient knowledge is a matter which increases vulnerability. Even though vulnerability can be stimulated by using technology (Del Bucchia *et al.*, 2021), it can also be assumed that strengthened boundaries between individuals and potentially not being able to access information through technology leads to increase vulnerability levels, leading to a positive attitude towards technology. In addition, directly relating vulnerability to adoption intention, considering the practical influence claimed by Kursan Milaković (2021) has a promising

appearance, considering to potentially state information against using virtual assistants in practice, hence:

H7: Perceived vulnerability positively influences attitude towards technology
H8: Perceived vulnerability positively influences adoption intention

H9: Complementary to hypothesis 1 and in accordance with Kursan Milaković (2021), resilience can be understood as an indicator for potentially stating information about negative influences and opportunities. This leads to the assumption that ideas like campaigning against using virtual assistants could be more promising in case resilience has an influence the adoption of these technologies. Due to resilience generally describes the ability to resist negative influences (Augusto, Godinho and Torres, 2019), it can be assumed that it has a positive influence on the adoption towards virtual assistants. From the practical point of view, Kursan Milaković (2021) describes that "[companies] can gain awareness of consumers' vulnerability and resilience levels and thus adapt their marketing and communication strategies for a better purchase experience" Kursan Milaković (2021; p. 15). In common, this leads to the assumption that resilience has a positive influence on adoption intention, hence:

H9: Resilience positively influences adoption intention

H10: The concept of motivational intensity was originally postulated by Brehm in 1975 and found its application predominantly in the psychology literature (Richter, Gendolla and Wright, 2016). In general, consumer motivation is a widely discussed and agreed theory, especially finding attention in areas like marketing or organisational research. Motivational theories find their roots in the area of psychology, predominantly shaped by the theory of human needs, developed by Maslow in 1943 (Maslow, 1943). Basically, considering human needs as a pillar of understanding motivation, points towards the development of contemporary discussions about the bandwidth of demand, additionally being driven by stimulation through technology. This leads to the requirement to

investigate motivation and needs from manifold perspectives, despite their being essentially based on paths like: from physiological needs to self-actualisation; or from essentials (like, for example, eating, in order to keep the function of the human body) to emotional and cognitive entities – which are probably difficult to grasp at an individual level (Kivelä, 2018; McLeod, 2018; Yap, Xu and Tan, 2021).

Even though there is a longstanding and wide-ranging tradition in terms of the interdependencies between motivation, need and consumer behaviour, for example as discussed by van Raaij (1986), it can be questioned whether the modern literature about consumer motivation or consumer behaviour thoroughly considers the probable significance of its legacy: Solomon *et al.* (2013) discuss motivation as a specific approach to consumer behaviour, directly relating it to values and discussions about lifestyles. This contention is underpinned by the general evolution of consumer motivation, stating: “Motivation refers to the processes that cause people to behave as they do. From a psychological perspective motivation occurs when a need is aroused that the consumer wishes to satisfy. Once a need has been activated, a state of tension exists that drives the consumer to attempt to reduce or eliminate the need. This need may be utilitarian [...] or it may be hedonic [...]. [...] Whether the need is utilitarian or hedonic, a discrepancy exists between the consumer’s present state and some ideal state. The gulf creates a state of tension” (Solomon *et al.*, 2013; p. 187).

This quote indicates the complexity of motivation in relation to consumer behaviour and, essentially, to human needs. Similarly, Solomon *et al.* (2013) further point out that consumers, after recognising the desire to fulfil a need, seek to achieve the goal of need-fulfilment as an end-state. The routes and means to obtain this end-state are determined by individual experiential backgrounds and culture, finding their extremes in the term ‘drive’ as a descriptor of urgency in behaviour.

In general, only a few sources directly relate consumers to the concept of motivational intensity, even though some contextual studies exist. These studies investigate, for example, shopping intensity, essentially being based on motivations (Hou and Elliott,

2021). In the rare cases of where the concept of motivational intensity (or comparable terminologies) is used, authors mostly remark on its novelty. The following quotes are considered to underpin key issues:

- "Unfortunately, little is known about consumers' mobile shopping intensity" (Hou and Elliott, 2021; p. 1)
- "Motivation for tourist behaviour is a multi-layered process with a hierarchical and sequential order. In this model, however, "motivation" refers only to the basic and general willingness to engage oneself in travel activities. We do not ask why, we are not interested in directions, we simply take into account if there is any motivation or not, or more precisely the intensity of this willingness to travel" (Lohmann and Beer, 2013; p.88)

The recent quote above from Lohmann and Beer (2013) additionally indicates the complexity of motivation, which is believed to substantiate the appropriateness of aligning consumer behaviour and motivational intensity, applying motivational intensity as a concept of being diligent in the context of seeking for the most appealing restaurant.

As motivational intensity is relatively novel in consumer research, the following sources were found from a wider literature sphere, suggesting key conceptual elements:

Table 10: Key literature on motivational intensity (from the area of psychology)

Source	Key findings
Brehm and Self (1989)	Motivational intensity is the current level of arousal, which requires applying effort to satisfy a motive; intensity mediates the level of potential motivation (maximum effort a person is intending to invest)
Campbell *et al.* (2021)	Motivational intensity is strongly related to valence (positively associated and intrinsic perception of approaching a good or service). The concept is related to the internally perceived appeal of the desired good or service, partially underpinned by arousal.

Harmon-Jones, Gable and Price (2013)	Motivational intensity is the “urge to engage in a behaviour or the impulse to move toward/away from a stimulus” (Harmon-Jones, Gable and Price, 2013; p. 315). Motivational intensity shapes cognitive processes to approach goals more distinctively through behaviour.
Wright, Agtarap and Mlynski (2015)	Reactance and motivational intensity are strongly related, but this relation is barely investigated in the literature (opposing each other). The intensity of motives influences effort in goal-achievement; reactance can be understood as a motive; the motivational intensity of reactance guides behaviour, from the intrinsic state to specific action.
Gendolla and Richter (2010)	Motivation is a process, which influences behaviour and manages its direction and degree; the degree is mediated by efficiency, leading to only investing as much effort as required to achieve the current goal – if self-esteem is at risk, effort is probably maximised, opting out the urge for efficiency. Motivational intensity is resource mobilisation in relation to goal-fulfilment, determined by the key variables: experienced demand, subjective task difficulty, potential motivation (as the hypothetical maximum of effort invested to achieve the current goal). Motivational intensity aims for the importance of success, which is influenced by multiple determinants like needs.
Richter, Gendolla and Wright, (2016)	“Motivational intensity theory [...] explains effort mobilisation in goal pursuit” (Richter, Gendolla and Wright, 2016; p. 150). Individuals are efficiency-oriented, attempting to not waste resources, even though this cannot be guaranteed. Three essential patterns of motivational intensity in relation to task difficulty (fixed and clear vs. unfixed and unclear), effort and success importance (as the potential motivation).

Sources referred to above set out the key findings, which are widely agreed in the motivational intensity literature in psychology. These are mainly: the specific, narrow and current time horizon, the theory's roots in human needs, the existence of levels of emphasis and the behavioural goal-orientation. Considering that authors strongly agree on the links between goal-oriented behaviour and effort (Harmon-Jones, Gable and Price, 2013; Richter, Gendolla and Wright, 2016; Campbell *et al.*, 2021), it can be assumed that motivational intensity serves as a moderator for approaching means identified to be promising in order to fulfil a current motivation-related intention, which is accounting for an element of variety-seeking intention (Lee, Chua and Han, 2020). Hence:

H10: Consumer motivational intensity moderates the association between variety-seeking intention and personalisation

H11: Variety-seeking is a concept dating back to the 1980s, featuring in several integrated approaches, which describe the concept as guiding consumers by their previous experiences, exploring the outcome individuals expect to secure from investigating alternative options across available opportunities. In this respect, two essential patterns of variety-seeking can be differentiated, generally being adopted by consumers: to seek an option from among familiar variants, or to investigate entirely new options. This behaviour is typically motivated by internal factors, leading consumers to seek for entirely new experiences or, at least, having the ability to choose from several options, not being completely limited (Song, Hess and Dekker, 2018). Even though the focus on internal factors is widely accepted, it can be debated whether consumers are driven by stimuli such as promotions which can initiate the behavioural variety-seeking process. In consequence, the concept has external and internal directions of behaviour, requiring the integration of both factors (Kim, Sauerwald and Sukpatch, 2021). The appropriateness of investigating stimuli in relation to variety-seeking is underpinned by changes within the individual environment, which can be intentionally triggered by companies' marketing efforts or by manifold imaginable needs of consumers. Both perspectives on variety-seeking stimuli can be subjectively or instrumentally initiated – accounting for utilitarian

or hedonic categories of motivations, which in the same way lead to visit intentions or experience-related perceptions (Iofrida *et al.*, 2022). In terms of its application, the importance of variety-seeking in marketing, hospitality and tourism is strongly accepted throughout the literature, predominantly agreeing on the behavioural, but is lacking in terms of a common understanding of conceptual determinants and their application because of predominantly product-related, in contrast to location- or service-related investigations, were identified. This point is based on inconsistencies in the literature, some of which asserts that restaurants are the equivalent of a product, but predominantly to investigates variety-seeking across offered menus. In consequence, a need for strong contextualisation can be deduced, leading to investigating variety-seeking in regard to available restaurants (Menon and Kahn, 1995; Legohérel, Hsu and Daucé, 2015; Tian, Zhang and Zhang, 2018; Kim, Sauerwald and Sukpatch, 2021).

In general, variety-seeking can be applied to various contexts, like food, looking for variety across dishes, products, or service-domains. Therefore, the awareness of variety-seeking related investigations is important for the application of marketing- and behaviour-related means, creating a pillar of company-related strategies (Nicklaus *et al.*, 2005; Iborra-Bernad *et al.*, 2018; Kahn, 2018). In a restaurant context, variety-seeking is considered to be influenced by demographic factors, predominantly customers' ages. This is factor is playing a major role for companies, especially in relation to older customers who tend to value familiar restaurants or dishes. Notwithstanding that this could be understood as an advantage for well-established restaurants, it creates an area of tension: this discrepancy is related to patterns, leading younger customers to give more attention to variety-seeking than older ones, which may well cause a dilemma for restaurants, between attempting to acquire new customers by offering variety, without losing loyal customers who may not be being willing to accept the changes implemented (Jang, Ro and Kim, 2015; Hanks and Line, 2018).

From a general point of view, variety-seeking is underpinned by social, hedonic or utilitarian motivations, depending on a bandwidth of potential influences or experiences (Kim, Sauerwald and Sukpatch, 2021). The motivational set, related to variety-seeking,

focuses predominantly on fulfilling a bandwidth of elementary needs, but can also be led by striving for sensational or (at least) new impressions, not only investing money and time, but also physical and mental effort (Xiang *et al.*, 2007). In addition to the age groups, customers' individual lifestyles or perception-related elements of restaurant atmosphere and appearance are other significant factors influencing variety-seeking. These personal and socio-demographic factors can be strongly tied to the individual involvement of consumers, subsequently related to situational motivations and the fulfilment of needs (Solomon *et al.*, 2013; Iofrida *et al.*, 2022). In addition, the individual restaurant category has a significant influence, despite the fact that lines between categories are becoming blurred. In this regard, for example, variety-seeking is stated to have greater influence in quick-service than in full-service environments (Lee, Chua and Han, 2020; Banerjee and Poddar, 2021). Legohérel, Hsu and Daucé (2015) state that variety-seeking behaviour is usually in line with strongly curiosity- and leisure-oriented customers, which indicates that variety-seeking probably has a more hedonic than utilitarian motivational foundation. This point on variety-seeking can be underpinned by time-relations, namely that individuals who have less pressure to fulfil the product-buying or consumption stage efficiently invest more time in exploring alternatives. This can be understood as a symptom of modern life, reflecting that stronger deviations between habitual consumption and the motivation to seek for variety is emerging at weekends, leading to a stronger desire for variety-seeking in less stressful timeframes. This indication is mirrored in times of the day, that is that individuals tend to seek for variety in evening hours (Gullo *et al.*, 2019; Cadario and Morewedge, 2022).

In general, there are many attempts to understand the effects of technologies on variety-seeking behaviour. Yang and Mattila (2020) suggest that location-based information should be used by companies in order to attract consumers by distributing marketing information in unsolicited ways via messages. It is therefore suggested to use knowledge about people's the current location by relating it to local weather. In this regard, Yang and Mattila (2020) focus on special discounts via smartphone message, explained by the relationship between weather conditions and the emotional consequences they engender. This is specified by stating that the wording of discounts should vary between

rainy and sunny weather, on the basis that these weather conditions significantly influence mood. In this regard, it can be concluded that variety-seeking is rarely engaged by individuals in rainy situations, leading to consumers being more open to discount messages, probably influencing their decision to visit a specific restaurant and limiting their desire for considering alternatives. Another example of the potential influence of technologies on variety-seeking is related to virtual reality approaches which are considered to increase the desire for variety-seeking while decreasing price sensitivity, stimulated by technology-initiated curiosity (Anderson and Laverie, 2022).

Overall, these examples suggest aligning technology with the concept of variety-seeking: offering situational, hedonic, or utilitarian content to individuals in order to stimulate variety-seeking by providing appealing information, distinct from currently known offers. This leads to an understanding of technologies as valuable tools for marketing purposes, even though this strongly depends on the clientele. Similarly, a highly contextual perspective on variety-seeking can be developed, leading to a requirement to balance the attempts to limit or stimulate variety-seeking on an individual level (Legohérel, Hsu and Daucé, 2015; Anderson and Laverie, 2022). Unlike the issue of choosing a restaurant, it can be appealing to increase customer variety-seeking after entering a specific environment, in order to potentially guide individuals into buying higher priced products, which can be fulfilled by, for instance, matching individual demand for sensation and currently unknown offers. In conclusion, it can be considered that consumers use technologies in order to help them achieve the fulfilment of current motivations, potentially leading to support the (already existing) variety-seeking behaviour within already entered environments, complemented by approaching its stimulation in order to attract the attention of individuals. In this regard, authors strongly agree on the relevance of technology to stimulate variety-seeking, even though information underpinning variety-seeking could be derived from many sources, like the social surrounding, leading customers to potentially seek for variety without having gauged specifically initiated stimuli. This can, for example, lead to unspecific or non-measurable behaviour, in line with related investigations like smartphone addiction or potential overuse and impulsivity (Harris *et al.*, 2020), which can trigger perceiving information that leads to variety-seeking.

In summary, it can be assumed that variety-seeking has an influence on identifying personalised offerings to be most promising, hence:

H11: Variety-seeking intention positively influences personalisation

H12: Digital technologies are key tools for individuals as well as businesses, enabling the exchange of information and the generation of knowledge, with a view to addressing customers on a more personal level (Gellweiler and Krishnamurthi, 2020). From a general point of view, even though authors are strongly agreeing on the importance of individual approaches and their relevance to consumers, it can be questioned whether the literature strictly differentiates the terminologies personalisation, customisation and individualisation (Wolfinbarger and Gilly, 2003; Sousa and Voss, 2009; Coelho and Henseler, 2012; Bolisani, Paiola and Scarso, 2013; Havíř, 2017; Bolton *et al.*, 2018; Cabigiosu and Campagnolo, 2019; de Bellis *et al.*, 2019; Buganza, Trabucchi and Pellizzoni, 2020; Xie, Li and Keh, 2020). From a perspective of aggregation, personalisation, customisation, and individualisation are profound means in order to attract and retain customers, leading them to require active or passive collaboration. In this regard, companies are collecting personal or behaviour-related data, which can be used in order to enhance services, aiming to identify and fulfil the demand of customers (Grönroos, Strandvik and Heinonen, 2015; Martin *et al.*, 2020; Xie, Li and Keh, 2020).

Losada-Otálora and Siqueira (2020) tried to encourage an awareness of individual adjustment of approaches within service environments, proposing that stores and restaurants should take greater care about their aesthetic appearance, attempting to foster emotions like fascination; this is equally applying to digital information sources where they are integrated within the service environment (Kapoor, 2003; Rezaei *et al.*, 2016; Kilby and Lennon, 2021). Xie, Li and Keh (2020) complement these arguments by coining the term eudemonia to account for another significant beneficial factor, fostering customers' personal comfort, supported by individual treatment. In this context, personalisation, and consequently a higher degree of eudemonic perception of services,

can be enabled by extending communication between customer and company, e.g., by tailoring services to individual demands. This communication can be fulfilled by using digital technologies and offering services, leading to interactivity. In consequence, the customer is intended not solely to consume services but also to contribute and participate in shaping their elements at customer encounters – which can be intentional or without specific intention or awareness (Grönroos, Strandvik and Heinonen, 2015; Xie, Li and Keh, 2020). Leading customers to a higher degree of satisfaction by enabling them to inject personal capabilities and influencing the appearance of services is a trend, which is driven by technology-enabled personalisation (Martin *et al.*, 2020). In this regard, digital technologies can serve as a means to influence other (not necessarily digital) services. The positive influence of individual approaches through digital services is considered to drive trust and to impart a high level of identification with the service surrounding; but this could be limited by privacy concerns or other uncertainties. From a business perspective, personalisation is said to be an advantage in competition, aimed at strengthening behavioural outcomes (Chen *et al.*, 2019; Farooq *et al.*, 2020; Martin *et al.*, 2020). Historically, personalising or customising services was discussed to be cost- and effort-intensive, but artificial intelligence is reducing these issues very extensively (Barrett *et al.*, 2019; Cabigiosu and Campagnolo, 2019). From the perspective of companies, attempting to offer a high level of customisation in order to create additional value for customers, companies equally try to simplify their processes, suggesting mass customisation to be the midpoint between standardisation and full customisation. The idea of mass customisation is limited by the key approach of companies, trying to increase the efficiency of their processes. This leads to the point that mass customised services rely on processes which are pre-defined, allowing the selection of a variety of individual (but rule-led) specifications. This points towards the idea that mass customisation approaches lead to a greater variety of choice that customers are empowered to make, attempting to create modular services (Sievänen *et al.*, 2010). Reflecting these underpinnings of individual approaches to artificial-intelligence supported technological services, it can be assumed that virtual assistants are approaching a system of mass customisation due to the technological rules that apply to these services, for example in terms of requiring commanding words like ‘Alexa’, or the approach of being required to use technological

skills (McLean, Osei-Frimpong and Barhorst, 2021). Adding to these previous points, the ideas behind empowering customers through individualised offers are partly differentiated from mass customisation on another level, insofar as the penetration of customised actions strongly varies depending on culture and environment (de Bellis *et al.*, 2019). Considering this together with highly individualised virtual assistants, it can be seen that these technological services are used differently, depending on cultural contexts (Perez Garcia, Saffon Lopez and Donis, 2018; Bawack, Wamba and Carillo, 2021).

In the context of how individualised approaches relate to food-service environments, Hwang, Kim and Lee (2021) indicate that offering them in dining environments is rather promising in solo-dining situations. This is explained by the potential of getting distracted from the ability to customise services in cases of social dining, together with generally growing numbers of solo diners due to, for example, increased work-related mobility. In addition, the fundamental intention of food consumption is said to be a crucial driver in customisation initiatives, requiring an understanding of whether the customer is looking for a utilitarian or hedonic consumption process. This is related to utilitarian-oriented customers usually being associated with higher degrees of retention and satisfaction, rather than seeking customised or alternative offers. In addition, individual approaches are said to be driven by the general technological enhancement, giving more attention to the many options of interaction and communication between business and customer, additionally pointing out that interaction acts as the central driver of customisation. This is complemented by the fact that customisation capabilities are subject to the knowledge that business environments are able to generate about individual customers. The generation and application of knowledge is said to be directly in line with the benefits of technological initiatives, despite challenging operational capabilities, trying to foster continuous improvement of processes (Zhang *et al.*, 2015).

In contrast to the operational and interaction related perspective of Zhang *et al.* (2015), Gwinner *et al.* (2005) who predominantly link individual approaches to the capabilities of frontline staff, explaining behavioural adaptation as the key factor for success. This point leads to the increased importance of interpersonal factors, even though it can be seen

that technologies like virtual assistants are probably overcoming this factor due to their projecting an ever more human-like appearance. The intersection between individual approaches and digital technologies is additionally highlighted by Ansari and Mela (2003), who adopt the term e-customisation by giving special attention to web-technologies, creating customer-specific value by shaping learned information to individual requirements automatically through software solutions and algorithms. This point relates to the knowledge that companies are able to generate about customers. Companies need to carefully balance the most efficient path for competitive advantage between offering customisation in general, mass customisation and sales-related attempts like increasing the degree of standardisation in haptic surroundings, while software and devices can be used as a mediator between online and offline solutions (Gruber *et al.*, 2021; Zhang and Zheng, 2021). In consequence, it can be assumed that customers generally seek for personalisation, finding this element of their consumption phase through using virtual assistants, probably propelled by the attitude gained towards previous usage of these technologies, hence:

H12: Personalisation mediates the association between attitude towards technology and a) switching and b) adoption intention

H13-14: From a general position, professional and academic authors, across myriad areas of research, strongly agree on one key point: human behaviour is usually surplus-oriented, attempting to generate a positive, beneficial outcome vis-à-vis to the current state. In order to achieve a likely positive outcome of their behaviour, consumers tend to identify and adopt means and tools that they associate with a positive attitude. These tools can be digital technologies, which might appear promising for the fulfilment of current tasks, transforming the attitude by long-term experience, consequently leading to further, directed behaviour and associated intentions (Finsterwalder *et al.*, 2017; Im and Qu, 2017; Grewal, Motyka and Levy, 2018; Islami, Asdar and Baumassepe, 2021), hence:

H13: Attitude towards technology negatively influences switching intention
H14: Attitude towards technology positively influences adoption intention

H15-18: Technology-related literature indicates that technology adoption has a strongly contextual element (Perez Garcia, Saffon Lopez and Donis, 2018; Mohamed, Rachid and Younes, 2021; Cao *et al.*, 2022; Pereira *et al.*, 2022). In consequence, utilitarian and hedonic dining value are integrated as contextual indicators, considering these constructs to enable drawing conclusions about the dining setting (e.g., Shin, Kim and Severt, 2019) in which virtual assistants are likely adopted. The integration of these indicators is considered on the base of an appearance of service networks, potentially leading consumers to approach using virtual assistants due to perceiving them as integrated actors within the individual service network (Tax, McCutcheon and Wilkinson, 2013; Finsterwalder *et al.*, 2017; Kot and Leszczyński, 2020). In consequence, it can be assumed that virtual assistants are required to attract customers by offering integrated service solutions as well as to retain them to the business environment (Ryu, Han and Jang, 2010; Bencherki, 2017; Carnemolla, 2018). Therefore, hedonic and utilitarian dining value are integrated as measurements to strengthen the perspective on contextual adoption as well as to derive recommendations for practice, considering that adoption and switching takes place in each value-related context but investigating the extent respectively, hence:

H15: Utilitarian dining value positively influences switching intention
H16: Hedonic dining value positively influences switching intention
H17: Utilitarian dining value positively influences adoption intention
H18: Hedonic dining value positively influences adoption intention

4.0 Research Design and Methods

Determining the research design is one of the most significant elements of writing and completing a project, requiring choosing and evaluating the entire methodology along methods, philosophy as well as the probable access to – and analysis of – data (Saunders, Lewis and Thornhill, 2019). The research design is discussed in the following chapter.

4.1 Research Paradigm Evaluation

Identifying the most appropriate paradigm for the conduction of a research project is directly in line with stating the researcher's worldview, shaping the way of data inquiry and analysis, and addressing the foundations of the project (Kivunja and Kuyini, 2017).

Žukauskas, Vveinhardt and Andriukaitienė (2018) emphasise the attention for the importance of the research paradigm and philosophy, which create the basis of identified methods and processes for finding answers to the elementary issues as well as it leads to the conduction of actions and processes across the entire research project. Saunders, Lewis and Thornhill (2019) indicate that the attempt to frame research between personal beliefs and assumptions, philosophies, and the entire design is often subject to an area of conflict, which leads researchers to require myriad considerations for justification. In this regard, one of the essential considerations to be undertaken is, whether to inquire data quantitatively or qualitatively, as differentiated within the following table:

Table 11: Quantitative vs. qualitative research (Source (cited): Sorin-Peters (2004))

Point of comparison	Qualitative research	Quantitative research
Focus of research	Quality (nature, essence)	Quantity (how many, how much)
Philosophical roots	Phenomenology, symbolic, interaction	Empiricism, logical positivism
Associated phrases	Fieldwork, ethnographic, naturalistic, grounded, subjective	Experimental, empirical, statistical
Goal of investigation	Understanding, description, discovery, hypothesis generating	Prediction, control, confirmation, hypothesis testing
Design characteristics	Flexible, evolving, emergent	Pre-determined structure
Setting	Natural, familiar	Unfamiliar, artificial
Sample	Small, non-random, theoretical	Large, random, representative
Data collection	Researcher as primary instrument, interviews, observations	Inanimate instruments (scales, tests, surveys, questionnaires, computers)
Mode of analysis	Inductive (by researcher)	Deductive (by statistical methods)
Findings	Comprehensive, holistic, expansive	Precise, narrow, reductionistic

Positivism is determined to be applied as the paradigm used in this research. This is reasoned as follows: From the methodological point of view, this research is relying on quantitative inquiry which is predominantly considered on the basis of data accessibility and tradition across the field research is conducted in. In general, Saunders, Lewis and

Thornhill (2019) describe positivism, interpretivism, realism and pragmatism to be appropriate for quantitative research. In addition, the following considerations lead to determine positivism to be appropriate (partly more thoroughly discussed in the following chapters):

- Structural Equation Modelling (Partially Least Square, SEM-PLS): Quantitative and deductive attempt, predictive confirmation of theory in line with recommendations by Hair *et al.* (2021).
- Questionnaire and statistical data as well as anonymised and independent recruitment: Value-free, detached, and neutral researcher.
- Model confirmation: Generalisation on the basis of literature-related model development which leads to causal explanation and measurable facts.

The philosophical position in line with the positivist paradigm is shown in the following tables, further justifying the application of this paradigm.

Table 12: Philosophical position of positivism (adapted from: Saunders, Lewis and Thornhill (2019))

Ontology	**Epistemology**	**Axiology**	**Aligned methods**
Real, external and independent, one true reality and ordered	Scientific method, observable and measurable facts; law-like generalisations, numbers; causal explanation and prediction as contribution	Value-free research; researcher is detached, neutral and independent of what is researched; researcher maintains objective stance	Typically deductive, highly structured, large samples, measurement, typically quantitative methods of analysis, but a range of data can be analysed

In addition, another approach to foundations of positivism is described in the following table:

Table 13: Elements of positivism as research paradigm (adapted from: Adcroft and Willis (2008))

Assumption	The research assumes that the observer is independent of that being observed which is, itself, external and objective.
Objective	The research focuses on the discovery of facts and the generation and/or testing of fundamental laws.
Method	The approach to research often involves the testing of formulated hypotheses through the frequent use of large scale and quantitative methods.

4.2 Quantitative Inquiry and Reasoning

The specific restaurant context investigated in this research is in alignment with consumer behaviour, accounting for a long tradition in positivist research (Hunt, 1991; Ramírez-Angulo and Londono, 2020). Chirkov and Anderson (2018) claim a statistical, variable-based way of thinking to be crucial in positivist research. This is said to enable to understand the field of inquiry independendly from the researcher. The conduction of data collection in a quantitative way is strongly accepted in behaviour- and motivation-related research, also accounting for the central pillar of this research. Therefore, based on a critical review of the literature, hypotheses are developed, which lead to elaborate an initial model for testing and analysis in practice. This way of reasoning is usually considered to account for a deductive approach, which is a specific characteristic of positivism (Saunders, Lewis and Thornhill, 2019). The comparison of the potential ways of reasoning is aggregated in the following table, which additionally justifies the path from hypotheses to theory testing:

Table 14: Reasoning in research (source (cited): Saunders, Lewis and Thornhill (2019))

	Deduction	Induction	Abduction
Logic	In a deductive inference, when the premises are true, the conclusion must also be true	In an inductive interference, known premises are used to generate untested conclusions	In an abductive interference, known premises are used to generate testable conclusions
Generalisabilit	Generalising from the general to the specific	Generalising from the specific to the general	Generalising from the interactions between the specific and the general
Use of data	Data collection is used to evaluate propositions or hypotheses related to an existing theory	Data collection is used to explore a phenomenon, identify themes and patterns and create a conceptual framework	Data collection is used to explore a phenomenon, identify themes and patterns, locate these in a conceptual framework and test this through subsequent data collection and so forth
Theory	Theory falsification or verification	Theory generation and building	Theory generation or modification; incorporating existing theory where appropriate to build new theory or modify existing theory

Quantitative data collection methods account for a long and sound tradition in consumer research, being fulfilled through researcher-initiated and managed data inquiry, even though, in some areas, data generated by authorities like the federal government is used as the basis for further research (Lusk, 2017). In contrast to qualitative methods for data collection, quantitative methods enable to rapidly generate data from large samples, complemented by advantages in terms of time, costs and efficiency. In addition, the researcher has the potential to act independently from subjects, which leads to reduce potential bias (Chrysochou, 2017; Saunders, Lewis and Thornhill, 2019). The questionnaire is developed with the intention to inquire for perceptions and behaviour towards digital service technologies which are widely used by consumers (Uphaus, Ehlers and Rau, 2019; Grewal *et al.*, 2022). Therefore, it can be assumed that participants are likely knowing how to use online technologies, which further justifies using an online survey questionnaire. Anonymised online questionnaires have a longstanding tradition in social and behavioural research; giving participants the ability to self-administrate their participation (Edlund and Nichols, 2019). In consequence, this method of data collection is determined to be appropriated.

4.3 Structural Equation Modelling

Research is conducted through the application of structural equation modelling (SEM) which enables to analyse complex relationships across a variety of variables. This multivariate, statistical method enables to analyse equations along parameters, including analysis like pathway, regression, factor, or simultaneous econometric equations. Therefore, a path diagram to illustrate the conceptual model is developed, which is based on previously generated knowledge – in this case, the critical review of the literature (Stein, Morris and Nock, 2012).

The use of structural equation modelling traditionally leads to confirmatory approaches to existing models as it enables to determine whether the previously developed model can be substantiated in relation to collected data. From the general point of view, structural

equation modelling can be applied to a bandwidth of research attempts due to it allows to use multiple scales, based on metric, nominal or ordinal measurement. For the purpose of the efficient accomplishment of structural equation modelling, regulations, like the geometric appearance, need to be followed, complemented by only relating one factor to another as it not concedes the investigation of reciprocal influences (Berning, 2018; Hair *et al.*, 2021).

In addition to the structural equation modelling approach, the two dimensions of this approach need to be considered: SEM is categorised into 'partial least square structural equation modelling' (PLS-SEM) and 'covariance based structural equation modelling' (CB-SEM) technique (Afthanorhan and Afthanorhan, 2013). While the PLS-technique focuses on variance-based analysis of data, in line with less restrictions, the more restrictive CB-technique approaches the analysis of covariances . Even though both dimensions are strongly accepted in research, their application traditionally deviates – using covariance-based modelling approach for the purpose of confirming (or potentially rejecting) hypotheses and, in consequence, entire theoretical models, while the PLS alternative is predominantly associated with the development of new models. In recent times, these traditional perspectives on application-related limitations of both SEM-approaches became blurry owing to the consideration of the predictive accuracy of PLS, which is claimed to enable to confirm models. Therefore, testing a theory through PLS leads to predictive suggestions for professional purposes, accounting for the foundation of business-related research (Astrachan, Patel and Wanzenried, 2014; Hair, Hult, Ringle, Sarstedt, *et al.*, 2017). Even though both modelling and analysis techniques are matter of discussion, Hair *et al.* (2017) strongly recommend the use of PLS in order to mitigate potential influences of CB-related restrictions. In addition, a number of sources in marketing and specifically consumer spheres were investigated in order to derive whether contemporary sources followed this recommendation. Although this was conducted on a randomised literature review basis, the use of variance-based PLS-SEM for this research appeared to be reasonable (Hasan, Shams and Rahman, 2021; Zhang *et al.*, 2021; Jin *et al.*, 2022).

4.4 Survey Research

The development and distribution of a survey questionnaire in an online format was determined with regards to potential struggle in terms of time and other potential issues, usually associated with other forms of data inquiry. In addition, this approach to data inquiry is strongly accepted in behaviour-related research (Chirkov and Anderson, 2018).

4.4.1 Pre- and Pilot-Test of the Questionnaire and Validity

Validity as well as feasibility of questionnaire research are strong elements which need to be thoroughly evaluated in advance of the conduction of the final data inquiry with a large number of participants. Therefore, pre- as well as pilot-tests are crucial elements, enabling to increase the probability of the elimination of potential struggle in terms of wording, formatting, or the misunderstanding of instructions – complemented by potential distraction of participants (Bowden *et al.*, 2002; Creswell and Creswell, 2018).

Face validity: Face validity is the minimum requirement, which needs to be fulfilled in advance of the collection of any data. This form of validity addresses the alignment of measurement items and conceptual underpinnings, by asking experienced individuals from academic and professional backgrounds for their assessment. In consequence, face validity accounts for an initial step to the evaluation and potential adjustment of the pilot study (Bryman, 2012). Briefly aggregated, face validity relates to create awareness, whether the questionnaire apparently makes sense (Saunders, Lewis and Thornhill, 2019).

Content validity: Subsequently to face validity, seeking for content validity is crucial for questionnaire research in order to limit potential issues like the potential collection of non-relevant data. Consequently, questions, concluded to be essential for the fulfilment of the intentions of the research, are judged on the basis of relevance to content. This validity assessment throughout the pre-testing stage enables to reshape questionnaire items and

evaluate questions in relation to the three categories essential, non-essential but useful, and irrelevant. In order to assess the questionnaire's content validity, the following points can be seen as crucial:

- Length of the questionnaire,
- understanding of instructions,
- clarification of potential misunderstanding of questions,
- clarification of difficulty of questions,
- avoidance of certain topics,
- appealing layout or clarification of layout,
- additional comments (Saunders, Lewis and Thornhill, 2019).

This is complemented by the following layout guidelines by Bell (2006), which are followed, noting that some points, like word-processing, are already fulfilled by the use of online questionnaires, even though some layout-related restrictions of the software were identified:

Table 15: Overview of layout guideline (source: Bell (2006))

Using word-processed, potentially printed and typed formats
Applying clearly appearing instructions by using different fonts and capital letters
Inserting spacing for a tidy appearance
Reduce number of sheets by photo-reduction of copies (not applying due to online-format)
Keeping response (open) boxes within one area of the questionnaire
If necessary, insert spacing for coding
Look at the questionnaire from the perspective of respondents
Taking care of the order questions appear by striving from easy to more complex questions
Leave out names and any other data, which could lead to identify participants, ensuring confidentiality and anonymity (already in line with ethical considerations)

4.4.2 Sampling and Recruitment of Participants

Johanson and Brooks (2010) discuss the sample size for pilot tests in an integrated way, indicating that recruiting 30-50 is reasonable for arbitrarily recruited participants. This recommendation is followed for the pilot survey. In contrast, for the main study, the literature traditionally disputed multiple attempts in terms of finding an appropriate sample size (Iacobucci, 2010). In alignment with Structural Equation Modelling and the Partially Least Square attempt, Kock and Hadaya (2018) compared five different mathematical approaches to identify appropriate sample sizes, contrasting the methods minimum R-squared, 10-times rule, inverse square root, Gamma-exponential, and the Monte Carlo test. Even though these tests find attention and justification along academic publications, Hair *et al.* (2021) state that the PLS-approach does not require a precise definition of sample sizes, complemented by generally being able to handle small sample sizes, which leads to suggest the use of the R-squared estimation method – even though this method equally doesn't necessarily find accurate answers. The R-squared method relies on the maximum arrows pointing on constructs in alignment with the R-squared values calculated throughout the model (Kock and Hadaya, 2018). In terms of the developed PLS-model, the R-squared value needs to be calculated retrospectively due to the approach for model confirmation, not having inquired any data in advance (Hair *et al.*, 2021). Despite this, initially the weakest R-square value (.10), exemplified by Kock and Hadaya (2018), is taken as the guideline for data inquiry, which leads to strive for a number of at least 157 – in conjunction with a maximum of 6-arrows pointing on one construct (as applied in the developed framework). In consequence, a further assessment of having met sample size requirements will be conducted retrospectively.

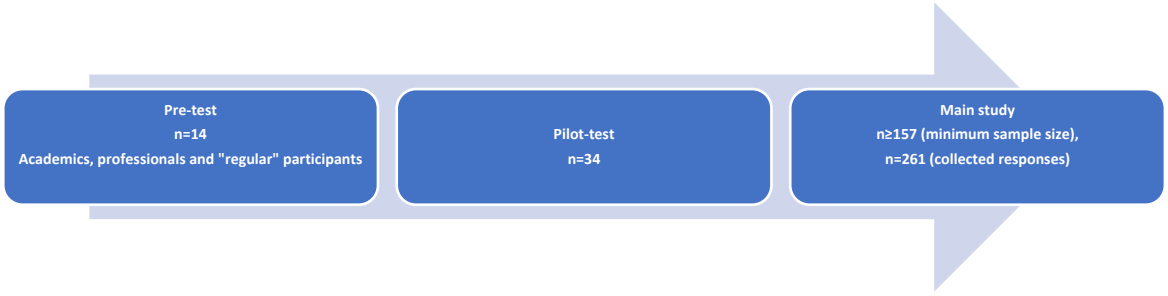

Figure 5: Approached sample sizes in test and study phases (source: own)

For recruitment purposes, various contemporary authors recommend the use – or exemplary used – the crowdsourcing platform “Mturk” (Amazon Mechanical Turk) to recruit participants for research purposes – being considered as an efficient solution for this purpose (Vriend, Jordan and Janssen, 2016; Cunningham, Godinho and Kushnir, 2017; Kautish and Khare, 2022). In general, the use of crowd-sourcing platforms (like Mturk) is widely accepted throughout universities (University of Winnipeg, 2021).

In order to assess representativeness, the analysis was determined to additionally compare demographic characteristics to data from the UK-census 2021. In addition, professional studies were decided to be integrated in order to discuss the behaviour of individuals or households towards restaurants and virtual assistants in comparison to findings from data collection. In consequence, conclusions about representativeness are drawn in the section discussing demographic characteristics.

4.4.3 Common Method Variance

Common method variance (CMV) is an issue, which is subject to potentially distort quantitative inquiry, accounting for threats to construct validity. Therefore, closer considerations in relation to the roots of CMV, as well as how to reduce potential effects, need to be made. In behaviour- and consumer-related research, CMV has increased probability of appearance, which can be reasoned on the basis of inquiring and analysing data from single sources (Rezaei *et al.*, 2016).

Essentially, the causes of CMV can be related to diverse influences, which are person-specific, item-specific, item-context-specific, or related to the entire context of data collection (Paulssen, Temme and Hildebrandt, 2009). In this regard, the essential consideration of struggle is related to participants, potentially being able to estimate underpinning hypotheses, caused by the inquiry of exogenous as well as endogenous variables from the same individual. Due to the event of publishing both types of variables and, in consequence, potentially enabling participants to deepen their understanding of

assumptions, CMV is subject to be driven by participants who attempt to provide answers, which are considered to be widely accepted or desirable (Podsakoff and Organ, 1986). Even though researchers strongly agree on CMV, there is some inconsistency, whether the issue should find attention or not; this creates an area of tension. In order to evaluate potential influences, research strongly agrees on the use of diverse formats of assessment, which can be semantic differentials, Likert-scales or other scales offered to participants. These attempts to evaluate and reduce CMV can be complemented by several means in terms of the design of the questionnaire. In this regard, ordering independent and dependent variables in random appearance can be considered, even though it has to be noted that the logical line might become insufficient. Another way for the reduction of effects is related to the design of the questionnaire: keeping binary scales and even numbers of points out of consideration is considered to decrease habitual answers, which can be in line with the use of different scales, considered to limit the probability of participants always agreeing on one point (Söhnchen, 2009).

4.4.4 Non-Response Bias

Evaluating potential struggle, which can be related to participants a lack of responses, is a crucial issue of research. The occurrence of lacking answers has the potential to raise data insufficiency as well as to affect the sample size. Non-response bias is categorised into item and unit, which depends on the level insufficient answers appear. While unit non-response accounts for missing answers on a general level, item non-response strives for the potential of not answering all items, which are required for generating sufficient data (Atif, Richards and Bilgin, 2012; Hulland, Baumgartner and Smith, 2018). Even though these are two profound elements of non-response, the potential of commencing with answering the questionnaire, but leaving without transmission after a certain time, can also be an issue, which has to be elucidated. The sum of conceivable non-response issues has four reasons, which have interrelated extends, accounting for whether approached participants entirely deny or are not able to edit the questionnaire,

complemented by struggle in locating or contacting respondents (Saunders, Lewis and Thornhill, 2019).

Attempting to mitigate potential non-response bias, in alignment with the evaluation of common method variance, is fulfilled by thorough considerations in terms of the questionnaire design, considering leading to higher response rates and more appropriate data. Even though it can be assumed that topics inquired within the questionnaire are less sensitive to participants – potentially propelling inconsistent response-behaviour – the final design and wording is tested, adjusted and aligned by a pre-test and piloting stage (Bryman, 2012; Creswell and Creswell, 2018; Williams, 2019). In addition, ensuring full anonymity and disposal of individual responses is ensured in favour of limiting potential uncertainty.

4.4.5 Common Method Bias

According to Podsakoff *et al.* (2003), the potential influence of common method bias (CMB) can be grounded on a number of issues like, for example, current mood or social desirability. These rather emotional influences were determined to be mitigated by ensuring full anonymity, which was also considered in line with ethical evaluations. In addition, this kind of bias is stated to be in effect when using common scale formats as well as inquiring for single emphasis like solely integrating positively associated measures. In order to mitigate these influences, it was determined to collate positively and negatively associated measures as well as to use matrix and open textbox questions in part. In general, in order to determine the potential influence of common method bias, Harman's one factor test was conducted after the main data collection. Even though Fuller *et al.* (2016) partly find some criticism for the accuracy of this test, with respect to the explanatory power of its ratio between CMV and CMB, this approach is accounting for a longstanding tradition in research.

4.4.6 Questionnaire Design

The survey was conducted through the use of the University's Microsoft Forms tool, which was thoroughly reasoned on the basis of ethical considerations. Based on the tool's design and restrictions, the questionnaire is structured into different pages. Questionnaire items are inquired making use of ratio questions, which are widely accepted for the purpose to inquire for participants' opinions – often fulfilled through Likert-scales, which require the assessment of statements in terms of agreeing or disagreeing through a number of points within one item (Saunders, Lewis and Thornhill, 2019). Even though researchers dispute the use of Likert-scales and the most appropriate number of points to apply for decades, there is strong agreement that 7-points find more accuracy than 5-points due to enabling participants to apply stronger differentiation (Joshi *et al.*, 2015; Sarstedt, Ringle and Hair, 2017). Therefore, a 7-point measurement was determined to be applied in the questionnaire. For the later analysis stage, in order to avoid issues like a potentially misleading classification, for example due to making use of too general measurements (and therefore to risk limited validity of items), constructs are only designed making use of multiple indicators throughout the developed model – reflected in the questionnaire (Bryman, 2012).

In addition to the previously stated, bias-related considerations, it could be assumed that some bias might additionally stem from people not using virtual assistants. In this regard, it was considered that this cannot be controlled by the researcher, owing to the anonymous setup of the questionnaire. Therefore, the introduction to the questionnaire clearly stated behaviour towards virtual assistants, in the specific restaurant context, to be subject of inquiry. In addition, the questionnaire provided a matrix-question to evaluate frequent usage and therefore some familiarity with virtual assistants. In order to ensure that potential bias from familiar and non-familiar participants has no further influence, the comparison of switching and adoption intention was integrated (in alignment with the SEM-model).

In terms of obtaining the specific questionnaire items, literature discussing behaviour towards technology as well as consumer behaviour in general was reviewed. This was complemented by literature from other fields like psychology – owing to the fact that elementary constructs, like resilience, are currently barely addressed in the area of marketing. These items were determined to be promising in order to derive whether behaviour towards virtual assistants can be influenced, especially with respect to informing individuals about drawbacks of technology. Any changes to an individual item were determined on the base of the pre-test as well as the context of this research. In addition, items showing a weak performance in the original source were deleted.

4.4.7 Research Ethics

Thoroughly considering research ethics is crucial for the conduction of a research project as it requires the alignment of data inquiry with norms of behaviour in society and codes of conduct. Therefore, the researcher is required to consider all stakeholders involved in research, which are recruited participants, directly associated organisations, as well as the researcher himself. In this regard, the researcher has to be aware that not only the data collection stage, but also the analysis, dissemination and report of data is crucial for ethical behaviour (Sekaran and Bougie, 2016).

In full alignment with University of Worcester's processes and guidelines for ethical approval, inquiring data commenced unexceptionally after receiving an entirely positive outcome from the ethical committee. In any case, the restrictions of collecting and storing data in completely anonymised forms were followed, complemented by ensuring that participants do not perceive being forced to participate – making sure and informing about the voluntary participation and the potential to withdraw from answering at any time. Complementary, the University of Worcester's participant information sheet, using the latest available version issued, was shared with attracted participants, requiring them to indicate having read and being aware of this document before answering the questionnaire. The participant information sheet also included the researcher's and the

supervisory-team's contact data, for the purpose of enabling to ask questions prior to participation, mitigating potential misunderstandings or unclarity.

4.4.8 Pre- and Pilot-Test

Pre-test (n=14): The pre-test was conducted without collecting any data, only asking for feedback in terms of wording or issues in terms of misunderstanding. Conducting the pre-test was fulfilled with professional and academic experts from the area of marketing and consumer behaviour, complemented by regular participants. This initial test showed minor issues in terms of misunderstanding or recommendations, which were evaluated and aligned thoroughly prior to further proof-reading and piloting the questionnaire. This ensured to fulfil the requirements of face- and content-validity to the researcher's fullest knowledge. One issue was, for example, stating (where applying) concretised periods rather than openly asking for experiences from the past or future. In this regard, a period of six months prior or after the time of data collection was stated, considering that consumer behaviour potentially changes over time.

Pre-test participants were: Three academics, four professionals from restaurant and IT backgrounds, and seven regular participants. Initially, the questionnaire was aligned, in an extensive pre-test session, with the supervisory team. Upcoming issues were considered and aligned, leading to changed wording, like for example, in case items were too narrow in terms of content – propelled by participants partially asking for their differentiation or of separating questions to facilitate readability (e.g., stating a single introduction at the head of the individual question and then asking for the concrete point, like "When using virtual assistants…" (introduction) "…the usage of my personal data is clear" (individual item)). Another significant point for pre-test participants was the appropriacy of stating the context within every single questionnaire item. This was emphasised by the length of the questionnaire. In this regard, pre-test participants claimed that people are likely to feel annoyed or numb when consistently being required to read the context, claiming that the context was entirely clear to them, and a continuous

repetition would lead them to be rather ‘stubborn’. In order to mitigate this potential source of bias, the situational context was described, stating: “Imagine you are intending to visit a restaurant and have to evaluate, which restaurant is the best one at your current location.” This way of stating the context was considered on the base of Sun *et al.* (2013), partly describing the individual situation in advance.

The pre-test showed no further issues in terms of the questionnaire’s content. Complementary, the assignment of Microsoft Forms and online data collection didn’t lead to further struggle. In general, the pre-test was conducted in advance of applying for ethical approval and piloting the survey. No data was collected prior to the ethical application and piloting the questionnaire.

Pilot-test (n=34): The pilot-test was self-administered through the Mturk platform, applying the same conditions as for the main study, not stating the differentiation between piloting and main data collection to participants, considering potential struggle by participants in terms of misunderstanding the pilot stage to be less relevant and giving less accurate answers. The pilot-test generated a total of 34 responses, which are, in aggregation, as follows from the demographic perspective.

Based on the design and the application of a self-administered questionnaire through Mturk, a non-response rate cannot be derived. The demographic characteristics were mandatory, while the regular items were collected on a voluntary basis. In this regard, it could be possible that participants only answer mandatory, demographic questions, leading to inconsistently answering non-mandatory items. This potential issue did not appear throughout the pilot-test. In addition, the pilot survey indicated that the setup through Mturk is performant, making no person identifiable and the link to Microsoft forms didn’t lead to further reported issues.

In general, no issues in terms of face or content validity or common method variance were reported (e.g., via e-mail) while or after conducting the pilot, opening the basis for the main study. In this regard, it has to be annotated that no empty answers were found and the researcher didn't identify consistent patterns (e.g., only indicating the same number etc.), which supports the appropriacy of using of the 7-point Likert scale, the self-administered questionnaire as well as the issued scales. The open text box, issued at the end of the questionnaire, included a number of reasonable answers – no answers were identified to potentially lead to the identification of participants. Complementary, in terms of the timescale, no issues were reported. These aggregated investigations led to the overall assumption that the questionnaire had a feasible character.

In addition, in favour of mitigating the influence of potentially taking part several times every time the survey was reposted on Mturk, the individual setup was adjusted to using "already participated" as a mandatory qualification, under the "has not been granted" setting – leading to prevent participants from potentially exploiting the system. In terms of participants and an initial data analysis, the following sub-chapter, as well as the table below, explains findings from the pilot stage.

Table 16: Demographic characteristics of pilot study respondents

		Total	Share
Gender identity	**Female**	10	29.4%
	Male	24	70.6%
	non-binary	0	0.0%
	other	0	0.0%
Age group	**18-30**	12	35.3%
	31-40	10	29.4%
	41-50	9	26.5%
	51-60	3	8.8%
	61-70	0	0.0%
	70 or above	0	0.0%
Education	**School education**	2	5.9%
	Vocational education	5	14.7%
	Bachelor's degree or equivalent	20	58.8%
	Master's degree or equivalent	6	17.6%
	Doctorate or equivalent	1	2.9%
	Other	0	0.0%

In terms of the visiting behaviour, the following table indicates that pilot participants visited quick-service restaurants most frequently.

Table 17: Restaurant visit behaviour of pilot study participants

	Bars	Cafés	Quick-service	Snack	Full-service
1-4 times	9	9	12	8	13
5-8 times	11	9	2	11	5
9-12 times	3	5	11	2	4
more than 13 times	3	4	4	3	3
not at all	8	5	4	8	7

The following table shows that regarding the usage of virtual assistants. In this regard, pilot study participants showed a clear preference for the services offered by Google.

Table 18: Virtual assistant usage of pilot study participants

	Virtual assistant service provider					
	Google	**Microsoft**	**Apple**	**Amazon**	**Samsung**	**Other**
Daily	8	0	2	3	0	0
Weekly	4	0	2	3	0	0
Monthly	0	0	1	1	0	0
Less often	5	0	1	1	0	3

4.4.9 Pilot Analysis

The pilot analysis was conducted under the same conditions as the later main data collection phase. The pilot study showed strong reliability in terms of all constructs even though utilitarian dining value (UDV) and privacy concerns (PCO) were considered to be concerning. For content-related reasons as well as on the base of indicator UDV2, showing much stronger performance (0.986) than the other two ones (UDV1 and UDV3), it was determined to keep the UDV construct as well as its indicators at this point. Complementary to UDV, the pilot revealed a strongly concerning performance of privacy concerns with respect to rho_A and AVE, which had values strongly distant from traditionally desirable or required thresholds. Even though this was also considered to be concerning, it was decided to keep the construct for content-related reasons as well as under the consideration that the indicator PCO2 (0.947) as well as Cronbach's alpha and CR had values of much stronger nature. This issue was also considered to be potentially mitigated after having increased the sample size – despite being aware of some potential risk of keeping the construct.

Table 19: Constructs in pilot analysis

Pilot study (n=34)				
Construct	**Cronbach's alpha**	**rho_A**	**CR**	**AVE**
AIN	0.976	0.977	0.988	0.976
ATT	0.908	0.917	0.936	0.787
CMI	0.931	0.953	0.956	0.878
HDV	0.839	0.848	0.892	0.674
OTC	0.767	0.811	0.864	0.683
PVU	0.797	0.855	0.879	0.710
PER	0.936	0.936	0.959	0.887
PCO	0.769	-4.013	0.556	0.367
RAN	0.896	0.902	0.936	0.829
REA	0.900	0.901	0.938	0.834
RES	0.917	1.045	0.934	0.741
SIN	0.962	0.971	0.976	0.930
TRA	0.891	0.929	0.924	0.753
UDV	0.245	0.149	0.362	0.341
VSI	0.878	0.904	0.912	0.721

4.5 Retrospective Assessment of Recruitment through Crowdsourcing

The decision to approach participants by using the crowdsourcing platform Mturk had a goal-leading appearance – even though a few constraints can be derived: In general, the use of the crowdsourcing platform enabled to quickly approach a significant audience, generating a larger sample within a relatively short period of time. While the pilot study recruitment was completed after three days, the main study recruitment initially also appeared to be fulfilled expeditiously but took much longer than expected after generating

about 160 responses. In addition, the crowdsourcing platform had to be adjusted manually and precisely prior to extending the collection numbers – to exclude participants who already contributed to the study after the previous main study recruitment process.

Due to ethical requirements, the survey was kept entirely anonymous, separating the crowdsourcing platform Mturk and the tool used for questionnaire inquiry, Microsoft forms. This ensured that participants can't be identified anyway – neither by the form's provider, the crowdsourcing platform, nor by the researcher. In addition, in favour of reinforcing ensuring anonymity, a non-individual participation code was issued in the questionnaire's confirmation message – despite this could potentially lead to sharing this code and consequently to being forced to compensate participants who didn't contribute to the study. This potential issue was, retrospectively, perceived to be relatively low after ending the data collection phase, even though a concretised evaluation of potential code sharing appeared to be elusive. In terms of the monetary costs of using the crowdsourcing platform, it has to be annotated that additional charges applied for using this solution, leading to relatively high costs in comparison to other considerable, quantitative recruitment solutions. In this regard, the researcher balanced this issue in advance, evaluating the pace of recruitment to be prevailing.

In terms of the entirely anonymous state of participants, complemented by keeping answering questionnaire items voluntary, some questionnaires were expected to lack in terms of quality (e.g., having missing data above 5% or entirely using the same Likert score indicator (Hair *et al.*, 2021). These responses were screened individually throughout the data analysis stage and consequently deleted (the following chapter shows that only two answers met this issue).

In conclusion, the usage of a crowdsourcing platform for recruitment purposes appeared to be promising, especially when considering time-related constraints and the diligence of participants (as indicated in the next chapter).

5.0 Main Study: Analysis of Collected Data

This chapter is dedicated to the data analysis conducted after the main data collection phase. Data collection, as previously discussed, was performed by approaching participants through a crowdsourcing platform and an anonymised online questionnaire. The analysis of collected data was conducted by using the software tools:

- Microsoft Excel (version 16),
- SmartPLS 4 (Ringle, Wende and Becker, 2022),
- IBM SPSS Statistics (version 28).

The following table is intended to offer an overview on steps conducted within the data analysis phase – reflected throughout the following subchapters. In this regard, it has to be annotated that the process was dynamic throughout the analysis – for example, continuously assessing the required sample size after preceding analysis phases (retrospective approach in alignment with Hair *et al.* (2021)). In general, data assessment is predominantly following contemporary recommendations and investigations on PLS-SEM by Hair *et al.* (2021).

The table below differentiates the preliminary data analysis phase, complemented by steps conducted throughout the main data collection analysis.

Table 20: Overview of applied steps in preliminary and main data analysis (own; sources: Dixon, 1980; Reifman and Garrett, 2010; Kock and Hadaya, 2018; Hair et al., 2021)

→ Preliminary data analysis				
	Analysis or method applied	**Reasoning/considerations**	**Thresholds, metrics and procedures**	**Software**
1.	Demographic characteristics	Overview of participants	Gender identity, age group, town/city size, finished education	Excel
2.	Usage-related characteristics	Overview of restaurant visit or technology usage behaviour	Usage/visit frequency of restaurant types and preferred virtual assistant service providers	Excel
3.	Exclusion of partially answered observations	Avoidance of major impacts in case participants only answered the questionnaire to an apparently dissatisfying degree	Deletion of observations	Excel
4.	Exclusion of inaccurate answers	Deletion of responses which showed high levels of undifferentiated answers, predominantly indicating the same levels throughout items	Deletion of observations	Excel
5.	Analysis and treatment of missing values	Use of mean replacement due to causing minor effects; entire deletion of questionnaires exceeding the 5% threshold in terms of missing values	<5% per observation, otherwise deletion of observation	SPSS

6.	Treatment of outliers	Winsorising to keep opinion of participants – who were not excluded throughout the previous stages –involved, appearing to have answered conscientiously	<15-20% winsorising of data reasonable	SPSS

→ Main data analysis				
	Analysis or method	**Reasoning/considerations**	**Thresholds, metrics and procedures**	**Soft-ware**
1.	Retrospective estimation of required sample size	Inverse R^2 method in order to meet sample size criteria	Minimum sample size estimation, inverse R^2 equation	SmartPLS
2.	Indicator reliability	Squared indicator loadings; bivariate correlation between indicator and construct	>0.708 reasonable, lower values to be examined in terms of potential deletion; deletion of indicators with loadings between 0.4 and 0.708 reasonable in case content validity is not affected and deletion leads to increased convergent validity and consistency reliability; always delete <0.4	SmartPLS

3.	Internal consistency Reliability	Composite reliability (rho_c), Cronbach's alpha	Composite reliability (rho_c) and Cronbach's alpha: 0.70-0.90 reasonable for explanatory research; <0.90, especially <0.95 problematic due to indicating redundant indicators	SmartPLS
4.	Convergent validity	Average variance explained (AVE), assessing all indicators related to each construct	AVE ≥0.50 reasonable	SmartPLS
5.	Discriminant validity	Heterotrait-monotrait ratio (HTMT)	HTMT <0.90 for similar constructs; <0.85 for different constructs	SmartPLS

5.1 Preliminary Analysis of Collected Data

The following sub-chapters are dedicated to show demographic as well as usage-related characteristics and to express procedures conducted prior to main data analysis.

5.1.1 Demographic Characteristics

The demographic characteristics of respondents are shown in the following table (missing data subject to non-mandatory fields).

Table 21: Demographic characteristics of participants

		Total	Share
Gender identity	**Female**	90	34.5%
	Male	169	64.8%
	non-binary	2	0.8%
	other	0	0.0%
Age group	**18-30**	110	42.1%
	31-40	83	31.8%
	41-50	19	7.3%
	51-60	47	18.0%
	61-70	2	0.8%
	70 or above	0	0.0%
Education	**School education**	35	13.4%
	Vocational education	26	10.0%
	Bachelor's degree or equivalent	131	50.2%
	Master's degree or equivalent	56	21.5%
	Doctorate or equivalent	8	3.1%
	Other	5	1.9%

In terms of representativeness, the characteristics show that the majority of participants were male (about two thirds), while female participants accounted for about one thirds, and those of other and non-binary identity were below one percent. In reference to the UK-census 2021, these numbers show some deviation to the British population, considering almost a parity of males and females, complemented by non-binary and other identities to account for about 1% (ONS, 2022, 2023). In terms of age groups, the table shows that most participants were 18 to 30 and 51 to 60 years old, while the age groups 41 to 50 and those above 61 were represented to a lower extent. Even though the categories of the census have slightly different ranges, these characteristics also show some deviation from the UK's population. In this regard, it can additionally be considered that younger people show a stronger internet usage behaviour than older ones (ONS, 2018) and the fact that nearly 40% of households are owners of a virtual assistant (Sims and Gaynor, 2022). Next to the usage-related behaviour towards the specific technology, it can further be considered that younger peoples' expenditures and those of people between 30 and 64 account for the highest shares in the UK's restaurant and hotel sector (Statista Research Department, 2022). In conclusion, representativeness cannot fully be claimed, even though some indications in terms of meeting the scaffolding of behaviour-related statistics can be identified.

5.1.2 Behaviour-related Characteristics

The following tables show the restaurant visit behaviour as well as the usage-related characteristics – referring to virtual assistants – of main study participants. In terms of virtual assistant usage, participants showed a strong preference for the solutions of the service provider Google, followed by those of Apple and Amazon. In addition, there is a tendency of frequent usage, indicated by prevailing weekly and daily numbers. In general, about 80% of participants indicated that they use virtual assistants on a daily, weekly, or monthly base, showing that most participants were familiar with this technology.

Table 22: Virtual assistants, usage-related characteristics of participants

	Google	Microsoft	Apple	Amazon	Samsung	Other
Daily	30	1	25	33	0	0
Weekly	48	2	23	19	0	0
Monthly	11	0	8	10	0	0
Less often	16	8	12	8	1	8

In terms of restaurant visit behaviour, participants showed a relatively consistent preference across inquired restaurant types.

Table 23: Restaurant visit behaviour of main study participants

	Bars	Cafés	Quick-service	Snack	Full-service
1-4 times	83	64	72	75	94
5-8 times	59	81	59	51	58
9-12 times	27	42	62	31	32
more than 13 times	40	49	39	31	24
not at all	47	16	23	62	48

The following figure indicates the pre-eminence of solutions by Google, directly followed by the those offered by Amazon and Apple.

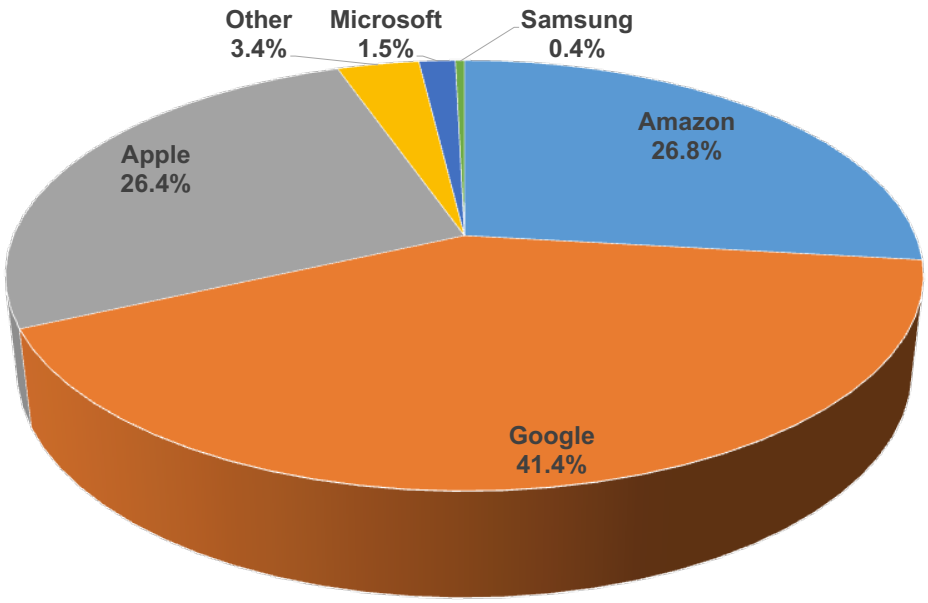

Figure 6: Share of virtual assistant service providers

Complementary to the figure above, the figure below provides an overview of the frequency of usage.

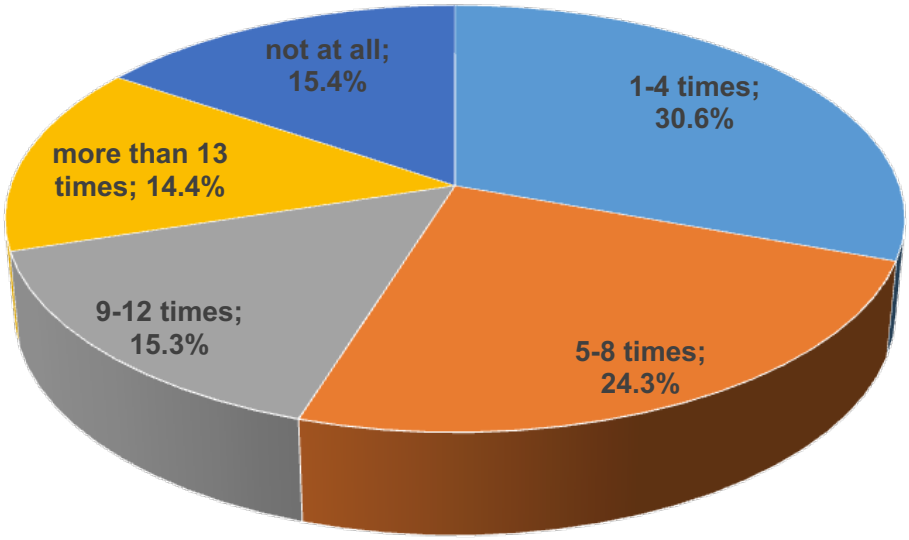

Figure 7: Virtual assistants, frequency of usage

5.1.3 Analysis and Treatment of Missing Values

Prior to further analysis, responses were screened with focus on undifferentiated and unsatisfying answers, i.e., consistently indicating the same emphasis across Likert-scales (Hair *et al.*, 2021). This issue was found in response, exclusively ticking one specific indicator throughout the entire observation. Additionally, another submission was entirely deleted due to exceeding the 5% approach: Conducting missing value treatment processes like mean replacement, expectation maximalisation or nearest neighbour is reasonable in case missing values are below 5% per observation. This way of handling missing data is subject to have minor influence on data analysis. In case the rate of missing data is above the 5% level, it is suggested to delete entire observations. Due to being one of the most prominent procedures, the researcher decided to conduct mean replacement for the remaining observations (Hair et al., 2021).

Table 24: Overview of initial treatment of responses

Collected	**Inconsistent Quality**	**Above 5% missing**	**Remaining**
261	1	1	259

5.1.4 Treatment of Outliers

Two major approaches to the handling of outlying, non-normal data were identified in regard to Reifman and Garrett (2010). Dixon (1980) states that both ways of handling can be reasonable for 15-20% of values:

- Trimming (deletion of data, which is identified outlying) or
- winsorising (converting of outliers to the next acceptable value in order to meet the range).

Dixon (1980) discusses that trimmed values do not give attention to extreme values, while winsorised values still involve them by aligning these values to the next reasonable score. In favour of keeping the sample on a consistent level and to keep remaining observations (after the initial cleaning) considered throughout data analysis, winsorisation was chosen as the method of data cleaning. This method was applied to about 12% of values.

5.1.5 Suitability of PLS-SEM

Consecutively to chapter 4.3 (“Structural Equation Modelling”), discussing the suitability of partial least squares SEM in comparison to the covariance-based approach, the analysis of the sample revealed that participants didn’t have major issues in terms of answering the questionnaire. This is determined on the fact that only two samples had to be deleted owing to quality issues, leading to a base of 259 for analysis purposes. Hair *et al.* (2017) discuss that covariance-based structural equation modelling is often lacking in terms of statistical power when small sample sizes are approached. Even though the final sample size exceeded the requirements issued by Kock and Hadaya (2018), it can be claimed that the sample size remains rather small – providing additional reasoning for approaching partial least squares structural equation modelling. In addition, the quality of answers had no effect in terms of potentially deleting entire constructs at this stage, leading to keep a rather complex appearing model for analysis purposes. This further supports using PLS-SEM for data analysis purposes – in alignment with Hair *et al.* (2017), emphasising that the analysis of complex models is more promising in case of following the PLS approach. In consequence, partial least squares is determined to be kept as the approach for data analysis purposes.

5.2 Main Analysis of Collected Data

The main analysis of data was considered to be reasonable after conducting the steps stated in the preliminary data collection.

5.2.1 Retrospective Estimation of Sample Size and R-square values

The research initially followed the sample size example issued by Kock and Hadaya (2018), assessed through the inverse R-squared method and exemplary stated within the research paper. From the general stance, Hair *et al.* (2021) discuss that assessing the required sample size by using the inverse R-squared approach might lead to exorbitant sample size requirements, suggesting to use a higher path coefficient found throughout model analysis. In addition, Hair *et al.* (2021) mention that the inverse R^2 method can only be used in order to assess the sample size retrospectively.

R^2 was evaluated using SmartPLS, leading to the following values:

Table 25: R-square values of constructs

Construct	R-square
Adoption intention	0.559
Attitude towards technology	0.433
Personalisation	0.476
Rationalisation	0.362
Reactance	0.314
Switching intention	0.100

The previous table shows that a minimum R^2 value of 0.1 (switching intention) was found throughout the model analysis. Complementary, the developed model is underpinned by a maximum number of six arrows, equally pointing at attitude towards technology and adoption intention. In this regard, Kock and Hadaya (2018) propose a required sample of 157 at the R^2 threshold of 0.1. This sample size was exceeded in order to approach a stronger base of significance.

In respect to the R-square values, the analysis shows that the behavioural extents adoption and switching intention significantly deviate, which leads to the finding that most participants rather tend to adopt virtual assistants than approaching to switch from using them – also giving proof for the fact that most participants had prior experience with these technologies. This can be claimed to give proof for using the diametrical constructs switching and adoption intention as outcome variables. In addition, the model gives evidence that the attitude towards virtual assistants not necessarily has to be on the same level as adoption intention, which leads to the finding that individuals might adopt virtual assistants despite not having an entirely positive attitude towards these technologies. This is considered to underpin a rather strict or intuitive behaviour. In addition, the R-square values provide insights that personalisation is subject to account for a major pillar of individuals' behaviour. In terms of rationalisation and reactance, it can be derived that actively rationalising or approaching to react against VA is a matter influencing behaviour to a lower extent. These values are subject to give additional proof for paradoxical and rather complex appearing behaviour.

5.2.2 Common Method Bias Assessment

To avoid potentially biased data, common method bias was assessed through SPSS, using Harman's one-factor test, considering that eigenvalues above 50% indicate the existence of CMB (Fuller *et al.*, 2016). This assessment showed a value of about 27%, giving evidence that no CMB can be claimed.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	16,250	26,639	26,639	16,250	26,639	26,639
2	5,937	9,734	36,373			
3	4,148	6,800	43,172			
4	3,327	5,454	48,627			

Figure 8: SPSS result of CMB assessment (extracted)

5.2.3 Indicator Reliability

Hair *et al.* (2021) discuss that indicator reliability (outer loadings) should be above 0.708, even though it could be reasonable to keep indicators between 0.4 and 0.708 in consideration. In any case, values below 0.4 should be deleted. The following table shows that all indicators meet the 0.708 threshold – except UDV3, OTC3, HDV1 and HDV2. The deletion of indicators was considered on the base of their content. While the deletion of HDV1 and HDV2 led to a decrease of surrounding indicators, the deletion of OTC3 strengthened the other ones. Complementary, the deletion of UDV3 caused issues for OTC1 and OTC2, leading to the decision to keep the indicator. In addition, t-values were added, giving proof for a statistical significance of all indicators at a 99% level (indicated with ***).

Table 26: Indicator reliability

Indicator	Outer loadings	t-values
AIN1 <- Adoption intention	0.965	150.976 ***
AIN2 <- Adoption intention	0.969	196.166 ***
ATT1 <- Attitude towards technology	0.858	41.613 ***
ATT2 <- Attitude towards technology	0.867	47.272 ***
ATT3 <- Attitude towards technology	0.873	48.457 ***
ATT4 <- Attitude towards technology	0.839	39.788 ***
CMI1 <- Consumer motivational intensity	0.980	138.916 ***
CMI2 <- Consumer motivational intensity	0.980	125.465 ***
CMI3 <- Consumer motivational intensity	0.861	28.002 ***
HDV1 <- Hedonic dining value	0.626 → kept	4.627 ***
HDV2 <- Hedonic dining value	0.675 → kept	5.496 ***
HDV3 <- Hedonic dining value	0.783	10.252 ***
HDV4 <- Hedonic dining value	0.827	7.505 ***
OTC1 <- Opportunity cost	0.829 → 0.832	28.236 ***
OTC2 <- Opportunity cost	0.882 → 0.904	39.837 ***
OTC3 <- Opportunity cost	~~0.618~~ → deleted	---
PCO1 <- Privacy concerns	0.884	3.490 ***
PCO2 <- Privacy concerns	0.932	3.977 ***
PCO3 <- Privacy concerns	0.857	4.078 ***
PER1 <- Personalisation	0.866	50.528 ***
PER2 <- Personalisation	0.854	43.033 ***
PER3 <- Personalisation	0.868	39.916 ***
PVU1 <- Perceived vulnerability	0.858	40.384 ***
PVU2 <- Perceived vulnerability	0.873	39.697 ***
PVU3 <- Perceived vulnerability	0.877	46.013 ***
RAN1 <- Rationalisation	0.911	77.554 ***
RAN2 <- Rationalisation	0.923	80.146 ***
RAN3 <- Rationalisation	0.937	92.275 ***
REA1 <- Reactance	0.910	70.174 ***
REA2 <- Reactance	0.889	62.396 ***
REA3 <- Reactance	0.840	32.917 ***

RES1 <- Resilience	0.758	16.952 ***
RES2 <- Resilience	0.732	13.035 ***
RES3 <- Resilience	0.705	14.028 ***
RES4 <- Resilience	0.762	16.616 ***
RES5 <- Resilience	0.785	19.224 ***
SIN1 <- Switching intention	0.921	60.448 ***
SIN2 <- Switching intention	0.904	47.552 ***
SIN3 <- Switching intention	0.870	28.885 ***
TRA1 <- Transparency	0.903	53.771 ***
TRA2 <- Transparency	0.870	36.668 ***
TRA3 <- Transparency	0.915	77.907 ***
TRA4 <- Transparency	0.913	79.279 ***
UDV1 <- Utilitarian dining value	0.720 → 0.701	13.519 ***
UDV2 <- Utilitarian dining value	0.796 → 0.870	17.671 ***
UDV3 <- Utilitarian dining value	0.586 → kept	7.539 ***
VSI1 <- Variety seeking intention	0.781	18.794 ***
VSI2 <- Variety seeking intention	0.853	37.743 ***
VSI3 <- Variety seeking intention	0.817	25.006 ***
VSI4 <- Variety seeking intention	0.826	28.785 ***

5.2.4 Construct Reliability and Convergent Validity

In order to assess reliability of constructs, Hair *et al.* (2021) suggest testing internal consistency through Cronbach's alpha, composite reliability (CR) and average variance extracted (AVE), stating that values should exceed 0.7 for explanatory studies. Hair *et al.* (2021) further state that high values indicate stronger reliability, even though values above 0.95 might indicate redundancy.

Table 27: Construct/convergent validity

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Adoption intention	0.931	0.933	0.967	0.935
Attitude towards technology	0.882	0.882	0.919	0.738
Consumer motivational intensity	0.936	0.957	0.959	0.888
Hedonic dining value	0.742	0.820	0.820	0.536
Opportunity cost	0.680	0.711	0.860	0.755
Perceived vulnerability	0.839	0.839	0.903	0.756
Personalisation	0.828	0.831	0.897	0.744
Privacy concerns	0.872	0.909	0.920	0.794
Rationalisation	0.914	0.914	0.946	0.854
Reactance	0.857	0.886	0.911	0.774
Resilience	0.805	0.814	0.865	0.561
Switch intention	0.882	0.898	0.926	0.808
Transparency	0.922	0.928	0.945	0.811
Utilitarian dining value	0.526	0.553	0.746	0.498
Variety seeking intention	0.838	0.850	0.891	0.672

The previous table indicates that nearly all constructs meet the reliability and validity criteria, even though utilitarian dining value could be considered to be concerning, despite still meeting the 0.4 threshold issued by Hair *et al.* (2021). In this regard, it was decided to keep the construct due potential content-related issues.

5.2.5 Discriminant Validity

The evaluation of discriminant validity addresses relationships among different constructs, traditionally using the Fornell-Larcker criterion. Even though being widely accepted and applied in research, this measurement recently found criticism due to slight differences in terms of indicator loadings are argued to lead to partially fail in terms of thoroughly addressing discriminant validity. Therefore, it is suggested to avoid using the Fornell-Larcker criterion and to apply a ratio of correlations, the heterotrait-monotrait ratio (HTMT). In this regard, HTMT should indicate values below 0.90 for conceptually similar constructs and below 0.85 for different ones (Hair *et al.*, 2021). The table below shows that discriminant validity is within the range of the issued threshold for all constructs.

Table 28: Discriminant validity (HTMT)

	AIN	ATT	CMI	HDV	OTC	PVU	PER	PCO	RAN	REA	RES	SIN	TRA	UDV	VSI	CMIx VSI
AIN																
ATT	0.742															
CMI	0.399	0.285														
HDV	0.264	0.383	0.505													
OTC	0.511	0.661	0.309	0.247												
PBE	0.096	0.200	0.171	0.169	0.416											
PER	0.731	0.775	0.271	0.395	0.526	0.114										
PCO	0.077	0.095	0.080	0.110	0.136	0.322	0.031									
RAN	0.632	0.565	0.314	0.206	0.459	0.069	0.673	0.055								
REA	0.055	0.050	0.119	0.069	0.317	0.634	0.115	0.274	0.090							
RES	0.260	0.191	0.345	0.387	0.222	0.162	0.287	0.193	0.309	0.138						
SIN	0.362	0.234	0.075	0.091	0.072	0.457	0.221	0.231	0.180	0.599	0.066					
TRA	0.555	0.512	0.269	0.245	0.410	0.091	0.612	0.164	0.602	0.071	0.262	0.116				
UDV	0.580	0.501	0.500	0.565	0.600	0.239	0.520	0.156	0.486	0.379	0.314	0.149	0.479			
VSI	0.318	0.330	0.595	0.693	0.271	0.184	0.381	0.131	0.251	0.121	0.404	0.088	0.273	0.620		
CMIx VSI	0.063	0.145	0.306	0.258	0.183	0.132	0.038	0.030	0.028	0.138	0.057	0.048	0.039	0.159	0.354	

6.0 Testing of Hypotheses and Model Fit

This chapter is dedicated in favour of evaluating the structural model and its underpinning hypotheses. The evaluation is based on the integrated assessment of partial least squares structural equation modelling in hospitality research by Ali *et al.* (2018), in alignment with the context of this research, as well as Hair *et al.* (2021). Tests were performed using SmartPLS 4.0. The following table shows that most hypotheses were confirmed, which will be discussed in more detail throughout the conclusion chapter.

T-values were investigated making use of a one-tailed, 5.000 sample based bias-corrected and accelerated (BCa) bootstrapping procedure at a significance level of 0.05, in alignment with Hair *et al.* (2017), considering the rather complex appearance of the model as well as the single emphasis of hypotheses. Arthur (2022) issues that t-values should exceed 1.28, at the applied significance level, to indicate statistical relevance. Further, Hair *et al.* (2017) states f-squares of 0.02, 0.15 and 0.35 to respectively indicate low, medium and strong effects of exogenous onto endogenous constructs.

Table 29: Significance level and effect size (own; source: Hair et al.*, 2017; Arthur, 2022)*

T-value and significance level		**f^2-value and effect size**	
1.28	90% significance	0.02	Low
1.64	95% significance	0.15	Medium
1.96	99% significance	0.35	Strong

Table 30: Table of hypotheses and decision

H#	Hypotheses	Path coeff.	f-squares	t-values	Decision	Effect size
H1	Resilience positively influences rationalisation	0.151	0.031	2.755	Supported	Low to medium
H2	Transparency positively influences attitude towards technology	0.166	0.031	2.819	Supported	Low to medium
H3	Rationalisation mediates the association between attitude towards technology and a) transparency and b) privacy concerns	pls. see below				
H4	Privacy concerns negatively influence attitude towards technology	-0.066	0.007	1.221	Not supported	/
H5	Opportunity costs positively influence attitude towards technology	0.355	0.164	6.041	Supported	Medium to strong
H6	Reactance mediates the association between attitude towards technology and a) opportunity costs and b) perceived vulnerability	pls. see below				
H7	Perceived vulnerability positively influences attitude towards technology	0.145	0.023	2.308	Supported	Low to medium
H8	Perceived vulnerability positively influences adoption intention	-0.050	0.005	1.177	Not supported	/
H9	Resilience positively influences adoption intention	0.067	0.009	1.323	Supported	None to low

H10	Consumer motivational intensity moderates the association between variety-seeking intention and personalisation	0.100	0.022	2.334	Supported	Low
H11	Variety-seeking intention positively influences personalisation	0.168	0.036	2.759	Supported	Low to medium
H12	Personalisation mediates the association between attitude towards technology and a) switching intention and b) adoption intention	pls. see below				
H13	Attitude towards technology negatively influences switching intention	-0.196	0.023	2.167	Supported	Low to medium
H14	Attitude towards technology positively influences adoption intention	0.423	0.212	6.359	Supported	Medium to strong
H15	Utilitarian dining value positively influences switching intention	0.200	0.036	2.778	Supported	Low to medium
H16	Hedonic dining value positively influences switching intention	0.101	0.009	1.222	Not supported	/
H17	Utilitarian dining value positively influences adoption intention	0.197	0.070	4.028	Supported	Low to medium
H18	Hedonic dining value positively influences adoption intention	0.200	0.036	0.904	Not supported	/

The following table shows the mediation analysis for the hypotheses 3, 6 and 12. The analysis is conducted on the base of Zhao, Lynch and Chen (2010), proposed by Hair *et al.* (2017) leading to the individual finding with respect to mediation.

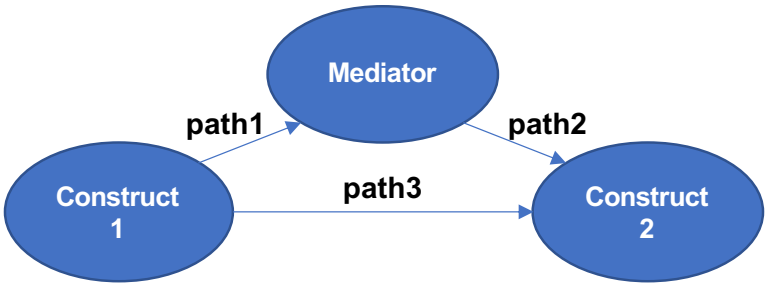

Figure 9: Simplified model for mediation analysis (own; source: Hair et al., 2017)

Mediation of rationalisation (hypotheses 3a and 3b):

#	Constructs	Path coeff.	f-squares	t-values	Decision	Effect size
1	TRA → RAN	0.521	0.364	9.728	Significant	Strong
2	RAN → ATT	0.273	0.085	4.772	Significant	Low/medium
3	TRA → ATT	0.166	0.031	2.819	Significant	Low/medium

The previous table shows that all paths are significant, and their emphasis is leading into equal directions. In consequence, complementary (partial) mediation can be claimed.

#	Constructs	Path coeff.	f-squares	t-values	Decision	Effect size
1	PCO → RAN	-0.007	0.000	0.088	Not sign.	/
2	RAN → ATT	0.273	0.085	4.772	Significant	Low/medium
3	PCO → ATT	-0.066	0.007	1.221	Not sign.	/

The mediation of rationalisation in the context of privacy concerns and attitude towards technology shows no significance of the paths 1 and 3, leading to the finding that no mediation can be claimed.

Mediation of reactance (hypotheses 6a and 6b):

#	Constructs	Path coeff.	f-squares	t-values	Decision	Effect size
1	OTC → REA	0.063	0.005	0.968	Non-sign.	/
2	REA → ATT	-0.149	0.026	2.565	Significant	Low
3	OTC → ATT	0.355	0.164	6.041	Significant	Med./strong

The mediation of reactance in the context of opportunity costs and attitude towards technology can be claimed to show competitive emphasis. Even though path 1 itself shows no significance, the equation of the indirect effect paths gives proof for significance. Further, the multiplication of all paths shows no positive effect, leading to the finding that competitive (partial) mediation can be derived.

#	Constructs	Path coeff.	f-squares	t-values	Decision	Effect size
1	PVU → REA	0.532	0.369	9.790	Significant	Strong
2	REA → ATT	-0.149	0.026	2.565	Significant	Low
3	PVU → ATT	0.145	0.023	2.306	Significant	Low

In terms of the mediating role of reactance with regard to perceived vulnerability and attitude towards technology, the table above shows that all paths provide significance but path 2 has a negative emphasis, leading to the finding that competitive (partial) mediation can also be claimed in this case.

Mediation of personalisation (hypotheses 12a and 12b):

#	Constructs	Path coeff.	f-squares	t-values	Decision	Effect size
1	ATT → PER	0.629	0.680	13.118	Significant	Strong
2	PER → SIN	-0.171	0.017	1.948	Significant	None/low
3	ATT → SIN	-0.196	0.023	2.167	Significant	Low

In this case, all paths show significance and the multiplication of all three paths leads into a positive result. In consequence, complementary (partial) mediation can be claimed.

#	Constructs	Path coeff.	f-squares	t-values	Decision	Effect size
1	ATT → PER	0.629	0.680	13.118	Significant	Strong
2	PER → AIN	0.296	0.101	4.562	Significant	Strong
3	ATT → AIN	0.423	0.212	6.359	Significant	Strong

In terms of the relationship between attitude towards technology, adoption intention and the mediating role of personalisation, the previous table shows that all paths are significant and positive, providing that complementary (partial) mediation is in effect.

Predictive power/model fit: In terms of assessing the model fit, Hair *et al.* (2017) propose to investigate Q^2 results, stating that predictive power is in effect in case these values exceed 0. Therefore, the PLSpredict calculation was conducted, using a 10-fold setting. In addition, Hair *et al.* (2021) state that RMSE (root-mean-square error) or MAE (mean absolute error) values are supporting assessment of the model's predictive power, considering the fulfilment of all indicators to lead to high predictive power, while the majority indicates medium predictive power, complemented by low predictive power in case the minority is fulfilled. This is conducted by comparing RMSE and the linear regression model's benchmark. This procedure led to the results stated in the table below, indicating medium predictive power across Q^2, RMSE and MAE.

Table 31: Predictive power/model fit

	Q^2predict	PLS-SEM_RMSE	PLS-SEM_MAE	LM_RMSE	LM_MAE
AIN1	0.271	1.291	1.069	1.361	1.098
AIN2	0.316	1.274	1.065	1.296	1.028
ATT1	0.272	1.020	0.821	1.126	0.885
ATT2	0.269	1.058	0.828	1.175	0.898
ATT3	0.221	1.093	0.882	1.205	0.958
ATT4	0.250	1.197	0.952	1.226	0.976
PER1	0.213	1.159	0.953	1.198	0.934
PER2	0.207	1.281	1.105	1.266	1.016
PER3	0.236	1.127	0.911	1.111	0.885
RAN1	0.297	1.192	0.964	1.332	1.065
RAN2	0.297	1.212	0.987	1.268	1.020
RAN3	0.285	1.246	1.030	1.331	1.062
REA1	0.246	1.259	1.014	1.303	1.046
REA2	0.304	1.125	0.900	1.161	0.914
REA3	0.116	1.430	1.231	1.428	1.160
SIN1	-0.011	1.416	1.204	1.409	1.113
SIN2	-0.007	1.467	1.277	1.405	1.126
SIN3	-0.020	1.419	1.219	1.446	1.173

7.0 Discussion and Conclusion

“Life is a matter of choices, and every choice you make makes you.” (John C. Maxwell)

This chapter discusses and presents the research findings, offering implications for both theory and practice.

7.1 Discussion of Findings

The research model provided insights into the way participants behave towards virtual assistants, rising the attention to the assessment of potential disbenefits as well as consequences associated with the adoption of virtual assistants. Even though the literature reveals that approaching the use of a specific technology is traditionally associated with issues like privacy concerns, the analysis of the conceptual model showed this element of risk assessments has no significant influence on the attitude towards virtual assistants. In addition, the structural model showed that the transparency associated with virtual assistants has a rather low influence on the assessment of these technologies. Even though privacy concerns were found to have no significant influence, neither direct nor mediated by rationalisation, some influence of rationalisation can be claimed with respect to transparency. This can be related to one of the cornerstones justifying this research: Casual conversations with non-professionals revealed a tendency to rationalise using virtual assistants on the base of comparing them to other technologies like smartphones or surveillance cameras. In addition, dialogue partners said to be aware of potentially being monitored but directly rationalised this on the base of knowing the limitations of voice processing or having nothing to hide. Relating findings and initial considerations to literature discussing that risk assessments are continuously becoming blurry in case of not directly experiencing consequences of technology adoption as well as information avoidance, limitations of voice interfaces, and paradoxical behaviour, it can be claimed that using virtual assistants leads to disregard traditional concerns over

time. This is amplified by the influence of resilience on rationalisation, indicating that the active process of rationalisation can partly be grounded on this specific character trait.

In terms of the relationship between opportunity costs, reactance and attitude, the model reveals that reactance has minor influence on attitude towards technology in contrast to opportunity costs. Further, the analysis shows that competitive mediation as well as a medium to strong direct effect of opportunity costs is in effect. Hence it can be derived that the attitude towards virtual assistants is influenced by missing relevant information about available venues in the close surrounding even though partly being aware that this investigation could be restricted. In addition, the significance of paths in the triangle between vulnerability, reactance and attitude indicates that individuals partly not perceive to be vulnerable when using virtual assistants but rather when not having the opportunity to use them. In this regard, literature indicated, with respect to other technologies, that technological services, in cases of not being available or not being in the reach of individuals, partly create unwelcome feelings.

Alongside the influence of vulnerability and resilience on rationalisation or attitude, the model tested the direct influence of these two factors on adoption intention. Directly relating these constructs to adoption intention was considered on the base of Kursan Milaković (2021), who considers these constructs as prerequisites of attempts to influence the way individuals behave. Therefore, companies are proposed to adapt their marketing or communication strategies. Even though the analysis shows that vulnerability has no significant influence on adoption intention, the construct resilience has some influence but to a negligible extent.

In terms of the association between personalisation and the contrasted behavioural intentions to adopt or switch from virtual assistants, the model shows that personalisation is a factor which influences the adoption or denial of virtual assistants but to a minor extent. In this regard, the model reveals that personalisation partly explains the path between attitude and the behavioural intentions. Further, considering the rather high R-square value of personalisation (0.476), it can be claimed that experiencing personalised

offers is of major importance for individuals, even though no major necessity or obligation to fulfil personalisation through virtual assistants exists. In addition, it can be seen that variety-seeking has influence on approaching personalised offers – moderated by the intensity to find the most promising one.

The model further demonstrates that switching intention (R-square of 0.100) is of minor relevance than adoption intention (R-square of 0.559). The comparison of these two opposing behavioural intentions reveals that individuals rather tend to adopt virtual assistants instead of switching to other means. This is supported by the open text box presented at the end of the survey, asking participants what means they would consider were they to attempt to avoid virtual assistants. The text box presented four different patterns of behavioural intentions towards virtual assistants: stating the means to be switched to when choosing to avoid virtual assistants (as inquired), and situational avoidance. These two essential patterns were complemented by the two extremes, which can be summarised as completely avoiding virtual assistants, or, in contrast, retaining the adoption of virtual assistants anyway.

Quantitatively assessed, a small number of answers were identified to present the complete avoidance of virtual assistants. These answers barely issued an explanation for their decision, although some participants answered that they had attempted to use virtual assistants in the past but stopped due to not being able to derive sufficient usefulness or because of the limited pace information can be inquired. These minorly appearing rational considerations were complemented by a statement that virtual assistants do not adequately fulfil emotional needs, due to the limited scope of information provided. Even though a few participants demonstrated this highly negative behaviour towards virtual assistants, the majority added a moderate view on virtual assistants in general, claiming to use other technological means, depending on the situation requiring the investigation of offers. These answers grounded on limited language processing abilities and service quality perceptions, or to the issue that virtual assistants do not communicate through other senses as for example to visually investigate information. These indications support

and explain the behaviour of striving for the adoption of virtual assistants rather than intending to switch from using them.

Complementary to previous considerations, the model investigated whether hedonic or utilitarian dining value have influence on the adoption or switching behaviour in order to raise additional insights for practice. Even though utilitarian showed a low influence on both opposing behavioural peculiarities, hedonic dining value had no significant effect.

In summary, the model gives proof for a rather intuitive adoption of virtual assistants and provides that ties between individuals and these technologies are stronger than rational reasoning can explain. Even though literature traditionally addresses privacy concerns, opportunity costs or vulnerability, the model reveals that participants partly showed vulnerability when considering the technology not to be available as well as to be concerned of potentially missing opportunities when not being able to use virtual assistants to substantiate a decision. In addition, the missing link between privacy concerns and attitude emphasises that the use of virtual assistants leads to slowly disregard potential privacy issues over the time. This is found to imply a perspective distant from traditional rational assessments. Further, the model points out that context-specific requirements of switching or adoption behaviour are of none to marginal relevance, which can be understood to reveal a rather intuitive behaviour towards virtual assistants. These findings can be claimed not only lead the bond between consumers and virtual assistants beyond the restrictions of planned or rational behaviour but also to the requirement to integrate these technologies into a service setting, probably having become significant actors for individuals.

7.2 Implications for Practice

This research was initially based on indications that technologies like virtual assistants have strengthened their power over consumers, and, in consequence, companies are widely forced to integrate them into their processes and, in particular, at consumer encounters. This was identified to be grounded on the finding that situational elements or rational reasons have no significant role – stimulated by becoming vulnerable or perceiving to have limited choice when virtual assistants are not available.

Even though it can be claimed that virtual assistants lead individuals to disregard traditional concerns or uncertainties, the model gives proof for some relevance of personalisation. In this regard, the analysis shows that personalisation has some influence on switching, while it has a rather strong emphasis on adoption. This finding is complemented by the influence of variety-seeking and the moderation of motivational intensity, which could, at first, be claimed to open some room for professionals attempting to limit or stimulate this behaviour. In this regard, the strong link between personalisation and adoption emphasises that approaching customers on personal levels through virtual assistants is rather goal-leading than the consideration of attempts to lead them to switching behaviour by the offer of personalised alternatives to virtual assistants. This is complemented by no or low influence of resilience and vulnerability when considering these two constructs to account for prerequisites of any consideration to inform individuals about potential disadvantages about virtual assistants in order to change their behaviour. For business associations, for example, the research gives additional prove that any attempt to limit consequences for individual companies is likely less successful when trying to change consumer behaviour through means like personalisation, even though it could be subject of discussion to address opportunity costs or transparency through company-own attempts – distant from traditional approaches in terms of issues like privacy concerns. Taken together, this research provides evidence for a rather strict adoption of virtual assistants, stimulated by no significant potential to influence this behavioural extent. Therefore, it is likely that attempts to limit the potential consequences

for companies appear less promising when considering traditional means associated with changing consumer behaviour.

7.3 Implications for Theory

From the theoretical point of view, the research demonstrates that virtual assistants have the potential to partly disrupt traditional approaches like technology acceptance, service quality or behaviour-related theories. In this regard, the research gives emphasis to discuss approaches like vulnerability from a perspective different from traditional attempts, stimulated by the finding that individuals are likely to become vulnerable when not being able to use virtual assistants. This may have a diametrical sound with respect to common literature, but it provides additional reasoning for casually reported behaviour, further giving proof for a strong adoption as well as a limited reflection. In this regard, adoption can be understood as a strong but likely unconscious behaviour, causing a high rather strict adoption of virtual assistant technologies.

In particular, it can be noted that the research emphasised the application of the concepts rationalisation, motivational intensity as well as resilience, currently being barely addressed in marketing or hospitality literature. In terms of reactance, the research offered an integrated review of this concept with respect to restaurant and hospitality contexts. In terms of rationalisation, the research showed that the concept could be valuable for marketing environments, especially when addressing it as a factor considering the potential immoral behaviour of others. In this regard, it could be valuable to understand rationalisation from the perspective of justifying the behaviour of companies which are offering a certain service to consumers, considering that consumers may tend to accept the behaviour due to being used to service adoption. Further, the integration of motivational intensity as a moderator is subject to reveal a potential for marketers who are considering the stimulation of the behaviour of consumers by offering means like personalisation, potentially enabling to influence or, at least in part, control factors like variety-seeking. Further, the research showed that resilience (alongside vulnerability) can be understood as a prerequisite of understanding whether consumers are receptive for

information against technology usage. In conclusion, the research is hoped to offer additional opportunities to understand the paradoxical appearing consumer behaviour towards technologies in more depth.

7.4 Limitations of the Research

The interpretation of research results is traditionally associated with limitations, which are substantiated on the individual context, access to data or other factors appearing throughout developing a research project (Sekaran and Bougie, 2016; Saunders, Lewis and Thornhill, 2019).

In this regard, it can be annotated that the research project is limited to the sample from the UK, which was approached through an online crowdsourcing platform. This consequently leads to inquire data from individuals being familiar with digital technologies. In addition, it can be claimed that the research is limited to the context applied, the specific technology as well as to the inquiry for behavioural intentions and attitude instead of assessing how individuals factually behave in terms of using virtual assistants. From the perspective of applied methods, it could be assumed to further verify findings through long-term or repetitive observations in conjunction with cross-sectional data analysis.

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Appendix: Measurement Scales

Measurement scales are adopted or adapted from literature sources. In case of adaption, minor changes were determined in alignment with the context of research as well as feedback from the pre- and pilot-test. Additional comments are provided directly under each construct. In general, pre-test participants partly discussed the wording to be redundant or unclear. In order to limit the influence of this potential issue, wording was partly changed to a minor degree and re-tested with other participants. In addition, pre-test participants claimed that the intention or context is already clear and might lead to some distraction or annoyance when continuously reading it in each of the items inquired. Therefore, it was determined to describe the situation in advance. After the finishing the questionnaire, other pre-test participants were asked, whether the situation was entirely clear to them when reading the questionnaire. This was further reassured with respect to Sun *et al.* (2013), partly describing the context in advance of items.

Table 32: Appendix/Measurement Scales

Construct	Item	Source items	Adopted/adapted	Source
Resilience	RES1	When things look hopeless, I never give up	When things look hopeless, I never give up	Kursan Milaković, 2021
	RES2	When under pressure, I can focus and think clearly	When under pressure, I can focus and think clearly	
	RES3	I think of myself as a strong person	I think of myself as a strong person	
	RES4	I can handle unpleasant feelings	I can handle unpleasant feelings	

	RES5	I think I am in control of my life	I think I am in control of my life	
RES: Adopted because of inquiring for the general character trait.				
Utilitarian dining value	UDV1	The best place to eat-out is one that is pragmatic and economical	Eating at restaurants is quick and easy	Park, 2004
	UDV2	It is a waste to spend a lot of money when eating-out	Eating at restaurants is saving money	
	UDV3	Eating-out should be simple and convenient	Eating at restaurants is convenient	
UDV: Adapted with respect to the pre-test, requiring more specific wording.				
Hedonic dining value	HDV1	Eating-out at the food truck was fun and pleasant	Eating at restaurants is special, rewarding and relieving	Shin, Kim and Severt, 2019
	HDV2	During the dining experience at the food truck, I felt the excitement of searching food	While eating at restaurants, I felt the excitement of trying new menus	
	HDV3	The mood and interior design of restaurants are important when eating-out	Eating at restaurants enables to see s.th. different	
	HDV4	Eating-out should be fun and pleasant	Eating at restaurants enables to find entertainment	

HDV: Adapted and minorly changed due to not inquiring for a specific restaurant setting (food trucks) as in the original source.				
Consumer motivational intensity	CMI1	I spend lots of time studying Chinese	I intensively investigate the location in order to find the most suitable restaurant	Feng and Papi, 2020
	CMI2	I am a diligent Chinese language learner	I am diligent in investigating the location in order to find the most suitable restaurant	
	CMI3	I put much time and effort into improving my Chinese language weaknesses	I put a lot of time and effort in investigating the most suitable restaurant	
	CMI4	I can break through any distractions when having important Chinese assignments to do immediately	*Not applied due to weak item in original source (0.44)*	
	CMI5	I concentrate on studying Chinese more than any other topic	*Not applied due to weak item in original source (0.40)*	
CMI: CMI1 and CMI3 were stated to be redundant (word “time”) by pre-test participants, leading to minorly change of CMI1.				
Variety-seeking intention	VSI1	I intend to change between technologies (Netflix or Cable TV) to have a little variety	I intend to change between restaurants to have variety	Bravo and Libaque-Saenz, 2017

	VSI2	I intend to continuously switch between technologies (Netflix or Cable TV) when consuming social media services	I intend to continuously seek for other available restaurants	
	VSI3	I intend to seek variety among technologies (Netflix or Cable TV) I am already familiar with	I intend to seek variety across restaurants I already know	
	VSI4	Overall, I intend to alternate between technologies (Netflix or Cable TV)	In general, I intend to alternate between restaurants	
VSI: Contextualised to restaurant variety-seeking.				
Transparency	TRA1	A brand's customer data management activities are: Unclear to me: Clear to me	The usage of my personal data is clear	Pallant *et al.,* 2022
	TRA2	A brand's customer data management activities are: Confusing: Straightforward	The usage of my personal data is obvious	

	TRA3	A brand's customer data management activities are: Difficult to understand: Easy to understand	The usage of my personal data is easy to understand	
	TRA4	A brand's customer data management activities are: Vague: Transparent	The usage of my personal data is transparent	
TRA: Changed to Likert scale to keep measurement consistent.				
Privacy concerns	PCO1	I am concerned that the information I submit to Tmall could be misused	I am concerned that personal information could be send to third countries	Chen *et al.,* 2019
	PCO2	I am concerned that others can find private information about me from Tmall	I am concerned that my personal information could be accessed by others	
	PCO3	I am concerned about providing personal information to Tmall because it could be used in a way I did not foresee	I am concerned that my personal information could be used in ways I didn't foresee	

PCO: Throughout the pre-test, participants independently claimed that items were redundant, leading to some confusion. Therefore, PCO1 was changed to a more concise and exemplary base under the consideration of literature findings about virtual assistants (lit. review, e.g., Warnke (2021)). Wording was re-tested, showing no further issues.				
Opportunity costs	OTC1	When using OPA on Tmall, I am concerned that Tmall is determining what I see so that I would not be able to access alternative information	Virtual assistants could determine my preferences so that I could miss other information	Chen *et al.,* 2019
	OTC2	When using OPA on Tmall, I am concerned that OPA offered by Tmall only presents what I seem to like so that I cannot see alternative information later	Virtual assistants lead to only receive information I probably prefer	
	OTC3	When using OPA on Tmall, I am concerned that OPA offered by Tmall may not be my preference so that I cannot see alternative information I like	Virtual assistants lead to potentially miss other good information	

OTC: Items were stated to be redundant ("alternative information") by pre-test participants, leading to minor changes in wording.				
Attitude towards technology	ATT1	Using self-check-in kiosks is helpful	Using virtual assistants is helpful	Feng *et al.,* 2019
	ATT2	Using kiosks is a more convenient way to check-in	Using virtual assistants is comfortable	
	ATT3	Using self-check-in kiosks is timesaving	Using virtual assistants is saving time	
	ATT4	Self-check-in is a good way to check-in	Using virtual assistants is a good way to investigate information	
ATT: Contextualised to virtual assistants.				
Personalisation	PER1	"My bank" offers me products and services that satisfy my specific needs	Using personalised virtual assistants to find restaurants enables me to satisfy my specific needs	Ball, Coelho and Vilares, 2006
	PER2	"My bank" offers products and services that I couldn't find in another bank	Using personalised virtual assistants to find restaurants enables to find restaurants I couldn't find otherwise	
	PER3	If I changed from banks I wouldn't obtain products and services as personalized as I have now	Using personalised virtual assistants to find restaurants leads to obtain restaurants as personalised as I couldn't in case I would step back from using them	
PER: Contextualised to virtual assitants.				

Perceived vulnerability	PVU1	I am at risk for suffering the stated problems	When using virtual assistants, I am at risk of being limited in terms of not being able to choose the most promising restaurant	Sun *et al.,* 2013
	PVU2	It is likely that I will suffer the stated problems	When using virtual assistants, it is likely that my ability to choose a suitable restaurant is influenced	
	PVU3	It is possible for me to suffer the stated problems	When using virtual assistants, my restaurant choices are probably controlled	
PVU: The original source described the problem leading to vulnerability prior to individual items. The specific context was included at this point.				
Rationalisation	RAN1	It is alright to pay below average prices to preserve one's welfare	It is alright to be potentially limited by virtual assistants when seeking for restaurants due to they offer other benefits	Narwal and Rai, 2022
	RAN2	It is ok to pay zero prices to take care of one's family needs and welfare	Due to virtual assistants fulfil their purpose, I don't mind potentially being limited in terms of seeking for restaurants	

	RAN3	It is alright to make unjustifiable payments to promote my family's welfare	It is alright to receive potentially limited recommendations	
RAN: Pre-test participants stated the items to be partly redundant ("it is okay"/"it is alright"), leading to minor changes.				
Reactance	REA1	The message threatened my freedom to choose	When using virtual assistants for seeking for restaurants they threaten my freedom of choice	Kang, Piao and Ko, 2021
	REA2	This message tried to restrict my daily life	When using virtual assistants for seeking for restaurants they restrict the number of restaurants I can find	
	REA3	This message gives me a feeling of threatening my freedom	When using virtual assistants for seeking for restaurants they give me a feeling of threatening my freedom	
REA: Contextualised to virtual assistants.				
Adoption intention	AIN1	Assuming I have access to a smart voice assistant next time I stay in Airbnb, I am likely to use it	Assuming I intend to visit restaurants in the next half year, I am likely using virtual assistants	Cao *et al.,* 2022

	AIN2	In the future, I intend to book Airbnb accommodation featuring a smart voice assistant	Assuming I intend to visit restaurants in the next half year, I intend to use virtual assistants	
AIN: Contextualised to virtual assistants. In addition, a specific time frame for outcome variables was integrated in order to mitigate potential influences of changing behaviour, as consumer studies emphasise (e.g., Ajzen (2011), Cao et al. (2022), Yuen et al. (2022))				
Switching intention	SIN1	Rate the probability that you would switch to another hotel the next time you travel to this location Improbable... Probable	In case of considering dining at a restaurant in the next 6 months, I will probably switch to other means than virtual assistants	Han, Kim and Hyun, 2011
	SIN2	Rate the probability that you would switch to another hotel the next time you travel to this location Unlikely... Likely	In case of considering dining at a restaurant in the next 6 months, I will likely avoid using virtual assistants and try other means	

	SIN3	Rate the probability that you would switch to another hotel the next time you travel to this location. No chance... Certain	In case of considering dining at a restaurant in the next 6 months, there is a high chance of switching to other means	
SIN: Changed to Likert scale to keep measurement consistent. Integrated a timeframe under the same consideration as for AIN.				