

The Gamified Tourist Experience

Meaningful Interaction with Gamified Technology in the Tourist Experience

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ABSTRACT

Personally meaningful tourist experiences foster subjective mental wellbeing. Modern, human-centred technologies such as gamified technology have been recognised as a promising means to support tourists in their co-creation of meaningful tourist experiences. However, a deeper understanding and conceptualisation of tourists' engagement with gamified technologies in the tourist experience has remained absent so far.

This study draws on positive psychology as the guiding theoretical lens to conceptualise and explore tourists' underlying motives for engaging with gamified technology, as well as the gratifications thereof for the tourist experience. In doing so, this thesis identifies how tourists generate meaning through interacting with gamified technology in the tourist experience, thereby fostering the co-creation of meaningful tourist experiences and contributing to subjective mental wellbeing. Being among the first studies to link the concepts of positive psychology, gamified technology, and tourist experiences, the results of this thesis provide rich findings on the underlying motives for tourists to engage with gamified technology during vacation, as well as the gratifications of gamified technology for the creation of meaning in the tourist experience.

Using the theoretical lens of positive psychology and achievement motivation theory as the main theoretical underpinning, this study is positioned at the intersection of social psychology, human-computer interaction, and tourism as the field of application. Conceptually, this thesis provides an in-depth understanding of tourists' engagement with gamified technology, including the socio-psychological motivators for engagement and the outcomes thereof for the tourist experience.

This thesis contributes to the theoretical advancement of two principal streams: a) tourists' motives for engaging with gamified technologies and the gratifications thereof in the vacation context and b) the understanding of motivational affordances of gamified technology in general. The substantial theoretical contribution of this study is the advancement of knowledge as it demonstrates the value of gamified technologies in the tourist experience. The findings eventually provide tourism destinations with nuanced insights into the feature-specific values of gamified technology to contribute to the co-creation of meaningful tourist experiences.

Keywords: Meaningful human-computer interaction, gamified technology, users' motives, gratifications of use, digital engagement, tourist experience, wellbeing

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Paul

&

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LIST OF ABBREVIATION

E.g.	Exempli gratia (meaning 'for example')
ICT	Information and communication technology
I.e.	Id est (meaning 'that is')
RQ	Research question(s)
S-O-R	Stimulus-organism-response
TAM	Technology acceptance model
U&Gs	Uses and gratifications

1 INTRODUCTION

“Will it make life better?” (Calvo & Peters, 2014, p. 1). This is what Apple claims to ask of their technologies. The key message that resonates from this question is both simple and far-reaching: a technology should actively help improve the wellbeing of individuals, society, or even the planet as a whole (Calvo & Peters, 2014).

1.1 General Background

In recent years, the role of technology has shifted from a tool that emphasises functionality and efficiency to one that actively mediates human experiences (Rosenberger & Verbeek, 2015; Verbeek, 2015). Today’s era of human-computer interaction can be characterised as one in which technology is expected to contribute to individual wellbeing – an era that gradually leaves behind the strong mechanical push for productivity and efficiency (Calvo & Peters, 2014). Questions considered central in this era are ‘How does technology affect users’ experiences?’ and ‘How does it affect users’ emotions?’ Thus, human-computer interaction is now as much about how people feel when interacting with technology as it is what people do (McCarthy & Wright, 2004). The development of technology to support human wellbeing and foster human potential is referred to as ‘positive computing’ (Calvo & Peters, 2014).

The desire to “do good with technology” has emanated from the shared experience that technology has a major impact on how people live their lives (Calvo & Peters, 2014, p. 1). As such, technology has the capacity not only to increase stress, but more importantly, to improve lives individually and en masse (Calvo & Peters, 2014). The interest in making life better through technology has gained relevance with the stronger embedment of technologies in humans’ everyday lives and leisure. With the shift from clearly defined work contexts to everyday life and leisure contexts, however, questions regarding human-computer interaction have also become considerably more complex (Fallman, 2011). In everyday life and leisure contexts, more emphasis is placed on the complexity of everyday life, considering the emotions, experiences, and values of human life. Technology has become a matter of human experience (McCarthy & Wright, 2004). This inevitably requires a more in-depth understanding of *why* and *how* people interact with technologies in certain life situations and contexts.

Along with the shift into humans’ everyday lives has come a human-centred mindset when understanding and designing technology for various aspects of people’s lives. As a result, technologies have rapidly become enhanced with digital capacities such as ‘smart’ behaviour and

interactive features (Fallman, 2011). Modern technologies that consider human values in their design are known as human-centred technologies. These technologies integrate those psychological needs and values that are central to human existence in their design (Zhang, 2007). By integrating human values in their design, human-centred technologies aim at engaging users in a meaningful way and stimulating positive experiences. Such technologies are characterised as ‘persuasive’ or ‘motivational’.

As a form of human-centred design, persuasive technologies seek to engage their users on a deeper level of cognition by including motivational mechanisms and thereby fostering meaningful experiences (Deterding, 2011; Hamari, Koivisto, & Pakkanen, 2014b). One specific example of persuasive technology is gamified technology. With their focus on human needs and values, gamified technologies tie in with the notion of technology for wellbeing (Brey, 2015) and positive computing (Calvo & Peters, 2014). The end goal of these technologies is to stimulate and reinforce individually beneficial behaviour, thereby surpassing mere entertainment purposes.

The potential for such modern technologies to contribute to personally meaningful experiences has been emphasised in the literature (Hamari, Koivisto, & Pakkanen, 2014a; Mekler & Hornbæk, 2016). Persuasive and gamified technologies have been noted to be particularly beneficial in contexts related to health and wellbeing (Johnson et al., 2016). Tourism, particularly the pleasure vacation as a highly emotional context appears particularly promising as it represents a context that seeks to build individual wellbeing according to tourists’ personal needs and values. Despite the recognised potential, however, in-depth knowledge regarding tourist’ experiences and goals in interacting with modern human-centred technologies, such as gamified technologies, is still lacking.

Understanding the interactions between humans and technology has become a central topic of research in general. This particularly refers to understanding humans’ experiences and goals in interacting with human-centred technology (Calvo & Peters, 2014; Johnson et al., 2016; Wan, 2018). As interactions occurring between humans, their environments, and technologies have become more multifaceted with a deeper embedment in people’s everyday lives and leisure time, a more in-depth understanding of people’s interactions with human-centred technologies is necessary. A more in-depth understanding of users’ experiences and goals in interacting with human-centred technologies is vital for the advancement of the field of human-computer interaction in general, as well as fields related to health and wellbeing, such as tourism, in particular.

This doctoral thesis comprises three individual studies which contribute to the overall topic of tourists’ goals and experiences in interacting with gamified technology in the tourist experience. By moving beyond questions of usability and focussing on questions related to motivations, emotions,

and experiences in human-computer interaction in tourism, this thesis contributes to the generation of knowledge on tourists' deeper engagement with gamified technology in the specific context of a pleasure vacation. In doing so, this thesis seeks to bring tourism research in line with the next level of technology use. Overall, this thesis ties in with the question of how technology facilitates tourists' achievement of personally meaningful goals during vacation, thereby contributing to tourists' overall experience. With this knowledge, the thesis aims at advancing tourism research and, by extension, the tourism industry.

1.2 Rationale for the Study

The quest for *meaning* and *personal value* in tourists' experiences has recently gained increasing attention in the tourism-related literature. Experiences personally perceived as meaningful contribute to tourists' overall wellbeing because they satisfy implicit psychological needs (Filep & Higham, 2014). In this regard, a growing body of scholars have emphasised the relevance of persuasive technologies in supporting tourists in their interaction with tourism settings (Tussyadiah, 2017), thereby contributing to tourists' meaning-creation and generating positive experiences. Specifically, gamified technologies have been noted as valuable for tourists' co-creation of meaningful experiences (Bulencea & Egger, 2015).

Gamified technologies – commonly associated with the term 'gamification' – can be defined as “the use of game design elements in non-game contexts” (Deterding, 2011, p. 1). Derived from the concept of games, gamified technologies integrate motivational mechanisms into their design with the aim to shape actions and behaviours (Bogost, 2007; Hamari et al., 2014a; Johnson et al., 2016). As such, meaningful gamified technology mainly seeks to address users' intrinsic motivations based on individual psychological needs (Ryan, Rigby, & Przybylski, 2006). Accordingly, the values inherent to gamified technologies are typically considered to afford experiences of autonomy, competence, and relatedness.

Despite the recognised potential of gamified technology in tourists' co-creation of meaningful experiences, however, an in-depth understanding of tourists' interactions with gamified technology during vacation is still lacking. In particular, there is a lack of research on tourists' underlying motivations and ultimate goals in engaging with gamified technology during vacation. Moreover, tourists' perceived outcomes including behavioural and psychological gratifications from interacting with gamified technology have not yet been explored in the context of the tourist experience. This is unfortunate as psychology has provided rich evidence that the satisfaction of psychological needs

(Ryan & Deci, 2000b) and experiences of *meaning* contribute to people's wellbeing (Hadden & Smith, 2019; Huta & Ryan, 2010; Ryff & Singer, 2008; Steger, 2012).

The few studies that have investigated tourists' use of gamified technology (Liu, Wang, Huang, & Tang, 2019; Xu, Tian, Buhalis, Weber, & Zhang, 2016) do not provide a deeper psychological understanding of why tourists engage with gamified technology and how the gamified technology plays a role in tourists' co-creation of meaningful experiences. In general, personal mobile information and communication technology (ICT) has become an integral part of tourists' interaction with tourism environments and settings. With tourists' increasing use of personal ICT during vacation (Wang, Xiang, & Fesenmaier, 2014; 2016), it is vital to better understand how human-centred technologies can facilitate tourists' creation of personal meaning, consequently contributing to the overall tourist experience. Gamified elements, which can be embedded in the existing technological settings in tourism destinations and used on personal mobile technology, represent new interaction opportunities for the tourists in their quest for meaningful experiences.

Thus far, a vast amount of research in tourism has primarily focussed on questions related to *single usage of general ICT* in the tourism experience (e.g., Neuhofer, 2014; Neuhofer, Buhalis, & Ladkin, 2015b; Wang, Park, & Fesenmaier, 2012) or has concentrated on the company perspective of smart ICT use in tourism (Neuhofer, Buhalis, & Ladkin, 2015a). Consequently, research in tourism has mainly been guided by an overly function-related perspective on human-computer interaction. In this regard, it has been demonstrated that mobile ICT plays an important role in the tourist experience in terms of greater flexibility and convenience through time and location-independent access to information, as well as the ability to make purchases on the go (Wang et al., 2014; 2016). It has also been shown that the use of mobile ICTs while travelling and on vacation mediates the tourist experience in multiple aspects, including movement, more short-term decisions, unplanned behaviour, and communication with distant social networks, overall resulting in a changed travel behaviour (Dickinson et al., 2014; Kennedy-Eden & Gretzel, 2012; Lamsfus, Wang, Alzua-Sorzabal, & Xiang, 2015; Wang et al., 2012; Wang et al., 2016).

In contrast to general ICTs, gamified technology taps into questions of how to *engage* tourists on a deeper cognitive level. As such, investigating tourists' engagement with gamified technology is about delving into the deeper emotional layers of mobile ICT use in tourism. Engagement is generally targeted at establishing a deeper connection and longer-lasting relationship with users through technology. On the user side, engagement is expected to result in positive outcomes through the creation of personal meaning and positive experiences, eventually leading to an increased customer value (Zichermann & Cunningham, 2011). The creation of meaning through engagement with

gamified technology directly contributes to individual mental wellbeing (Mekler & Hornbæk, 2016; Mekler & Hornbæk, 2019). Moreover, meaningful experiences are generally marked by higher emotional involvement and more frequent rehearsal (Talarico & Rubin, 2003) and are therefore more memorable than regular experiences.

On the supplier side, successful engagement encourages value-creating behaviours such as continuous user engagement in the gamified system, increased willingness to pay, greater loyalty, and product advocacy to the supplier (Blohm & Leimeister, 2013; Harwood & Garry, 2015; Zichermann & Cunningham, 2011). Consequently, integrating gamified technologies in tourism settings is valuable for both the tourist and the tourism supplier. A deeper understanding of tourists' engagement with gamified technology provides tourism destinations with knowledge on how to engage tourists in a meaningful way and helps advance gamified design.

Limitations of Previous Studies

When it comes to the general question of why people interact with gamified technology, existing studies from the field of human-computer interaction do not provide sufficient explanation. In the game-related literature, several studies in the field of human-computer interaction have emphasised that there is a general need to better understand why people choose to interact with gamified technology in the first place (Koivisto & Hamari, 2019; van Roy, Deterding, & Zaman, 2018). Those studies that have investigated users' motivations for engaging with gamified technologies in fields other than tourism largely tested motivations already known from general gameplay (Hamari & Koivisto, 2015b; Hamari & Koivisto, 2015a; van Roy & Zaman, 2018). These motivations include the need for autonomy, competence, and relatedness based on the self-determination theory (Ryan et al., 2006). In voluntary contexts, however, self-determination might be neither the sole nor a sufficient explanation for why people choose to interact with games or gamified technologies. Users' underlying motivations and ultimate goals may be more multifaceted than the generic needs for autonomy, competence, and relatedness.

Humans have their own goals and intentions independent of technology use (Tromp, Hekkert, & Verbeek, 2011; Verbeek, 2015). Therefore, the values inherent in and offered by gamified technologies largely depend on how people perceive them and the ultimate goals they associate with them. Similarly, Ryan et al. (2006) argue that investigated game motivations often largely reflect the structure and content of current game technology, rather than the underlying motives of users that spark participation among all potential players. Motivation research on games should thus address those factors associated with enjoyment and persistence related to engagement in games.

Moreover, existing literature on gamified technology use has, thus far, predominantly focussed on the effectiveness of gamified technology, overlooking users' personal goals in engaging with said technology (Koivisto & Hamari, 2019). Research into the effectiveness or the persuasive power of gamified technology is only interested in determining whether the technology succeeds in initiating or shaping certain actions and behaviours in the real world. Again other studies have investigated motivations in a pre-determined way using only quantitative measures (Hamari & Koivisto, 2015b; Hamari & Koivisto, 2015a). Such approaches may lead to rather reductionist findings.

Finally, the person who the gamified technology is targeted at should not be merely seen as a 'user' or 'experiencer' of the technology. Rather, users should be considered as humans who use technologies to optimally realise their own goals and intentions (Brey, 2015). This view goes hand in hand with the perspective of positive psychology and technology for human wellbeing (Brey, 2015). Understanding humans' needs beyond the momentary interaction with the technology is particularly relevant in contexts related to health and wellbeing. Health and wellbeing contexts, such as pleasure vacations, allow for human flourishing and the fostering of those goals and values which are truly meaningful to the individual (Filep & Pearce, 2014b; Packer & Gill, 2017).

Following the suggestion of Ryan et al. (2006), this thesis investigates gamification engagement using a bottom-up approach to explore tourists' underlying motives and, consequently, their perceived gratifications of gamified technologies in the tourist experience. In doing so, this study draws on motivation theories as a loose theoretical framework. The motivations that human-centred technologies are generally considered to afford are called 'motivational affordances' in human-computer interaction research (Zhang, 2007; 2008). This study specifically draws on motivation theories that are particularly relevant to the social context of use and the activity at which the gamified technology is targeted.

The overall research need that motivates this doctoral thesis can be divided into three levels of enquiry: theoretical, methodological, and practical.

Theoretical level of inquiry

There is a need for:

- a deeper psychological understanding of tourists' engagement with gamified technology in the context of a pleasure vacation.
- insights into the underlying reasons why tourists engage with gamified technology during a pleasure vacation. With that, this study contributes to knowledge of the motivations that

gamified technologies afford in tourism contexts. New theoretical frameworks that more specifically consider the context of use and the social dynamics therein are necessary.

- knowledge regarding the persuasiveness of gamified technology in contributing to individually beneficial behaviour through behavioural activation. Behavioural activation represents the outcome of engaging with the gamified technology.
- knowledge of the behavioural and psychological gratifications of gamification engagement in the tourist experience.
- insights into the personal meaning and deeper emotional values of gamified technology for the tourist experience and, with that, overall knowledge of the gamified tourist experience.

Methodological level of inquiry

There is a need for:

- exploratory approaches to investigate tourists' motives for engaging with gamified technology to allow for motives not inherent in the design of gamified technology and not yet considered by the typical motivational affordances framework of gamified technology.
- surveying, on a broader level, the explored motives of tourists who interacted with gamified technology.
- connecting all phases related to interacting with gamified technology. These phases include tourists' motives for engagement, the process of engagement itself, the behavioural outcomes of engagement, and the psychological outcomes in terms of an overall evaluation of the value of gamified technology for the tourist experience.
- samples that include tourists who have had the relevant experiences with gamified technology in a pleasure vacation context. This is in contrast to the more predominant student samples that have been used in tourism research related to this topic.

Practical level of inquiry

There is a need for:

- knowledge of how gamified technology helps to engage tourists on a deeper level of cognition.
- knowledge of the values that can be derived from the single game elements of the tourist experience.
- knowledge of the feature-related, technical contents of gamified technology relevant for meaningful tourist experiences.

This thesis contributes to research on human-computer interaction in the context of tourism. Knowledge regarding a) tourists' motivations for engaging with gamified technology during vacation and b) tourists' perceived behavioural and psychological gratifications from engaging with gamified technology during vacation contributes to the advancement of the following streams:

- The understanding of motivational affordances of gamified technology in general and, more specifically, in relation to tourism contexts.
- The persuasiveness of gamified technology in fostering individually beneficial behaviour.
- The value of gamified technology in tourists' co-creation of an overall meaningful tourist experience.

1.3 Overall Aim and Research Questions

The overarching aim of this thesis is to explore the underlying values of gamified technology for the tourist experience. This aim is tightly coupled with the question of how tourists can be engaged through gamified technologies and what the gratifications of engagement with gamified technologies are in the tourist experience. The answers to these questions contribute to the exploration of the *gamified tourist experience*.

Overall research aim

To explore the underlying values of gamified technology for the tourist experience.

In particular, this thesis seeks to investigate 1) tourists' underlying motives for engaging with gamified technologies during a pleasure vacation and 2) the behavioural and psychological gratifications of tourists' engagement with gamified technologies for the tourist experience. The overall aim of this research is addressed in the following two ways.

First, it is addressed by conducting two studies in the pleasure vacation context which address tourists' underlying motives for engaging with gamified technology while on vacation. Based on that, this thesis then investigates tourists' perceived outcomes in regard to the tourist experience on a behavioural and psychological level. In this way, this study challenges existing knowledge on gamification in the field of human-computer interaction. By exploring the reasons for tourists' engagement with gamified technology, the two studies uncover underlying motivations that gamified technology affords in the tourist experience. Tourists' perceived behavioural and psychological gratifications of engaging with gamified technology during vacation provide knowledge on the consequences and the value of this technology for the overall tourist experience. From a tourism

destination perspective, this doctoral thesis accordingly explores how gamified technology helps to engage tourists on a deeper level of cognition during vacation and how engagement with gamified technology relates to the overall tourist experience.

Second, the research aim is addressed by using positive psychology as a guiding theoretical lens to approach, study, and analyse tourists' interactions and experiences with gamified technology during vacation and, consequently, the values of gamified technology for the tourist experience. Positive psychology deals with questions of human wellbeing. Central to this view of human wellbeing is that people actively seek out enjoyable activities for the satisfaction of intrinsically valued states with the goal to maximise their overall wellbeing (Seligman, 2011). The underlying assumption of the positive psychology perspective links with the expectancy-value theories of motivation, which postulate that people seek to achieve desirable consequences and avoid negative ones (Atkinson & Feather, 1966). The lens of positive psychology is considered to be particularly appropriate because it focusses on fostering human wellbeing and creating positive experiences. On a subjective level, positive psychology relates to valued subjective experiences (Seligman & Csikszentmihalyi, 2000).

Motivated by this overall research aim, the two overarching research questions that guide this doctoral thesis can be summarised as follows:

Guiding research questions

Why do tourists engage with gamified technologies while on a pleasure vacation?

What are the behavioural and psychological gratifications of engaging with gamified technology for the tourist experience?

Based on this overall aim and the guiding research questions, primary importance is assigned to tourists' experiences and their perceptions of both the interaction process itself and interaction outcomes in this thesis.

Research Questions and Sub-Goals of Studies 1–3

Study 1 lays the foundation, with the goal to provide a general understanding of the main factors that contribute to individual mobile ICT adoption and use. Based on this goal, Study 1 identifies, appraises, and synthesises knowledge on individual mobile ICT adoption and use by means of a systematic literature review. In doing so, the first study maps the field of mobile ICT adoption research from a user-centred perspective. In the context of this thesis, Study 1 can be considered a preliminary study following a broad approach to facilitate a general understanding of the main factors contributing to people's *use* of mobile ICT.

The second and third studies then work more specifically and in-depth on understanding people's *engagement* with mobile ICT. The focus thereby lies on human-centred technologies, namely gamified technologies. Study 2 explores tourists' ultimate goals in engaging with gamified technology during a pleasure vacation. Based on the results of the exploratory Study 2, Study 3 conceptualises tourists' engagement with gamified technology and the outcomes thereof for the tourist experience. Based on this conceptualisation, socio-psychological motivators for engaging with gamified technology and the behavioural and psychological outcomes thereof for the tourist experience are investigated.

Overall, with the three included studies, the thematic composition of this thesis is representative of the theoretical and conceptual advancement of the field of human-computer interaction in recent years. The topical focus of the three studies is an indication of the shift from general questions related to adoption and use of mobile ICTs to questions related to deeper engagement with mobile ICTs. As such, this thesis can be considered representative of the shift from questions of usage, utility, and usability to questions of engagement, emotions, and meaning within the field of human-computer interaction.

Table 1 summarises the research questions (RQs) addressed in this thesis on the two levels of inquiry: the *usage level* and the *engagement level*.

Research questions addressed in this thesis
<i>Usage level</i>
RQ1: What factors contribute to individual mobile ICT adoption and use?
<i>Engagement level</i>
RQ2: What are tourists' motives for engaging with gamified technology during vacation?
RQ3: What are the socio-psychological motivations underlying tourists' engagement with gamified technology?
RQ4: What are the behavioural and psychological gratifications of tourists' engagement with gamified technology for the tourist experience?

Table 1: Research questions addressed in this doctoral thesis.

The remainder of this section presents in detail how the RQs of the three studies were derived. Moreover, the sub-goals of the three studies are discussed.

Study 1: What factors contribute to individual mobile ICT adoption and use?

Mobile ICT has become a fundamental part of today's society. In particular, the use of the smartphone and the time spent on said device has increased rapidly over recent years (ComScore,

2017). An important reason for the increasing popularity of the smartphone relates to its time- and space-independent use, as well as the various activities that can be performed on the device. In short, the smartphone plays a decisive role in people's everyday social interactions and social dynamics (Carolus et al., 2019; Vorderer, Hefner, Reinecke, & Klimmt, 2018).

Despite the rapid general growth of mobile ICT use, individuals are often hesitant to adopt certain mobile services. For instance, services related to mobile learning (Alrasheedi, Capretz, & Raza, 2015; Liu, Han, & Li, 2010), mobile banking (Ha, Canedoli, Baur, & Bick, 2012; Sitorus, Govindaraju, Wiratmadja, & Sudirman, 2016), and mobile health (Deng, Mo, & Liu, 2014) are adopted more slowly than other mobile services. Consequently, knowledge of the key determinants of people's adoption has become of major interest for the suppliers of mobile ICT services. Especially in a time when the permanent availability and use of the smartphone has become the 'new normal' (Ericsson, 2017), mobile services represent great potential for new business opportunities in the field of mobile commerce. Therefore, for the industry to grow further, it has become essential to know what factors influence people's adoption of mobile ICTs.

Understanding why people adopt certain mobile services while rejecting others is challenging. In this regard, there is not only a need for in-depth knowledge of the key determinants of individual mobile ICT adoption and use from an industry-related perspective, but from a research perspective in particular. Well-known researchers in the field of ICT adoption and use have pointed out that "the field is at the threshold of crisis, if not chaos, in regard to explaining technology acceptance" (Bagozzi, 2007b, p. 244). A paradigm shift in the field of ICT research is requested by several researchers (Bagozzi, 2007b; Benbasat & Barki, 2007; Benbasat & Zmud, 2003). The 'crisis' seems to be ongoing, with inconsistencies in findings and fragmented knowledge in recent ICT adoption research (Gangwar, Date, & Raoot, 2014; Kim, 2014; Sanakulov & Karjaluoto, 2015).

Many studies have been conducted to obtain answers on the question of what factors explain individual adoption and use of mobile ICT. However, a holistic understanding of the key determinants of individual mobile ICT adoption and use is still missing. In this respect, it must also be noted that personal mobile ICTs, including the smartphone, are closer to the individual user than are traditional technologies (Arbore, Soscia, & Bagozzi, 2014). Thus, adoption factors might have become more user-centred in recent years, reaching beyond the functional level of mobile ICT adoption. It is therefore the aim of Study 1 to provide a concise overview of the prevalent factors contributing to individual mobile ICT adoption and use.

Although the question of why individuals adopt technologies has been an enduring one in information systems research (Hirschheim, 2007), a well-arranged, holistic survey of the explanatory

variables of mobile ICT adoption is still missing. The few literature reviews that have been conducted on mobile ICT adoption (Aldhaban, 2012; Ovčjak, Heričko, & Polančič, 2015; Sanakulov & Karjaluoto, 2015; Shaikh & Karjaluoto, 2015) are insufficient for several reasons – either they include only quantitative studies in their review to identify the most significant drivers of adoption (e.g. Ovčjak et al., 2015) or they only focus on one specific type of ICT, such as mobile banking (e.g. Shaikh & Karjaluoto, 2015). What remains missing is a holistic overview of the key determinants of mobile ICT adoption across disciplines and technologies. This necessity motivates the first study of this thesis.

Accordingly, Study 1 maps the field of mobile ICT adoption research by systematically collecting, appraising, and synthesising studies on individual mobile ICT adoption. In so doing, a holistic overview of the field of research is outlined and an in-depth understanding of the main factors contributing to individual mobile ICT adoption is provided. Based on the synthesis of the knowledge on mobile ICT adoption, suggestions for future research are derived.

Transition from Technology Use to Technology Engagement

The questions related to adoption and use addressed in Study 1 do not consider user engagement. Thus, studies related to this field of research are not necessarily interested in a deeper understanding of the *why* behind usage. Rather, they are primarily concerned with decision-making processes and are interested in determining whether or not a product is being adopted. By only considering the behavioural act of adoption, an underlying perspective that views the adoption of technology as an end in itself is taken (Bagozzi, 2007b).

Over time, however, the role of technology has shifted from a neutral tool that facilitates operations and transactions (Buhalis, 2003) to one that actively mediates human experiences and influences decisions and behaviours (Rosenberger & Verbeek, 2015; Verbeek, 2015). The underlying rationale for this shift in human-computer interaction is the recognition that technology plays an active role in fostering individual wellbeing (Brey, 2015), providing more than a solely functional value for humans. Technology is thereby aimed at providing meaning to humans and helping them optimally realise their goals beyond interaction with the system.

Modern technologies such as gamified technologies exceed the single usage level with the aim to engage users on a deeper level of cognition. As such, questions surrounding human-computer interaction have become more focussed on fundamental human needs and values. Studies 2 and 3 of this thesis accordingly deal with questions related to the next level of technology use – the level of *engagement*. The human-centred perspective underlying this shift seeks to generate knowledge on

how users can be involved on a deeper level of cognition by interacting with technologies. Guided by the human-centred perspective, Studies 2 and 3 add to the general discussion on how tourists can be engaged through gamified technology during a pleasure vacation.

***Study 2:** What are tourists' motives for engaging with gamified technologies during a pleasure vacation?*

Gamified technologies have been pointed out as a promising means to foster tourists' engagement with tourism settings during travels and vacation, leading to more rewarding interactions, as well as increased brand awareness and customer loyalty (Xu, Buhalis, & Weber, 2017). In particular, scholars have emphasised the potential for gamified technology to promote positive emotions and facilitate tourists' co-creation of personally meaningful experiences (Bulencea & Egger, 2015; Xu et al., 2016). As a result, gamified technology has the potential to contribute to memorable tourist experiences (Bulencea & Egger, 2015; Xu et al., 2017).

Despite this general knowledge, little is known about tourists' underlying motivations for engaging with gamified technologies during a vacation. In fact, Xu et al. (2016) and Liu et al. (2019) are among the only researchers to have investigated tourists' engagement with gameplay and gamified technology. In regard to the aim of this thesis, however, these studies are not informative as they did not investigate gamified technology use, but rather investigated gameplay in general. Moreover, Xu et al. (2016) used a student sample to investigate tourists' gaming motivations and only discussed the potential of gamification during trips. Further, Liu et al. (2019) focussed on a highly specific context, namely the festival context. Accordingly, existing studies in tourism have not been able to determine what it means to use gamified technology in the particular context of a pleasure vacation.

From a general perspective, the underlying motives and ultimate goals in engaging with gamified technology can vary among people. A single motivational construct can be targeted at various ultimate goals (Atkinson & Feather, 1966). In the game-related literature, the motivations for and experiences with using gamified technology typically refer to those psychological needs that games are generally considered to promote, which include experiences of autonomy, competence, and relatedness (Ryan et al., 2006). The standard motivations that gamified technologies are considered to afford refer to the design-inherent motivational mechanisms that structure games and aid in inducing gameful experiences within the systems (Koivisto & Hamari, 2019). However, the gamified elements only offer opportunities for action (Deterring, 2011). In real-world contexts, gamified technology is aimed at providing gameful experiences outside of the technological system. With the embedment in the real-world context, the situation of use co-shapes the so-called motivational

affordances that pertain to the system (Deterding, 2011) and, with that, the behavioural and psychological gratifications derived from engaging with the gamified technology.

Pleasure vacations are geographically concentrated action spaces in which tourists reside at the same place for a certain amount of time. In such a context, gamified technology can be viewed as part of the tourism setting, offering new interaction opportunities for the tourists on their quest for meaningful experiences. In this thesis, the tourist experience is defined as the ways in which tourists derive meaning from interactions with tourism products and services (Gretzel, Fesenmaier, & O'Leary, 2006). Accordingly, the system-inherent values offered by gamified technologies largely depend on how tourists perceive them and the ultimate goals tourists associate with them in relation to the context of use (Deterding, 2011; Hutchby, 2001). Therefore, a more in-depth understanding of tourists' underlying motives for engaging with gamified technology is needed.

Study 2 explores the deeper layers of gamification engagement by uncovering tourists' ultimate goals in engaging with gamified technology during a pleasure vacation. Knowledge of these goals provides information on tourists' sought end values or desired outcomes of interaction and, with that, the personal meaning of using the gamified technology in the tourist experience. By exploring the sought end values of using gamified technology during vacation, the underlying causality behind tourists' engagement with gamified technology is uncovered. The functional, psychosocial, and behavioural consequences are thereby elicited, which connect with tourists' ultimate goals of using gamified technology on a value level.

Based on the findings of the exploratory Study 2, Study 3 investigates how eight socio-psychological motivators explain tourists' engagement with gamified technology and what the perceived outcomes are for the overall tourist experience. The socio-psychological motivators for and the perceived outcomes of tourists' engagement with the gamified technology are conceptualised by means of behavioural and psychological gratifications.

***Study 3:** What are the socio-psychological motivations underlying tourists' engagement with gamified technology? What are behavioural and psychological gratifications of tourists' engagement with gamified technology for the tourist experience?*

The goal of gamified technology in real-world contexts is to shape actions and behaviours (Bogost, 2007). By including motivational mechanisms, gamified technology in real-world contexts connects the mechanisms of gameplay with behavioural activities in the real world. The end goal is to motivate the user towards individually beneficial behaviour. As such, users' interactions with and experiences in engaging with gamified technology are always *situated* in real-world contexts.

Despite the numerous gamified approaches in the health behaviour and wellbeing sector, knowledge of the outcomes of engaging with gamified technology for the overall tourist experience is lacking. In particular, it is not known what the gratifications of engaging with gamified technology are on a behavioural level and on the overall tourist experience level. Unanswered questions include, for instance, ‘What consequences does engagement with gamified technology have for tourists’ behaviour in the destination?’ ‘What overall psychological gratifications result from engaging with gamified technologies in terms of the tourist experience?’ Previous studies on gamified technology use (Liu et al., 2019; Xu et al., 2016) do not provide an understanding of how the gamified technology plays a role in the tourist experience. Therefore, it is necessary to pursue an overall conceptualisation of gamified technology engagement that investigates the behavioural and psychological gratifications of engaging with gamified technology in the tourist experience, as well as considers the specific context of use.

Study 3 fills this gap by investigating socio-psychological motivators for gamification engagement and the consequences thereof for the overall tourist experience. In a wellbeing context such as a pleasure vacation, the behavioural and psychological gratifications of engaging with gamified technology are implicitly linked to questions of tourists’ wellbeing and, with that, recovery. A pleasure vacation serves as an ideal context to foster mental wellbeing and positive functioning. As a reflection of positive psychology, positive functioning refers to people’s psychosocial functioning and describes the ways in which people operate to achieve wellbeing (Rusk & Waters, 2015; Seligman, 2011). Important domains of positive functioning include, for instance, positive emotions, personal goals and values, and social relationships (Rusk & Waters, 2015).

In line with this understanding, gamification engagement in Study 3 comprises two conceptual dimensions: 1) the dimension of motivational needs satisfaction and 2) the wellbeing outcomes. Figure 1 illustrates the conceptual model of Study 3.

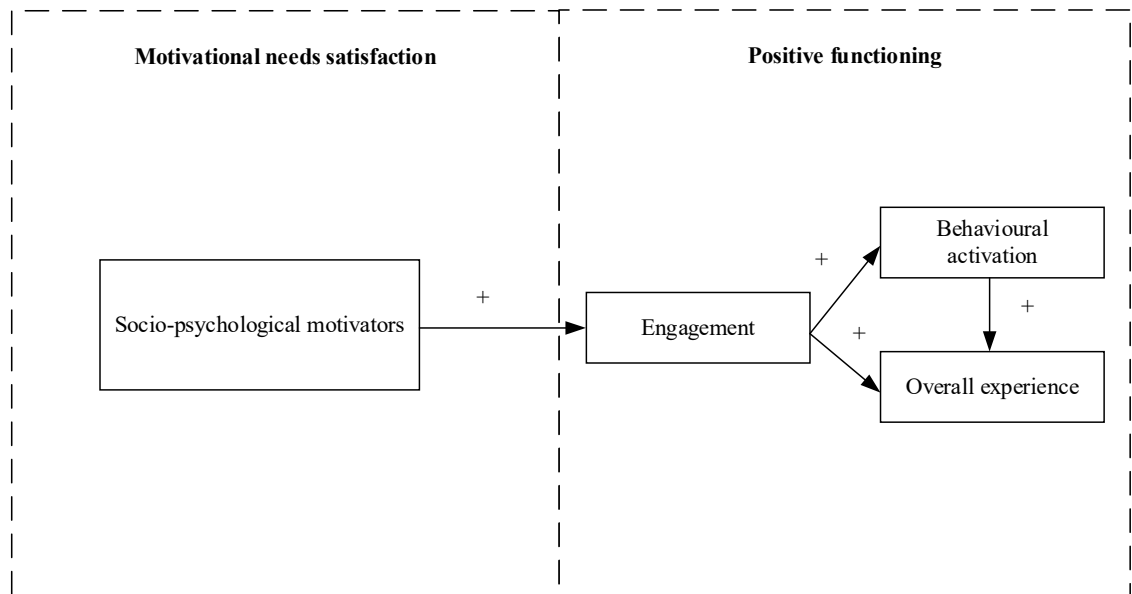


Figure 1: Conceptual model of Study 3.

The motivational needs dimension refers to tourists' psychosocial goals in engaging with gamified technology, thereby representing the mechanisms of positive functioning. Further, the positive functioning dimension refers to tourists' perceived outcomes of engaging with gamified technology in the tourist experience. The positive functioning dimension thereby describes how well the gamified technology eventually contributes to tourists' perceived overall wellbeing. In this dimension, the perceived behavioural gratifications are conceptualised as 'behavioural activation', including measures such as 'being more active during the stay', 'driving new slopes', and 'better use of time during vacation'. Finally, the perceived overall psychological gratifications are measured, for instance, by means of 'a more meaningful stay', 'better overall stay', and 'increased recovery.' In this study, positive functioning thus indicates tourists' perceived outcomes related to personal wellbeing. Based on the holistic conceptualisation of gamification engagement in Study 3, conclusions about the overall value of gamified technology for tourists' co-creation of meaningful experiences can be drawn.

1.4 Scope of Research

How Do the Three Studies Relate?

The three studies of this thesis work on different levels to investigate questions related to human-computer interactions. These two levels are *adoption/use* and *engagement*. While the level of *adoption/use* describes the factors that generally determine adoption and use of mobile ICT, the level of *engagement* refers to people's deeper involvement when using mobile ICT.

This study defines mobile ICT adoption and use as an individual's voluntary choice to accept and utilise mobile ICT. This definition is based on Rogers's (2003) understanding of making full use of a technology. As per Rogers's (2003) definition, the adoption of a technology also implies its use. Based on this understanding, adoption and use are not necessarily separate concepts. Rather, they can be understood as interconnected. Accordingly, adoption and use reflect people's actual use from initial acceptance to a more regular mode of utilising the technology. Henceforth, for reasons of simplicity, only the term 'adoption' is used when referring to the process of adopting and using a technology. While adoption typically refers to people's one-time usage of technology, engagement describes people's deeper involvement in interacting with technology. In this thesis, engagement refers to people's positively valenced active cognitive, emotional, and behavioural involvement (Hollebeek, Glynn, & Brodie, 2014) during and/or in relation to interaction with the gamified technology.

In exploring and investigating tourists' engagement with gamified technology during a pleasure vacation, different game elements are included in the second and third studies.

Leaderboards, badges, and points are among the most popular game elements in general gamification literature (Hamari, Koivisto, & Sarsa, 2014; Koivisto & Hamari, 2019). With the pleasure vacation being the main context, gamified technologies specific to health and wellbeing are of relevance for this thesis, as a pleasure vacation can be seen as comparable to health and wellbeing contexts (Chen & Petrick, 2013; Hobson & Dietrich, 1995). In such contexts, the gamified technology is typically targeted at activities related to physical activities, mental switching off, relaxation, and recovery (Johnson et al., 2016). Common game elements implemented for health and wellbeing purposes include rewards, leaderboards, levels, progress, social interactions, and stories/themes (Johnson et al., 2016).

Table 2 details the technologies addressed in each of the three studies in this thesis, as well as provides an overview of each study's scope and main research content.

Scope of research and content of studies		
<i>Usage level</i>		
Study	Technology addressed in the study	Scope of research and content
Study 1	Personal mobile ICT, not limited to a specific mobile ICT	<p>Systematic overview of research on mobile ICT adoption from a user-centred perspective</p> <p>Including both quantitative and qualitative studies</p> <p>Compilation of the main factors that contribute to users' adoption of mobile ICT</p> <p>Synthesis of findings and suggestions for future research</p>
<i>Engagement level</i>		
Study	Technology addressed in the study	Scope of research and content
Study 2	Gamified technology including the following game elements: performance tracking, points, badges, leaderboard, and my story	<p>Exploration of tourists' motives for engaging with gamified technology during a pleasure vacation</p> <p>Using the means-end chain approach to ladder up from game elements to tourists' desired end values in engaging with gamified technology</p> <p>Desired end values represent the ultimate goals tourists seek in using the gamified technology and, with that, tourists' deeper personal meaning and values derived from engaging with gamified technology during a pleasure vacation</p> <p>Based on the laddering technique, tourists' behavioural activation through engagement with the gamified technology is also explored; tourists' behavioural activation provides information on the persuasive power of gamified technology in a pleasure vacation</p>
Study 3	Gamified technology including the following game elements: performance tracking, points, badges, leaderboard, and my friends	Exploration of the uses and gratifications of gamified technology in the tourist experience during a pleasure vacation

		<p>Investigation of how eight socio-psychological motivators explain tourists' engagement with gamified technology during a pleasure vacation</p> <p>Consequences of engagement with the gamified technology:</p> <ul style="list-style-type: none"> - Investigation of tourists' behavioural gratifications of engaging with gamified technology (persuasion) - Investigation of tourists' psychological gratifications of engaging with gamified technology in regard to the overall tourist experience <p>Examination of how tourists' engagement with gamified technology is associated with behavioural activation and the overall tourist experience</p>
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Table 2: Scope of research and content of studies in this doctoral thesis.

Thematic Delimitation

To explore the underlying motivations for gamified technology use, this thesis only includes active users of gamified technologies, while non-users were excluded from the study. In the context of mobile ICT use, studies have previously been conducted with people who did not have the necessary experience with using the addressed mobile technology. Such studies have often been based on convenience samples, which select participants ad-hoc based on their accessibility and/or proximity to research. Convenience samples most commonly include students as study participants. These samples are problematic, as they lack generalisability to any identifiable target population and may result in inconsistent findings (Bornstein, Jager, & Putnick, 2013). The frequent use of convenience samples is also the case for studies in the field of gamified technology in tourism (e.g., Xu et al., 2016). As the respondents do not necessarily have the relevant experiences and are therefore not able to express their actual motivations related to gamified technology use, the results of these studies might be biased.

Moreover, aligned with the overall aim of this thesis, this thesis only considers highly engaged users of gamified technology. In both studies, the highly engaged users were identified based on self-descriptions. In general, highly engaged users are able to provide in-depth insights into their reasons for engaging with gamified technology, as well as their personal values in using the gamified

technology. Such an approach is particularly valuable when investigating a phenomenon in-depth (Corbin & Strauss, 2008).

Finally, this thesis only focusses on the consumption stage of vacation, generally disregarding the pre- and post-consumption stages. Nevertheless, Study 2 reveals that that tourists' motivations for engaging with the gamified technology during vacation also spill over into the post-consumption stage – the stage after vacation (Aebli, 2019). This finding is intriguing, as gamified technology seems to be a powerful means to engage tourists beyond their vacation, spilling over into the everyday lives of tourists.

1.5 Theoretical Positioning and Outline of the Thesis

This thesis is positioned at the intersection of positive psychology, modern motivation theories, human-centred technology of human-computer interaction, and tourism. The modern motivation theories considered in this thesis relate to the needs satisfaction theories, which also represent a stream of positive psychology, as well as motivational affordances as the generic motivation-related understanding of gamification. Accordingly, the major disciplines that inform this thesis are *psychology*, with a focus on human wellbeing (Seligman, 2011) and basic needs satisfaction (Ryan & Deci, 2002), and *human-computer interaction*, with a focus on human-related factors and design. Tourism serves as the general context in this thesis, with the pleasure vacation as a specific form of tourism. With an emphasis on human-centeredness within the discipline of human-computer interaction, this thesis takes the lens of positive psychology to explore and investigate the underlying value of gamified technology for meaningful tourist experiences. This positioning applies to the main body of this thesis, including Study 2 and Study 3. Study 1 is broadly aligned with the general human-computer interaction discipline.

Figure 2 illustrates the theoretical embedment and overall conceptualisation of this thesis. As depicted, positive psychology serves as the guiding lens in this thesis.

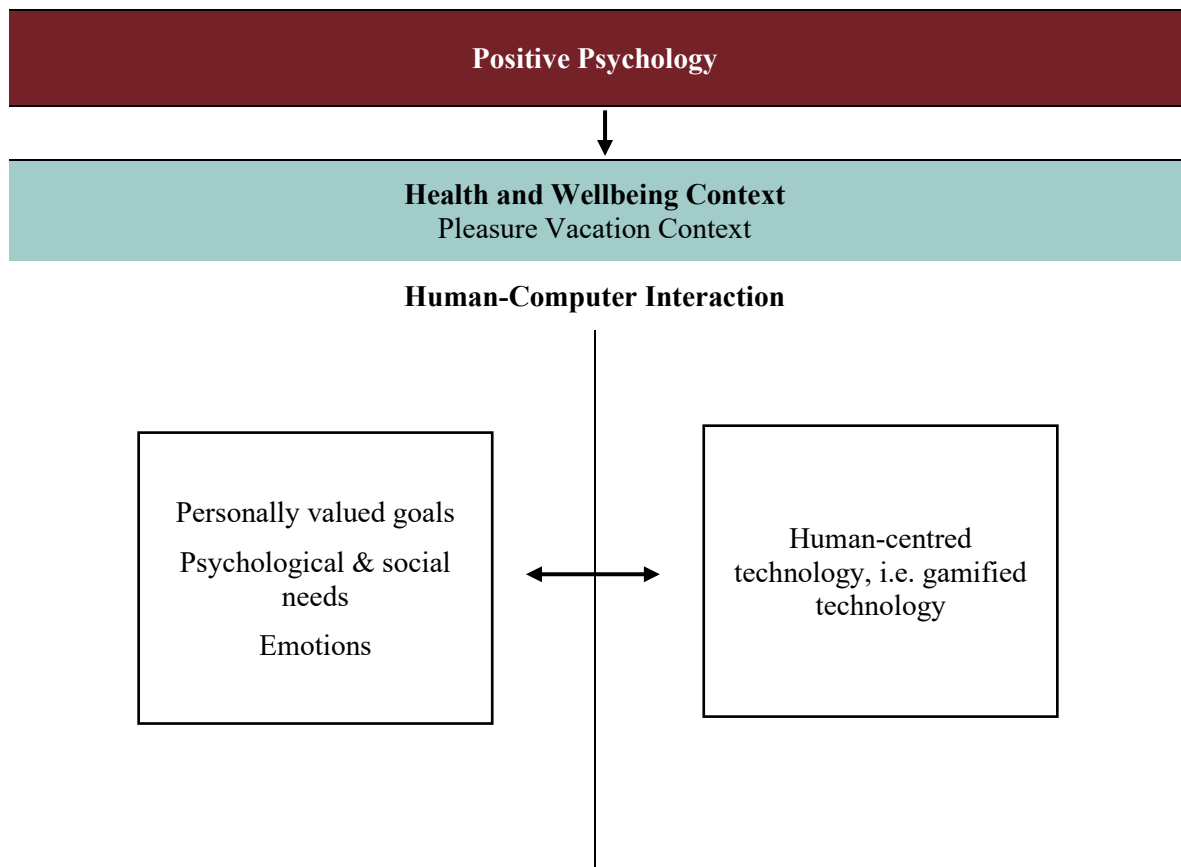


Figure 2: Theoretical embedment of this doctoral thesis.

Positive psychology serves as the overarching understanding of human functioning and thereby ties in with the notion of human-centeredness of positive computing in this thesis. In fact, the field of positive computing, with its developments on ‘motivational’ technologies including persuasive and gamified technologies, has resulted from positive psychology. As part of the human-centred view of human-computer interaction, positive computing was introduced to support humans in their pursuance of positive experiences related to wellbeing (Calvo & Peters, 2014). As such, the lens of positive psychology lays the foundation for a general understanding of human-computer-interaction in this thesis.

The overall structural outline of this doctoral thesis is illustrated in Figure 3.

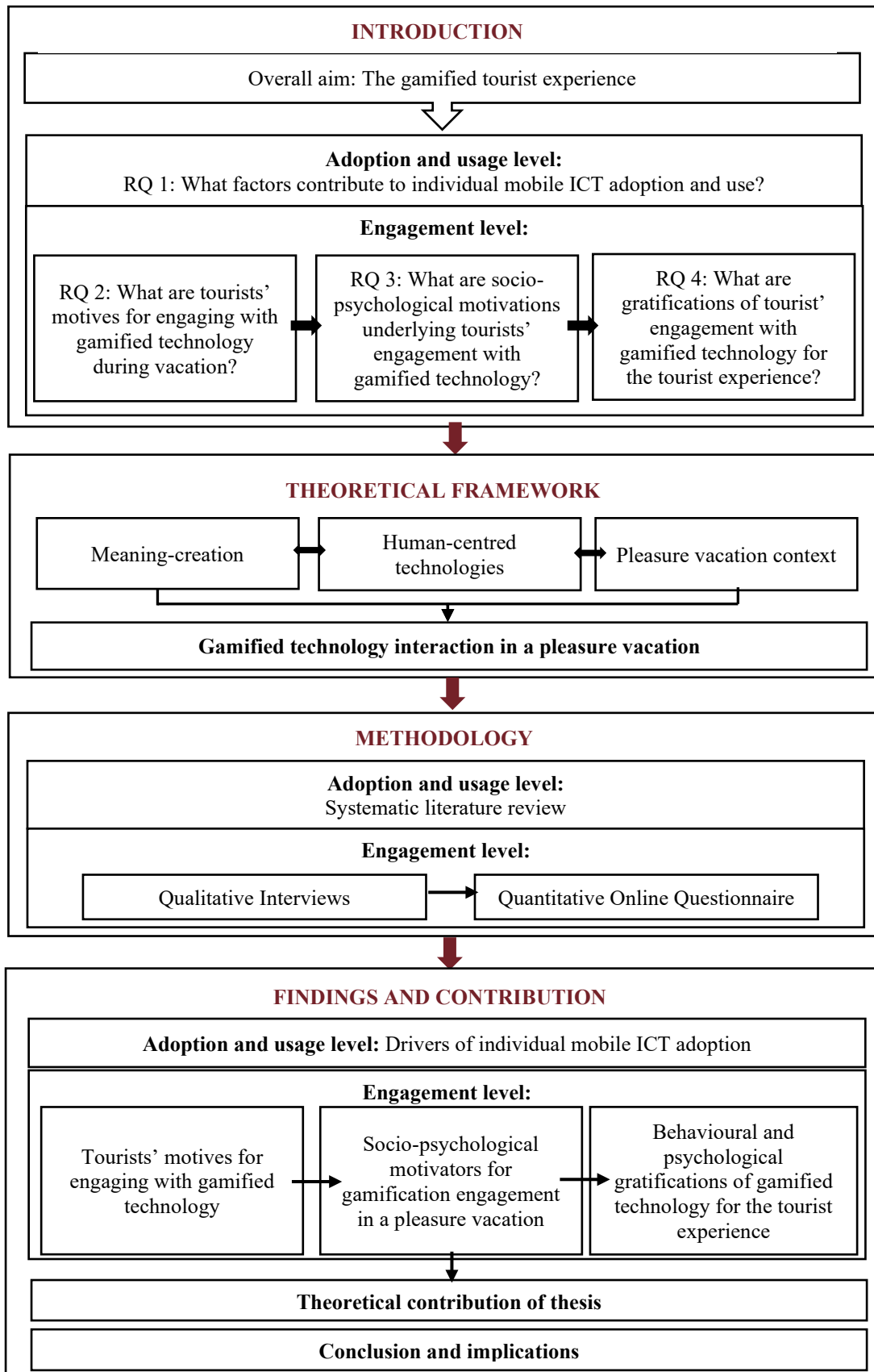


Figure 3: Outline of thesis.

2 THEORETICAL FRAMEWORK

This chapter defines the theoretical and conceptual framework of this doctoral thesis. It demonstrates how the studies conducted in this thesis are embedded in previous works related to the field of positive psychology and human-computer interaction. Within this framework, the key theoretical concepts are defined and discussed in light of the overall research aim. The theoretical framework comprises the following main chapters.

First, meaningful tourist experiences are defined and discussed from a positive psychology perspective. This section demonstrates how modern ICT conceptually ties in with meaningful tourist experiences. Second, human-computer interaction in general is discussed from a theoretical perspective, and it is demonstrated how the understanding and theoretical underpinning of human-computer interaction has progressed towards a human-centred view of human-computer interaction. This chapter briefly discusses how human-centred technology links to the framework of positive psychology. Based on the understanding of human-centred technology, the chapter then elucidates how gamified technology is conceptualised, what motivational mechanisms gamified technology includes, and how the activity and situation of use play a role in engagement with gamified technology. Finally, the pleasure vacation context is outlined as a framework to study tourists' engagement with gamified technology.

2.1 The Quest for Meaning in Human Experiences

Meaning in Today's Society

The search for 'meaning' in human experiences has become characteristic of today's society. From a sociological perspective, the focus in values can be described as having shifted from the previously labelled 'experience' society to a society that seeks 'meaning' (Bolz, 2012). This shift is enduring and in flux, which is why a clear delimitation related to time and content cannot be made (Kreilkamp, 2013). As a result of the re-evaluation of the moral concepts and underlying values of society, 'meaning', including concepts like 'wellbeing', has become an ideal of modern society. The human quest for meaning can thus be found in various aspects of life: private lives, businesses, and politics alike (Romeiß-Stracke & Born, 2003).

As an expression of modern society, the search for meaningful experiences has also become central to tourism research and practice. But what is the meaning of meaning? Characteristically, meaning can be described as finding value in human experiences and life (Frankl, 2006). Interestingly,

according to Bolz (2012, p. 26), ‘the meaning of meaning’ in an etymological sense finds its roots in original, Old High German words that import meanings like ‘reisen’ or ‘eine Richtung einschlagen’. This is even more interesting given that travels and vacations are often promoted as promising means for meaning-creation and assist tourists in their search for meaning (Pechlaner & Innerhofer, 2016).

Vacation as an Ideal Context for Meaning-Creation

Travels and vacations offer ideal settings to realise personally meaningful goals. Notably, the underlying notion of travelling and vacation has recently experienced a shift towards meaning-creating activities and meaningful tourist experiences and, with that, questions related to the *self*. Early on, Richards (1999) had already recognised the significance of vacations as a suitable context for fostering values that are individually meaningful. He emphasised that vacations provide opportunities for “personal development and individual identity formation”, both of which contribute to quality of life (Richards, 1999, p. 189). As such, vacation have long been recognised to provide opportunities for personal development. However, only with the beginning of a society that seeks meaning has the concept and notion of meaning become more explicit in tourism.

The importance of meaning in travelling and vacation has become a major stream of tourism research today (Filep & Higham, 2014; Filep & Laing, 2019; Filep & Pearce, 2014a). Before that, the role of vacation had traditionally been viewed as functional. As such, vacations had a functional role in relieving tensions built up in everyday life and collecting new resources (Cohen, 1979). Accordingly, tourists sought activities that allowed them to rest and physically and mentally detach from work (Richards, 1999). With the shift in values of today’s society, however, questions related to the *self* have also gained increasing attention with regard to leisure and tourism. Today, pursuing individually meaningful goals and finding purpose in activities have become driving forces in people’ leisure and vacation time (Filep & Pearce, 2014a). Pleasure travel, in particular, has been identified as promising for the satisfaction of needs related to the *self* and the creation of meaningful experiences (Harrison, 2003). Thus, it is tourists’ inner desires related to the deeper human values of the *self* that give meaning to pleasure travel (Harrison, 2003). As a result, activities and the experiences sought during leisure and vacations can be considered expressions of what is personally meaningful.

Positive Psychology as the Guiding Lens to Understand Meaning

More in-depth answers to the question of what is personally meaningful can be found in positive psychology. In line with the general shift in the values of society, tourism and positive psychology have merged to develop a humanist-inspired view of individual flourishing in tourism (Filep

& Laing, 2019). The notion of meaning thereby goes beyond the idea of short-term pleasure and fun, which is generally used to describe hedonic experiences. In psychology, hedonic experiences are typically contrasted with eudemonic experiences. In regard to eudemonia, meaning-creation starts to evolve when experiences reach the deeper levels of human experience, thereby satisfying implicit psychological and social human needs (Seligman, 2011). Unlike hedonic experiences, eudemonic experiences refer to pursuing personal values and striving towards personal goals (Ryan, Huta, & Deci, 2008; Seligman, 2011).

Eudemonia refers to the ‘true self’ (Filep & Laing, 2019) and is concerned with personal development and self-realisation of the individual (Ryff, 1989). Central to this humanist view is the notion of striving towards one’s personal best based on one’s unique potential (Huta & Ryan, 2010; Ryff & Singer, 2008). Eudemonic experiences can also be characterised as individual fulfilment, purpose, and enduring values beyond the experience itself (Huta & Ryan, 2010; Ryan et al., 2008). As a main component of eudemonia, meaning refers to personal growth, positive relations with others, and mastery (Ryff, Singer, 2006), among others.

On this basis, Filep and Pearce (2014a) suggest that meaningful tourist experiences are more than just hedonic. According to eudemonia, the creation of meaning thus deals with questions related to the *self* and the satisfaction of innate human needs and desires. Based on this understanding, a sense of self is achieved when one is able to act in a self-determined way and experience feelings of competence and social relatedness (Ryan et al., 2008). In this respect, meaningful tourist experiences particularly refer to pursuing intrinsic goals, personal growth, positive emotions, and meaning guided by one’s personally valued states (Filep & Pearce, 2014a; Ryan et al., 2008).

From a psychological point of view, meaning constitutes a psychological need that is necessary for humans to flourish (Maslow, 2014). This perspective has been influential in positive psychology. Meaning is thus typically used to describe a state of flourishing (Seligman, 2011), fulfilment (Seligman, 2002), subjective wellbeing (Newman, Tay, & Diener, 2014), or satisfaction of psychological needs (Ryan et al., 2008). Importantly, meaning is a subjective state (Seligman, 2011). Thus, it is the individual’s subjective perceptions and feelings that matter in experiencing meaning.

Overall, the perspective of positive psychology ties in with human wellbeing and flourishing. It claims that humans strive to maximise their overall state of wellbeing by seeking positive experiences (Seligman, 2011). In the tourism context, the view of positive psychology posits that tourists seek more than just hedonic experiences of fun and pleasure. Tourism contexts provide an environment that fosters personal growth, expression of the self, and values that are important to oneself.

Meaningful Experiences Support Personal Wellbeing

Personally perceived meaningful experiences are restorative. Positive psychology provides ample evidence that the experience of meaning directly contributes to individual wellbeing (Hadden & Smith, 2019; Huta & Ryan, 2010; Peterson, Park, & Seligman, 2005; Ryff & Singer, 2008; Steger, 2009) through the satisfaction of psychological needs (Deci & Ryan, 2000; Ryan et al., 2008). Yet, the question remains: 'How are meaningful experiences established in practice?' To understand meaningful vacation experiences, one must understand tourists' intrinsic needs and goals (Filep & Pearce, 2014a). Tourists' underlying motives are informative of the experiences tourists seek during vacation. Needs and wants act as inner drivers and motivators (Maslow, 1943). When it comes to the creation of meaning, mental needs are of relevance. In contrast to physical needs such as hunger and thirst, mental needs often act subconsciously, and people may not always recognise them or may find them difficult to express (Maslow, 1943). What can easily be expressed, however, are the activities that relate to personally meaningful goals and thus serve to satisfy the often subconsciously seated mental needs.

Personally meaningful goals and the activities related to them can vary among people. Yet, the underlying mechanism that drive people to pursue personally meaningful goals and thus the creation of meaning is universal (Sonnentag & Fritz, 2007). The underlying mechanisms refer to the satisfaction of basic psychological and social needs, as previously elucidated. Accordingly, the creation of meaning begins to unfold when an activity ties in with people's inner drivers, thereby fulfilling basic psychological and social needs. Common overall characteristics of these basic psychological needs are that they (1) motivate goal-oriented behaviours, so that people seek to fulfil said need, and (2) promote wellbeing (Baumeister & Leary, 1995; Hadden & Smith, 2019; Huta & Ryan, 2010; Ryan & Deci, 2002).

Finally, meaningful experiences do not just create positive emotions. They are generally marked with higher emotional involvement and more frequent rehearsal (Kim, Ritchie, & McCormick, 2012; Talarico & Rubin, 2003) compared to traditional experiences. Thus, meaningful tourist experiences are memorable and remain in tourists' awareness beyond the experience itself (Filep & Pearce, 2014a; Tung & Ritchie, 2011).

Tourists' Role in the Creation of Meaning

Tourists play an active role in shaping their own experiences. The tourism environment therefore represents a contextual setting for shaping one's own experiences. Coupled with the relevance of

meaning in today's society and human life in general, the discussion evolves to how technologies may support people in achieving personally valued goals (Calvo & Peters, 2014) and thus creating meaningful experiences. With the growing use of various digital tools during vacations (Wang et al., 2014; Wang et al., 2016), tourists have become co-creators of their own experiences (Gretzel et al., 2006). Tourism consequently serves as an *interaction environment* for meaning-creation. One fundamental prerequisite for the co-creation of meaning is tourists' engagement and active mental and/or physical involvement in the experience (Gretzel et al., 2006).

The development of tourists' active role in the creation and perception of their experiences calls on tourism destinations to provide tourists with tools that contribute to the creation of personally meaningful experiences. In this regard, modern human-centred technologies have been highlighted as promising means to actively engage tourists on a deeper level of cognition (Tussyadiah, 2017). By using human-centred technologies, tourists can thus be supported in their co-creation of meaningful experiences.

Underlying Assumptions of Meaning and Eudemonic Experiences

This thesis includes some assumptions underlying the concepts of *meaning* and *eudemonic experiences*. Following Mekler and Hornbæk (2016), eudemonic experiences in this thesis relate to needs fulfilment, long-term importance, positive affect, and feelings of meaningfulness. Eudemonic experiences involve the pursuance of personal ideals and achievements. Thus, as noted by Mekler and Hornbæk (2016), eudemonic experiences can occur even during seemingly trivial activities, such as setting up a new device without outside help. In contrast to eudemonia, hedonia largely concerns 'momentary pleasures', such as unwinding and relaxing (Mekler & Hornbæk, 2016).

Moreover, meaning is primarily understood in this thesis as a moment-to-moment experience. While psychological studies chiefly focus on meaning as the overall cognitive and affective evaluation of one's life (e.g. Seligman, 2011), meaning is largely derived from people's situational experiences (Hadden & Smith, 2019; Hicks & King, 2009; King, Heintzelman, & Ward, 2016). This is in line with Mekler and Hornbæk's (2019) conceptualisation of meaning in human-computer interaction. Further, meaning is defined as a subjective state. It is primarily understood as a subjective experience, rather than being objectively given in the world (Calvo & Peters, 2014; Mekler & Hornbæk, 2019; Seligman, 2011). As such, meaning is something personal that must be subjectively generated through 'meaning making' (Mekler & Hornbæk, 2019) or 'co-creation'. Finally, although meaning is abstract in nature, the experience of meaning is not inexpressible (Heintzelman & King, 2014; King et al., 2016; Martela & Steger, 2016; Mekler & Hornbæk, 2019).

2.2 Human-Computer Interaction

In accordance with the increasing relevance of meaning in human experiences, meaning has also evolved as a main focus of attention in the user experience design literature (Mekler & Hornbæk, 2019). The question of what makes human-computer interaction good has become of major interest in human-computer interaction research (Cockton, 2006; Desmet & Hassenzahl, 2012; Fallman, 2007; 2011; Mekler & Hornbæk, 2016). One reason for the attentiveness to meaning in human-computer interaction research may be the general, ongoing shift of the underlying values of modern society towards favouring a meaningful life (Bolz, 2012). A more apparent explanation, however, lies in the contemporary ubiquity of mobile ICT in everyday life. Deeper aspects of human life such as the notion of meaning must be considered in human-computer interaction as a consequence of the increased use of mobile ICT in everyday life and leisure (Bødker, 2006).

From a theoretical perspective, the field of human-computer interaction has gone through a paradigmatic transformation since the early 1980s. With the advancement of technology and the shift from work contexts to everyday life and leisure contexts, mobile ICTs have increasingly become a part of various activities of human life. Through the ubiquitous and place- and time-independent use of modern mobile ICT while moving about, boundaries between work, everyday life, leisure, and other parts of life such as vacation are increasingly blurred (Bødker, 2006; Fallman, 2011). This leads to an ongoing reconfiguration of different aspects of human life and questions related to technologies (Bødker, 2006). That is, new elements of human life are included in human-computer interaction considerations. Examples thereof include aspects related to human needs, values (Friedman, 1997; Harrison, Tatar, & Sengers, 2007), cultures (Bødker, 2006), and emotions (Norman, 2002).

Understanding interactions that occur between humans, their environments, and technology in everyday life and leisure is complex. As the focus began to expand beyond the workplace and technologies increasingly became a part of leisure time, human-computer interaction research has come to investigate the nature of interactions between humans, artefacts, and environments through a more human-centred view. Thus, emphasis lies on the need to understand the ‘messiness’ of everyday life (Hauser, 2018). In this context, concepts like meaning (Mekler & Hornbæk, 2019), emotion (Norman, 2002), and experience (McCarthy & Wright, 2004) provide an important foundation. This shift in perspective directly links with the notions of wellbeing and positive psychology in ICT design.

Fundamental to the human-centred view of human-computer interaction are questions pertaining to human needs and values (Zhang, 2007; 2008) related to the context of use. From a human-centred

perspective, technology should help humans realise their needs and goals in an optimal or even fun and pleasurable way, thereby supporting personal wellbeing (Brey, 2015; Desmet & Hassenzahl, 2012; Hassenzahl, Wiklund-Engblom, Bengs, Hägglund, & Diefenbach, 2015).

With the aim to investigate the value of human-centred ICT for the tourist experience, it is necessary to understand the underlying notion of human-centred technology more in depth. Theoretically and conceptually, human-computer interaction stands at the intersection between psychology and the social sciences, on the one hand, and computer science and technology on the other hand (Carroll, 1997). Based on Verbeek's (2015) definition, interaction is understood in this thesis as 'action in-between'. Interaction thereby indicates what is happening between the human being and the technological artefact (Verbeek, 2015), implying mutual effects on both the human being and the artefact. Based on this understanding, this thesis generally defines mobile ICTs as artefacts (Benbasat & Zmud, 2003; Orlikowski & Iacono, 2001). Artefacts are human made; they are designed by humans and made for humans. Thus, artefacts usually implicitly comprise the structures, norms, and values of the rich contexts within which the artefacts are embedded (Benbasat & Zmud, 2003). The following section positions human-centred technology, discussing the role and underlying notion of this technology from a theoretical perspective.

2.2.1 Theoretical Positioning of Human-Centred Technology

With the shift of technology from the workplace to everyday life and leisure, three paradigms (Harrison et al., 2007) or waves (Bødker, 2006) that theoretically underpin the notion of human-computer interaction have been described. Within these paradigms, human-computer interaction has moved from an industrial to a human-centred setting of everyday life and leisure. Importantly, within the development of these three paradigms, one paradigm should not be viewed as better than or as a substitute for the former paradigm (Hauser, 2018). Rather, the paradigms co-exist (Bardzell & Bardzell, 2015).

Moreover, there is no clear delimitation between each of the three paradigms, as the boundaries are arguably blurred. All paradigms may, to some extent, contribute to and foster human-centeredness. However, works that particularly emphasise human-centeredness of technology and even move beyond human-centeredness are allocated to the third paradigm (Hauser, 2018). Therefore, this thesis takes the underlying notions of the third paradigm as a point of departure. More precisely, as this research is not limited to only investigating interaction with the gamified technology, but is particularly interested in the effects thereof in the real world, it is theoretically positioned in the third paradigm and works that move beyond the third paradigm.

Table 3 summarises the three paradigms. It outlines the overall shift from technology in work contexts to everyday life and leisure contexts with its underlying notions, central foci, and understanding about the role of technology. Overall, technology has transformed from a tool for productivity and efficiency to one through which the world can be experienced (Fallman, 2011). Coupled with this shift, the role of technology has become more multifaceted. Questions related to technology have thus moved beyond utility and usability to those of emotions, meaning, and experiences.

<i>Human-Computer Interaction</i>			
	Paradigm I Human Factors/Engineering	Paradigm II Cognitive Revolution	Paradigm III Situated Perspective
Roots	Industrial engineering and economics research	Cognitive science research; coined by 'cognitive' revolution	User experience design; phenomenological situatedness
Notion	Engineering	Efficiency	Meaning, emotions, experience, value
Metaphor of Interaction	Interaction as man-machine coupling	Interaction as information communication	Interaction as phenomenologically situated
Central Goal of Interaction	Optimising fit between man and machine	Optimising accuracy and efficiency of information transfer	Support for situated action in the world
Central Focus and Context	Single human user operating a single application or system in work contexts, e.g. pilot.	Human-machine interaction in work contexts	Human interaction with technology in everyday life contexts
Role of Technology	Increase productivity and safety; technology as a means to accomplish well-defined tasks	Productive and efficient communication; technology as a means to accomplish well-defined tasks	Design usable products and effective user experiences situated in humans' everyday lives; goal is to better understand humans' abilities and behaviours to design better technologies
Typical Questions of Interest	How can we fix specific problems that arise with interaction?	How can we improve the efficiency of computer use?	What existing situated activities in the world should we support? How do users appropriate technologies? What are the values at the site of interaction and how can we support those in design?
Time	Early 1980s	Late 1980s	1990–2010
Understanding of Human(s)	A single user	Users, workers	Users, experiencers

Table 3: The three paradigms of human-computer interaction (Harrison et al., 2007, p. 9).

Paradigms I and II stand for *information transfer*. The main premise of traditional human-computer interaction design was usability. In light of that, interactive systems were designed to be effective, efficient, error tolerant, and easy to learn (Fallman, 2011). By constructing metrics based on these terms, the main goal was to improve interactive artefacts by enhancing their usability – that is, by making them more useful (Fallman, 2011).

Paradigm III, in contrast, focusses on *interaction in the world*. The third paradigm treats interaction not as analogous to information processing, but as a form of *meaning making*. In this perspective, the artefact and its context are mutually defining and are subject to multiple interpretations (Harrison et al., 2007). Thereby, meaning making is brought about both by the designers and analysts and by the users and other actors in the situation of use (Harrison et al., 2007). Concurrently, Fallman (2011, p. 1053) argues that within human-computer interaction research, “third wave approaches [however] tend to share an interest in meaning and in human experiences, momentary or long-term, of using or living with a digital product or service, often termed the ‘user experience’”. Overall, a central characteristic of the third paradigm is thus “the shift from a rather narrow task-orientation to the broader concern of trying to increase the quality of everyday experiences” (Fallman, 2011, p. 1059).

Emotions, meaning, and experiences are keywords in the third paradigm. This emphasis results from discussions about rationality and purposefulness in the second wave, the focus on non-work, and motivation (Bødker, 2006). By focussing on questions of users’ perceptions, emotions, meaning, motivations, and lived experiences, the third paradigm offers a perspective that ties in with users’ deeper involvement in human-computer interaction (Hauser, 2018 Rosenberger, Verbeek 2015) – a perspective related to *engagement* with technology.

The main principles of the third paradigm can be summarised as follows:

1) Construction of meaning: The third paradigm sees meaning and meaning construction as a central focus (Harrison et al., 2007). Thereby, the third paradigm takes the underlying assumption that meaning is co-constructed by people in specific contexts and situations (Harrison et al., 2007). In this way, interaction itself is an essential element in meaning construction.

2) Putting users in their place: Meaning-creation, along with interaction with technology, is always *situated* in the third paradigm. This means that users’ interaction and engagement with technology is strongly informed by their varying physical and social situations (Harrison et al., 2007).

3) Putting interfaces in their place: Moreover, the third paradigm suggests that the specifics of particular contexts largely define the meaning and nature of interaction (Harrison et al., 2007). An example of this is location awareness of smartphones recognising whether the user is in a movie theatre or in nature. A key aspect of the third paradigm is to make sense of what is happening at the site of interaction (Harrison et al., 2007). The underlying idea of this stance is that the environment is filled with meaning. It moves beyond considerations solely related to interactions with the system. Rather, the third paradigm specifically considers questions of what is happening around the system, in the world.

In the third paradigm, context is a central component of design and evaluation. That is, context is not only decisive for the creation of the design, but also for the evaluation and understanding of the values of technology in a given context or situation (Harrison et al., 2007). Therefore, a major interest of the researchers lies in the questions, “How does context give [our] design meaning?” and “How does [our] design accommodate the context?” (Harrison et al., 2007, p. 6). From a human-computer interaction perspective, works that have generally contributed to the shift towards meaning making in the third paradigm have started to look at human experiences with technologies that are fun (Blythe & Hassenzahl, 2003), embodied (Dourish, 2004), and hedonic (Hassenzahl, 2003).

Human-centred design in the third paradigm views interaction as a matter of experience which is phenomenologically situated in the real world. Accordingly, the given phenomenological perspective of human-centred technology in the third paradigm means that the evaluation of what makes a technology valuable is situated and therefore subjective (Harrison et al., 2007). With that, the goal of interaction is to support *situated* action and meaning making in specific contexts. As a result, the question of what makes technology ‘good’ in a particular context is implicitly linked to discussions of peoples’ innate needs and values related to the situation of use.

Examples of technologies that reflect the human-centred view in their design include persuasive and gamified technologies. These modern technologies are rooted in the third paradigm of human-computer interaction. With the objective to stimulate meaning making and positive emotions through interaction, these technologies integrate basic human needs in their design (Norman, 2004). Given that these human-centred technologies are generally concerned with questions like ‘What are the values at the site of interaction?’ and ‘How can technology support those values?’ (Harrison et al., 2007), technologies associated with the third paradigm directly link to the notions of human wellbeing and positive psychology. On a practical level, it is thus the goal to understand users’ behaviour and motivations to build better technologies for better user experiences. By focussing on the values of the experiential aspects of human-computer interaction (Bødker, 2006), the overall aim of these technologies is to engage users on a deeper level of cognition and stimulate personally meaningful experiences.

However, meaning can mean different things to different people. So, what exactly does meaning mean in human-computer interaction? To avoid any confusion, meaning is described and fleshed out in relation to human-computer interaction in the following subsection.

2.2.2 Meaning as a Quality of Interaction

In human-computer interaction, meaning is often discussed in the context of “a meaningful experience”, “finding meaning in an activity”, or “to be engaged in meaning-making” (Mekler & Hornbæk, 2019, p. 2). Similar to the environmental setting in tourism, human-centred technologies can be viewed as providing meaningful ‘interaction environments’ (Deterding, 2014). A requirement for meaning-creation when interacting with technologies is users’ active engagement and fulfilment of potential (Calvo & Peters, 2014). Accordingly, meaning is typically equated to a form of ‘fulfilment’ (Light, Powell, & Shklovski, 2017), ‘worth’ (Cockton, 2006), or ‘goodness’ (Fallman, 2011) of interaction in human-computer interaction.

As a consequence of the shift towards a more human-centred view of human-computer interaction, the questions of *what* creates goodness and meaning in interaction has become central in human-computer interaction research (e.g., Mekler & Hornbæk, 2016; Mekler & Hornbæk, 2019). Notably, Harrison et al. (2007, p. 5) discuss how the role of meaning has evolved over the three paradigms in human-computer interaction. The first paradigm “[...] ignor[es meaning] unless it causes a problem, while the second [paradigm] interprets meaning in terms of information flows. The third paradigm, in contrast, sees meaning and meaning construction as a central focus.”

Similarly, and in accordance with Fallman's (2011, p. 1053) assertion that the main interest of third-paradigm approaches in human-computer interaction lies in the “meaning and in human experiences, momentary or long-term, of using or living with a digital product or service”, Cockton (2006) introduces the concept of quality of interaction. The determinants of interaction quality do not only lie within the interactions themselves; rather, “the determinants of interaction quality [...] lie in the *lasting value of enduring outcomes*” (Cockton, 2006, p. 166). He suggests that systems should be judged based on what endures beyond moment-to-moment interaction.

These conceptualisations of meaning reveal that both experiences *during* interaction and outcomes that endure *beyond* the moment-to-moment interaction are decisive for evaluating meaning in human-computer interaction (Mekler & Hornbæk, 2019). Based on this understanding, this thesis views meaning as a form of personal quality of user experience during interaction and beyond, including the lasting values that endure after interaction. Meaning may commonly be used as a term that indicates a general sense of purpose or significance (Mekler & Hornbæk, 2019).

Thus, meaning in human-computer interaction clearly exceeds questions of efficiency and usability. This is not to say that the value of efficiency or usability can be ignored in human-computer interaction. However, while questions related to efficiency and the like serve as a means to an end,

questions of meaning connect with human needs and goals beyond interaction with the system. As Cockton (2006, p. 166) puts it, “While we may value efficiency as a means to an end, and fun for the moment of experience, there really is more to life (and thus humans) than this.”

With this basic understanding of meaning, it is now important to more precisely understand how meaning evolves in human-centred technology. There are two main theoretical underpinnings of meaning that help with understanding meaning in relation to human-computer interaction: psychological needs and motives. Humans’ psychological needs and motives go hand in hand in that psychological needs present themselves in the form of motives (Maslow, 1943). Thus, meaning in human-computer interaction starts to evolve within the user himself.

In this regard, Hassenzahl et al. (2013) argue that meaning stems from the extent to which a technology satisfies various psychological needs. Therefore, they suggest that the design should focus on affording moments of meaning. Similarly, Cockton (2006) postulates that human motives reveal what is worthwhile and, thus, meaningful. Empirical evidence for these postulations can be found in human-computer interaction research. Mekler and Hornbæk (2016) demonstrate that meaning depends on users’ motivations and that both hedonic and eudemonic motives appear in user-generated experiences. Thereby, social experiences and eudemonically motivated experiences, such as striving to pursue one’s personal ideals, are considered to be more meaningful than hedonic experiences (Mekler & Hornbæk, 2016). Hedonic experiences typically pertain to short-term pleasure and fun. Eudemonic experiences are longer lasting than hedonic experiences (Huta & Ryan, 2010).

Some research has looked into the design qualities that afford the experience of meaning. Persuasive and gamified technologies in real-world contexts represent a first step towards real-life meaning making through design. Characteristic of these technologies is that they go beyond questions solely related to interaction between the user and the technology, such as ‘What happens on the system between the user and the technology?’ Key interests of persuasive and gamified technologies are the psychological and behavioural outcomes of engagement beyond the system. Notably, as meaning making also refers to what endures beyond interaction, technology starts to unfold its full potential for creating meaningful user experiences when it manages to leave a lasting impact on its users.

With this understanding, the concern when investigating persuasive and gamified technology use in real-life contexts primarily lies in the question of what happens around the system, rather than what happens on the system. Accordingly, creating personal meaning through interaction is a circumstance *around* good interaction, rather than a characteristic of interaction itself (Mekler & Hornbæk, 2019). Importantly, and as previously elucidated, this all begins with users’ motives for interaction.

Accordingly, it can be concluded that users' motives in relation to the context and situation of use inform what is meaningful in interacting with human-centred technologies.

Aligned with the aim of this thesis to investigate the values of gamified technologies as a specific form of human-centred technology for the tourist experience, gamified technologies and the underlying mechanisms thereof are described in detail in the following subsection.

2.2.3 Gamified Technologies

Games have long been an important aspect of human life. Gameplay was already an important social activity in Ancient Egypt. In fact, Harari (2015) strikingly suggests that people had likely been playing games before they learned to speak, write, or even stand on two legs – historically and personally. Similarly, McGonigal (2011) demonstrates that games are not frivolous undertakings per se; they come naturally to humans as an essential part of life. The question is, why are games so much fun and essential to humans?

Games are well known for their power to engage and excite, because they satisfy intrinsic psychological needs (Rigby & Ryan, 2011; Ryan et al., 2006). When people play games, they commonly experience senses of autonomy, mastery, immersion, or flow (Koivisto & Hamari, 2019; Ryan et al., 2006). Game-related technology accordingly uses the power of games by connecting the values of gameplay with regular information systems. By doing so, the concept of games is transferred to non-gaming contexts.

In contrast to a common misconception in practice, gamified technologies are not full-fledged games. Rather, gamified technology refers to the selective incorporation of game design elements into an interactive system (Deterding, Dixon, Khaled, & Nacke, 2011a; Deterding, Sicart, Nacke, O'Hara, & Dixon, 2011b). Gamified technology is essentially used to describe those features of an interactive system that aim to engage end users through motivational mechanisms (Koivisto & Hamari, 2019). To this end, gamified technology seeks to make activities more playful, offering experiences similar to those provided by games in general (Deterding et al., 2011a; Huotari & Hamari, 2012; Liu, Santhanam, & Webster, 2017).

In health and wellbeing contexts, gamified technology has recently increasingly emerged in relation to health behaviour reinforcement and wellbeing derived from the rhetoric of positive computing (Calvo & Peters, 2014; Johnson et al., 2016). Similar to persuasive design, the end goal of meaningful gamified technology in such contexts is to drive and shape individually beneficially behaviours through persuasion (Johnson et al., 2016). Persuasion thereby refers to the motivational mechanisms

based on humans' inner needs and values. It describes the status that is achieved when the gamified technology manages to engage its users and motivate them towards certain actions and behaviours. Theoretically and conceptually, meaningful gamified technology thus stands at the intersection of persuasive design, serious games, and personal informatics (Cugelman, 2013). An alternative term for technology with the end goal to drive action and behaviour is behavioural technology (Seaborn & Fels, 2015).

On an overarching level, gamified technology can be considered to comprise three main consecutive steps underlying the use of the system: the gamified elements or technological affordances implemented into a system, the psychological outcomes from engaging with these gamified elements, and the behavioural outcomes thereof – that is, the activities and behaviours that the gamified technology aims to support (Deterding, 2015; Koivisto & Hamari, 2019). Notably, these three steps are situated within a specific context. Figure 4 illustrates the consecutive steps representing the overall gamification conceptualisation.

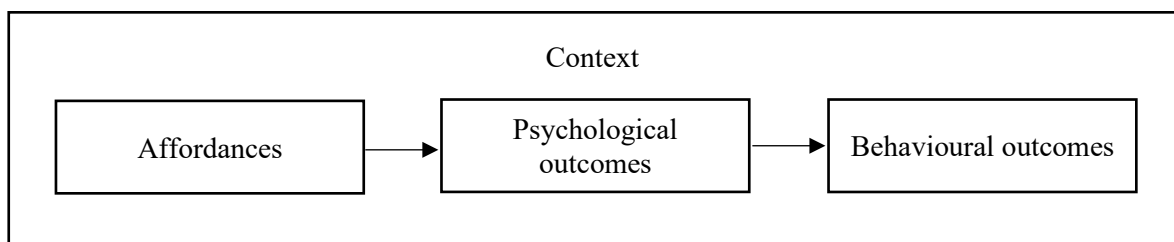


Figure 4: Overall conceptualisation of gamification (based on Deterding, 2015; Koivisto & Hamari, 2019).

In the gamification literature, affordances typically refer to the various elements and mechanics that structure games and aid in inducing gameful experiences within the systems (Koivisto & Hamari, 2019). Thus, affordances typically refer to the characteristics of the artefact (Mekler & Hornbæk, 2019). Furthermore, the psychological outcomes refer to the psychological experiences, such as autonomy, competence, relatedness, or enjoyment, which games are generally considered to promote (Koivisto & Hamari, 2019; Ryan et al., 2006). The psychological outcomes thereby represent the engagement level. Finally, the behavioural outcomes refer to the activities and behaviours that are induced or supported through the use of the gamified system (Koivisto & Hamari, 2019). Examples may include increased physical activity in the context of exercise gamification or better learning results in the context of education gamification.

2.2.3.1 Motivational Affordances of Gamified Technology

Gamified technology considers the motivational mechanisms of gameplay in general, referred to as motivational affordances. Theoretically, the motivational affordances understanding of gamified technology ties in with the human-centred interaction perspective. That is, the motivational mechanisms of meaningful gamified technologies consider humans' basic psychological needs in their design (Zhang, 2007; 2008).

A commonly used theoretical framework underlying the conceptualisation of the motivational mechanisms of gamified technology is the needs satisfaction theory (Deci & Ryan, 2000; Ryan et al., 2006) and its related theories, such as the concept of flow (Csikszentmihalyi, 1990). The needs satisfaction theory as a central element of the positive psychology framing for technology argues that humans actively seek out enjoyable activities and continue to engage in those activities if they promise to satisfy and succeed in fulfilling innate psychological needs (Deterding, 2014). Games, in general, are seen as environments that optimally afford such experiences. Thus, the rhetoric of wellbeing underlying meaningful gamified technologies frames the 'fun' of games as simply those states that humans innately strive for – namely, experiences of autonomy, competence, relatedness, meaning, and flow (Deterding, 2014). Perceived autonomy is thereby emphasised as a necessary condition for play based on the rhetoric of wellbeing.

Table 4 summarises the main theoretical foundations of gamified technologies. The main theories are the self-determination theory by Ryan and Deci (2000b); intrinsic and extrinsic motivation, also by Ryan and Deci (2000a); situated motivational affordances introduced by Deterding (2011); and the concept of affordances of user-centred design by Norman (2013).

Theoretical foundations	Sources
Self-determination theory (Ryan & Deci, 2000b)	(Aparicio, Vela, Sánchez, & Montes, 2012; Nicholson, 2012)
Intrinsic and extrinsic motivation (Ryan & Deci, 2000a)	(Blohm & Leimeister, 2013; Nicholson, 2012; Sakamoto, Nakajima, & Alexandrova, 2012)
Situated motivational affordances (Deterding, 2011)	(Nicholson, 2012)
User-centred design (Norman, 2013)	(Nicholson, 2012)

Table 4: Theoretical foundations of meaningful gamified technology (based on Seaborn & Fels, 2015).

As part of the needs satisfaction theory, the self-determination theory (Ryan & Deci, 2000b) specifically serves as the core theoretical underpinning of understanding motivational affordances in

the game-related literature. Accordingly, the standard motivations that gamified technologies are typically considered to afford include experiences of autonomy, competence, and relatedness. As previously mentioned, these motivations refer to the psychological needs that games are generally considered to afford (Ryan et al., 2006). Put simply, a motivation is afforded when the system allows the actor to satisfy basic psychological needs, as illustrated in Figure 5. In such cases, the actor feels engaged with the system and will continue the activity until the need is sufficiently fulfilled (Deterding, 2011). As illustrated in Figure 5, users' engagement with the gamified technology refers to the first two steps of the overall conceptualisation of gamification.

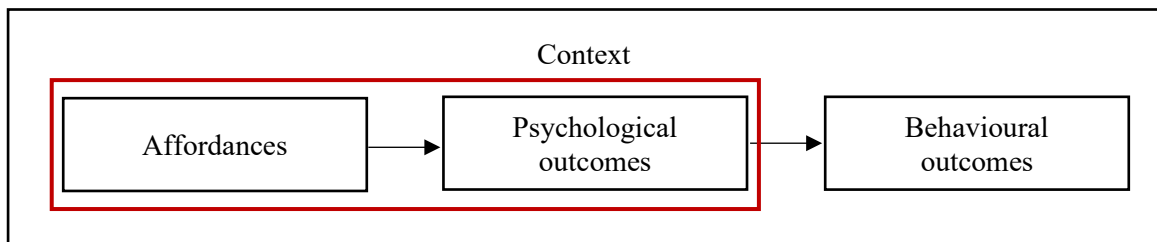


Figure 5: Engagement level based on the overall conceptualisation of gamification (based on Deterding, 2011; 2015).

A variety of game design elements or technological affordances can be found in literature. In line with the motivational affordances understanding, however, the most commonly used game design elements include leaderboards, points, and badges (Hamari et al., 2014). Table 5 summarises the most commonly used game design elements comprising the technological affordances and game dynamics in gamification literature. Whereas the affordances refer to the technological mechanics of the game elements, the game dynamics describe the effects of these mechanics on the user experience (Huotari & Hamari, 2012).

Game-design elements	
Affordances	Game dynamics
Documentation of behaviour	Exploration
Scoring systems, badges, trophies	Collection
Rankings	Competition
Ranks, levels, reputation points	Acquisition of status
Group tasks	Collaboration
Time pressure, tasks, quests	Challenge
Avatars, virtual worlds, virtual trade	Development/organisation

Table 5: Game design elements including technological affordances and game dynamics (based on Blohm & Leimeister, 2013).

Based on the understanding that the *meaning* of human-computer interaction depends on users' motivations for interacting with the system (Cockton, 2006; Mekler & Hornbæk, 2016), the design-inherent motivational mechanisms, including the technological affordances and game dynamics, can only be considered design-specific characteristics. In addition, meaning evolves as a circumstance around good interaction, rather than a characteristic of it (Mekler & Hornbæk, 2019). With this understanding, the design of human-centred and gamified technology only serves as an *interaction environment* (Deterding, 2014). Yet, the interaction environment can help to achieve personally meaningful goals (Mekler & Hornbæk, 2016). This is in line with the perspective of the third paradigm of human-computer interaction, according to which game-related technologies serve as well-structured interaction environments for positive experiences (Deterding, 2014).

Moreover, Hutchby (2001) argues that affordances of the *artefact* do not necessarily derive only from the natural features of the game artefact's materiality. As proposed by the situatedness assumption of human-centred technology, affordances most likely come from *personal interaction in the real-world context* (Hutchby, 2001). Affordances are thus functional and relational aspects which frame, but do not determine, the possibilities for action in relation to the object (Hutchby, 2001). In this way, affordances only offer opportunities for action (Gibson, 2015). They must be perceived if they are to successfully be executed (Deterding, 2011).

In real-world contexts, the opportunities for action offered by gamified technology are co-shaped by the environmental setting in which the technology is being used. The context and situation of use exert an important influence on interaction with gamified technology (Deterding, 2011; 2014;

Richards, Thompson, & Graham, 2014). Thus, the underlying motives for engaging with gamified technology and the resulting experiences thereof are not only defined by the specific properties of the game design. Rather, the motives for engaging with gamified technology are particularly dependent on the nature of the activity, the context, and the specific situation in which the gamified technology is being used (Deterding, 2011; Hutchby, 2001).

The use situation provides salient, motivation-related features of its own (Deterding, 2011). As a result thereof, the situation of use co-shapes the usage, meaning, and consequential salient motivational affordances of the technology in question (Deterding, 2011). Thus, even the affordances and, with that, the characteristics that pertain to the gamified technology are partially co-shaped by situation-specific usage and meaning (Deterding, 2011). When successfully perceived and realised in accordance with actors' motivations related to the situation of use, the affordances of the gamified technology support the actor in optimally achieving desired goals.

In tourism contexts, the vacation setting therefore plays a role in determining the usage of gamified technology. Figure 6 illustrates the interplay between the situational affordances of the vacation setting and artefactual motivational affordances of gamified technology in the vacation context.

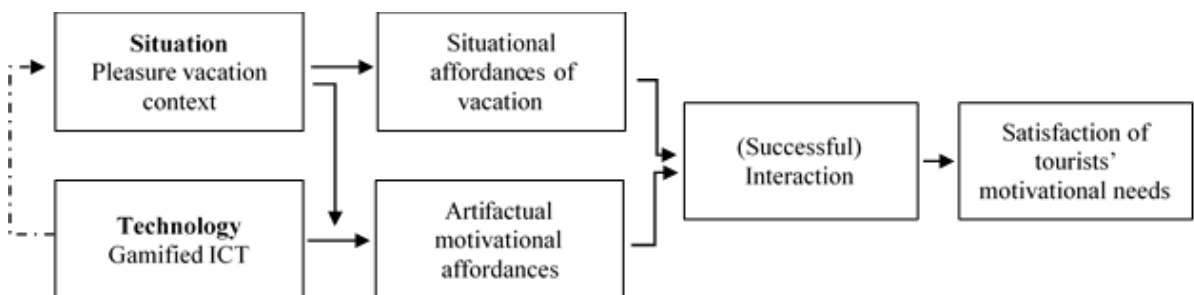


Figure 6: The situation of use co-shapes the motivational affordances of gamified technology (based on Deterding, 2011).

Studying the underlying motivations for engaging with gamified technology in real-life contexts is complex, as the gamified technology is linked to situation-specific dynamics of the context. That is, real-world contexts always include implicit, incremental, and, at times, ambivalent or undetected encounters and relations that emerge among people, artefacts, and environments (Wakkary & Odom, 2018). Moreover, gamified technology is targeted at different audiences and may therefore be associated with a number of motivations, serving a variety of motivational needs which individuals may have in each specific context (Koivisto & Hamari, 2019). Therefore, when investigating the underlying motives for engaging with gamified technology, it is vital to determine what is meaningful to the user in the specific context. As such, the ultimate goals of interacting with gamified technology

related to the situation-specific setting may exceed the motivational affordances already identified by the general game-related literature.

With the embedment of the gamified technology in the vacation destination, tourists' meaningful goals and motivations related to the vacation activity independent of the game elements must be considered. This necessity motivates the second study of this doctoral thesis. When an interaction with the gamified technology can successfully be initiated, gamified technologies might serve as playful environments as part of the tourism setting, offering tourists meaningful interaction opportunities. In this way, gamified technologies may support the tourists in the pursuit of their goals.

2.2.3.2 Outcomes of Engaging with Gamified Technology

As illustrated in Figure 7, according to the gamification literature, the end goal of gamified technology engagement is to drive actions and behaviours. Considering this goal, successful engagement with the gamified technology leads to behavioural consequences in the real world and generally informs about how well the technology fits with personally meaningful goals related to the behavioural activity of the use context (Hamari et al., 2014a). These behavioural consequences of gamification engagement can be measured and quantified, for instance, in terms of the number of physical activities.

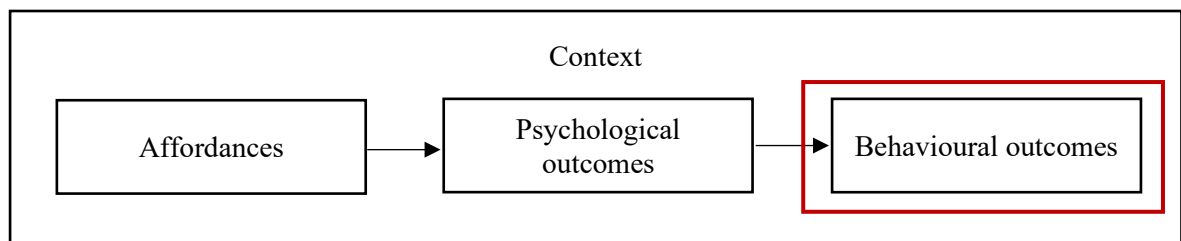


Figure 7: Behavioural outcomes of engagement with gamified technology (based on Deterding, 2011; 2015).

Considering the concept of situatedness, and as previously elucidated, the context of use co-shapes users' perception of and motivations for engaging with game elements (van Roy & Zaman, 2018). Consequently, the situation of use not only co-shapes the persuasiveness of the gamified technology but also the behavioural outcomes from engaging with the technology. In real-world contexts, however, the behavioural outcome of gamified technology use should not be seen as an isolated behavioural act. Actions and behaviours in real-world contexts are always embedded in the larger experiential setting intimately linked to an overall experience. Thus, the behavioural consequences of engaging with gamified technology represent *only* the immediate quantifiable outcomes of gamification engagement. Yet, behavioural technology such as gamified technology should consider

all aspects of an experience (Tussyadiah, 2017). More specifically, the goals related to the overall experience are important. As such, the end goal of engaging with gamified technology should extend beyond small behavioural interventions.

This view is in line with the premise that studying human-centred technology should also consider the lasting value of enduring outcomes beyond the moment-to-moment interaction. Similarly, Huotari and Hamari (2012) assert that gamified technology needs to support users in their overall value creation. More important than the behavioural outcomes, and more difficult to grasp, are thus questions related to less quantifiable measures, such as the intrinsic gratifications of gamification engagement for the overall value creation. Such questions are related to the overall psychological outcomes from engaging with gamified technology during vacation. In vacation contexts, the creation of value and lasting outcomes are ultimately linked to questions of wellbeing, mental health, and recovery (Chen & Petrick, 2013; Filep & Higham, 2014; Fritz & Sonnentag, 2006; Sonnentag & Fritz, 2007). Thus, a higher-order outcome from engaging with gamified technology would include values related to a generally meaningful experience and mental wellbeing.

Furthermore, games are generally known to have restorative effects on the user and foster mental switching off, precisely because games satisfy basic psychological needs (Jones, Scholes, Johnson, Katsikitis, & Carras, 2014; Ryan et al., 2006). The satisfaction of deeper psychological needs fosters mental wellbeing (Seligman, 2011). Therefore, it can be elaborated that, when gamified technology successfully ties in with the meaningful goals of tourists in relation to the behavioural activity in the context of use, gamified technology helps to satisfy users' intrinsic psychological needs and thus taps into users' deeper layers of meaning and emotional values. In this way, gamified technology functions as a stimulator for tourists' co-creation of personally meaningful experiences and, consequently, contributes to tourists' overall mental wellbeing.

In sum, by investigating the successful realisation of meaningful goals through engaging with gamified technology, conclusions regarding the value of gamified technology for the overall tourist experience can be drawn. With the pleasure vacation being a highly emotional context, the notion of value, meaning, emotions, and wellbeing becomes even more pronounced. As meaningful experiences are longer lasting and more memorable (Filep & Pearce, 2014a; Tung & Ritchie, 2011), meaningful experiences are more likely to remain in tourist's minds beyond the vacation. Gamified technology can assist tourists in co-creating meaningful experiences, adding to their overall value creation during vacation and beyond. The aim to investigate the behavioural and psychological gratifications of gamification engagement for the overall tourist experience motivates the third study of this doctoral thesis.

As the successful realisation of gamification engagement and the creation of meaning is particularly dependent on the nature of the activity, the context and the specific situation in which the gamified technology is being used, tourists' diverse needs and goals related to vacation activities must be considered. Therefore, the specific context of a pleasure vacation addressed in this thesis is introduced in the following section. Moreover, tourists' motives related to the pleasure vacation context and the associated activities are discussed.

2.3 Motives in Pleasure Vacation Contexts

Pleasure Vacation at Ski Resorts

Gamified technology appears especially promising in contexts in which people remain in the same geographical place for a specified amount of time. Vacations at tourism destinations typically take place in clearly defined and geographically concentrated action spaces. This doctoral thesis uses the pleasure vacation as the context of this study. More specifically, it focusses on a winter vacation at a ski resort in Switzerland. Ski resort vacations are popular in countries with tourism destinations located in the Alps, such as Switzerland, France, Austria, Germany, and Italy (Dolnicar & Leisch, 2003). In Switzerland, Alpine destinations account for 43% of all overnight stays, with the winter months contributing most to this fact (Bundesrat, 2017). Alpine destinations accordingly make up the largest contribution of all regions and have been pointed out to play an important role for the national tourism turnover in Switzerland in general (Schweizer Tourismus-Verband, 2019).

Winter vacations at ski resorts are considered to be the more active form of pleasure vacations and represent the counterpart of typical summer vacations at beach resorts (Dolnicar & Leisch, 2003). Pleasure vacations commonly provide a restorative function for the tourist, which is realised through recreational activities. Typical recreational activities in the general context of pleasure vacations include light to moderately difficult sports activities. In this regard, alpine skiing and snowboarding are among tourists' main behavioural activities and motivations for pleasure vacations at ski resorts (Dolnicar & Leisch, 2003). Accordingly, the primary motivation for a pleasure vacation at a ski resort is participating in one's favourite winter sports activity for recreational purposes (Gibson, Attle, & Yiannakis, 1998). Recreational activities such as skiing and/or snowboarding thereby serve as the means to recharge one's 'batteries' and restore one's energy.

Green and Chalip (1998) note that vacationers at winter sports resorts are primarily interested in the process of playing a sport. The central focus thus lies on doing sports for fun or realising one's passion. Furthermore, playing one's favourite winter sport for recreational purposes is often

integrated with social activities (Kurtzman & Zauhar, 2005). Yet, while tourists may engage in the same winter sports activities and express similar generic motivations, the underlying needs and goals of these activities can vary between tourists. Put simply, performing the same behavioural activities at the same winter sports destination may be linked with different underlying motives (Dolnicar & Leisch, 2003).

The primary behavioural activity at which the gamified technology in the context of a pleasure vacation at a ski resort is targeted is thus engaging in winter sports for recreational purposes. Skiing and/or snowboarding and the social activities related to these sports, such as spending time with family and friends, thereby serve as the main means to satisfy intrinsically valued states. Hence, of particular interest are tourists' underlying needs and goals in relation to these activities. Moreover, pleasure vacations are characteristically social contexts (Crompton, 1979). Considering the specific activity and context of use, therefore, motivation theories in the physical domain targeted at social needs appear particularly promising as a theoretical framework to better understand tourists' motives and experiences related to gamified technology use. Motivation theories primarily targeted at social needs include theories in the fields of social interaction studies (Baumeister & Leary, 1995) and goal achievement (Atkinson & Feather, 1966; Elliot & Church, 1997).

Achievement Motivations in Pleasure Vacations at Ski Resorts

There are numerous theoretical perspectives on sports and exercise motivations. From a socio-psychological point of view, achievement goal theories are considered to be among the dominant motivation theories in contexts related to physical activities, like sports (Spray, Wang, Biddle, & Chatzisarantis, 2006). Achievement motivations do not necessarily arise only in relation to competitive sports or formally organised sports events. Goal achievement motivations can also be activated in general social settings, for instance, during informal sports activities or leisure sports. In such cases, goal achievement may mainly be linked to social aspects related to 'play' and/or 'fun' in performing the sports activities. In this respect, goal achievement is not necessarily less relevant or meaningful in pleasure-oriented contexts. On the contrary, pleasure vacations represent an ideal setting for personal growth (Crompton, 1979) and thus serve as a suitable environment precisely for fostering those individual goals and values which are personally meaningful.

McClelland's (1987) achievement motivation theory has been emphasised as particularly suitable in contexts in which social needs may be activated, such as during a vacation. Achievement motivation theory describes one's social relationship with the world. It refers to the need to preserve one's own identity, values, and interpersonal relationships. With the goal to obtain a better understanding of the

underlying motivations in relation to physical activities such as sports, achievement motivation theory is often used in combination with other theoretical, conceptually related approaches, such as the general needs theories. In particular, the self-determination theory (Deci & Ryan, 2000), which exhibits an overarching view on human motivation, has been noted as beneficial in such cases (Spray et al., 2006). Although the self-determination theory and achievement motivation theory are conceptually related, achievement motivation theory describes social needs that arise from interacting with the environment. The self-determination theory, in contrast, relates to the psychological needs inherent in human nature.

2.4 Theoretical Conceptualisation of the Thesis

Needs satisfaction theories align with the positive psychology perspective that humans actively search for experiences to satisfy their inner needs. In this section, the theoretical conceptualisation of this thesis is summarised. The needs satisfaction theories serve as the main theoretical framework related to the environmental setting and context of use. Therefore, the self-determination theory and achievement motivation theory are subsequently described in greater detail.

Self-Determination Theory

As an acknowledged positive psychology theory, the self-determination theory argues that people sometimes act out of their deepest and growth-oriented motives and needs, while, at other times, they act out of pressure (Deci & Ryan, 2000; Filep & Laing, 2019; Sheldon & Kasser, 2001). The self-determination theory ties in with the early humanistic works of Maslow (1962) on the innate need for self-actualisation. From a positive psychology perspective, self-actualisation is synonymous to eudemonic experiences (Mekler & Hornbæk, 2019). Autonomy, competence, and relatedness are the key concepts of the self-determination theory.

Autonomy refers to acting according to one's own interests and values. An actor feels autonomous if he perceives himself as the source of his own behaviour (Ryan & Deci, 2002). **Competence** generally refers to a perceived sense of confidence and is related to opportunities to express one's own capacities and skills (Deci, 1975; Ryan & Deci, 2002). As a psychological need, competence cultivates feelings of having the ability to master a task and achieve goals (Reeve, 2018). The strongest source of satisfaction of the need for competence is experienced when one engages in a task which is right for one's own skills (Deci & Ryan, 1985). Finally, **relatedness** refers to the feeling of being connected with others (Ryan & Deci, 2002). This also includes the desire to care for those people with which one feels connected and, in return, feeling cared for by those people.

Achievement Motivation Theory

The main concepts of the achievement motivation theory include the social needs for achievement, power, and affiliation. Achievement and affiliation are closely linked, yet are distinct from the competence and relatedness concepts of the self-determination theory.

Achievement is a learned social need. The natural incentive for the achievement motive is “doing something better” (McClelland, 1987, pp. 227–228). People can wish to do something better for numerous reasons. As such, the desire to do something better can occur either for its own sake or to prove to others that one is capable of doing so. Accordingly, achievement can comprise 1) competition with a task, 2) competition with the self, or 3) competition against others (Heckhausen, 1967). The need for achievement is closely related to the need for competence. In contrast to the psychological need for competence, however, achievement is a social need that predominantly arises in social situations. Both competence and achievement can have intrinsic (self-evaluation) or extrinsic (norm-based evaluation) incentives.

Power, like achievement, is a learned social need. Power characterises the desire to exert influence on others or strive for leadership (McClelland, 1987). As a competence-demonstrating need, power is primarily extrinsically oriented. This is in contrast to the needs for competence and achievement, which are more intrinsically oriented and describe a competence-expanding need.

Affiliation refers to people’s basic need and desire to be with others (McClelland, 1987). Affiliation can include various types of emotional interpersonal attachments. One particular form of affiliation relates to the desire to belong. Social interaction thereby serves as the primary condition for social belonging. Building on the psychological need for relatedness (Reeve, 2018), affiliation can also be described as establishing or maintaining positive relationships with others. Feelings of affiliation can create love and harmony among people (McClelland, 1987).

Achievement motivations are generally triggered through the individual’s motives and desired outcomes of an activity (Atkinson & Feather, 1966). One motivational construct can thereby be targeted at different motives and end goals. For instance, the desire to do something better can occur for several reasons. People may wish to do something better because they would like to please others or gain others’ approval. It can also occur for reasons of one’s own personal confirmation.

Consequently, the opportunities for action offered by gamified technology may be connected to the various needs and goals tourists have in relation to their chosen activities in the context of a pleasure vacation. By making interactions with the tourism setting more playful, and with the end goal to

shape or amplify certain actions, gamified technology can support tourists in achieving personally desired outcomes.

Theoretical Conceptualisation of Tourists' Interaction with Gamified Technology in Pleasure Vacation at a Ski Resort

Based on the aforementioned theoretical foundation of gamified technology, this study conceptualises engagement with gamified technology as co-determined by users' meaningful goals and motives related to the main behavioural activity and context of use. In other words, tourists' meaningful goals related to skiing and/or snowboarding and the general context of the pleasure vacation at a ski resort determine tourists' engagement with the gamified technology and, consequently, the outcomes thereof for the tourist experience. It is argued that social motives are particularly relevant to social contexts such as pleasure vacations and physical activities like sports. Empirical support in this regard is provided by several studies from the field of sports and tourism (Green & Chalip, 1998; Hungenberg, Gray, Gould, & Stotlar, 2016; Klenosky, Gengler, & Mulvey, 1993; Spray et al., 2006; Standage, Duda, & Ntoumanis, 2003).

Using a pleasure vacation at a ski resort as the general context of this study, and skiing and/or snowboarding as the main target activity, the social needs-based achievement motivation theory is considered as the main theoretical framework. Nevertheless, as achievement motivation theory largely builds upon the self-determination theory, the two theories are used in combination to investigate tourists' underlying motives for engaging with gamified technology and, as a result, the behavioural and psychological gratifications thereof for the tourist experience.

As elaborated in this thesis, it is theorised that motives for and meaning related to interacting with technology are co-shaped by the context of interaction. Based on that knowledge, the outcomes from interacting with the gamified technology are conceptualised and investigated in the form of perceived gratifications beyond the system, that is, behavioural and psychological gratifications. Figure 8 summarises and illustrates this thesis's theoretical conceptualisation of tourists' engagement with gamified technology during a pleasure vacation.

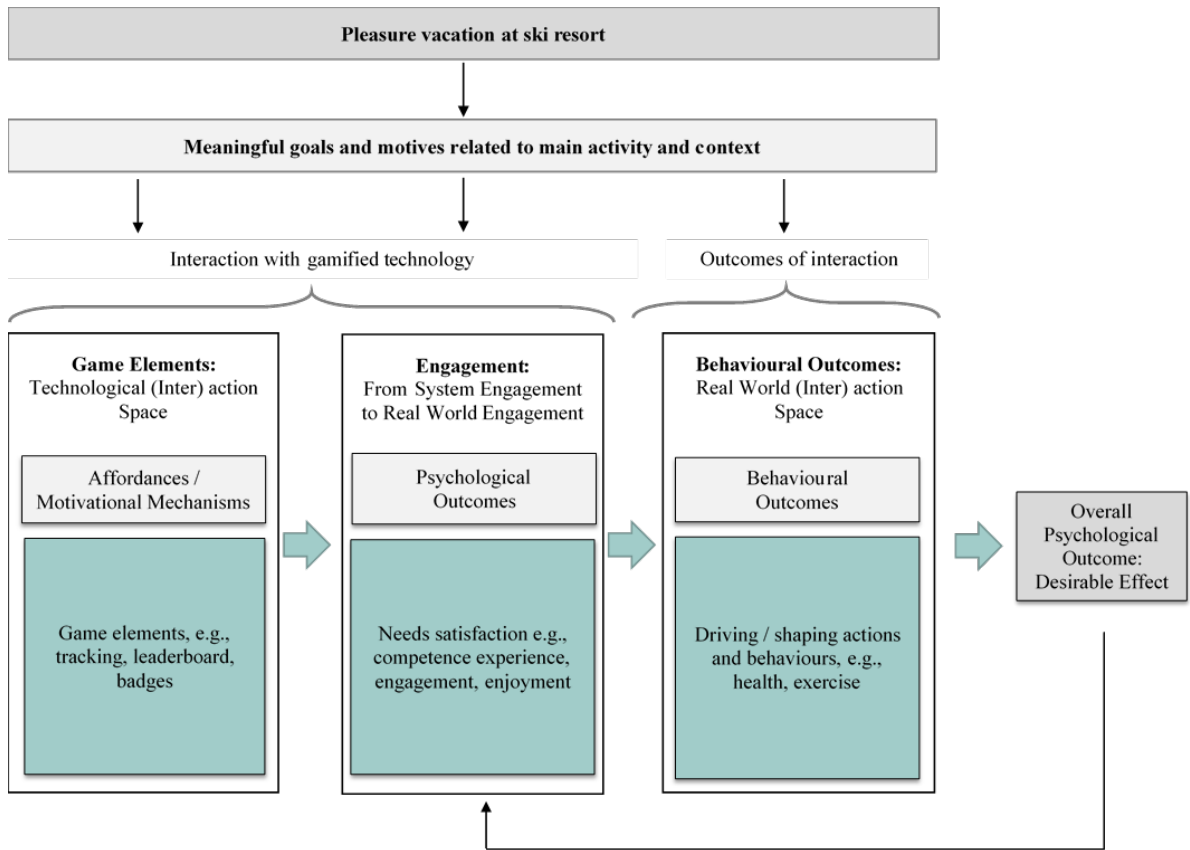


Figure 8: Theoretical conceptualisation of gamified technology interaction in this thesis.

As illustrated in Figure 8, the pleasure vacation context and tourists’ personally perceived meaningful goals related to that context represent the theoretical and conceptual framework for understanding engagement with gamified technology. Based on the general conceptualisation of gamification engagement, the interaction with gamified technologies includes three consecutive steps. First, the game elements or affordances indicate the tourists’ offered opportunities for action, depicting the system’s technological interaction space. When perceived, tourists voluntarily choose to interact with the system’s game elements.

In a second step, engagement with the game elements results from successful interaction with the system. Engagement is thus achieved when users’ psychological and/or social needs are satisfied through their interaction with the game elements. Engagement is defined as users’ positively valenced cognitive, emotional, and behavioural activity during or in relation to interaction with the gamified technology (Hollebeek et al., 2014). Based on Hollebeek et al.’s (2014) three-dimensional concept of engagement, cognitive processing refers to users’ levels of thought processing and elaboration when interacting with the system. The emotional dimension refers to users’ degree of

positive affect in their interaction with the system. Lastly, behavioural activity describes the levels of energy, time, and effort users spend on the system while at the vacation destination.

The third step refers to the behavioural outcome from engaging with the system. In the real-world context, successful engagement with the system consequently leads to a behavioural outcome in the world. In this thesis, behavioural outcomes refer to, for instance, increased skiing or snowboarding initiated by the gamified technology use.

Finally, it is theorised that, when the gamified system optimally supports the user in achieving personally perceived meaningful goals related to the context of use, engagement with the gamified technology leads to overall desirable effects. These overall effects eventually contribute to tourists' co-creation of meaningful experiences. Desirable effects thereby describe tourists' overall perceived psychological gratifications beyond the momentary interaction with the system. As such, the desirable effects refer to users' reflections and the overall value they derive from engaging with gamified technology in the tourist experience at the destination. The successfully realised desirable effects, in turn, feed back into tourists' continued engagement with the gamified technology, as illustrated in Figure 8 by the arrow connecting back to engagement with the system.

On a theoretical level, the achievement of an overall desirable effect is indicative of the value that endures *beyond* the momentary interaction of engaging with the gamified technology (Mekler & Hornbæk, 2019) and, with that, the meaning of the gamified technology for the overall tourist experience. The overall desirable effect thus includes the lasting values that endure beyond interaction. Conceptually, gamified technology in a real-world context such as a pleasure vacation connects the technology-related (inter)action space with the real world, the destination-related (inter)action space. Figure 8 illustrates that the (inter)action space transfers from (inter)actions on the system to actions in the real setting of the tourism destination.

2.5 Concluding Remarks

This chapter has discussed the theoretical framework, including concepts that are related to and comprise the foundation of this doctoral thesis. It has illustrated how the perspective of human-computer interaction has shifted from an engineering and information-centric perspective related to work contexts to a more human-centred perspective related to everyday life and leisure contexts. With this shift, the understanding of human-computer interaction has evolved from a perspective mainly concerned with questions of usefulness and usability to one primarily related to questions of meaning, experiences, and emotions.

The concept of meaning is central to both the tourist experience and interaction with human-centred technologies. Information regarding personal meaning can generally be derived from an individual's motives and deeper personal values when pursuing an activity such as interacting with gamified technologies. Although meaning develops within the individual, the context and specific situation mutually co-shape individual motives and, thus, the creation of meaning. Therefore, it is important to know tourists' motives related to the context of using gamified technologies. Thus, the motives for engaging with gamified technology are not just defined by the characteristics of the game design. Moreover, one motivational construct can be targeted at several ultimate goals.

With the pleasure vacation being a social context, this thesis considers social needs as particularly relevant to the use of gamified technology during one's vacation. Social needs particularly arise when interacting in a social environment. Coupled with the main behavioural activity pursued during a pleasure vacation at a ski resort, achievement motivation theory has been highlighted as a suitable theoretical framework. Achievement motivation theory is thereby used in combination with self-determination theory to better understand and analyse why tourists engage with gamified technology during their stay at the investigated tourism destination. Positive psychology serves as the underlying understanding of what is personally meaningful and how meaning starts to evolve through interaction with gamified elements.

3 METHODOLOGY

In this chapter, the methodological approach of this thesis is presented. First, theoretical considerations, including ontological and epistemological considerations, are elucidated. Through this discussion, the main paradigms in social sciences are considered with the goal to identify the paradigm that is most suitable for this thesis. Second, and based on the theoretical considerations, the research approach, methodology, and methods are presented and discussed in line with the goals of each study conducted in this thesis.

3.1 Ontological, Epistemological and Methodological Considerations

The researcher inevitably brings a number of assumptions to the theoretical and methodological setting when planning and conducting a study. So, what is the best way to generate knowledge? With the goal to find answers to the questions that guide a research study, cognitive orientation is needed. Whether studying a specific social phenomenon or investigating concrete facts, conducting research is implicitly linked to the world's larger questions. Metaphysical considerations, also known as the philosophy of science, help establish a better understanding of such questions (Bunge, 1996).

The philosophy of science seeks to find answers to the greater questions regarding humans, the world, and the places and schemes within it (Rescher, 2001). The task of philosophy of science is to provide guidance and a cognitive orientation in a complex world. It does this by reflecting on the questions, 'How can knowledge be generated?' and 'What is the nature of existence or "reality" within which knowledge is generated?' (Crotty, 1998). Overall, the philosophical stance underlying the research thus defines the fundamental belief system that governs its ontological and epistemological assumptions and, with that, the selection of a study's methods.

Ontology, epistemology, and methodology represent the three levels of inquiry or areas of thought that shape the nature of a particular research paradigm (Guba, 1990). While ontology deals with questions of what is 'real', epistemology is concerned with the way in which knowledge is generated (Guba, 1990). Methodology, finally, is concerned with the process and design behind the choice of particular methods (Crotty, 1998). The main questions considered on an ontological, epistemological, and methodological level can be summarised as follows (based on Crotty, 1998; Guba & Lincoln, 1994):

Ontological questions: What is the form and nature of 'reality'? What is the object of research?

Epistemological questions: What can be known? How is knowledge gained about the object of research?

Methodological questions: How should the inquirer go about obtaining knowledge? What is the strategy, plan of action, or conceptual framework that informs research?

The answers to these questions consequently inform about the set of basic beliefs or the paradigm to be adopted when conducting research (Guba, 1990).

In social science, three overarching paradigms or philosophies of science have been identified, which also represent the three most opposing natures of philosophy. These include positivism, social constructionism, and critical realism (Alvesson & Skoldberg, 2009). While these three paradigms depict the most commonly applied belief systems, they are not exhaustive. Rather, they represent the most dominant ones in a wider spectrum of paradigms.

Positivism can be seen as the one most closely aligned with principles of natural sciences. Positivism is concerned with facts (Alvesson & Skoldberg, 2009). Ontologically and epistemologically, positivism assumes that there is only one truth in an objective reality, independent of human perception (Sale, Lohfeld, & Brazil, 2002). Thus, the investigator and the studied phenomenon are assumed to be independent entities (Guba & Lincoln, 1994). The main endeavour of positivism is to test causal relationships by means of quantitative methods (Guba & Lincoln, 1994).

Social constructionism, in stark contrast to positivism and with its roots in phenomenology, assumes that reality is socially constructed through humans' interactions in the world (Alvesson & Skoldberg, 2009). According to this understanding of knowledge, multiple realities can exist, which are mentally constructed and socially based (Guba & Lincoln, 1994). The focus of the social constructionism paradigm primarily lies in studying *how* phenomena are socially constructed (Crotty, 1998). Epistemologically, social constructionism suggests that there is no access to reality independent of humans' minds. Therefore, different people may construct meanings in different ways, even in relation to the same phenomenon (Crotty, 1998). Social constructionism typically applies qualitative methods for studying a phenomenon under investigation.

Aligned with the two opposing stances of positivism and social constructionism, *critical realism* has been recognised as an intermediate position, bridging quantitative and qualitative studies without favouring one or the other (Alvesson & Skoldberg, 2009). Critical realism sees both positivism and social constructionism as too superficial and unrealistic (Alvesson & Skoldberg, 2009). On an

ontological level, critical realism advocates that the world exists independently of human beings; this world includes deep structures that can be made accessible by scientific theories (Alvesson & Skoldberg, 2009). Yet, critical realism also acknowledges individuals' perspectives. As such, it treats both the independent world and individuals' perceptions as real phenomena which causally interact with one another (Maxwell & Mittapalli, 2010). Epistemologically, the main endeavour of critical realism is to analyse the world in terms of underlying structures and mechanisms, being open to both quantitative and qualitative approaches (Maxwell & Mittapalli, 2010).

Unlike the three extreme paradigmatic positions of positivism, social constructionism, and critical realism, there exists a further paradigm, called *pragmatism*, which represents a less radical belief system. Pragmatism is less deeply grounded in philosophical assumptions and is not dedicated to any one system of philosophy or reality (Creswell, 2014). Rather, pragmatism is concerned with what works best for the research in practice, suggesting that research should mainly be guided by the underlying research question (Saunders, Lewis, & Thornhill, 2016).

Ontologically and epistemologically, the pragmatist acknowledges that research always takes place in a specific context, be it social, political, or historical (Creswell, 2014). This means that multiple paradigm positions may be relevant in one study. Methodologically, pragmatism looks at different approaches to data collection. The choice of method, technique, and procedures of research are based on the consideration of what best meets the needs and purposes of the study (Creswell, 2014). Thus, pragmatism can be considered as a unique position that allows freedom of choice regarding worldviews, assumptions, and applied methods (Creswell, 2014). The only central philosophical principle underpinning pragmatism is whether the research questions unquestionably fit into one paradigm (Biesta, 2010). If the research questions cannot be clearly allocated to one paradigm, pragmatism can serve as a suitable stance (Biesta, 2010).

Overall, all four paradigms have their merits. While positivism, social constructionism, and critical realism are deeply grounded in philosophical assumptions, pragmatism postulates that considerations of ontology and epistemology are secondary. In pragmatism, more emphasis is placed on the guiding research question(s) and the aim to find answers to those questions which are of value to the researcher.

3.1.1 Research Paradigm of the Thesis

What resonates from the previously described philosophical stances is that there is no right or wrong in the choice of a suitable paradigm. The philosophical stance that lies behind a study provides context for the research process and grounds its logic and criteria (Crotty, 1998). Although there are

premises concerning which paradigms and methodologies are typically considered to belong together, there is not one particular way. Saunders et al. (2016) argue that an appropriate paradigm should be selected according to whether it fits the scope, aim, and research objectives of the study. The present thesis comprises three studies. One of these studies is of theoretical nature and two of empirical nature. The two empirical studies refer to positive psychology as their main guiding lens. As pragmatism allows for multiple perspectives in one main study, such as in a single thesis that comprises several studies, it is considered to be the most suitable research paradigm for this thesis.

In the following subsection, paradigm considerations based on the overarching goal of this thesis are made. More precisely, ontological, epistemological, and methodological thoughts related to users' interactions and experiences with technologies in tourism contexts are discussed. These considerations provide the rationale for adopting pragmatism as a suitable paradigm for this doctoral thesis. As the first study of this thesis is considered to be preliminary, it is not specifically affected by the underlying paradigm considerations.

General Paradigm Considerations for Human-Computer Interaction

As a stream of positive computing, gamified technology seeks to shape actions and behaviours through persuasion. The concept of persuasion can be considered to stem from so-called behaviouristic approaches based on Skinner (1938) and the underlying idea that human behaviour can be influenced through technological interventions. Behaviouristic approaches and the related 'trigger-reaction modelling' largely assume the non-voluntariness of behaviour – that is, that human behaviour can be controlled via external circumstances. Moreover, behaviouristic approaches treat humans as a 'black box', assuming that everyone is the same (Skinner, 1938).

In contrast to the behaviouristic perspective of technology use, which assumes a technology-dominant view of human-computer interaction, the rhetoric of wellbeing of positive psychology stresses "the (re)discovery of the fact that humans voluntarily engage in activities without any reinforcement" (Deterding, 2014, p. 44). Positive psychology for technology use represents the very counteraction to behaviourism. The view of positive psychology emphasises inner states over external control by acknowledging that one and the same situation might lead to different understandings, experiences, and behavioural responses (Deterding, 2014). Although the goal of such 'behavioural technology' is to shape users' actions and behaviours through technological interventions, the user himself, with his individual needs and perceptions, still plays an active role in the human-computer interaction relation. The rhetoric of wellbeing for technology interaction accordingly emphasises users' self-determination over outside control and experiences over

behaviour (Deterding, 2014). In this view, humans have their own values and ideas that they bring to human-computer interaction.

Nevertheless, although the human-centred perspective of wellbeing puts the user in the foreground, it does not refute that technology also has its own, inherent values and can accordingly influence human behaviour and human experience to a certain extent. With these underlying assumptions, specific sub-goals are formulated for the three individual studies. Pragmatism best meets the needs of this thesis, particularly because it allows for different theoretical considerations according to the sub-goals and purposes of the three individual studies in this thesis. Positivism, social constructionism, and critical realism are all perceived as too unilateral for the requirements of an overarching paradigm and too radical with their deep philosophical grounding.

Positivism is considered to be inappropriate, as it adopts a reductionist perspective mainly interested in theory testing. Such a perspective fails to see the nuanced layers of reality (Alvesson & Skoldberg, 2009). In contrast to positivism, social constructionism implies the value of gamified technology as primarily socially constructed independently of technology's values. Lastly, critical realism is more interested in investigating underlying structures and mechanisms by combining an objective worldview and individual perspectives, which is not the goal of this thesis.

In fact, pragmatism has been highlighted as a paradigm particularly suitable for studying humans' interactions and experiences with technology, in which understanding users' *meaning making* represents a core aspect (McCarthy & Wright, 2004). As a philosophy of experience, pragmatism seems especially helpful to understand human experiencing, meaning, and the emotional characteristics of interaction (McCarthy & Wright, 2004).

Pragmatism as the Paradigm to Study Users' Interactions and Experiences with Technology

This thesis applies the lens of positive psychology with the overarching goal to explore the value of gamified technology in the tourist experience. The positive psychology lens of this thesis helps to define and interpret tourists' interactions and moment-to-moment experiences with gamified technology during a pleasure vacation. It does so by means of the closely related concepts of achievement motivation and self-determination theory. As such, the fundamental belief system of pragmatism must be discussed in relation to the guiding lens of positive psychology, as it governs the ontological and epistemological assumptions and, with that, the selection of methods of the two main studies of this thesis. Finally, these considerations help define the understanding of users' interactions and experiences based on positive psychology.

Human-centred approaches to studying human-computer interaction, such as positive psychology, assume that it is the individual user who brings the values of technology to life (Verbeek, 2015; Zhang, 2007). These values do not only refer to the characteristics – or the so-called mechanics and dynamics – of the gamified design, but are particularly dependent on individuals' perceptions and understandings. With relation to human-computer interaction, accordingly, the underlying belief system of pragmatism means that the values inherent to technology are co-determined by users' perceptions, feelings, and meaning making. McCarthy and Wright (2004, p. 21) put it the following way:

“Whether we are watching a film, playing a computer game, or using a spreadsheet, pragmatism tells us that our experiences do not come to us ready made. Rather, as meaning-making creatures, we bring as much to the experience as the filmmaker or designer puts into it.”

Pragmatism serves as a suitable paradigm for works aligned with the positive psychology perspective. Especially in relation to tourism studies on positive psychology, pragmatism has been deemed valuable, as it welcomes both qualitative and quantitative contributions (Filep, Laing, & Csikszentmihalyi, 2017). In this regard, tourism studies on positive psychology are characterised as having a less positivist flavour than most mainstream studies on psychology and positive psychology.

Traditionally, positive psychology has been believed to typically favour quantitative and reductionist approaches to research. This is in contrast to its forerunner, humanistic psychology. Humanistic psychology traditionally represents the qualitative tradition of research on human topics (Filep & Laing, 2019). The focus of both humanistic and positive psychology is the exploration of human potential and, relatedly, on what is growth oriented (Friedman, 2008). Thereby, both approaches follow the core underlying belief that human nature is intrinsically positive (Filep & Laing, 2019). Although the relationship between humanistic and positive psychology has been marked with tensions due to their different methodological and implicitly epistemological groundings (Friedman, 2008), researchers note that the gap between these two psychological streams does not seem so profound in reality. According to Friedman (2008, p. 115),

“This divide may be more illusory than real, because much of humanistic psychology research is firmly quantitative and, likewise, some qualitative research stems from the positive psychology tradition. So how real is this divide?”

Accordingly, positive psychology offers a relatively open view in terms of epistemological and methodological considerations. Precisely because of its multidisciplinary appeal and epistemological pluralism, pragmatism has been proposed as the ideal philosophical underpinning for positive

psychology (Filep et al., 2017). Thus, in this thesis, pragmatism provides the tools for understanding tourists' interactions and experiences with gamified technology in a pleasure vacation.

With pragmatism as the overarching paradigm, the ontological, epistemological, and methodological considerations in this thesis can be briefly summarised as follows (based on Pansiri, 2005; Waterman, 2013):

Ontological:

- Human nature is not generic. There is also an individual human nature. Individual human nature strives towards one's greatest potential and personal growth.

Epistemological:

- Emphasis is placed on that which best produces desired outcomes.
- Knowledge can be generated through communication. As such, communication is seen as a reliable source of understanding. Communication may take various forms, such as interviews or paper-and-pencil methods.

Methodological:

- There is no strict methodological approach to be followed. Rather, a variety of perspectives and approaches may be combined, allowing for empirical openness. Both qualitative and quantitative approaches are welcome.

Figure 9 provides an overview of the overarching research philosophy and its related primary considerations for Studies 2 and 3 in this thesis. While the outer layer depicts the overarching paradigm underpinning this thesis, the inner layers include the inductive-deductive research approach, the methodologies applied, and the main methods employed in this thesis.

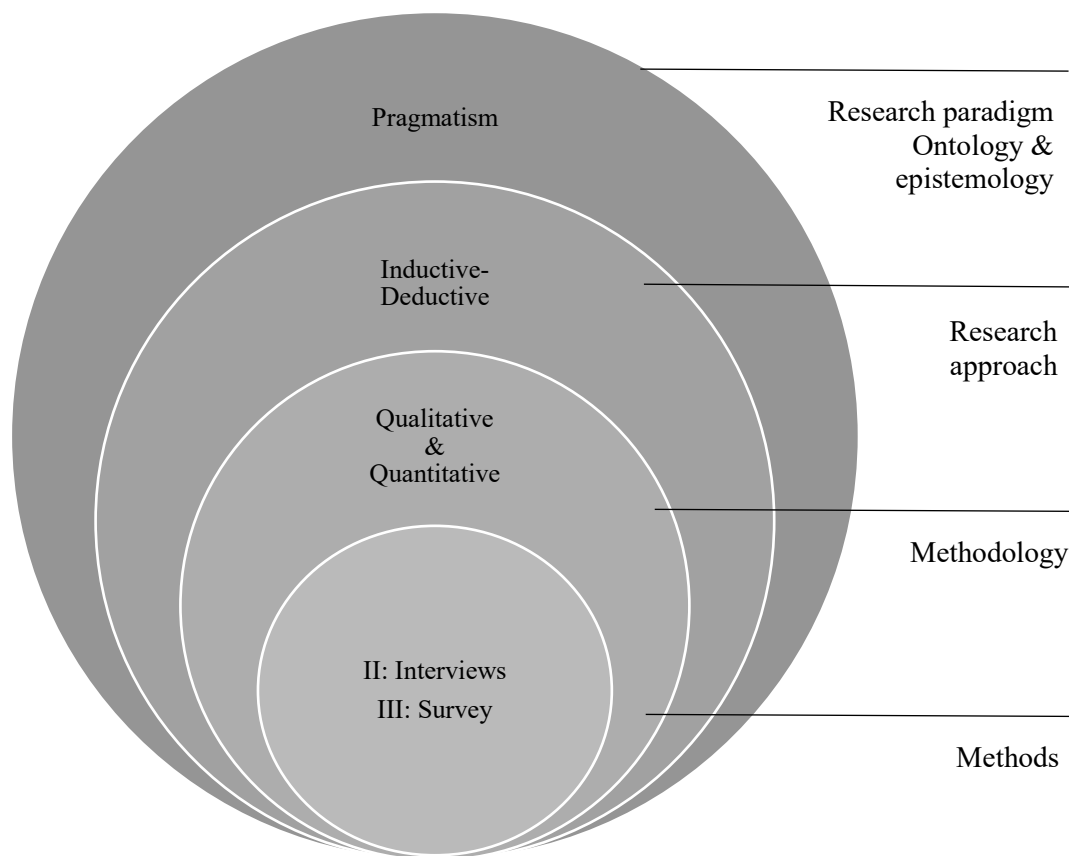


Figure 9: Overall research philosophy of this thesis.

3.1.2 Research Approach, Methodology, and Methods

Table 6 provides a summary of the research approach, methodology, and methods used in the three studies of this thesis. Study 1 is of theoretical nature and serves as the pre-research study, including a systematic literature review on the most prevalent factors that contribute to individual mobile ICT adoption. Studies 2 and 3 then build on each other. Study 2, following an inductive approach, explores tourists' ultimate goals for interaction with gamified technologies during a pleasure vacation. Positive psychology serves as the guiding lens and achievement motivation theory as the loose theoretical framework within this approach. The goal of this exploratory study is to establish knowledge within the framework of existing theories (Corbin & Strauss, 2015). Study 3 then builds on the results of Study 2 to develop a conceptual model including the behavioural and psychological gratifications of gamified technology use in a pleasure vacation.

Research Paradigm	Research Approach	Methodology	Method	Study
Pragmatism	Summary of primary research in a given field and synthesis of knowledge	Monomethod theoretical: Systematic collection, appraisal, and synthesis of knowledge	Systematic literature review	Study 1
	Inductive	Monomethod qualitative: Interview research	Qualitative, in-depth, face-to-face interviews	Study 2
	Deductive	Monomethod quantitative: Survey research	Quantitative online questionnaire	Study 3

Table 6: Overview of research approach, methodology, and methods used in this thesis.

In the following subsection, the methodological approach and applied methods for each study are briefly discussed. This discussion describes how data were collected and analysed in each study.

3.1.2.1 Study 1: Systematic Literature Review

Method

The aim of systematic literature reviews is to summarise primary research in a given field and to synthesise knowledge (Petticrew & Roberts, 2010). In doing so, systematic literature reviews provide an in-depth understanding of the status quo, as well as the progress of research in a given field. With the goal of Study 1 to, first, map the field of mobile ICT adoption from a user-centred perspective in general and, second, identify the most prevalent factors that contribute to individual mobile ICT adoption, a systematic literature review was deemed to be the appropriate tool. Thus, a systematic literature review was conducted to systematically collect, appraise, and synthesise primary research (Petticrew & Roberts, 2010) in the field of individual mobile ICT adoption.

Systematic literature reviews aim to minimise methodological errors by means of a comprehensive literature search and by systematically identifying, appraising, and synthesising all relevant studies in a given field to answer the research question (Petticrew & Roberts, 2010). The systematic literature review of Study 1 was conducted following Petticrew and Roberts (2010). By adopting a methodical

process, systematic literature reviews stand out due to their enhanced rigor and traceability compared to traditional reviews (Tranfield, Denyer, & Smart, 2003). Transparency is provided through the disclosure of each single process step, which allows for the potential replication of each step by any other researcher (Tranfield et al., 2003). In this manner, a systematic literature review is a scientific tool comparable to any other research method that is used to make sense of a large body of studies and to provide a scientific summary of any evidence in regard to a particular question (Petticrew & Roberts, 2010).

Data Collection and Analysis

The data collection process of this study was conducted after the pre-defined steps and criteria following Petticrew and Roberts (2010). The search process was executed using several electronic databases from January 2016–December 2016. Figure 10 depicts the overall data collection process. In total, 86 empirical studies were identified for further analysis and synthesis.

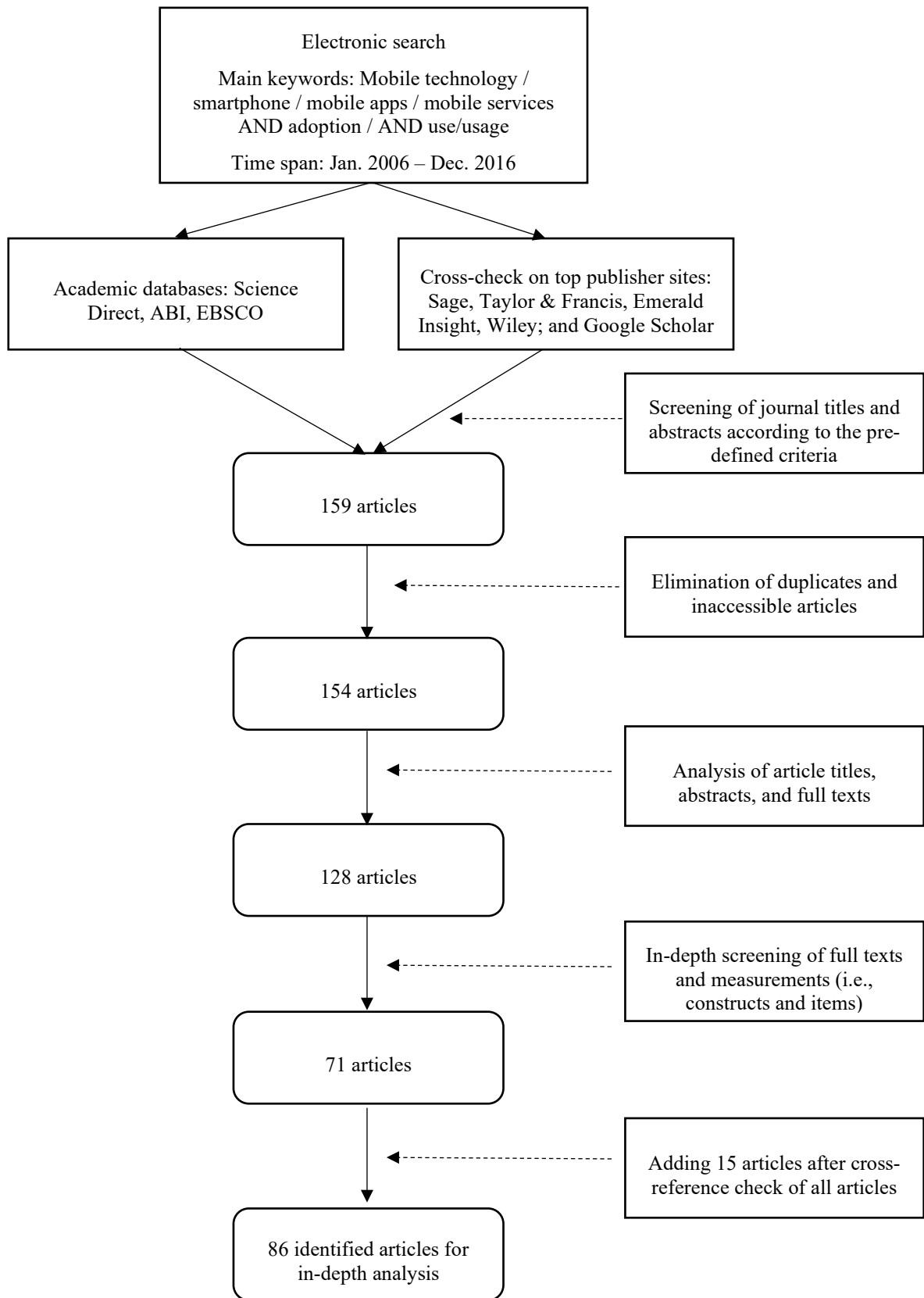


Figure 10: Systematic process to collect empirical studies in the field of individual mobile ICT adoption.

The identified articles were then systematically examined according to pre-defined quality criteria. Based on the quality assessment, 85 articles were included for in-depth analysis of the complete texts and measures of the prevalent factors that contribute to individual mobile ICT adoption. These 85 articles were carefully read through and analysed according to the pre-defined research questions of the systematic literature review.

3.1.2.2 Study 2: Qualitative In-Depth Interviews

Method

The goal of Study 2 was to explore tourists' underlying motives and ultimate goals in interacting with gamified technology during a pleasure vacation. With the aim to uncover tourists' higher-order goals in interacting with gamified technology, and based on the general need for a better understanding of why people choose to use gamified technology in the first place (van Roy et al., 2018), an exploratory approach was deemed appropriate. Higher-order goals in interacting with technology generally inform about the deep personal meaning behind technology interaction (Mekler & Hornbæk, 2016). With the aim to explore the ultimate goals tourists have in interacting with gamified technology during a pleasure vacation, Study 2 employed a qualitative laddering technique based on the rationale of the means-end chain analysis (Gutman, 1982). This laddering revealed how each game-related attribute connected with tourists' needs at the value level. Knowledge of tourists' desired end values provides information on their desired outcomes and the deep personal meaning they attribute to using gamified technology in the tourist experience.

The means-end chain provides an appropriate methodological bottom-up approach to understanding how consumers derive personal meaning from products. Methodologically, the means-end chain helps to answer motivational questions with analytical rigor. The personal values perspective of the means-end chain is theoretically based on the premise of modern motivation theories. More specifically, it parallels the expectancy-value theories of motivation. Expectancy-value theories postulate that people actively seek to achieve desired consequences and avoid negative ones to maximise their overall state of wellbeing (Atkinson & Feather, 1966). In this regard, the means-end chain assumes that consumers use products instrumentally to achieve desired consequences (Gutman, 1997). The desired consequences thereby represent the fundamental goals and values held by the individual.

Data Collection and Analysis

The participants of Study 2 were recruited from a pool of tourists at the tourism destination Flims/LAAX/Falera, Switzerland, who participated in a survey at the end of the winter season of 2016–2017. In the survey, those participants were identified who indicated their willingness to take part in the personal in-depth interviews. Those participants then received a follow-up email. Only tourists who had vacationed for at least two overnight stays during the 2016–2017 season and were active users of the gamified elements of the destination-related mobile app ‘INSIDE LAAX’ during this time were considered suitable for Study 2. In total, 18 personal in-depth interviews were conducted with the identified tourists from March to August of 2017.

In the main part of the laddering technique, the researcher began to ask questions about participants’ specific use of the game attributes on the INSIDE LAAX app. The questions were laddered up from ways of using the various gamified features to more specific questions of motivations until, finally, questions of personal experiences were reached. Following the laddering process, the main initial questions included, for instance, “What game features did you use? How did you use them?” (Aebli, 2019, p. 6). The questions were then laddered from participants’ specific motivations for interacting with the game features such as “Why did you use the ‘leaderboard’ in that way?” and “Why is that important to you?” to their personal experiences: “What did that bring you?” (Aebli, 2019, p. 6). This process helped to elicit tourists’ motivations for interacting with the gamified technology and the personal values they derived from it.

Data saturation of the interviews was attained after the 14th interview, with no new themes emerging in the interviews (Corbin & Strauss, 2008). Nonetheless, the interviews continued until the 18th session to allow for supplementary validation of evolving themes, with the first two interviews considered as test interviews. The transcribed interviews were then analysed based on the criteria of data-driven inductive thematic analysis, following the coding and analysis process of Strauss and Corbin (1998). Within this process, the researcher shifted from open coding to the development of the main categories, which were examined above others to ensure that all themes had been included in the analysis (Corbin & Strauss, 2008).

Table 7 summarises the step-by-step coding strategy used in Study 2 based on Corbin and Strauss (2008). The main steps, in sequential order, included open coding, grouping, axial coding, and, finally, selective coding. ATLAS.ti was used as the analysis software in this study.

Coding Strategy – From Open Coding to Selective Coding				
	Open coding	Grouping	Axial coding	Selective coding
	1	2	3	4
1	Mark relevant text passages	Look for similar codes	Look for relationships between the identified categories	Developed main categories are examined above others
2	Create direct quotes	Group similar codes in category	Relate categories to sub-categories	Examine main categories above all interviews
3	Create text-based codes related to the quotes	Refine categories in terms of their properties	Identify relationships separately per interview	--
4	Identify emergent codes separately per interview	Identify categories separately per interview	Identify and compare relationships above all interviews	--
5	Identify emergent codes above all interviews	Identify and compare categories above all interviews	--	--

Table 7: Coding strategy.

Next, the codes and categories were arranged according to their different levels or ladders within the laddering technique. Table 8 summarises the different coding levels based on the laddering technique. Code Level 1 describes the functional level and starts with participants' sought immediate effects or direct benefits from using the game features. Code Level 2 refers to the psychosocial and behavioural levels. It describes the next laddering level of participants' sought psychosocial and behavioural outcome goals. Finally, Code Level 3 refers to the end-value level and captures participants' fundamental values and ultimate goals of interacting with the gamified elements during their vacation.

Technological Level	Code Level 1	Code Level 2		Code Level 3
Game element	Functional level	Psychosocial level	Behavioural level	End-value level
		Personal	Social	Behavioural

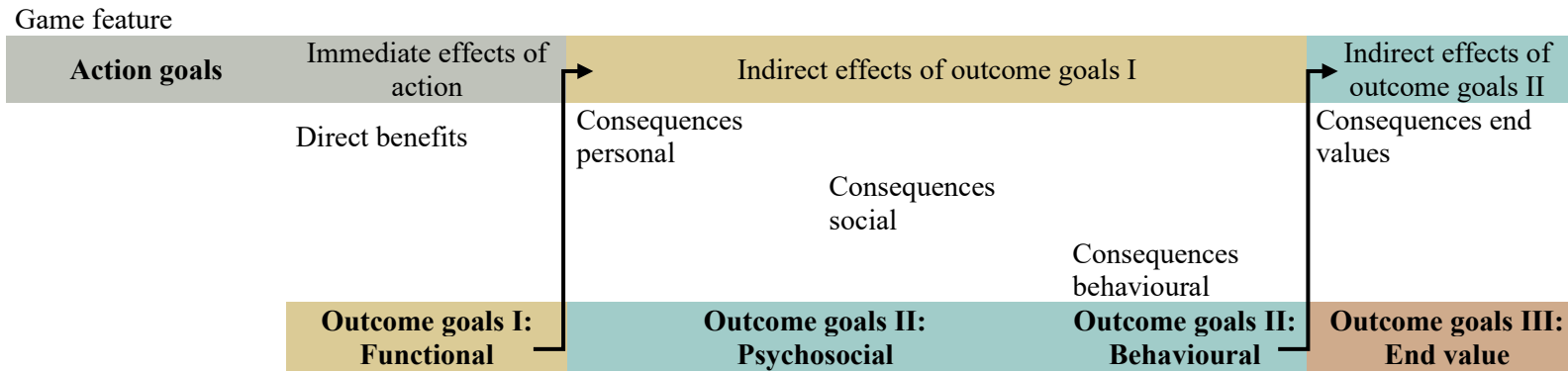


Table 8: The codes arranged according to their levels in the laddering technique.

To conclude, the results derived from the interviews were interpreted within the loose framework of achievement motivation theory. In qualitative research, theoretical frameworks serve only as an “overall orienting lens” (Creswell, 2014, p. 249). Therefore, achievement motivation theory was used only as an interpretation framework to compare the gained results against the motivations suggested by achievement motivation theory.

The laddering results of Study 2 are summarised in Appendix A.

3.1.2.3 Study 3: Quantitative Online Questionnaire

Method

Study 3 builds upon the results of Study 2. In doing so, Study 3 sought to test the explored motives and ultimate goals for engaging with gamified technology on a broader level of tourists by applying a quantitative survey method. In addition to investigating tourists’ motives for engaging with gamified technology, Study 3 also conceptualised the behavioural and psychological consequences of engaging with gamified technology in the tourist experience. Accordingly, the overall goal of Study 3 was to investigate tourists’ socio-psychological motivations for gamification engagement and the behavioural and psychological gratifications thereof for the overall tourist experience within a pleasure vacation.

With this goal, Study 3 applied the uses and gratifications (U&Gs) framework, within which tourists’ gamification engagement and the gratifications for the tourist experience were conceptualised. The U&Gs theory posits that consumers selectively choose media to gratify their needs (Katz, Haas, & Gurevitch, 1973). According to U&Gs, consumers use products to satisfy their psychological and social needs. The U&Gs understanding in Study 3 serves as the general theoretical and conceptual framework for tourists’ interactions with gamified technology. Within this framework, constructs for tourists’ perceived motivational needs were developed based on the findings of Study 2, as well as by drawing on additional conceptual support from the self-determination and achievement motivation theories. Tourists’ perceived motivational needs are indicative of the gratifications tourists seek in interacting with gamified technology. In total, eight constructs on tourists’ socio-psychological motivational needs were derived and are suggested to explain tourists’ engagement with gamified technology.

In real-world contexts, gamified technology aims at shaping actions and behaviours (Bogost, 2007; Hamari et al., 2014a). Hence, tourists’ sought outcomes or gratifications from engaging with gamified technology were also conceptualised in this study, including behavioural and psychological

gratifications. The conceptualised behavioural gratifications comprised, for instance, ‘being more active during the stay’, ‘driving new slopes’, and ‘better use of time during vacation’. Finally, the overall psychological gratifications were conceptualised as ‘a more meaningful stay’, ‘better overall stay’, and ‘increased recovery’. Four experts from the field of tourism and gamification were asked to critically examine the developed constructs and items. Upon the critical reflection and discussion collected by the experts, some items were slightly modified, while others were deleted altogether. Appendix B details the constructs and items generation in Study 3. Moreover, Appendix C provides an overview of all constructs and items measured in Study 3.

Data Collection and Analysis

An online survey was administered for data collection in Study 3. To conduct the survey, a description of the study and the survey link were posted on the gamified mobile app, INSIDE LAAX. This way, the questionnaire was accessible only to users of the gamified mobile app. Because the mobile app also included regular information and commerce services, a filter question was implemented at the beginning of the survey. This indicated whether the respondents were active users of the gamified elements on the mobile app. Before the actual data collection took place, a pilot study was initiated to pre-test the research model. The final survey was made available on the gamified mobile app from the end of March until the beginning of April 2019. As an incentive, respondents of the survey were entered into a prize drawing for free skiing day passes. Study 3 was conceptualised as a cross-sectional, non-experimental design.

In total, data from 1’914 participants were collected in the German and English languages. Several responses had to be eliminated for several reasons, including incompleteness, excessively short response time, unrealistic answers, and answers from local visitors. After elimination of these responses, a final sample of 1’456 participants was retained. Overall, the participants of Study 3 consisted of tourists who were highly engaged users of the gamified elements on the mobile app, INSIDE LAAX, during their stay at the ski resort in the winter of 2018/2019.

SPSS was used as the analysis software in Study 3. Multiple linear regression analysis (MLR) was conducted to test how well the socio-psychological motivators explained tourists’ engagement with the gamified technology. Based on this, it was tested whether tourists’ engagement with gamified technology was positively associated with the influence the gamified technology had on tourists’ ‘overall experience’. More specifically, it was examined whether engagement with the gamified technology fostered ‘behavioural activation’ during their stay and consequently, whether behavioural activation mediated the relationship between ‘engagement’ and the ‘overall experience’ as illustrated

in the conceptual model in Figure 1. To this end, structural equation modelling using mediation test was employed based on the steps presented by Hayes (2009). According to Hayes (2009), bootstrapping is recommended as a valid and powerful method for testing intervening variable effects (Mackinnon, Lockwood, & Williams, 2004; Williams & Mackinnon, 2008). Accordingly, Hayes (2009) posits that bootstrapping has more explanatory power than the traditional causal steps approaches proposed by other researchers, such as Baron and Kenny (1986). The mediation test was performed using the PROCESS function in SPSS.

3.2 Context of the Study

Comprising the empirical part of this doctoral thesis, Studies 2 and 3 were conducted at the tourism destination Flims/LAAX/Falera in Switzerland (www.laax.com). This tourism destination is well known for its innovativeness and its modern ski resort, which comprises three geographic regions, attracting guests from all over the world (123,871 overnight stays during the 2016–2017 season) (Weisse Arena AG, 2017). In the winter of 2015–2016, this destination introduced the context-aware destination mobile app INSIDE LAAX with the goal to enhance the tourist experience through gamified design.

In addition to some generic information and commerce services, INSIDE LAAX gamifies skiing and snowboarding at the tourism destination. The gamified features addressed in this thesis include the ‘performance tracking’, ‘points’, ‘badges’, ‘leaderboard’, ‘my story’, and ‘my friends’ functions. The gamified features are designed to be persuasive, which means that they aim at stimulating tourists’ behaviours and experiences beyond the game-related experience.

The motivational design of the system – in particular, the features ‘performance tracking’, ‘points’, ‘badges’, ‘leaderboard’, and ‘my friends’ – mainly target performance-related motivations such as competence, achievement, and/or rewards. The ‘my friends’ feature allows users to connect with other users and challenge them to skiing/riding duels. This feature is thus targeted at both performance-related and social needs.

Table 9 describes the game elements addressed in this doctoral thesis.

Gamified feature	Core service activity of gamified feature
Performance Tracking	System records the skiing/snowboarding activities performed at the destination – that is, what slopes the user has been skiing/riding, the number of lifts used, and vertical metres covered.

Points, Badges	System provides immediate performance feedback in the form of collected points and badges. Badges are similar to trophies that can be collected through performed activities. They provide incentives for certain actions. Collected points can be redeemed for vouchers or merchandise articles (extrinsic motivators).
Leaderboard	System provides a ranking of the results of users' performed skiing/snowboarding activities based on the number of ski lifts used and vertical meters covered.
My Story	System creates a 'my story' based on the information generated by the tracking feature. The story illustrates the days spent at the destination and supplements it with real-time information, such as the weather and snow conditions for that day.
My Friends	System allows users to connect themselves with other users and to challenge them in skiing/snowboarding duels.

Table 9: Gamified elements addressed in this doctoral thesis (adapted from Aebli, 2019).

The gamified features of INSIDE LAAX work through what is known as 'gate tracking'. That is, every time users pass the gates at the lifts or cable cars, the performance data are tracked and the associated features – points, badges, leaderboard, and 'my story' – are activated. The performance data are thus interlinked with these features. Based on users' tracked data, the system calculates the points and displays the badges that can be unlocked. For instance, when a user skis a particular slope, the system tracks the vertical metres. Based on the number of vertical metres, the system then calculates the points the user has gained through his or her performance. The overall collected points can then be used to unlock pre-defined badges. Additionally, the system automatically calculates a ranking, which represents a position on the leaderboard based on users' total vertical metres covered and the number of ski lifts used. In contrast to the performance-related features, the initiation of the 'my friends' feature works manually. Users must proactively connect themselves with other users. Once the users are connected with one another, they can track each other – that is, the system displays the location of the users at a specific point in time.

Thus far, the mobile app has recorded 100'000 active users during the winter seasons, of which approximately 47'000 (personal information inside labs AG) regularly use the gamified features thereon. The mobile app is available free of charge and enables voluntary use. Upon installing the app, users are made aware of what data are tracked. Moreover, users are informed about the trustworthy handling of the tracked data and are asked for active permission to record their own data. The studied gamified features are generic; thus, they could also apply to other contexts.

The rationale for choosing Flims/LAAX/Falera with its mobile app INSIDE LAAX as the context for this doctoral thesis is threefold: first, studying gamified technology in tourism is challenging from a practical perspective, because a limited number of gamification examples exists in practice.

Flims/LAAX/Falera is one of the few tourism destinations with a destination-related mobile app that includes a variety of gamified features. Based on the aim of this thesis to study tourists' engagement with gamified technology in a pleasure vacation context, the chosen tourism destination was therefore considered suitable. Second, and relatedly, Flims/LAAX/Falera represents a pioneering tourism destination with its destination-related mobile app, which was three times awarded gold for its innovative character, first in 2017 and again in March and October 2019.

Third, the gamified features of the mobile app record a remarkable number of active users. This suggests the important role that these features play in the tourist experience. Moreover, the mobile app has continually been listed among the 100 most important travel apps (as of January 2020) on the Apple App Store since 2017. From a theoretical perspective, the tourism destination Flims/LAAX/Falera and its mobile app INSIDE LAAX thus represent a forward-looking research setting that enables cutting-edge research and helps to advance the tourism industry. Therefore, the studies conducted in this thesis are of both theoretical and practical significance.

3.3 Description of Sample

The sample of the studies in this thesis include winter tourists of the tourism destination Flims/LAAX/Falera, Switzerland. On average, about 53% of the tourists at the destination are domestic tourists (personal information Weisse Arena AG). Characteristic for the tourists included in the sample of this thesis is that they are all experienced skiers and snowboarders. Among these, a majority described themselves as passionate skiers or snowboarders who perceive skiing or riding all day as being a recreational activity. Moreover, the majority of the tourists in this sample had a relatively high educational degree. Based on these facts, the sample can be described as largely homogenous.

3.4 Reliability, Validity, and Ethical Considerations

Reliability and validity are commonly used as key quality criteria in research. Reliability generally refers to the consistency and repeatability of the results of a study, while validity is an indication of whether the study really measures what it claims to measure (Heale & Twycross, 2015). These quality criteria are primarily used for quantitative studies. Regardless of the nature of a study, its underlying philosophical perspective, or the methodology chosen, 'documentation of the research process' is generally considered to be a principle criterion in research (Steinke, 2004). Accordingly, main quality criteria considered of general importance within a research process mainly refer to the

accuracy and transparency of the research process with regards to the goal of the study, as well as researchers' reflective discussions throughout the entire research process (Patton, 2015).

Overall, this thesis seeks to ensure reliability and validity by presenting an overall clear conceptual framework, disclosing and discussing the methodological approach, and describing how data were collected and analysed in each individual study. Moreover, and importantly, the sampling methods applied in the individual studies are made transparent. It is shown how and where data were derived from. The three studies in this thesis follow separate quality criteria in line with their inquiries of interest, research aim(s), and applied methodologies. This way, the reliability and validity of each study were ensured.

Study I: Systematic Literature Review

Systematic literature reviews stand out due to their enhanced rigor and traceability by adopting a methodical process (Tranfield et al., 2003). The main goal of a systematic literature review is to minimise systematic errors through a comprehensive literature search and to identify, appraise, and synthesise all relevant studies in a given field to answer a specific research question (Petticrew & Roberts, 2010). In this manner, it is less a discussion of the reviewed studies and more a scientific tool, comparable to any other research method, that is used to make sense of a large body of studies and to provide a scientific summary of any evidence on a particular question (Petticrew & Roberts, 2010).

The main quality criterion of systematic literature reviews is a systematic approach following clear rules, process documentation, and transparency (Kitchenham, 2004). Transparency is ensured through the disclosure of each process step so as to allow for the potential replication of each step by future researchers (Tranfield et al., 2003).

Systematic approach following clear rules

Systematic literature reviews require a systematic approach in collecting the literature and should follow clear, pre-defined rules in the analysis steps (Petticrew & Roberts, 2010). The literature review process in Study 1 was systematically carried out and each step is made transparent. Further, the analysis of the identified literature was conducted according to clear rules and pre-defined criteria. Thus, the quality requirements of the systematic approach and review process have been met. In brief, the systematic approach and review process included the following steps (Petticrew & Roberts, 2010, pp. 284–287):

1. Specification of the research question the systematic literature review aims to answer.
2. Definition of the study types that are to be located (i.e. inclusion/exclusion criteria) to be able to answer the research question(s), the main electronic databases, the most appropriate keywords to ensure a sufficiently broad literature search, and a description of how the studies will be appraised and synthesised.
3. Conducting the literature review based on the pre-defined inclusion/exclusion criteria and keywords.
4. Screening the references by title and abstracts; identification of studies that are relevant for further review.
5. Evaluating the remaining studies against the inclusion/exclusion criteria through a further examination of the abstracts and in-depth analysis of the full texts; exclusion of irrelevant studies with a specification thereof.
6. Extraction of the data of each included study, i.e. the relevant information of each study with regard to the research question(s).
7. Critically appraising the included studies based on pre-defined criteria, such as the methodological approach and the studies' measurements and sample populations.
8. Synthesising the primary studies by systematically describing, reporting, and integrating the results of the studies.

Process documentation and transparency

A further central quality criterion is the systematic documentation of the research process. By disclosing the research process in detail, any third party should be able to retrace each step of the analysis and understand the dynamic process between the research question, methodological approach, and results (Kitchenham, 2004). In Study 1, the detailed process documentation, description of the systematic literature review approach, and transparent analysis process fulfil these quality criteria. Such a procedure ensures the objectivity of the data collection process and allows for the intersubjective traceability of the research process. Objectivity and intersubjective traceability can be regarded as the main quality criteria and prerequisites for further analysis (Steinke, 2004).

Study 2: Qualitative In-Depth Interviews

Guided by the philosophical underpinning, the qualitative data collection and analysis of Study 2 were conducted with the necessary closeness to the subject of investigation to allow for subjective meanings (Strauss & Corbin, 1998), while, at the same time, ensuring the highest possible objectivity of the researcher. In qualitative research, the evaluation of quality criteria follows different rules than in quantitative research. Several authors have argued that qualitative research should be judged according to its own criteria (Mayring, 2015; Steinke, 2004), since qualitative research starts from other scientific points of departure and follows different goals and methodological procedures than quantitative research. Thus, quantitative criteria should not simply be transferred to qualitative research.

For the formulation of appropriate quality criteria, the particular theoretical, methodological, and procedural character of qualitative research should be considered as the starting point. In this regard, *communicative validation* and *validation of the interview situation* have been discussed as two main quality criteria, among others, for qualitative research (Steinke, 2004). The quality criteria of communicative validation and validation of the interview situation have both been fulfilled in Study 2.

Communicative validation

In communicative validation, data and contents from the research are presented to the subject of investigation with the goal to assess the validity of the collected data and contents (Steinke, 2004). In this way, it can be ensured that the researcher correctly understood the subject of investigation. In the English language literature, communicative validation refers to ‘member checks’ (Steinke, 2004). In line with the theoretical underpinning and methodological procedure, Study 2 applied member checks during the interviews based on the criteria suggested by Patton (2015).

Validation of the interview situation

The required closeness of the researcher to the subject under investigation in qualitative research may hold the risk of establishing an overly close working relationship between the researcher and interviewees. Validation of the interview situation therefore analyses whether the interviewees are being truthful and sincere (Steinke, 2004). More precisely, the researcher seeks to ensure that a working relationship between the researcher and the informants has not been established (Groeben, Wahl, Schlee, & Scheele, 1988) by reflecting upon the interviews and their sequencing as a whole. The goal thereof is to maintain an objective stance between the researcher and the informants.

In general, the relationship between researcher and informant should be characterised by openness, trust, willingness to collaborate, and a low power difference (Steinke, 2004). Validation of the interview situation can be considered as given in Study 2, as the researcher was careful to maintain an objective yet sufficiently close relationship with the interviewees during the interviews. Moreover, the researcher carefully reflected upon the interview procedure for each individual interview, as well as across all interviews.

In addition to communicative validation and validation of the interview situation, Study 2 applied further quality criteria to ensure the trustworthiness of the study. These additional quality criteria include internal validity and transferability of the findings, as suggested by Lincoln and Guba (1985).

Internal validity

Study 2 applied the constant comparative method of analysis (Corbin & Strauss, 2008) to ensure internal validity of the established concepts, categories, and eventually results of the study. The constant comparative method is used to compare the evolving codes and concepts against one another to identify common characteristics within them (Strauss & Corbin, 1998). Although the categories could be established close to the material collected in the interviews, the underlying motives and meanings sometimes differed across participants. Therefore, the iterative coding process for thematic analysis suggested by Corbin and Strauss (2008) was strictly followed. That is, the researcher repeated the coding process several times and made adjustments where necessary. Further, quotes with their primary examples from similar categories were compared with each other. In doing this, the researcher made sure that the allocation of concepts and sub-categories into one main category was as close to the material as possible and hence valid.

Transferability

Transferability concerns the question of whether the circumstances under which the measurement was conducted were stable and whether the measurement itself is reproducible and accurate (Lincoln & Guba, 1985). In other words, similar results should be achieved if the study is conducted under different circumstances by any other researcher or in any other comparable context. Transferability can also be referred to as external validity, primarily used in quantitative research.

To establish transferability, Lincoln and Guba (1985) recommend providing a thick description of the phenomenon under investigation. This means that the researcher should provide a robust account of the data collection process, including a detailed description of the sample and other aspects of data collection that help provide a rich understanding of the research setting. Such an explicit and precise

process documentation helps to ensure the transferability of a study. Importantly, the idea is not to provide an index or catalogue of transferability. Rather, the goal is to provide a database and transparent analysis process that make transferability judgements possible (Lincoln & Guba, 1985).

Study 2 conforms to the transferability criteria as detailed information on the data collection process and a rich description of the sample are provided. Each step in the data collection process is made transparent. In addition, two different researchers individually coded the interviews to ensure the trustworthiness of the study's findings and to increase the reproducibility of the study.

Study 3: Quantitative Online Questionnaire

Quantitative studies typically use validity and reliability as their main quality criteria (Bryman, Becker, & Sempik, 2008). Study 3 applied both validity and reliability quality criteria to ensure the trustworthiness of the results.

Validity and reliability

Validity generally refers to the extent to which a concept accurately measures what it claims to measure (Heale & Twycross, 2015). In quantitative studies, validity also indicates whether one can draw meaningful inferences from scores on a particular instrument (Creswell, 2014). Reliability, in contrast, refers to whether scores to items on an instrument are internally consistent and stable over time (Creswell, 2014).

Study 3 used convergent and discriminant validity to measure the validity of the research model. Convergent validity describes the degree to which the dimensional measures of the same concept are correlated (Nusair & Hua, 2010). Convergent validity was assessed by means of the average variance extracted, composite reliability, and Cronbach's alpha, all of which exceeded the recommended thresholds according to Fornell and Larcker (1981). This means that internal consistency of the research model was met.

Moreover, the discriminant validity of the model was also met. Discriminant validity describes the extent to which similar concepts are distinct (Nusair & Hua, 2010), which means that the measures of theoretically different constructs should have low correlations with each other. Discriminant validity was achieved, first, because the square root of the average variance extracted for each of the constructs was higher than the correlation between the construct and all the other constructs in the model (Fornell & Larcker, 1981). Second, no inter-correlation between the constructs was higher

than 0.9 (Pavlou, Liang, & Xue, 2007). Therefore, it can be concluded that the internal consistency and reliability of the research model in Study 3 are fulfilled.

Ethical Considerations

Ethical considerations and precautionary measures are important in any kind of research. The studies that comprise this thesis comply with the ethical guidelines of Leuphana University Lüneburg and have been assessed as ‘ethically harmless’ by the ethical advisory board of Leuphana University Lüneburg (see Appendix F). Nevertheless, several ethical considerations and precautionary measures were taken in this thesis, whereby particular attention was paid to the data handling of the participants involved in the empirical studies. Accordingly, the ethical considerations and precautionary measures mainly refer to the process of data collection, analysis, and reporting of the results in the respective studies. For instance, a) the privacy of the participants was ensured, b) the participants were provided with sufficient information prior to participating in the personal interviews or online survey, c) participants were informed that they had the option to withdraw from the personal interviews or survey at any time, and d) the anonymity and confidentiality of the participants’ data was ensured. In the personal in-depth interviews, all participants consented to the use of their full names in the transcription and reporting of the results. Concerning the online survey, confidentiality and anonymity have been ensured in that the collected data have been used, analysed, and reported anonymously.

4 DISCUSSION AND CONTRIBUTION OF STUDIES

This chapter discusses the main findings and contributions of each study. Table 10 provides an overview of how each study contributes to theoretical, methodological, and practical knowledge.

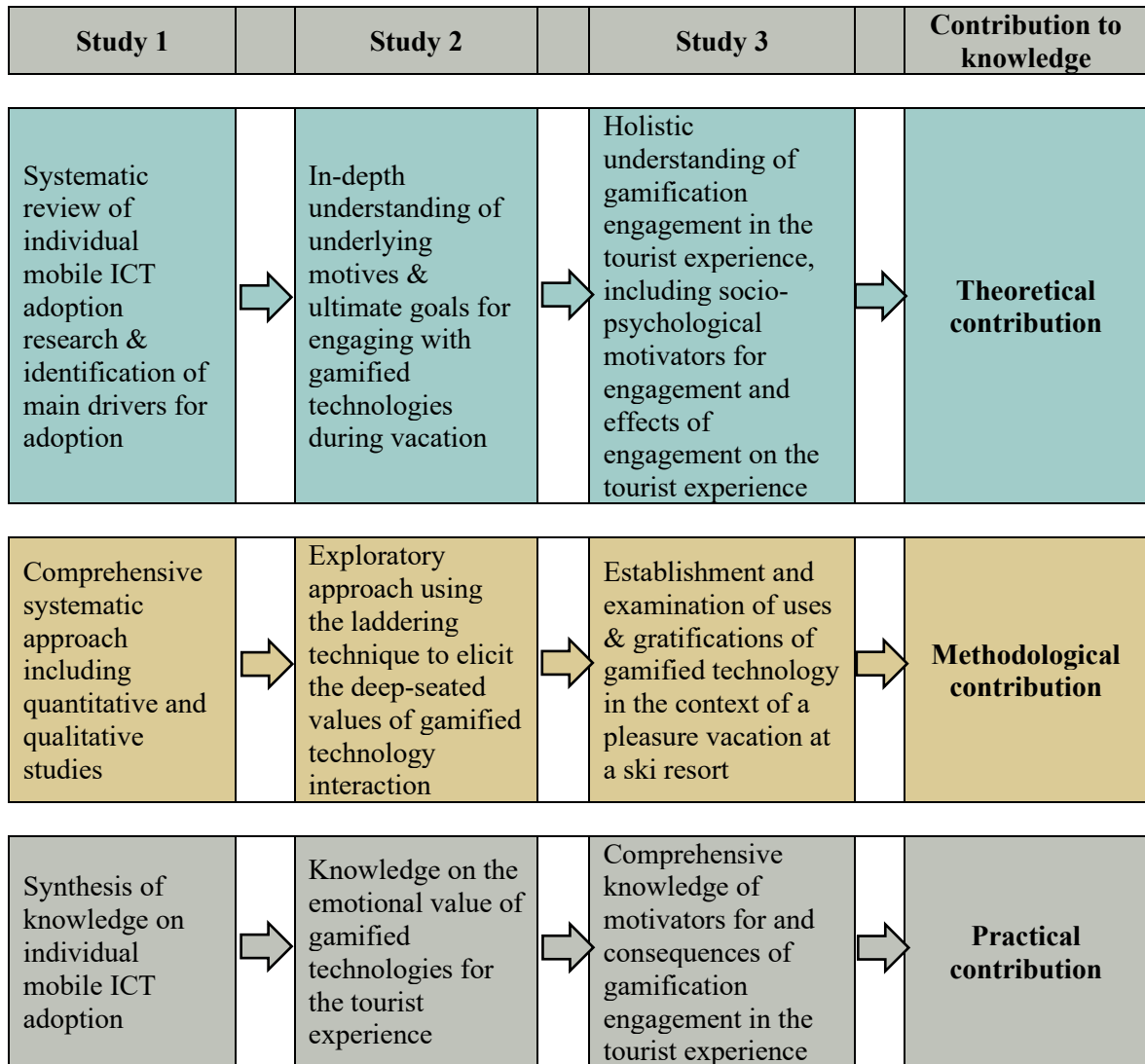


Table 10: Theoretical, methodological, and practical contribution of each study.

The field of individual mobile ICT adoption represents the starting point and, with that, the basis for any questions related to ‘what factors contribute to individual technology use’ or ‘why people use particular technologies in certain contexts’. As a broad field of research, individual mobile ICT adoption has been studied extensively and in a variety of ways. As identified in the systematic literature review, typical answers to the questions of why people adopt technologies refer to the functional benefits of the technology. For instance, people use mobile ICTs because they are convenient and easy to use, efficient, and useful in particular situations. Moreover, the systematic

literature review was conducted at a time when literature started to look into questions that extended beyond the single adoption and use of technology. The literature began to address questions such as ‘How can people be engaged through mobile ICTs?’

In contexts such as a pleasure vacation, the simultaneously relevant and challenging questions concerning personal ICT use go beyond the functional level, which is mainly concerned with the ‘usefulness’, ‘usability’, and ‘efficiency’ of technology. Relevant questions related to technology use in such contexts implicitly include, for instance, ‘How can meaningful experiences be created by engaging with mobile ICTs?’ and ‘How is mobile ICT engagement beneficial for personal recovery during vacation?’ Thus, what is of particular interest are questions related to the enduring values and, with that, the personal and social meaning of technologies.

As previously noted, knowledge of the determining factors for individual mobile ICT adoption provides a basic understanding of why people use mobile ICT in general. Therefore, the results and findings of the systematic literature review conducted in Study 1 are discussed in detail to provide an in-depth understanding of what factors contribute to individual adoption of mobile ICT. Upon this basic understanding, it is revealed how engagement with mobile ICTs can be established. With this purpose, the results and main findings of Study 2 and Study 3 are discussed.

4.1 Study 1: Systematic Literature Review on Individual Mobile ICT Adoption

Discussion of Results and Main Findings

Study 1 of this doctoral thesis consisted of a systematic literature review with the goal to map the field of individual mobile ICT adoption research and provide an overview of the main factors for individual mobile ICT adoption. Characteristic of the literature in this field is that it is mainly concerned with individuals’ perceptions and attitudes towards the adoption of mobile ICT. In other words, it primarily seeks answers to the question, ‘How can *potential* users be motivated to adopt and use mobile ICT?’ It is thus concerned with predicting individual mobile ICT adoption, rather than seeking reasons for users’ actual behaviour.

In this section, a synthesis of the results of the systematic literature review is briefly discussed. Overall, the synthesis of the results shows that the driving factors for individual mobile ICT adoption are multidimensional. The main dimensions of the analysed factors of mobile ICT adoption include the personal, technological, and social dimensions, as depicted in Table 11.

Personal Dimension				
Attitude & hedonic value	Personality & capability	Lifestyle compatibility	Habit & past experiences	Emotional states
⇕		⇕		
Technological reliability & quality		System usefulness & usability		Security
Technological Dimension				
Content usefulness & information quality	Interaction experience	Service quality	Infrastructure & support	Customisation & reliability
⇕		⇕		
Influence of social reference groups			Social image	
Social Dimension				

Table 11: Synthesis of the results on individual mobile ICT adoption/use (own graph).

The technological dimension represents the most dominant dimension as identified by the systematic literature review. Therefore, the technological dimension is discussed first.

Technological dimension

Technology and content-related factors

The literature review revealed that studies predominantly dedicate themselves to drivers related to the technological system, including factors like ‘system characteristics’, ‘system quality’, ‘system-related privacy concerns’, and overall ‘technological value’. Therefore, it comes as no surprise that the system-related ‘perceived usefulness’ and ‘perceived ease of use’ are the most commonly applied factors to predict individual mobile ICT adoption. In line with that, the inherent characteristics of mobile ICT are decisive for adoption. Due to their ubiquity – that is, time- and place-independent information and communication access – mobile ICTs enable users to conduct tasks more efficiently, which also leads to enhanced productivity and task accomplishment. These technology-inherent functionalities generally contribute to a higher perceived usefulness.

Moreover, to realise the technology-inherent qualities of mobile ICT, such as time- and place-independent information and communication access, an error-free technological performance must be guaranteed. A smooth operating system, allied with technological quality, builds the fundamentals to do so. The literature review indicates that ‘instant connectivity’, ‘fast response’, and ‘error-free transactions’ are perceived as prerequisites for a smooth handling and, thus, adoption of mobile ICT.

Similarly, the ‘user friendliness’ of the technology is also important, implying that the mobile ICT should be intuitive and easy to use.

In addition to these functionalities, technology-related security aspects also represent an important influencing factor. This is especially the case with regard to mobile payment (Liébana-Cabanillas, Sánchez-Fernández, & Muñoz-Leiva, 2014; Liu, Zhao, Chau, & Tang, 2015). In the beginning, when a given mobile ICT is not yet widely used, users might be more hesitant to adopt it due to privacy concerns. Finally, the overall technological value – that is, users’ consideration of what is received and what is given – also influences their willingness to adopt. The input factors, such as the ‘efforts’ required to use a mobile ICT, as well as the ‘perceived risks’ and ‘perceived costs’, are thereby weighted against the overall ‘perceived benefits’ of adoption. If the overall perceived value is positive, users are more willing to adopt a mobile ICT.

Closely linked to the technological prerequisites are the contents offered by the system. ‘Perceived usefulness’ also acts as a significant driving factor of adoption with regards to the content. In this case, perceived usefulness refers to the information consumption through the system. ‘Content richness’ and ‘timeliness’ are key factors in users’ perceived content quality (Lin & Lu, 2015; Lu, Mao, Wang, & Hu, 2015). These criteria are also relevant measures for information quality in general. In addition to transmitting complete and timely information, the content delivered by the mobile ICT should be ‘relevant’, ‘reliable’, and of ‘informative value’ to the user (Kim & Hyun, 2016; Lai, 2015).

In addition to providing useful information, the technology should also facilitate information sharing and interaction between users (Lin & Lu, 2015). In some contexts, interaction with the mobile ICT itself is of particular relevance. In such cases, the experiential value of interacting with the technology already depicts a sufficient reason for adoption (Tojib, Tsarenko, & Sembada, 2015). This might especially be the case for mobile services with entertainment character. Finally, ‘visual appeal’ also represents an important factor of adoption, facilitating content quality.

Service provider related factors

In addition to the technological and content-related aspects, factors related to the provider of the mobile content also influence users’ willingness to adopt a mobile ICT. Due to today’s general information overload, ‘personalisation’ has become of key importance, depicting an additional main factor of adoption. Thus, not only should the delivered contents be tailor-made to individual needs, but also the services offered by the provider of a mobile ICT (Morosan, 2014; Morosan & DeFranco, 2016b). The literature review revealed that customised services represent the basis for perceived

‘service quality’. Perceived service quality thereby includes prompt and professional services, coupled with follow-up services (Kim & Hyun, 2016; Wang & Wang, 2010).

Moreover, facilitating infrastructures can also be regarded as essential for adoption. The service provider should not only provide infrastructural resources like wireless internet access, but also organisational support in case of any unexpected issues with relation to the adoption of the mobile ICT (Lai, 2015; Morosan & DeFranco, 2014; Thakur & Srivastava, 2014). In addition, the service provider is expected to ensure a trustworthy handling of the collected user data, thereby fostering organisational trust (Harris, Brookshire, & Chin, 2016; Zhou, 2015). Trust generally represents an important factor for adoption, since it possesses the ability to lower perceived risks, be it with regard to general security or privacy concerns (Harris et al., 2016; Zhou, 2015).

Personal dimension

One important theme across many studies of the systematic literature review refers to users’ characteristics for individual mobile ICT adoption. Within this theme, the most commonly studied driving factors refer to users’ ‘perceived enjoyment’, which has been identified as a reliable predictor and describes the hedonic value of individual mobile ICT adoption. Accordingly, users adopt mobile ICTs because they perceive them as intrinsically entertaining or fun (e.g. Morosan & DeFranco, 2016a). These findings correspond with the intrinsic motivational factors observed in the qualitative studies, which suggest that entertainment and pastimes represent significant factors for adoption. The literature review further indicates that a user’s personality and perceived ‘personal capability’ of handling mobile ICTs increases his or her propensity for adoption (e.g., Ha & Im, 2014; Kim & Preis, 2016; Liu et al., 2015).

Another relevant theme concerns the ‘compatibility’ of mobile ICTs with users’ personal lifestyles, as well as their ‘past experiences’ with comparable technologies (e.g., Ha & Im, 2014; Kim, Kim, & Kil, 2009; Lu & Su, 2009). Moreover, ‘habit’, defined as users’ automatic behaviour, represents an additional significant factor of adoption. Once the user has become accustomed to the mobile ICT and habitually uses it, the adoption of, for instance, new mobile services becomes more natural (Hew, Lee, Ooi, & Wei, 2015).

Finally, some studies examined in the systematic literature review address the notion of anticipated emotions and emotional states. Like with any consumer decision-making process, users seek positive experiences in consumption settings (Compeau & Higgins, 1995). This is also the case when it comes to adoption of individual mobile ICTs. The studies reveal that positive feelings, such as ‘perceived pleasure’ and ‘arousal’, contribute to users’ willingness to adopt mobile ICTs. The opposite exists in

the case of negative feelings, such as ‘anxiety’. However, according to the systematic literature review, the role of emotions in individual mobile ICT adoption has not yet been extensively researched.

Social dimension

Finally, the literature review further revealed social factors for individual mobile ICT adoption. An important theme identified in many studies examined in the literature review refers to the relevance of users’ social surroundings. It is well known that people’s social environment represents an important reference point in decision-making processes and consequently, acts as a powerful force in mobile ICT adoption decisions (Cobanoglu, Yang, Shatskikh, & Agarwal, 2015; Okumus, Bilgihan, & Ozturk, 2016). These external influences can give rise to adoption in a twofold manner: the individual might be more willing to adopt a mobile ICT because he or she perceives it as a subjective norm to do so or because of social pressure, which is closely linked to social image (Kim, Chun, & Lee, 2014; Song, Sawang, Drennan, & Andrews, 2015; Yu, Lee, Ha, & Zo, 2015). In addition to social influences, the literature review provides evidence for factors related to the need for social relationships, which also influences adoption (Kang, 2014). Overall, only a few of the investigated studies have identified social factors for adoption.

Summary

Study 1 has provided a comprehensive overview of individual mobile ICT adoption research. By systematically identifying, appraising, and synthesising empirical studies with a focus on the driving factors of individual mobile ICT adoption, Study 1 has mapped the field of individual mobile ICT adoption.

The systematic literature review revealed a range of different driving factors for individual mobile ICT adoption. The various factors can be allocated into three main dimensions: technological, personal, and social. Overall, technology-related factors for adoption have been researched the most in the identified studies. That is, the usefulness of a system, its usability, and its ease of use are key determinants of adoption. This finding is not surprising, given that these technology-related factors are the main concepts of the technology acceptance model (TAM). Introduced by Davis (1989), the TAM represents the model most commonly used today to explain and predict individual technology adoption.

As an information systems theory, the TAM was derived from the theory of reasoned action in social psychology and was initially developed to predict user acceptance of information systems in non-

voluntary, organisational settings (Davis, 1986). The model defines ‘perceived usefulness’ and ‘perceived ease of use’ as the two dominant personal beliefs that determine users’ intentions to adopt and use a technology (Davis, 1989). In the model, perceived usefulness and perceived ease of use function as mediating variables in the relationship between system characteristics and the probability of using the system. The underlying assumption of the TAM posits that users’ motivation to use a technology is shaped by their response to the system characteristics (Davis, 1986). Accordingly, the systems characteristics can be considered as determinants in the TAM.

The view that the system characteristics – that is, external technological factors – are determining for individuals’ adoption of mobile ICT derives from the assumptions underlying the neo-behaviouristic stimulus-organism-response (S-O-R) model (Jones, 1998). The S-O-R model suggests that human behaviour can be understood as a reaction to external stimuli such as technology characteristics, which are processed in the organism (Kroeber-Riel & Gröppel-Klein, 2013). This behaviouristic perspective based on Skinner (1938) assumes that humans are passive organisms who each react to external stimuli in the same way. In this human-technology conceptualisation, technology represents the guiding force for human behaviour by adopting a strong system-belief focus (Benbasat & Barki, 2007; Morosan & DeFranco, 2016a; Morosan & DeFranco, 2016b) – that is, a technological focus.

Moreover, the underlying rationale of the concepts used in TAM-based models is that human behaviour can be predicted and that consumers act rationally when deciding to adopt a particular technology. Although behaviour, to a certain extent, can be predicted through intention, the actual behaviour should nonetheless be measured (Fishbein & Ajzen, 2010). Fishbein and Ajzen (2010) argue that actual behaviour should, wherever applicable, be measured in retrospect. Understanding the various reasons for adoption is therefore more complex than the simplified predictive models. Moreover, although technological factors such as the utility and usability of technology have been identified as the most commonly researched driving factors for adoption, the systematic literature review also indicates that the reasons for adoption go beyond technological questions. Personal and social factors also play a critical role in individual mobile ICT adoption.

Contribution of the Study

Study 1 of this thesis contributes to individual mobile ICT adoption literature by providing a comprehensive overview of the current state of individual mobile ICT adoption research. By identifying, appraising, and synthesising knowledge on individual mobile ICT adoption in the form of a systematic literature review, Study 1 provides in-depth insights into individual mobile ICT adoption and lays the foundation for a contemporary understanding of the field of adoption research.

In doing so, Study 1 has summarised and discussed the most commonly researched driving factors for adoption. In particular, it has identified that technological, personal, and social factors are the most commonly cited factors to predict and explain individual mobile ICT adoption. Among these, technological factors were represented the most in the identified studies.

Moreover, Study 1 adds to theoretical discussions on the paradigm shift of technology adoption in general (Bagozzi, 2007b; Benbasat & Barki, 2007) and whether explaining adoption through predicting factors such as ‘attitude’ or ‘behavioural intention’ is sufficient. In this discussion, the intention–behaviour linkage has been critically assessed. In this regard, scholars particularly from the field of psychology assert that it cannot be assumed that humans always act rationally and based on their intentions (Bagozzi, 2007b; Fishbein & Ajzen, 2010). In fact, “intentions are often ill-informed or incomplete”, because intentions are made prior to taking action (Bagozzi, 2007b, p. 245). Relatedly, the absence of user motivation in the typical TAM-based models has been emphasised as a further major concern of these models (Bagozzi, 2007a; Bagozzi, 2007b). This means that, while someone can have a positive attitude towards adoption, he or she might not have the desire to use the mobile ICT in certain situations. This systematic literature review revealed that ‘attitude’ and ‘behavioural intention’ are still among the most dominant predictors in mobile ICT adoption research today.

From a methodological perspective, Study 1 contributes to systematic literature reviews on technology adoption in general. By including quantitative and qualitative empirical studies in the review, Study 1 offers a comprehensive understanding and overview of the field of research. As a result, a holistic understanding of individual mobile ICT adoption can be achieved.

4.2 Study 2: Tourists’ Motives for Gamified Technology Use

Study 2 ties in with the *engagement level* of mobile ICT use. On a general level, Study 2 aimed to achieve a better understanding of users’ engagement with human-centred technologies. With this aim, it explored tourists’ motives for engaging with gamified technology during a pleasure vacation.

Discussion of Results and Main Findings

Study 2 applied an exploratory approach to explore tourists’ underlying motives and ultimate goals in engaging with gamified technology. The means-end chain laddering analysis revealed four overarching motivational patterns: ‘achievement and progress’, ‘gaining recognition and status’, ‘connectedness to others’, and ‘reminiscence and positive feelings.’ Figure 11 illustrates the four

overarching motivational patterns identified in Study 1. An overview of all laddering results is provided in Appendix A.

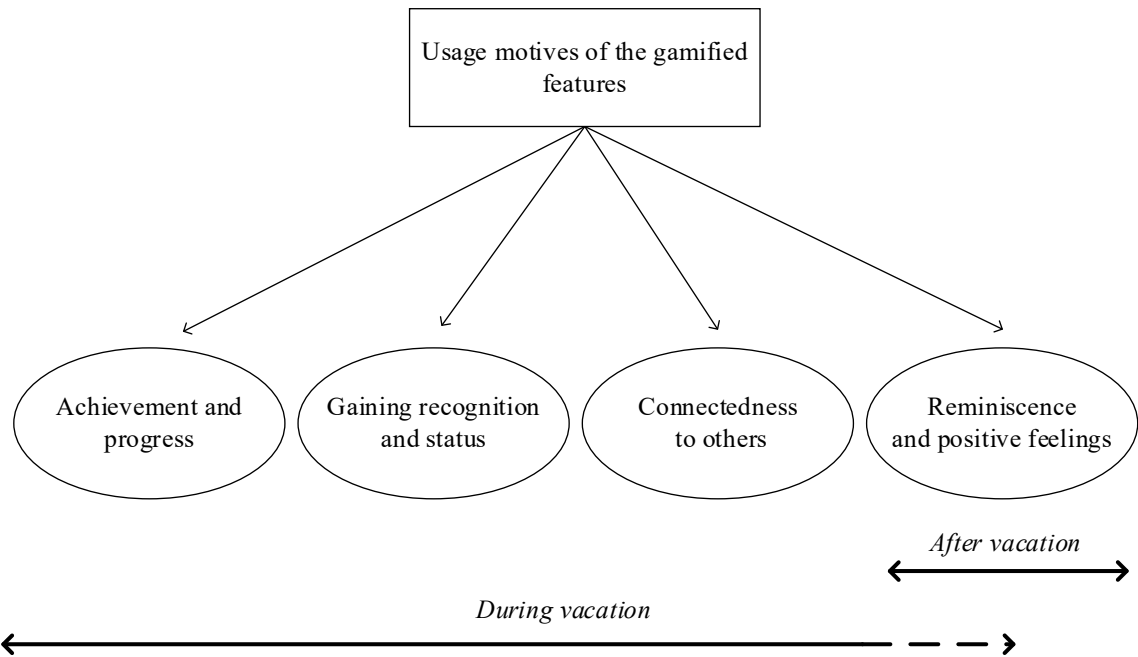


Figure 11: Motivational pattern of using gamified technology during and after vacation (Aebli, 2019).

The moments in which these motivations occur including the main game elements are summarised in Table 12.

During vacation (consumption stage)	After vacation (post-consumption stage)
<ul style="list-style-type: none"> - Achievement and progress <i>(game element: performance tracking)</i> - Gaining recognition and status <i>(combination of several game elements, with leaderboard and points being the main elements)</i> - Connectedness to others <i>(combination of several game elements, with leaderboard being the main element)</i> - Re-experiencing the vacation day <i>(game element: my story)</i> <p>→ Memory collection during vacation through positive on-the-spot experiences and social interactions on site</p>	<ul style="list-style-type: none"> - Recollection of vacation experiences <i>(game element: my story)</i> - Mental link to vacation and positive feelings <i>(game element: my story)</i> <p>→ Reminiscence and positive feelings after vacation</p>

Table 12: Main motivations for gamified technology use during a pleasure vacation including the moments of use.

The main findings of Study 2 can be summarised as follows: gamified technology in a pleasure vacation context mainly affords opportunities in which tourists can satisfy their desires for personal growth, power, and social relationships. The gamified elements thereby function as intensifiers of those needs. Although tourists' engagement with the gamified elements could largely be explained through the social motivations proposed by the achievement motivation theory (McClelland, 1987), the results also reveal connections to inherent psychological needs. In particular, the needs for both achievement and close relationships found in the motivational patterns of 'achievement and progress' and 'connectedness to others' reveal close relations to the inherent psychological needs for competence and relatedness on a lower level of the ladders. Competence and relatedness are psychological needs inherent to human nature and are the main concepts of the self-determination theory (Ryan & Deci, 2000b). Moreover, the gamified elements in this study afforded the satisfaction of emotional needs through re-experiencing the vacation days during the stay and recollection of vacation experiences after the vacation.

The results revealed that tourists pursued multiple parallel usage motives in using the gamified technology. Thus, the same gamified element could have multiple functions for one person, depending on individuals' attributions of meaning and present emotional states or moods. From a technological perspective, this means that the same game feature can afford several parallel underlying motives and ultimate goals. This finding suggests that the game mechanisms' functionality works in combination with users' individual attribution of meaning and indicates individual differences in social needs. Individual differences in social needs are acquired through experience, socialisation, and development (Reeve, 2018).

Moreover, the results indicate on a behavioural level that tourists' engagement with the gamified technology increased their physical activities during vacation. In particular, tourists stated that they were skiing/snowboarding more, (re-)discovered new slopes, and experienced greater variety in skiing/riding. An additional behavioural response from tourists' engagement with the gamified technology was increased social interaction at the destination. Tourists explained that the gamified elements helped to foster interactions with other tourists, socializing, and meeting new people in general. Finally, tourists' engagement with gamified technology enhanced their on-the-spot experiences and contributed to tourists' mental involvement during vacation and beyond.

These findings provide evidence of several linkages to meaning making through gamified technology during a pleasure vacation. According to Cockton (2006), meaning is the value that endures beyond the moment of interaction with the technology. In this regard, Mekler and Hornbæk (2019) conclude that meaning making ideally refers to both experiences during the momentary interaction and outcomes that endure beyond that interaction. Whereas the motivational pattern 'achievement and progress' can be considered as primarily referring to the creation of meaning during the moment of interaction with the system, the motivational patterns 'gaining recognition and status', 'connectedness to others', and 'reminiscence and positive feelings' also include values that endure beyond interaction. Tourists' gained social recognition from other tourists, increased socializing and social interactions, such as meeting up with other tourists at the destination and feelings of a sense of community, and recollection of experiences after vacation when at home all refer to values that endured beyond interaction.

Overall, these enduring values can be considered meaningful for several reasons: first, they describe values that arose beyond tourists' interaction with the gamified technology during vacation and, more importantly, even beyond their stay at the destination. Second, the outcomes refer to social dynamics surrounding the game, such as social recognition and experiencing a sense of community, as well as the emotional value of reminiscence and positive feelings beyond the tourists' stay at the destination.

These values were not directly fostered by the gamified design. Rather, they describe the end values of interacting with gamified technology. Third, the identified values during interaction and lasting outcomes beyond interaction express eudemonic experiences. Striving to pursue personal ideals and achievements, social recognition, social belonging, and social bonding are typically considered to be eudemonically motivated experiences in human-computer interaction (Mekler & Hornbæk, 2016). Moreover, it has been pointed out that higher-order goals best inform about the eudemonic motives of users (Mekler & Hornbæk, 2016). As such, the explored ultimate goals express tourists' deeper needs, which refer to tourists' personal meaning.

In addition to eudemonic experiences, hedonic experiences were also observed in the results of this study. Hedonic experiences refer to "momentary pleasure", such as unwinding and relaxing (Mekler & Hornbæk, 2016, p. 4515). In particular, the motivational pattern 'connectedness to others' includes hedonic experiences. These hedonic needs are found on the lower level of the ladders in the results, including, for instance, tourists' motivations for 'entertainment' and 'challenging each other for fun'.

Overall, eudemonic experiences are longer lasting than hedonic experiences (Mekler & Hornbæk, 2016). As previously mentioned, eudemonic experiences are considered more meaningful than hedonic experiences. Although both types of experiences directly contribute to personal mental wellbeing through the creation of meaning (Peterson et al., 2005; Ryff & Singer, 2008; Steger, 2009), eudemonic values are more strongly related to meaning and thus, wellbeing (Mekler & Hornbæk, 2016).

Contribution of the Study

Study 2 contributes to the advancement of knowledge in several ways: first, it contributes to the knowledge about tourists' underlying motivations for using gamified technology by indicating the range of needs tourists seek to satisfy in interacting with gamified technology during a pleasure vacation and beyond. In particular, this study demonstrates that social needs are important for tourists' engagement with gamified technologies during a vacation. Considering the context of this study, the findings suggest that social motivational needs are particularly important in situations which afford social interaction opportunities. This is a contribution to both the game-related literature and the tourism literature. Typical game-related literature has, thus far, primarily studied the satisfaction of basic psychological needs including autonomy, competence, and relatedness through gamification (van Roy & Zaman, 2018), referring to within-game effects. The findings also indicate that gamified technology helps to satisfy both the social and psychological needs of tourists.

Second, this study revealed the underlying causality of why people use gamified technology. It therefore contributes to the general discussion on the motivational affordances of gamified technology. The underlying usage reasons represent a complicated network of interdependent functional, psychosocial, and behavioural consequences (Aebli, 2019). Only through the successful interplay between all nodes in the network can the desired outcomes or sought end values be achieved.

Third, this study adds to the knowledge that gamified technology helps tourists achieve those superior personal goals that they truly value during a pleasure vacation at a ski resort. The superior motivational goals thereby provide insights on the meaning and therefore, the deep personal and emotional benefits of the product. As such, the findings of this study reveal that gamified technology serves as a means to an end, as demonstrated by the upper levels of the ladders, but can also be an experience in itself, as demonstrated by the lower levels of the ladders. In this regard, this study contributes to the game-related literature by demonstrating that a game's motivational affordances are not defined only by the features or characteristics of the game design (Deterding, 2011; 2019). Rather, it is the successful combination of the game design's functionality and the individual's attribution of meaning related to the context and the target activity of use which leads to engagement with gamified technology.

Fourth, this study adds to the discussion on the value of gamified technology for the tourist experience (Xu et al., 2016) by demonstrating that gamified technology fosters tourists' social interactions with the world and contributes to on-the-spot experiences at the destination. In doing so, the gamified technology functions as an exogenous activator or pull mechanism for users' interactions with the world and accordingly, their experiences.

Moreover, the findings of this study suggest that gamified technology fosters the creation of meaning and thereby, eudemonic experiences. The ultimate goals achieved, as well as the underlying perceived cognitive and emotional experiences in interacting with the gamified technology, describe the personal meaning derived from interacting with the gamified technology. Thus, this study also contributes to the gamification literature (Mekler & Hornbæk, 2016) by providing empirical evidence of eudemonic-oriented experiences through gamification engagement in tourism contexts.

Lastly, this study provides a methodological contribution to existing literature on the use of gamified technology through its application of a bottom-up laddering approach. In this way, the study has been able to identify, on the different levels of the ladders, the deeper needs and the interrelations among the identified motives for users' engagement with gamified technology.

4.3 Study 3: Uses and Gratifications of Gamified Technology in a Pleasure Vacation

The aim of Study 3 was to establish and test a holistic model explaining tourists' engagement with gamified technology in the tourist experience. Thus, it sought to not only investigate the underlying motivations for engagement on a broader level of tourists, but also to investigate the gratifications thereof for the tourist experience. With this aim, Study 3 investigated tourists' socio-psychological motivations underlying gamification engagement and the behavioural and psychological gratifications thereof for the overall tourist experience. The behavioural gratifications of gamification engagement thereby provide insight on the persuasiveness of the gamified technology in the tourist experience. The psychological gratifications on the outcome level ultimately inform about the overall value of the gamified technology for the tourist experience.

The exploratory results of Study 2 served as the basis for the development of the uses and gratifications on both conceptual levels – that is, tourists' motivational needs and positive functioning. While the motivational needs level includes socio-psychological gratifications that explain tourists' motivations for engaging with the gamified technology, the positive functioning level includes behavioural and psychological gratifications that are conceptualised as the outcomes of engaging with the gamified technology.

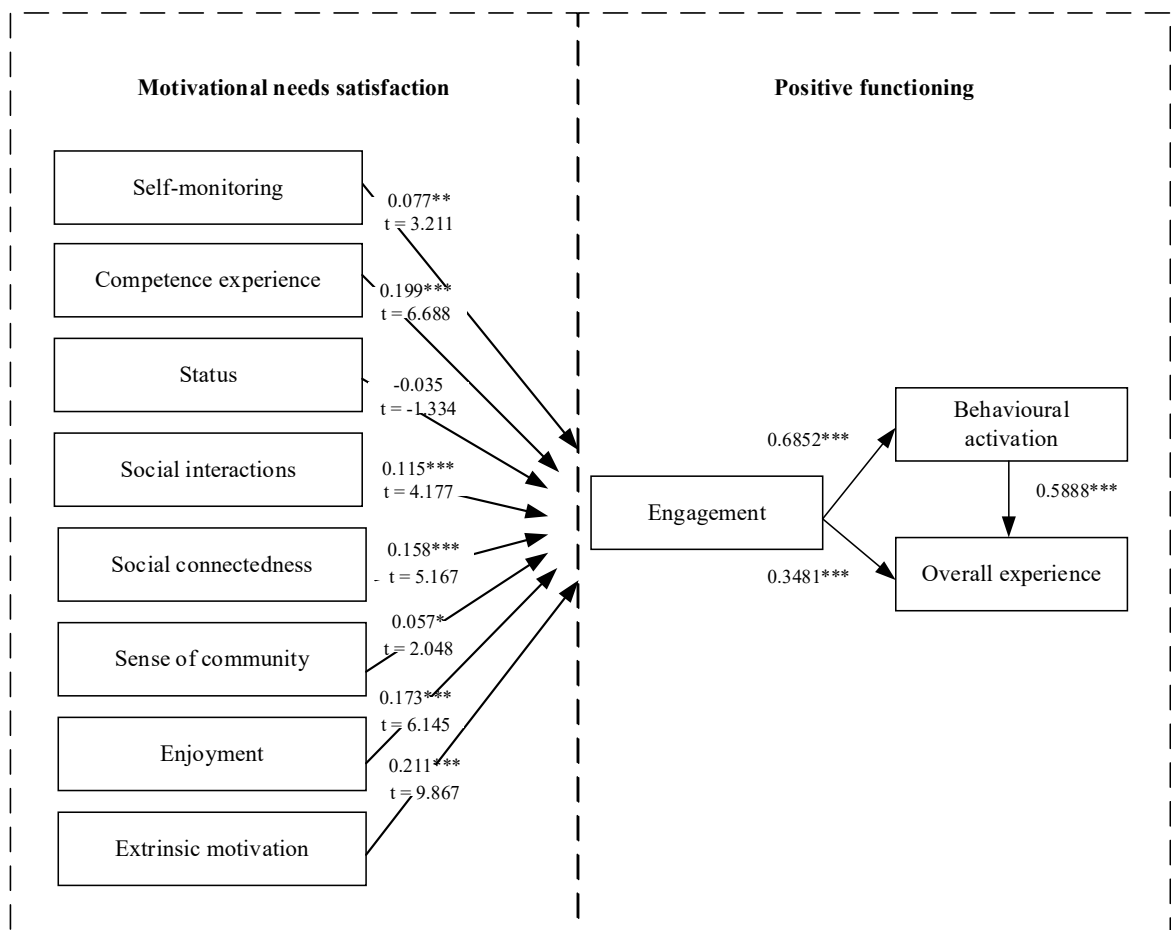
Discussion of Results and Main Findings

Overall, the results of Study 3 indicate that tourists' engagement with the gamified technology was best explained by a combination of extrinsic motivation, achievement needs, social affiliation needs, and hedonic needs. Extrinsic motivation refers to tourists' desire to obtain rewards and badges, while achievement needs mainly refers to tourists' desire for competence experiences. Social affiliation needs are primarily informed by tourists' desire for social connectedness and social interactions. Hedonic needs mainly refer to enjoyment and describe the experiential value of the gamified technology. Overall, the desire of tourists to gain rewards and badges was most strongly associated with engagement. Aside from that, tourists' desires for competence experiences, enjoyment, social connectedness, and social interactions also explained a large amount of their engagement with the gamified technology.

In summary, the main factors that influenced tourists' engagement with the gamified technology were extrinsic motivations, their need for competence experience, enjoyment, social connectedness,

and social interactions, in descending order. Tourists' need for self-monitoring and experiencing a sense of community also contributed to their engagement.

Moreover, the results demonstrate that tourists' engagement with the gamified technology was positively associated with behavioural activation through gamified technology and consequently, the overall tourist experience. This means that tourists with higher gamification engagement indicated a higher overall value of the gamified technology for the tourist experience. Furthermore, more highly engaged tourists demonstrated a stronger association with behavioural activation, meaning that these tourists were more motivated, more active, and more frequently (re-)discovered new slopes. Figure 12 illustrates the path model results of Study 3.



Reported paths: Standardized Coefficients Beta (β)

Reported paths: Coefficients

Note. * p < 0.05, ** p < 0.01, *** p < 0.001

Figure 12: Path model results.

The investigated socio-psychological and behavioural gratifications provide interesting insights on a descriptive level as well. The analysed gratifications reveal that the gamified technology contributed not only to the satisfaction of tourists' diverse socio-psychological needs, but also to their perceived behavioural activation and an overall meaningful tourist experience. For instance, the results indicate that tourists used the gamified technology because it gave them 'personal confirmation' and the feeling of 'mastering challenging tasks', as measured by the competence experience construct. Moreover, tourists engaged with the gamified technology because it made 'skiing/snowboarding more exciting and diversified', as measured by the enjoyment construct, and because it facilitated 'interesting discussions with others', as measured by the social interactions construct. Moreover, getting the feeling of 'shared experiences' and of a sense of 'togetherness', as measured by the social connectedness construct, were further important reasons for engaging with the gamified technology. Finally, tourists stated the engagement with the gamified technology made them 'more active' during their stay, 'led them to slopes that they had not used lately/had not used before', and contributed to an overall 'meaningful stay'. The descriptive values of the tested socio-psychological and behavioural gratifications represent overall high mean values. An overview of the descriptive results is presented in Appendix E.

Overall, the results of Study 3 suggest that gamified technology is a promising means to actively engage tourists on a deeper level of cognition, thereby contributing to tourists' perceived overall positive functioning during the stay. As such, gamified technology contributes to a meaningful overall tourist experience when the gamified technology addresses those socio-psychological and hedonic values that are personally meaningful to the tourists in relation to the context and activity. In the context of a pleasure vacation, tourists voluntarily engage with gamified technology.

The results suggest that in addition to extrinsic motivation, competence experiences, and enjoyment, the social needs surrounding the gamified technology are particularly decisive for engagement. As indicated by the results of this study, tourists particularly engaged with the gamified technology because it provided them with feelings of shared experiences and social connectedness. Thus, it was tourists' desire for connecting and interacting with others in the real world that primarily motivated their gamification engagement. Overall, the main findings of Study 2, including the motivators, behavioural activation, and the overall value of the gamified technology in the tourist experience, could be confirmed in Study 3. 'Status' was the only motivator that was not significantly associated with gamification engagement and thus, not confirmed in this study.

Contribution of the Study

The theoretical contributions of Study 3 are threefold: first, this study generally contributes to the game-related literature (Hamari et al., 2014; Ryan et al., 2006) in the form of a comprehensive understanding of the motivational affordances of game technologies. Specifically, the findings contribute to research on social motivators of gamified technology engagement (Hamari & Koivisto, 2015b; Hamari & Koivisto, 2015a). The findings reveal that in addition to psychological needs including competence and relatedness, social and emotional needs also play an important role in engagement with gamified technology in specific contexts, thereby contributing to the literature on gamified technology (Deterding, 2011; Koivisto & Hamari, 2019).

Second, the findings of this study add to the tourism literature by informing about the overall value of gamified technology in the tourist experience (Xu et al., 2016). This study has demonstrated that gamified technology can provide tourists with meaningful interaction opportunities in the pursuit of their goals, which eventually fosters positive experiences and contributes to the overall tourist experience at the tourism destination. Specifically, Study 3 provides a general understanding of the social, psychological, and behavioural gratifications of gamification engagement, describing the personal meaning derived from interaction. By doing so, this study lays the foundation for a more in-depth understanding of how gamified design can foster the creation of meaningful and memorable tourist experiences (Bulencea & Egger, 2015), contributing to the conceptualisation of gamification in tourism.

Third, and related to the overall outcome of engagement with gamified technology, this study adds to the discussion about the benefits of motivational design and gamified technology in fostering positive human functioning and mental wellbeing (Deterding, 2014; Jones et al., 2014). The findings of this study tie in with insights on positive psychology (Seligman, 2011) and motivational technologies (Zhang, 2007; 2008), providing empirical evidence that motivational designs, such as gamified technology, can play an active role in shaping positive human experiences. In this regard, the findings of Study 3 represent an enrichment of the general gamification conceptualisation (Koivisto & Hamari, 2019) as they indicate that successful behavioural activation through gamification engagement additionally leads to a better overall evaluation of the tourist experience.

5 CONCLUSION AND IMPLICATIONS

Based on the results and main findings of the studies conducted in this thesis, this chapter presents an overall synthesis. Moreover, the main theoretical and practical contributions of this thesis are derived and discussed. Finally, to close this chapter, an overall reflection including the limitations of this thesis is provided.

5.1 Synthesis and Overall Contribution to Theory and Methodology

Synthesis

The overarching aim of this thesis was to provide an understanding of the value of human-centred technologies, particularly gamified technology, for the tourist experience. In other words, it aimed to determine how personal meaning can be created through interaction with human-centred technologies. A knowledge of personal meaning thereby informs about the value of these technologies for the human experience.

Relevant for meaning-creation is the interaction with users' personally valued goals and desires. This thesis provides empirical evidence that both hedonic and eudemonic values appeared in user-generated experiences with the gamified technology. These experiences exhibited different experiential patterns. The personally valued goals fostered through human-centred technologies mainly include achievement goals including the desire for learning and progress and social goals including the desire for status and social recognition, as well as social bonding and social belonging as identified in this thesis. Aside from that, several emotional values have been identified as related to interaction with the gamified technology. These emotional values include feelings of excitement, joy, and fulfilment, as well as re-experiencing at the end of a vacation day or fostering positive memories through interaction with the gamified technology.

Meaning can be created through interaction with the technology. Nevertheless, of primary relevance for the creation of meaningful experiences are the values that persist beyond interaction. In this thesis, evidence for both meaning-creation during interaction and lasting values beyond interaction was found. The meaning-creation during interaction thereby appeared to be mainly related to momentary pleasure, whereas the values beyond interaction seemed to be coupled with deeper personal needs.

Meaning, which is created through the satisfaction of deeper psychological and social needs, is generally related to eudemonic values or experiences (Mekler & Hornbæk, 2016). Based on this

understanding, the hedonic values can be considered as primarily referring to meaning-creation during interaction and more loosely connected to the deeper personal goals and sought end values than eudemonic values. Hedonic experiences generally refer to needs related to short-term pleasure and fun (Mekler & Hornbæk, 2016). In this thesis, tourists' hedonic experiences derived from interacting with the gamified technology included the pursuit of entertainment, collecting badges and tangible benefits, and challenging each other for fun with no particular end purpose. Eudemonic values, in contrast, are more about fulfilling personally meaningful goals. Eudemonic values are related to need fulfilment and are of long-term significance (Mekler & Hornbæk, 2016). In this regard, particularly the generated social dynamics surrounding the game provide interesting insights into meaning-creating experiences through gamified technology in this thesis. For instance, the desire for social recognition, gaining status, and building one's position in the vacation community are eudemonic values that demonstrate evidence of social needs, including the need for power and affiliation. Social interactions and meeting new people through interacting with the gamified technology are other social experiences describing the primary condition for the desire for social belonging (McClelland, 1987).

The creation of meaning through eudemonic experiences is longer lasting and contributes to mental wellbeing through the satisfaction of psychological needs (Mekler & Hornbæk, 2016). In this regard, the results of this thesis suggest that achievement of personally meaningful goals is strongly associated with a more positive overall vacation experience. Tourists' perceived gratifications from interacting with the gamified technology referred to an overall enhanced experience in terms of a more meaningful and recreational stay. Finally, the findings of this thesis indicate that tourists' interaction with gamified technology adds to the creation of meaning beyond the vacation experience. The gamified technology fosters reminiscence and positive feelings and produces a mental association with the vacation experience.

Overall, this thesis reveals that human-centred technology such as gamified technology helps provide an awareness of what is personally meaningful during vacation. As demonstrated in this thesis, the uncovered end values of interaction can thereby reach beyond the technological values already inherent in the technology. Relatedly, and as also indicated by the results of this thesis, one game element is connected with multiple end values and is thus associated with different meanings. It is therefore crucial to identify and nurture those values that are truly meaningful to users. Finding users' internal triggers requires digging deeper into users' engagement with products in an attempt to unravel the underlying and often subconscious goals and values (Eyal, 2016). These goals and values can be activated through human-centred technologies, such as gamified technologies.

In other words, when the product ties in with users' personally meaningful goals and values, users' internal triggers can be leveraged (Eyal, 2016). In such cases, users become deeply engaged with a product, often beyond their perceptive consciousness. Consequently, users' deep engagement leads to several positive outcomes and gratifications on a behavioural and psychological level. From a psychological perspective, the creation of meaning through engagement with human-centred technologies is thus linked to the question of how to 'make users feel better and more meaningful' – not only during but beyond interaction with the technology.

Conceptual Framework

Based on the main findings and contributions of the three studies of this doctoral thesis, a conceptual framework is presented in this section. The conceptual framework combines the insights from the general usage level investigated in Study 1 and the engagement level with human-centred technologies investigated in Studies 2 and 3. This proposed conceptual framework provides an overview of the main findings of this doctoral thesis and at the same time, builds the fundamentals for a holistic understanding of how to engage users on a deeper level of cognition.

Figure 13 illustrates the conceptual model comprising two interaction stages: 'meaningful interaction' and 'functional interaction'. Whereas the meaningful interaction stage refers to the creation of meaning through technologies and correspondingly, 'engagement' with technologies, the functional interaction stage refers to single usages of technologies. As elucidated in this thesis, the meaningful interaction stage comprises the human-related dimension, while the functional interaction stage captures the product-related dimension. When interacting with technology on a functional level, the main interest concerns single usage questions, including questions mainly related to adoption of a technology. In such cases, a product-dominant perspective is taken. Personal factors, such as users' attitudes towards adoption of the technology, the functional characteristics of the technology, and social influencing factors play a role in constituting functional interaction. In contrast, meaningful interaction is concerned with users' deeper personal goals and values of interaction. The main question on this level is, 'What higher-order goals does the mobile ICT allow one to achieve?' Higher-order goals or ultimate goals inform about users' deep-seated, personal values of using a product (Walker & Olson, 1991).

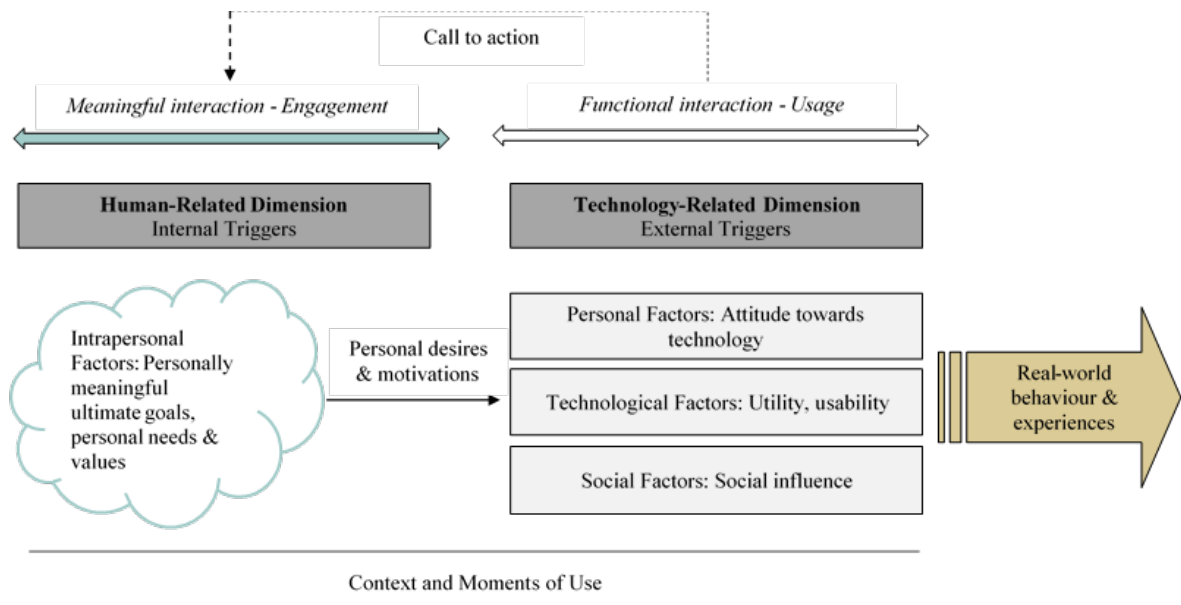


Figure 13: Conceptual framework for future adoption research.

Humans’ internal needs and values are the root cause of their engagement with products on a deeper level of cognition. Humans’ deep-seated values govern their behaviour and operate as the basis for any decision-making process (Eagly & Chaiken, 1998). The deep-seated values become evident in the form of people’s needs and desires and consequently, their motivation to act in a certain way (Eagly & Chaiken, 1998). With the goal to engage users on a deeper level of cognition, these roots must be uncovered. Accordingly, interaction with the technological product should be aimed at serving personal higher-order goals, rather than be considered as an end in itself (Bagozzi, 2007b).

In psychology, the factors related to personally meaningful goals and values are considered to be internal triggers. In this regard, according to Eyal (2016, pp. 47–48),

“When a product becomes tightly coupled with a thought, an emotion, or a pre-existing routine, it leverages an internal trigger. Unlike external triggers, which use sensory stimuli like a morning alarm clock or giant ‘Login Now’ button, you can’t see, touch, or hear an internal trigger.”

The internal triggers irrespective of the technological product accordingly form the roots for users’ meaning-creation through interacting with the technological product. Once the internal triggers are activated, the deeper levels of engagement start to evolve. In such cases, technology functions as an external trigger or call to action (Eyal, 2016).

Importantly, decision-making and interaction processes do not represent a linear and deterministic act. Human decision making is a dynamic process which emphasises movement and context (Snyder

& Cantor, 1998). Characteristic to decision-making processes is the interplay between several individual events occurring simultaneously on a conscious and subconscious level in temporal and spatial contexts (Snyder & Cantor, 1998). For reasons of simplicity and comprehensibility, Figure 13 represents a linear model beginning with human-centred factors which, on a conscious level, form personal desires and motivations. Only then does the product-related dimension become of relevance. When successfully perceived and enacted upon, the technological factors of the product-related dimension function as a call to action, stimulating deeper engagement with the technology. Engagement finally leads to behavioural outcomes and experiences beyond the interaction with the technology.

Overall Theoretical Contribution

This thesis aimed to explore the underlying values of gamified technology for meaningful tourist experiences. In particular, the study sought to investigate 1) tourists' underlying motives for engaging with gamified technology during a pleasure vacation and 2) the gratifications of tourists' engagement with gamified technology for their co-creation of meaningful tourist experiences. Considering this overarching aim, the main theoretical contributions are briefly summarised in this section.

This thesis primarily contributes to a motivational affordances understanding of gamified technology use in the vacation experience. By having applied achievement motivation theory as the main theoretical underpinning to understand, identify, and conceptualise tourists' underlying motivations for engaging with gamified technology during a pleasure vacation, the findings of this study specifically contribute to the understanding of the diverse underlying motivations and their related theoretical concepts. The main motivational concepts include psychological, social, and emotional needs. The identified motivational needs inform about tourists' perceived gratifications for interacting with the gamified technology.

Table 13 summarises the main needs and motivations identified in this thesis including the related theoretical concepts based on classic motivation theories (McClelland, 1987; Reeve, 2018; Ryan & Deci, 2000b; Ryan & Deci, 2002).

	Needs & Desires	Related Theoretical Concept
Psychological	<ul style="list-style-type: none"> - Personal confirmation, competence, experience - Learning, progress - Positive self-worth 	Competence experience (self-determination theory)
	<ul style="list-style-type: none"> - Socialise; have something to talk about; social interactions - Feeling connected and involved; social connectedness 	Relatedness (self-determination theory)
Social	<ul style="list-style-type: none"> - Sense of achievement 	Achievement (achievement motivation theory)
	<ul style="list-style-type: none"> - Impress others; show off - Social recognition; status - Build a position within the vacation community 	Power (achievement motivation theory)
	<ul style="list-style-type: none"> - Be a part of the community/sense of community 	Affiliation (achievement motivation theory)
	<ul style="list-style-type: none"> - Bond with family and friends 	Intimacy; warm, secure relationships (achievement motivation theory)
Emotional	<ul style="list-style-type: none"> - Satisfaction; fulfilment - Joy - Excitement - Fun; enjoyment - Positive feelings 	Feelings (emotions)
	<ul style="list-style-type: none"> - Re-experience; enjoy again - Mental immersion; daydreaming - Reminiscence 	Cognitions (emotions)

Table 13: Tourists’ main needs and motivations for engaging with gamified technology during a pleasure vacation as identified in this thesis.

The identified underlying motivations and ultimate goals in engaging with the gamified technology further inform about the underlying mechanisms that leverage tourists' engagement with this technology. With the goal to identify the underlying values of gamified technology for tourists' co-creation of meaningful experiences only highly engaged tourists were included in this thesis. In Study 3, engagement was conceptualised as a three-dimensional concept consisting of the positively assessed cognitive, emotional, and behavioural processing of interacting with the gamified technology. Relatedly, this thesis also provides insight on the outcomes of engagement on a behavioural and overall psychological level. This adds to the understanding of the value of gamified technology for the tourist experience.

Moreover, this thesis contributes to the understanding of the co-creation of meaning through engagement with human-centred technologies. In this thesis, empirical evidence for both hedonic and eudemonic experiences, which are both relevant for the creation of meaning was obtained. The identified eudemonic experiences are particularly informative about the value for the overall experience. Further, clear evidence of meaning-creation was observed through the identified lasting values beyond the interaction with the technological system. Aside from the deeper psychological and social needs, these lasting values include social interactions around game and emotional values during vacation and beyond. Interestingly, some values endured beyond vacation, such as reminiscence, positive feelings, and establishing a mental link to the vacation experience.

Another key theoretical contribution of this thesis is the finding that tourists seek to accomplish personal goals through technology use. In this way, this thesis provides in-depth insights into tourists' experiences in engaging with gamified technology during vacation. Reaching personally meaningful goals does not only contribute to the creation of meaning. Rather, and more importantly, the active mental and physical involvement of goal achievement and, with that, the creation of meaning are crucial for people's subjective mental wellbeing (Hadden & Smith, 2019; Huta & Ryan, 2010; Ryff & Singer, 2008; Steger, 2012) and thus mental health. Gamified technology can help leverage those needs which are personally meaningful. Hence, this thesis further adds to the discussion of how human-centred technology helps people set personally meaningful goals and supports them in pursuing those goals (Mekler & Hornbæk, 2019).

Finally, the findings of this thesis indirectly contribute to the idea of how human-centred technologies foster mental wellbeing and health in general. The satisfaction of psychological and social needs through achieving personally meaningful goals generally contributes to mental wellbeing (Reeve, 2018; Ryan & Deci, 2000b). The vacation functions as a suitable context to do so by nurturing those needs and values that are personally meaningful. It is common knowledge that people often take on

a different mood and emotional state during vacation, seeking positive experiences and personally valued states. These aspired end values thus serve as an ideal starting point to facilitate tourists' positive experiences. As demonstrated in this thesis, the social dynamics around the game hold the potential to create situations of healthy competition that develop lasting values beyond the game. Game-related physical activity movements, positive experiences, and emotions can support human flourishing, eventually contributing to personal wellbeing and recovery during vacation and beyond.

Methodological Contribution

This thesis offers several contributions from a methodological perspective. To uncover subconscious needs, it is important to use methodologies that delve into users' feelings, emotions, and experiences. This thesis applied the laddering technique based on the rationale of the means-end chain (Gutman, 1982) to reach the deeper needs and values of the tourists and thus the personal meaning of engaging with gamified technology in the tourist experience. In doing so, tourists' underlying motives and sought ultimate goals could be uncovered. This way, nuanced insights into tourists' engagement with and perceived gratifications of gamified technology were generated. Such an approach also allowed for an exploration of motives not inherent in the design of gamified technology and not yet considered by the typical motivational affordances framework of studies on gamified technology in general. In particular, this bottom-up methodological approach allowed for identifying several underlying motives, enriching the knowledge regarding the motivational affordances of gamified technologies from other contexts. Specifically, it was discovered that not only the needs related to competence and relatedness proposed by the self-determination theory, but also the social needs inherent to achievement motivations play a role in users' engagement with gamified technology.

Based on the results of the exploratory study, this thesis surveyed the explored motives on a broader level of tourists, thereby connecting all phases related to gamification engagement. More precisely, tourists' motives for engagement were connected with the behavioural and psychological outcomes for the tourist experience. The main phases thus included 1) motives for engagement, 2) engagement, 3) behavioural outcomes, and 4) overall psychological outcomes, measured as the overall value for the tourist experience. By combining the exploratory approach with the verifying, quantitative approach to investigate tourists' engagement with gamified technology, an in-depth and holistic understanding could be generated. Moreover, this thesis only included tourists who have had the relevant experiences with gamified technology in a pleasure vacation context. This is in contrast to the student samples that have primarily been used in prior tourism studies related to this topic. By only studying highly engaged tourists, the thesis provides in-depth knowledge of the antecedents and outcomes of engaging with gamified technology in the tourist experience.

On a general level, this thesis contrasted the phases of ‘adoption and use’ of mobile ICTs with ‘engagement’ with mobile ICTs. In doing so, the main factors contributing to both phases were identified and summarised. This knowledge ultimately helps to facilitate a better understanding of these two phases and distinguish between the phases related to adoption/use and engagement with technology in general.

5.2 Theoretical and Practical Implications

The findings of this thesis offer several theoretical and practical implications. This thesis provides the grounds for a better understanding of how human-centred technologies can help one to achieve personally superior goals of enduring value. In other words, technology can assist people in becoming more aware of those goals that they truly value. The knowledge thereof, in turn, helps people set manageable, yet meaningful goals that eventually nurture a higher-order goal or end value. The achievement of such goals is not only of personal value, but also holds the potential for generating benefits on an overarching, social level. Based on the knowledge that achieving meaningful goals contributes to mental wellbeing, the insights generated in this thesis facilitate an understanding of how technology could provide mechanisms for leveraging overarching, socially relevant needs and goals. Goals of social relevance could include actions related to a more healthy behaviour, sustainable consumption, or education, all of which contribute to social wellbeing. As elucidated in this thesis, achieving meaningful goals requires a smooth alignment of the technology with the context and activity of use.

Moreover, this thesis paves the way for an understanding of why and how technology helps to shape human behaviour and experiences through gamified mechanisms. By exploring and investigating gamification engagement in the tourist experience, this thesis provides the foundation for a better understanding of how user-generated experiences with gamified technology create positive emotions and relate to the overall tourist experience. These user-generated experiences thereby include users’ needs, motives, and perceived outcomes from interacting with the gamified technology. Such insights lead to a nuanced view of tourists’ behaviours during a pleasure vacation with a particular focus on how technologies can help shape human behaviour and experiences. Specifically, the findings of this thesis provide the theoretical grounds to further investigate how technologies can help engage tourists on a deeper level of cognition, thereby producing individually beneficial behaviour on a personal and social level. The theoretical model proposed in Study 3 provides a basis to investigate the role of gamified technology in other non-game contexts.

Finally, the knowledge generated in this thesis offers the grounds to further examine the role of gamified technology in establishing or fostering personal connections with users by engaging them on a deeper level of cognition and creating positive experiences. As demonstrated in this thesis, although the technological features of the gamified technology were primarily targeted at the behavioural activities performed during the participants' stay at the destination, users also engaged with the gamified features beyond their vacation. This finding suggests a promising connection for meaning-creating activities by means of the gamified technology beyond the stay, with the goal to foster and strengthen customer relationships.

From a practical standpoint, this thesis provides tourism destinations and tourism suppliers with nuanced insights into how customer engagement can be fostered using game mechanisms and human-centred technologies in general. More precisely, this thesis not only demonstrates how tourists' engagement can be triggered through technologies, but also illustrates several outcomes thereof for the overall tourist experience. This helps to identify ways to establish more personally relevant relationships with customers during and beyond their stay at the destination. For tourism destinations, it has become vital to offer technological tools and interaction opportunities that support tourists in their co-creation of personally meaningful experiences. Human-centred technologies such as gamified technologies represent a promising means to do so. These technologies demonstrate a user-centred method that holds the power to address those needs that are truly meaningful to their users. This with the end goal of engaging users in a more meaningful way, eventually leading to more meaningful and longer-lasting experiences. In doing so, a deeper connection and longer-lasting relationship with the user can be established. Although the findings of this study are context and activity specific, the general implications of this study are of relevance for the tourism industry as a whole.

5.3 Overall Reflection and Limitation of the Studies

Related to the overarching aim of this thesis is the question of how tourists can be engaged through gamified technologies with the goal to support them in their co-creation of meaningful experiences. This thesis comprises three studies, all of which contribute to the overarching aim. Study 1 contributes to the general knowledge of what factors explain individual mobile ICT adoption. Studies 2 and 3 more specifically focus on the question how tourists can be engaged through gamified technology and, with that, on the underlying value of gamified technology for the tourist experience.

The three studies that comprise this thesis were conducted according to pre-defined validity and reliability considerations, thus complying with strict scientific rigour. Nevertheless, the studies include some limitations.

Study 1 served as a preliminary study to establish the grounds for an in-depth understanding of the factors explaining individual mobile ICT adoption. This was achieved by conducting an extensive systematic literature review that allowed for a broad inclusion of the factors that contribute to individual mobile ICT adoption. The identified factors and associated paths of individual mobile ICT adoption were descriptively summarised and interpreted. Although this was in line with the goal of the study and helped to map the field of individual mobile ICT adoption, future research should statistically analyse the paths between the identified adoption factors and users' actual adoption. A meta-analysis that applies "statistical procedures to collections of empirical findings from individual studies for the purpose of integrating, synthesizing, and making sense of them" (Wolf, 1987, p. 5) would contribute to a more condensed understanding of which drivers have the strongest effect on individual mobile ICT adoption. In addition to this, the systematic literature review was conducted in a broad manner to allow for a comprehensive inclusion of driving factors and to map the field of mobile ICT adoption as comprehensively as possible. While such a broad approach allows for a comprehensive overview of the existing knowledge in the field of study, it holds the risk of remaining too shallow in terms of explanatory power. Such a broad approach could be divided into two separate studies: one that provides an in-depth overview of the empirical qualitative studies in the field and one that focusses only on empirical quantitative studies. The findings of both studies could then be synthesised and collectively discussed. Finally, it is also worth investigating the factors for non-adoption, including individuals' resistance towards mobile ICTs. The knowledge thereof would contribute to a more holistic understanding of the phenomenon under investigation.

Studies 2 and 3 both applied achievement motivation theory as the main theoretical framework in addition to the self-determination theory to investigate tourists' engagement with gamified technology in the tourist experience. While Study 2 was exploratory in nature, Study 3 surveyed the explored motives for engagement on a broader level of tourists. With the goal to generate an in-depth understanding of the underlying motives for engaging with gamified technology, a bottom-up approach was chosen as the first step. A bottom-up approach was considered highly promising, as previous studies had not investigated users' underlying motivations for gamification engagement, neither in the broader field of gamification nor in tourism. Study 3 builds upon the results of Study 2. Hence, as a second step, the explored motivations for tourists' engagement with gamified technology and the consequences thereof for the tourist experience were quantitatively investigated among a larger group of tourists.

As is typical with exploratory approaches, the findings should be interpreted with caution. Exploratory studies do not seek to produce results that can be generalised on a broader level. In addition, the results of the exploratory study only provide a one-time excerpt of the phenomenon under investigation. The limitation of referring only to a single excerpt of the phenomenon under investigation also applies to Study 3. Therefore, future research should take the form of repetitive or longitudinal studies. Nevertheless, as the results of the exploratory Study 2 could partially be confirmed by the results achieved in Study 3, it can be concluded that the findings obtained in this thesis are trustworthy. In other words, the results presented in this thesis are largely consistent, meaning that findings could be replicated if the study were repeated with the same (or similar) respondents in the same (or similar) context (Lincoln & Guba, 1985).

Moreover, purposive sampling was used in Study 2 to study tourists' underlying reasons for engaging with gamified technology and the value of gamified technology for the tourist experience. Purposive sampling was in line with the main goal of this thesis. It generally offers a suitable approach to study the phenomenon under investigation in depth (Patton, 2007). Accordingly, Study 2 focussed on a highly specific group of tourists, consisting of highly affine skiers and snowboarders – an approach which is justified or even necessary when seeking to study a phenomenon in depth (Corbin & Strauss, 2008). This way, distinct results and replicable knowledge can also be generated based on exploratory studies.

A further limitation of this thesis concerns the reductionist approach of Study 3. Despite the strength of quantitative studies to generate replicable knowledge on a large number of people with relevance to a wider population (Bryman, 2003), quantitative studies tend to measure and thus investigate a phenomenon in an overly simplistic way. This particularly applies to complex measures such as 'meaning' in this study. Study 3 applied a cross-sectional, single-source, self-report survey-based design, which bore the risk of being subject to common method bias (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). However, self-report measures were considered to be the most accurate and readily available method. Moreover, a single one-factor test (Podsakoff et al., 2003) revealed that the data obtained in Study 3 were free of common method biases. Nevertheless, further research should consider experimental and longitudinal designs.

In addition, Study 3 was based only on *stated* measures. That is, respondents rated on a five-point Likert scale to what extent they agreed on the statements regarding the socio-psychological motivators and behavioural and psychological gratifications for the tourist experience. This approach was deemed suitable for the goal of the study, which was to survey the socio-psychological motivators and gratifications based on the exploratory results of gamification engagement.

Nevertheless, future studies should use experimental designs to examine whether the overall tourist experience of guests who use the gamified technology actually differs from those who *do not* use the gamified technology. Concerning the behavioural outcomes of gamified technology engagement, it is further recommended that tourists' behaviour be measured based on real-time data, rather than on self-reported behaviour.

Finally, the sample in this thesis comprised a specific group of winter tourists: highly affine skiers and snowboarders vacationing at a ski resort. Although the sample can thus be described as highly specific, the narrowly defined group was necessary to enable distinct results and replicable knowledge. This is also in line with Pearce and Packer (2013), who note that one should not study all tourists in general. Rather, one should distinguish between specific groups of tourists to be able to generate specific knowledge. The overall findings generated by the studies are of general relevance and are thus transferrable to other contexts. Importantly, a main prerequisite for users' successful interaction with the gamified technology are users' personally meaningful goals regarding the activity and context of use.

Lastly, the tourists included in both study samples demonstrated an averagely high loyalty to the tourism destination, having an effect on the engagement with the gamified technology. This should be taken into consideration when interpreting the results of this thesis. Nonetheless, some tourists explicitly stated in the exploratory study that the gamified technology helped to further intensify their relationship with the tourism destination. Future studies should consider loyalty effects when investigating users' engagement with gamified technology.

6 CLOSING WORDS

This thesis is grounded in a forward-looking research setting that enables the production of cutting-edge research. The tourism destination is well known for its innovative power with its destination-related mobile app, which is among the few successful examples of gamified technologies in tourism. Although users' engagement with gamified technologies has been studied in the fields of user experience design, human computer interaction, and the like, users' underlying motives for engaging with gamified technologies in varying contexts have remained largely unexplored. Most research in this field has primarily focussed on studying performance-related outcomes of gamification, implicitly assuming the user motivations to be pre-defined by the gamified elements. There was a general need to more specifically study why people use gamified technologies in the first place (van Roy et al., 2018) and how engagement with the gamified technology can be initiated.

Particularly in the tourism context, knowledge and practical examples of tourists' interactions with modern ICTs such as gamified technology are scarce. In-depth insights into a specific phenomenon can only be generated based on existing examples and research subjects who have already had the necessary experience with a given phenomenon. This thesis ties in with the research need for studying gamified technologies in relation to tourism from a user-centred perspective and specifically, with the need to study tourists' underlying motives for interacting with gamified technologies. Accordingly, the main objective of this thesis was to generate in-depth knowledge of tourists' motives for engaging with gamified technologies during a pleasure vacation. Thus, this thesis sought to uncover the value of gamified technologies for tourists' co-creation of meaningful tourist experiences. Given this goal, this thesis only focussed on users' positive experiences related to gamification engagement.

In today's society, the creation of 'meaning' and activities related to 'wellbeing' have gained increasing importance. Personally meaningful experiences can be achieved in seemingly trivial activities. The leisure and tourism contexts offer opportunities to perform personally meaningful activities and foster those values that are of central meaning to the individual. Modern ICTs can support people in achieving their personal goals, thereby contributing to the personal meaning-creation. With the advancement of modern technologies and today's use of personal mobile technologies in general, it is important to know how technologies help people foster personal values and lead a meaningful life. Although often downplayed as 'baublery' or 'gaming' in everyday life, gamified technologies are more than just entertainment tools. In fact, persuasive and gamified technologies hold the potential to establish a long-term shift towards more healthy behaviour (Johnson et al., 2016) or sustainable living (Agnisarman, Madathil, & Stanley, 2018). As such,

contexts related to health and wellbeing seem particularly promising for persuasive technologies to function as intensifiers of human experiences.

The foundation for a better understanding of how modern technologies contribute to tourists' meaning-creation has been laid in this thesis. With new human-centred technologies being developed, this thesis provides the necessary in-depth understanding of tourists' perceptions of interacting with human-centred technologies during vacation. It is expected that the findings of this thesis will inspire future research to contribute to knowledge of how human-centred technologies can facilitate the creation of meaning and stimulate positive experiences, not only during vacation but in everyday life in general.

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APPENDIX

Appendix A: Overview Laddering Results

attributes	functional consequences	psychosocial consequences	behavioral consequences	end value
<ul style="list-style-type: none"> - tracking - leaderboard - badges - points - my story 	<ul style="list-style-type: none"> - arouses interest & learning - arouses ambition - compete/compare with others - challenge each other - create own game - perceived fairness - tangible benefits 	<ul style="list-style-type: none"> - creates memories - mental immersion, daydreaming - excitement / feeling excited - re-experience / enjoy again - feeling connected, involved - joy - recall memories - satisfaction / fulfillment - challenge myself / explore limits - improve skills / progress - knowledge - learning about myself - personal confirmation / competence experience - set new goals - entertainment - socialize, have something to talk about - impress others / show off - achievement & progress - having fun, enjoyment - build position within community 	<ul style="list-style-type: none"> - adjust route / ride different slopes - ski / snowboard more - physically connect with others / meet up with others in the destination 	<ul style="list-style-type: none"> - be part of community / sense of community - bonding with family / friends - self-esteem - reminiscence, positive feelings - social recognition / status

Appendix B: Constructs and Items Generation Questionnaire

Constructs and Items Generation Questionnaire Study 3

Construct	Definition	Measure	Developed Items English	Developed Items German	Supporting Literature Items
1.0 Functional motivation			I use the „playful” functions on the INSIDE LAAX App because ...	Ich nutze die „spielerischen“ Funktionen auf der INSIDE LAAX App, weil...	
Extrinsic Motivation	Refers to doing something because it leads to a separable outcome (Ryan & Deci, 2000a)	In-game reward / extrinsic benefit	EXM_01: ... it is important for me to get rewards for my activities in the ski resort. EXM_02: ... it is important for me to receive additional points for my activities in the ski resort. EXM_03: ... I want to collect as many badges as possible. EXM_04: ... my goal is to redeem the collected points for products or vouchers.	EXM_01: ... ich möchte Belohnungen für meine Aktivitäten im Skigebiet erhalten. EXM_02: ... ich möchte Punkte für meine Aktivitäten im Skigebiet sammeln. EXM_03: ... ich möchte so viele Badges wie möglich sammeln. EXM_04: ... es ist mein Ziel, die gesammelten Punkte gegen Produkte oder Gutscheine einzulösen.	(Bock, Zmud, Kim, & Lee, 2005; Kankanhalli, Tan, & Wei, 2005)
2.0 Achievement motivation			I use the „playful” functions on the INSIDE LAAX App because ...	Ich nutze die „spielerischen“ Funktionen auf der INSIDE LAAX App, weil...	
2.1 Self-monitoring	The need to record physical activities (Burke et al., 2012)	Recordability	SEM_01: ... I want to record my skiing / snowboarding activities in the ski resort. SEM_02: ... I want to learn about my skiing / snowboarding performance. SEM_03: ... I would like to track my skiing / snowboarding performance over time. SEM_04: ... it helps me to learn about myself.	SEM_01: ... ich möchte meine Ski-/Snowboardaktivitäten im Skigebiet aufzeichnen. SEM_02: ... ich möchte mehr über meine Ski-/Snowboardleistung erfahren. SEM_03: ... ich möchte meine Ski-/Snowboardleistung über die Zeit verfolgen. SEM_04: ... es hilft mir, etwas über mich selbst zu lernen.	(Flanagin, 2005; Kaplan, Farzanfar, & Friedman, 2003; Lee & Cho, 2017)

<p>2.2 Competence experience</p>	<p>Competition with the self; do well to a standard of excellence (Heckhausen, 1967); refers to a person's appraisal of his or her value (Reeve, 2018)</p>	<p>Competence experience</p>	<p>COMP_01: ... I want to measure if I broke my own record. COMP_02: ... it arouses my ambition to go to my own limits. COMP_03: ... it makes me feel that I am taking on and mastering challenges. COMP_04: ... it makes me feel that I am successfully completing challenging tasks. COMP_05: ... it gives me a personal confirmation. COMP_06: ... it makes me feel good about what I do.</p>	<p>COMP_01: ... ich möchte messen, ob ich meinen eigenen Rekord gebrochen habe. COMP_02: ... es weckt meinen Ehrgeiz bis an meine eigenen Grenzen zu gehen. COMP_03: ... es gibt mir das Gefühl, Herausforderungen anzunehmen und zu meistern. COMP_04: ... es gibt mir das Gefühl, anspruchsvolle Aufgaben erfolgreich zu bewältigen. COMP_05: ... es gibt mir eine persönliche Bestätigung. COMP_06: ... es gibt mir ein gutes Gefühl bei dem, was ich tue.</p>	<p>(Ryan, Frederick, Lepes, Rubio, & Sheldon, 1997; Sheldon, Elliot, Kim, & Kasser, 2001; Sonnentag & Fritz, 2007)</p>
<p>3.0 Power motivation</p>			<p>I use the „playful” functions on the INSIDE LAAX App because ...</p>	<p>Ich nutze die „spielerischen“ Funktionen auf der INSIDE LAAX App, weil...</p>	
<p>Status / Power (social recognition)</p>	<p>Refers to the value that participants derive from gaining acceptance and approval of other members, and the enhancement of one's social status within the community on account of one's contributions</p>	<p>Status / Social enhancement</p>	<p>STA_01: ... it helps me to attract others' attention with my performance. STA_02: ... it helps me to impress others with my performance. STA_03: ...it helps me to show others how well I have performed at skiing / snowboarding. STA_04: ...it makes others recognise me as a good skier / snowboarder.</p>	<p>STA_01: ... ich kann mit meiner Leistung die Aufmerksamkeit anderer auf mich ziehen. STA_02: ... ich kann andere mit meiner Leistung beeindrucken. STA_03: ... es hilft mir, anderen zu zeigen, wie gut ich im Skifahren / Snowboarden abgeschnitten habe. STA_04: ... ich kann anderen zeigen, dass ich ein guter Skifahrer / Snowboarder bin.</p>	<p>(Cheung, Chiu, & Lee, 2011; Dholakia et al., 2004; Lin, Hsu, Chen, & Fang, 2017; Okazaki, 2009)</p>

	to it (Baumeister, 1998; Dholakia, Bagozzi, & Pearo, 2004) Status / power (social recognition)				
4.0 Affiliation motivation			I use the „playful” functions on the INSIDE LAAX App because ...	Ich nutze die „spielerischen“ Funktionen auf der INSIDE LAAX App, weil...	
4.1 Social interaction	The desire to interact with others; primary condition for relatedness (Reeve, 2018)	Social interaction	SI_01: ... it gives me something to talk about with other people during my stay at the ski resort. SI_02: ...it makes my interaction with other people more fun during my stay at the ski resort. SI_03: ...it gives me interesting discussions with other people during my stay at the ski resort.	SI_01: ... es gibt mir etwas, worüber ich mit anderen Leuten während meines Aufenthaltes sprechen kann. SI_02: ... es macht meine Interaktion mit anderen Leuten während meines Aufenthaltes interessanter. SI_03: ... es gibt mir interessante Gespräche mit anderen Leuten während meines Aufenthaltes.	(Jahn & Kunz, 2012; Lin, Fang, & Hsu, 2014; Ryan et al., 1997)
			Through the use of the „playful” functions on the INSIDE LAAX App...	Durch die Nutzung der „spielerischen” Funktionen auf der INSIDE LAAX App...	

<p>4.2 Social bonding</p>	<p>The desire to belong; the desire to be emotionally connected to and interpersonally involved in warm relationships (Baumeister & Leary, 1995)</p>	<p>Social connectedness / relatedness</p>	<p>SC_01: ... I get a feeling of shared experiences with other users of the app. SC_02: ... I feel connected to other users of the app. SC_03: ... I get a feeling of togetherness with other users of the app. SC_04: ... I want to connect with friends or people like me through this app. SC_05: ... I want to follow friends or people like me through this app.</p>	<p>SC_01: ... erhalte ich das Gefühl gemeinsamer Erfahrungen mit anderen Nutzern der App. SC_02: ... fühle ich mich mit anderen Nutzern der App verbunden. SC_03: ... erhalte ich ein Gefühl von Zusammengehörigkeit mit anderen Nutzern der App. SC_04: ... möchte ich mich mit Freunden oder Leuten wie mir verbinden. SC_05: ... möchte ich Freunden oder Leuten wie mir folgen.</p>	<p>(Jang, Reeve, Ryan, & Kim, 2009; Klenk, Reifegerste, & Renatus, 2017; Lee & Robbins, 1995; Sheldon et al., 2001)</p>
<p>4.3 Sense of community</p>	<p>Refers to a group membership (a feeling of belonging or a sense of interpersonal relatedness); emotional connection (a feeling of attachment or bonding rooted in members' shared history, place or experience) (McMillan & Chavis, 1986)</p>	<p>Sense of community</p>	<p>SOC_01: ... I feel like a member of the LAAX community. SOC_02: ... I feel like I belong to the LAAX community. SOC_03: ... I feel connected to the LAAX community. SOC_04: ... I feel that I have a bond to others in the LAAX community.</p>	<p>SOC_01: ... erhalte ich das Gefühl, ein Mitglied der LAAX Community zu sein. SOC_02: ... fühle ich mich, als würde ich der LAAX Community angehören. SOC_03: ... fühle ich mich mit der LAAX Community verbunden. SOC_04: ... fühle ich eine Bindung zu anderen in der LAAX Community.</p>	<p>(Peterson, Speer, & McMillan, 2008)</p>
<p>5.0 Hedonic motivation</p>			<p>I use the „playful” functions on the INSIDE LAAX App because ...</p>	<p>Ich nutze die „spielerischen“ Funktionen auf der INSIDE LAAX App, weil...</p>	

Enjoyment physical experience	The extent to which the activity of playing is perceived to be enjoyable (Ryan & Deci, 2000a)	Enjoyment	ENJ_01: ...it makes skiing / snowboarding even more fun. ENJ_02: ...it makes skiing / snowboarding even more exciting. ENJ_03: ...it makes skiing / snowboarding even more diversified. ENJ_04: ...it makes skiing / snowboarding even more interesting.	ENJ_01: ... dadurch macht Skifahren / Snowboarden noch mehr Spass. ENJ_02: ... dadurch wird Skifahren / Snowboarden noch spannender. ENJ_03: ... dadurch wird Skifahren / Snowboarden noch abwechslungsreicher. ENJ_04: ... dadurch wird Skifahren / Snowboarden noch interessanter.	(Li, Liu, Xu, Heikkilä, & van der Heijden, 2015)
6.0 Engagement					
Engagement	“A psychological state that occurs by virtue of interactive, co-creative customer experiences with a focal agent/ object (e.g. a brand)” (Hollebeek et al., 2014, p. 149).	Engagement	ENG_01: I feel very positive when I use the playful functions of the INSIDE LAAX App. ENG_02: I think about the playful functions on the INSIDE LAAX App when I am using them. ENG_03: I spend a lot of time using the playful functions of the INSIDE LAAX App when I am in the ski resort. ENG_04: Whenever I am in the ski resort Flims/LAAX/Falera, I usually use the playful functions of the INSIDE LAAX App. ENG_05: I am proud to use the playful functions of the INSIDE LAAX App. ENG_06: Using the playful functions stimulates my interest to learn more about the playful functions.	ENG_01: Ich fühle mich sehr gut, wenn ich die spielerischen Funktionen der INSIDE LAAX App benutze. ENG_02: Ich denke über die spielerischen Funktionen auf der INSIDE LAAX App nach, wenn ich sie benutze. ENG_03: Ich verbringe viel Zeit mit der Nutzung der spielerischen Funktionen der INSIDE LAAX App, wenn ich im Skigebiet bin. ENG_04: Wann immer ich im Skigebiet bin, nutze ich in der Regel die spielerischen Funktionen der INSIDE LAAX App. ENG_05: Ich bin stolz darauf, die spielerischen Funktionen der INSIDE LAAX App zu nutzen. ENG_06: Die Verwendung der spielerischen Funktionen weckt mein Interesse, mehr über die spielerischen Funktionen zu erfahren.	(Hollebeek et al., 2014)
7.0 Outcomes			Overall, the use of the „playful” functions on the INSIDE LAAX App...	Im Allgemeinen hat die Nutzung der „spielerischen” Funktionen auf der INSIDE LAAX App...	

Behavioural outcomes	Refers to the behavioural outcome from engaging with gamified technology (Hamari et al., 2014a)	Behavioural activation	<p>BA_01: ...has motivated me to ski / snowboard more.</p> <p>BA_02: ...has led me to slopes that I haven't used lately / have not used before.</p> <p>BA_03: ...has made me use my time better during my stay.</p> <p>BA_04: ...has made me be more active during my stay.</p>	<p>BA_01: ... mich motiviert, mehr Ski / Snowboard zu fahren.</p> <p>BA_02: ... dazu geführt, dass ich Pisten gefahren bin, die ich schon lange nicht mehr gefahren bin / noch nie gefahren bin.</p> <p>BA_03: ... dazu geführt, dass ich die Zeit während meines Aufenthaltes besser genutzt habe.</p> <p>BA_04: ... dazu geführt, dass ich aktiver war während meines Aufenthaltes.</p>	(Hamari et al., 2014a; Tussyadiah & Zach, 2012)
Psychological outcomes	Refers to the overall tourist experience from engaging with gamified technology; the notion of positive, meaningful experience is emphasized to measure the overall tourist experience (Tussyadiah & Zach, 2012)	Overall experience	<p>OEX_01: ...has contributed to a meaningful stay.</p> <p>OEX_02: ...has contributed to my experience during the stay.</p> <p>OEX_03: ...has contributed positively to my overall stay.</p> <p>OEX_04: ...has contributed positively to my recovery during my stay.</p>	<p>OEX_01: ... zu einem bedeutungsvollen Aufenthalt beigetragen.</p> <p>OEX_02: ... zu meinem Erlebnis während des Aufenthaltes beigetragen.</p> <p>OEX_03: ... positiv zu meinem gesamten Aufenthalt beigetragen.</p> <p>OEX_04: ... positiv zu meiner Erholung während meines Aufenthaltes beigetragen.</p>	(Tussyadiah & Zach, 2012)
8.0 Loyalty					

Customer loyalty	The desire to continue a relationship with a service provider (Yang & Peterson, 2004)	Customer loyalty	<p>LOY_01: I say positive things about the winter ski resort Flims/LAAX/Falera to other people.</p> <p>LOY_02: I would recommend the winter ski resort Flims/LAAX/Falera to those who seek my advice about winter ski resorts.</p> <p>LOY_03: I would encourage friends and relatives to visit the winter ski resort Flims/LAAX/Falera.</p> <p>LOY_04: I would spread positive messages about the winter ski resort Flims/LAAX/Falera.</p> <p>LOY_05: I intend to continue to visit the winter ski resort Flims/LAAX/Falera.</p>	<p>LOY_01: Ich sage positive Dinge über den Winterskiort Flims/LAAX/Falera zu anderen Leuten.</p> <p>LOY_02: Ich würde den Winterskiort Flims/LAAX/Falera allen empfehlen, die meinen Rat über Winterskiorte einholen.</p> <p>LOY_03: Ich würde Freunde und Verwandte ermutigen, den Winterskiort Flims/LAAX/Falera zu besuchen.</p> <p>LOY_04: Ich würde positive Nachrichten über den Winterskiort Flims/LAAX/Falera verbreiten.</p> <p>LOY_05: Ich beabsichtige, den Winterskiort Flims/LAAX/Falera weiterhin zu besuchen.</p>	(Yang & Peterson, 2004)
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Appendix C: Construct and Survey Items Overview

Construct and Survey Items Overview Study 3

5er Likert Scale: 1: strongly disagree – 5: strongly agree

Construct Name	Indicator	Items
Engagement	ENG_01	I feel very positive when I use the playful functions of the INSIDE LAAX App.
	ENG_02	I think about the playful functions on the INSIDE LAAX App when I am using them.
	ENG_03	I spend a lot of time using the playful functions of the INSIDE LAAX App when I am in the ski resort.
	ENG_04	Whenever I am in the ski resort Flims/LAAX/Falera, I usually use the playful functions of the INSIDE LAAX App.
	ENG_05	I am proud to use the playful functions of the INSIDE LAAX App.
	ENG_06	Using the playful functions stimulates my interest to learn more about the playful functions.
Self-monitoring	SEM_01	... I want to record my skiing / snowboarding activities in the ski resort.
	SEM_02	... I want to learn about my skiing / snowboarding performance.
	SEM_03	... I would like to track my skiing / snowboarding performance over time.
	SEM_04	... it helps me to learn about myself.
Social connectedness	SC_01 I get a feeling of shared experiences with other users of the app.
	SC_02	... I feel connected to other users of the app.
	SC_03	... I get a feeling of togetherness with other users of the app.
	SC_04	... I want to connect with friends or people like me through this app.
	SC_05	... I want to follow friends or people like me through this app.
Competence experience	COMP_01	... I want to measure if I broke my own record.
	COMP_02	... it arouses my ambition to go to my own limits.
	COMP_03	... it makes me feel that I am taking on and mastering challenges.
	COMP_04	... it makes me feel that I am successfully completing challenging tasks.
	COMP_05	... it gives me a personal confirmation.
	COMP_06	... it makes me feel good about what I do.

APPENDIX

Status	STA_01	... it helps me to attract others' attention with my performance.
	STA_02	... it helps me to impress others with my performance.
	STA_03	... it helps me to show others how well I have performed at skiing / snowboarding.
	STA_04	... it makes others recognise me as a good skier / snowboarder.
Sense of community	SOC_01	... I feel like a member of the LAAX community.
	SOC_02	... I feel like I belong to the LAAX community.
	SOC_03	... I feel connected to the LAAX community.
	SOC_04	... I feel that I have a bond to others in the LAAX community.
Social interactions	SI_01	... it gives me something to talk about with other people during my stay at the ski resort.
	SI_02	... it makes my interaction with other people more fun during my stay at the ski resort.
	SI_03	... it gives me interesting discussions with other people during my stay at the ski resort.
Enjoyment	ENJ_01	... it makes skiing/snowboarding even more fun.
	ENJ_02	... it makes skiing/snowboarding even more exciting.
	ENJ_03	... it makes skiing/snowboarding even more diversified.
	ENJ_04	... it makes skiing/snowboarding even more interesting.
Extrinsic motivation	EXM_01	... it is important for me to get rewards for my activities in the ski resort.
	EXM_02	... it is important for me to receive additional points for my activities in the ski resort.
	EXM_03	... I want to collect as many badges as possible.
	EXM_04	... my goal is to redeem the collected points for products or vouchers.
Behavioural activation	BA_01	... has motivated me to ski/snowboard more.
	BA_02	... has led me to slopes that I haven't used lately / have not used before.
	BA_03	... has made me use my time better during my stay.
	BA_04	... has made me be more active during my stay.
Overall experience	OEX_01	... has contributed to a meaningful stay.
	OEX_02	... has contributed to my experience during the stay.
	OEX_03	... has contributed positively to my overall stay.
	OEX_04	... has contributed positively to my recovery during my stay.

APPENDIX

Skills	Skill	I rate my skiing/snowboarding skills as very good.
Loyalty	LOY_01	I say positive things about the winter ski resort Flims/LAAX/Falera to other people.
	LOY_02	I would recommend the winter ski resort Flims/LAAX/Falera to those who seek my advice about winter ski resorts.
	LOY_03	I would encourage friends and relatives to visit the winter ski resort Flims/LAAX/Falera.
	LOY_04	I would spread positive messages about the winter ski resort Flims/LAAX/Falera.
	LOY_05	I intend to continue to visit the winter ski resort Flims/LAAX/Falera.
	Valid N (listwise)	

Appendix D: Questionnaire

Questionnaire Study 3

Dear guest

Your opinion is important to us. Please participate in this survey and win attractive prizes for the winter ski resort Flims/LAAX/Falera.

I am a PhD student at Leuphana University Lüneburg. In my work, I investigate the use of playful functions (gamification) on mobile apps in tourism destinations. By completing this survey, you significantly contribute to the success of my work and help to generate new knowledge.

The survey only takes about 8 minutes. The collected data will only be used for my research. Your responses will be kept strictly confidential and your data will solely be used anonymously.

As a thank you for your time and help, I am giving away five day passes and five vouchers of CHF 50,- each for the winter ski resort Flims/LAAX/Falera. All you have to do is to answer the questions honestly and leave your e-mail address at the end of the survey.

Thank you very much for participating in this survey!

If you have any questions, please contact: annika.aebli@stud.leuphana.de

* 1. Have you used the Inside LAAX App this winter season 2018/19?

- Yes
- No

* 2. Which of the following functions of the Inside LAAX App have you actively used this winter season 2018/19?

Please select all functions that you have actively used.

- Leaderboard
- Points
- Badges
- My Story
- My Friends
- None of these functions

* 3. How important were the following functions for you?

	not important at all	rather unimportant	neutral	rather important	very important
Leaderboard	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Points	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Badges	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My story	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My friends	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please note: The subsequent questions of the survey only refer to the "playful" functions of the Inside LAAX App. The playful functions are: the leaderboard, points, badges, my story and my friends. Therefore, please only think of the playful functions on the Inside LAAX App when answering the subsequent questions.

* 4. To what extent do you agree on the following statements?

	strongly disagree	slightly disagree	neutral	slightly agree	strongly agree
I feel very positive when I use the playful functions of the Inside LAAX App.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I think about the playful functions on the Inside LAAX App when I am using them.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I spend a lot of time using the playful functions of the Inside LAAX App when I am in the ski resort.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Whenever I am in the ski resort Flims/LAAX/Falera, I usually use the playful functions of the Inside LAAX App.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am proud to use the playful functions of the Inside LAAX App.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using the playful functions stimulates my interest to learn more about the playful functions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

* 5. I use the "playful" functions (leaderboard, points, badges, my story or my friends) on the Inside LAAX App because ...

Please indicate to what extent you agree on the following statements.

	strongly disagree	slightly disagree	neutral	slightly agree	strongly agree
... it is important for me to get rewards for my activities in the ski resort.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... it is important for me to receive additional points for my activities in the ski resort.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... I want to collect as many badges as possible.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... my goal is to redeem the collected points for products or vouchers.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... I want to record my skiing / snowboarding activities in the ski resort.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... I want to learn about my skiing / snowboarding performance.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... I would like to track my skiing / snowboarding performance over time.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... it helps me to learn about myself.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... I want to connect with friends or people like me through this app.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... I want to follow friends or people like me through this app.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

* 6. I use the "playful" functions (leaderboard, points, badges, my story or my friends) on the Inside LAAX App because ...

Please indicate to what extent you agree on the following statements.

	strongly disagree	slightly disagree	neutral	slightly agree	strongly agree
... I want to measure if I broke my own record.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... it arouses my ambition to go to my own limits.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... it makes me feel that I am taking on and mastering challenges.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... it makes me feel that I am successfully completing challenging tasks.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... it gives me a personal confirmation.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... it makes me feel good about what I do.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... it helps me to attract others' attention with my performance.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... it helps me to impress others with my performance.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... it helps me to show others how well I have performed at skiing / snowboarding.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... it makes others recognise me as a good skier / snowboarder.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

* 7. Through the use of the "playful" functions (leaderboard, points, badges, my story or my friends) on the Inside LAAX App ...

Please indicate to what extent you agree on the following statements.

	strongly disagree	slightly disagree	neutral	slightly agree	strongly agree
.... I get a feeling of shared experiences with other users of the app.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... I feel connected to other users of the app.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... I get a feeling of togetherness with other users of the app.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... I feel like a member of the LAAX community.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... I feel like I belong to the LAAX community.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... I feel connected to the LAAX community.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... I feel that I have a bond to others in the LAAX community.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

* 8. I use the "playful" functions (leaderboard, points, badges, my story or my friends) on the Inside LAAX App because ...

Please indicate to what extent you agree on the following statements.

	strongly disagree	slightly disagree	neutral	slightly agree	strongly agree
... it gives me something to talk about with other people during my stay at the ski resort.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... it makes my interaction with other people more fun during my stay at the ski resort.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... it gives me interesting discussions with other people during my stay at the ski resort.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... it makes skiing / snowboarding even more fun.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... it makes skiing / snowboarding even more exciting.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... it makes skiing / snowboarding even more diversified.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... it makes skiing / snowboarding even more interesting.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

* 9. Now, please think of your overall experience of having used the "playful" functions of the Inside LAAX App this winter season 2018/19. To what extent do you agree on the following statements?

Overall, the use of the "playful" functions on the Inside LAAX App...

	strongly disagree	slightly disagree	neutral	slightly agree	strongly agree
... has motivated me to ski / snowboard more.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... has led me to slopes that I haven't used lately / have not used before.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... has made me use my time better during my stay.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... has made me be more active during my stay.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... has contributed to a meaningful stay.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... has contributed to my experience during the stay.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... has contributed positively to my overall stay.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... has contributed positively to my recovery during my stay.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

*** 10. How do you rate your skiing / snowboarding skills?**

Please indicate to what extent you agree on the following statement.

	strongly disagree	slightly disagree	neutral	slightly agree	strongly agree
I rate my skiing / snowboarding skills as very good.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

*** 11. To what extent do you agree on the following statements?**

	strongly disagree	slightly disagree	neutral	slightly agree	strongly agree
I say positive things about the winter ski resort Flims/LAAX/Falera to other people.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would recommend the winter ski resort Flims/LAAX/Falera to those who seek my advice about winter ski resorts.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would encourage friends and relatives to visit the winter ski resort Flims/LAAX/Falera.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would spread positive messages about the winter ski resort Flims/LAAX/Falera.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I intend to continue to visit the winter ski resort Flims/LAAX/Falera.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

* 12. In Flims/LAAX/Falera, I am (a) ...

Please indicate what type of guest you are.

- Day visitor
- Hotel guest
- Vacation rental apartment guest
- Vacation home owner
- Local or living in the neighborhood of Flims/Laax/Falera
- Other, namely:

* 13. I **usually** visit the winter ski resort Flims/LAAX/Falera with ...

- Friends
- My partner, girlfriend/boyfriend, wife/husband
- My family
- My school class, sport camp or similar
- Alone
- Others:

* 14. My highest level of educational qualification is:

- Compulsory school
- Vocational training
- High school degree / general qualification for university entrance
- Diploma of further education, e.g. higher vocational / technical school
- Bachelor (University of Applied Sciences, University)
- Master (University of Applied Sciences, University)
- Doctor / PhD
- Other, namely:

* 15. I was born in year:

Please indicate your year of birth

* 16. I am:

Male

Female

17. Do you have any comments on this survey?

End of the survey. Thank you very much for your participation!

18. If you would like to participate in the raffle, please enter your email address here:

Email address

Appendix E: Descriptive Results Questionnaire

Descriptive Results Questionnaire Study 3

Demographics

Gender (N=1'456)			Type of Guest (N=1'456)		
	Frequency	Percent		Frequency	Percent
Male	895	61.1%	Day visitor	75	5.2%
Female	561	38.9%	Hotel guest	84	5.8%
			Vacation rental apartment guest	363	24.9%
			Vacation-home owner	934	64.1%

Age (N=1'451)			Travel Companion (N=1'456)		
	Frequency	Percent		Frequency	Percent
≤ 20	100	6.87%	Friends	190	13.0%
21–30	167	11.47%	Partner, girlfriend/boyfriend, spouse	370	25.4%
31–45	343	23.56%	Family	854	58.7%
46–55	459	31.52%	School class, sports camp	1	0.1%
56–65	250	17.17%	Alone	34	2.3%
> 65	132	9.07%	Others	7	0.5%
Missing values	5				

Descriptive Results Constructs (Cleaned data ; without outliers)

Deskriptive Statistik							
	N	Mittelwert	Standardabweichung	Schiefe		Kurtosis	
	Statistik	Statistik	Statistik	Statistik	Standardfehler	Statistik	Standardfehler
K_EXTRINSIC MOTIVATION	1387	3.7893	0.79290	-0.617	0.066	0.016	0.131
K_SELFMONITORING	1387	3.8533	0.78646	-0.588	0.066	-0.107	0.131

K_COMPETENCE	1387	3.3140	0.99802	-0.457	0.066	-0.387	0.131
K_STATUS	1387	2.0827	1.04073	0.702	0.066	-0.378	0.131
K_SOCIAL CONNECTEDNESS	1387	2.6942	1.05668	0.076	0.066	-0.860	0.131
K_SENSE OF COMMUNITY	1387	2.89906	1.113708	-0.219	0.066	-0.804	0.131
K_SOCIAL INTERACTION	1387	3.0252	1.02764	-0.302	0.066	-0.649	0.131
K_ENJOYMENT	1387	3.2275	1.09059	-0.483	0.066	-0.398	0.131
Gültige Werte (Listenweise)	1387						

N=1'387

Descriptive Statistics Survey Items

Construct Name	Indicator		N	Mean	Std. Deviation	Skewness	Kurtosis
Engagement	ENG_01	I feel very positive when I use the playful functions of the Inside LAAX App.	1387	3.86	.859	-.514	.272
	ENG_02	I think about the playful functions on the Inside LAAX App when I am using them.	1387	3.54	.969	-.639	.164

	ENG_03	I spend a lot of time using the playful functions of the Inside LAAX App when I am in the ski resort.	1387	3.34	1.122	-.360	-.710
	ENG_04	Whenever I am in the ski resort Flims/LAAX/Falera, I usually use the playful functions of the Inside LAAX App.	1387	3.97	1.011	-.982	.441
	ENG_05	I am proud to use the playful functions of the Inside LAAX App.	1387	3.32	1.102	-.300	-.426
	ENG_06	Using the playful functions stimulates my interest to learn more about the playful functions.	1387	3.42	1.036	-.394	-.360
Self-monitoring	SEM_01	... I want to record my skiing / snowboarding activities in the ski resort.	1387	4.23	.902	-1.270	1.473
	SEM_02	... I want to learn about my skiing / snowboarding performance.	1387	3.96	.944	-.774	.232
	SEM_03	... I would like to track my skiing / snowboarding performance over time.	1387	4.09	.937	-1.005	.671
	SEM_04	... it helps me to learn about myself.	1387	3.13	1.122	-.177	-.599
Social connectedness	SC_01 I get a feeling of shared experiences with other users of the app.	1387	2.66	1.170	.096	-.933
	SC_02	... I feel connected to other users of the app.	1387	2.56	1.202	.144	-1.075
	SC_03	... I get a feeling of togetherness with other users of the app.	1387	2.45	1.183	.270	-1.004
	SC_04	... I want to connect with friends or people like me through this app.	1387	2.99	1.282	-.065	-1.051
	SC_05	... I want to follow friends or people like me through this app.	1387	2.80	1.299	.103	-1.088
Competence experience	COMP_01	... I want to measure if I broke my own record.	1387	3.64	1.130	-.776	-.143
	COMP_02	... it arouses my ambition to go to my own limits.	1387	3.24	1.244	-.283	-.922
	COMP_03	... it makes me feel that I am taking on and mastering challenges.	1387	3.22	1.190	-.324	-.780

	COMP_04	... it makes me feel that I am successfully completing challenging tasks.	1387	2.99	1.178	-.127	-.825
	COMP_05	... it gives me a personal confirmation.	1387	3.29	1.145	-.476	-.578
	COMP_06	... it makes me feel good about what I do.	1387	3.50	1.089	-.669	-.121
Status	STA_01	... it helps me to attract others' attention with my performance.	1387	2.10	1.097	.689	-.375
	STA_02	... it helps me to impress others with my performance.	1387	2.07	1.124	.776	-.328
	STA_03	... it helps me to show others how well I have performed at skiing / snowboarding.	1387	2.11	1.156	.737	-.495
	STA_04	... it makes others recognise me as a good skier / snowboarder.	1387	2.05	1.138	.801	-.308
Sense of community	SOC_01	... I feel like a member of the LAAX community.	1387	3.06	1.207	-.282	-.860
	SOC_02	... I feel like I belong to the LAAX community.	1387	2.93	1.201	-.177	-.892
	SOC_03	... I feel connected to the LAAX community.	1387	3.01	1.211	-.263	-.891
	SOC_04	... I feel that I have a bond to others in the LAAX community.	1387	2.60	1.156	.103	-.871
Social interactions	SI_01	... it gives me something to talk about with other people during my stay at the ski resort..	1387	3.24	1.108	-.513	-.553
	SI_02	... it makes my interaction with other people more fun during my stay at the ski resort.	1387	2.89	1.148	-.135	-.882
	SI_03	... it gives me interesting discussions with other people during my stay at the ski resort.	1387	2.95	1.150	-.195	-.896
Enjoyment	ENJ_01	... it makes skiing/snowboarding even more fun.	1387	3.35	1.178	-.559	-.472
	ENJ_02	... it makes skiing/snowboarding even more exciting.	1387	3.28	1.181	-.490	-.586
	ENJ_03	... it makes skiing/snowboarding even more diversified.	1387	3.12	1.168	-.303	-.700
	ENJ_04	... it makes skiing/snowboarding even more interesting.	1387	3.16	1.169	-.347	-.666
Extrinsic motivation	EXM_01	... it is important for me to get rewards for my activities in the ski resort.	1387	3.75	1.047	-.706	-.044

	EXM_0 2	... it is important for me to receive additional points for my activities in the ski resort.	1387	4.02	.901	-.824	.346
	EXM_0 3	... I want to collect as many badges as possible.	1387	3.26	1.132	-.262	-.610
	EXM_0 4	... my goal is to redeem the collected points for products or vouchers.	1387	4.13	.963	-1.030	.522
Behavioural activation	BA_01	... has motivated me to ski/snowboard more.	1387	3.36	1.150	-.535	-.530
	BA_02	... has led me to slopes that I haven't used lately / have not used before.	1387	3.13	1.307	-.240	-1.136
	BA_03	... has made me use my time better during my stay.	1387	2.99	1.220	-.114	-.926
	BA_04	... has made me be more active during my stay.	1387	3.26	1.194	-.491	-.726
Overall experience	OEX_0 1	... has contributed to a meaningful stay.	1387	2.80	1.161	-.026	-.776
	OEX_0 2	... has contributed to my experience during the stay.	1387	3.26	1.149	-.491	-.520
	OEX_0 3	... has contributed positively to my overall stay.	1387	3.49	1.083	-.745	.044
	OEX_0 4	... has contributed positively to my recovery during my stay.	1387	2.86	1.089	-.087	-.496
Skills	Skill	I rate my skiing/snowboarding skills as very good.	1387	4.21	.858	-1.059	.892
Loyalty	LOY_0 1	I say positive things about the winter ski resort Flims/LAAX/Falera to other people.	1387	4.65	.573	-1.529	2.208
	LOY_0 2	I would recommend the winter ski resort Flims/LAAX/Falera to those who seek my advice about winter ski resorts.	1387	4.64	.589	-1.572	2.387
	LOY_0 3	I would encourage friends and relatives to visit the winter ski resort Flims/LAAX/Falera.	1387	4.62	.614	-1.473	1.553
	LOY_0 4	I would spread positive messages about the winter ski resort Flims/LAAX/Falera.	1387	4.56	.646	-1.336	1.364

LOY_0 5	I intend to continue to visit the winter ski resort Flims/LAAX/Falera.	1387	4.88	.378	-3.350	11.792
Valid N (listwise)		1387				

Appendix F: Approval of Ethical Advisory Board



Leuphana Universität Lüneburg- Ethikbeirat-21335 Lüneburg

An

Herrn Professor Dr. Kreilkamp, Frau Annika Aebli
Institut für Marketing

- im Hause -

06. September 2016

Ihr Antrag an den Ethikbeirat der Leuphana Universität Lüneburg

EB-Antrag_Aebli_201605_Interviews: Untersuchung zum Thema ‚How mobile apps constitute tourism experiences in a digital context.‘

Sehr geehrter Professor Dr. Kreilkamp, sehr geehrte Frau Aebli,

Ihr oben genannter Antrag wurde am 13.5.2016 eingereicht und vom Ethikbeirat im Umlaufverfahren beraten.

Mit dem abschließenden Votum beurteilt der Ethikbeirat die Studie als „**ethisch unbedenklich**“.

Als Orientierungshilfe bezüglich Ihrer Rückfrage zu medienadäquaten Datensicherheitsvorkehrungen finden sie anhängend die Richtlinien der Deutschen Gesellschaft für Psychologie zum Umgang mit Forschungsdaten.

Wir wünschen Ihrer wissenschaftlichen Arbeit viel Erfolg.

Mit freundlichen Grüßen,

Prof. Dr. Dirk Lehr
Vorsitz

Der Bewertung liegen folgende Unterlagen zugrunde:

- EB-Antrag EB-Antrag_Aebli_201605_Interviews
 - Detaillierte Vorhabenbeschreibung
 - Aufklärungstext
 - Muster der Einverständniserklärung
 - Datenmanagementplan

Beirat für Ethikfragen
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Appendix G: Study 1

Study 1: Aebli, A. (2018): An update on individual mobile information and communication technology adoption: A systematic literature review (not published). Publication through this doctoral thesis.

An Update on Individual Mobile Information and Communication Technology Adoption

A Systematic Literature Review

Abstract

With the increase in use of mobile information and communication technologies (ICTs) in general, the question of what drives individuals' mobile ICT adoption has become pressing. Despite the increasing research in this field, the knowledge of individual mobile ICT adoption remains fragmented. Moreover, critics have indicated that technology adoption research has pursued a view that is too technology-centric. This study contributes to the literature by systematically reviewing studies on individual mobile ICT adoption and providing a concise understanding of the main drivers of adoption and progress of this field. The results show that the technology-centric view is still predominant in mobile ICT adoption research. It is suggested that future research incorporates human-centric factors such as individual motivation and psychological needs to study mobile ICT adoption.

Keywords: Information and Communication Technology; Drivers of Adoption; Systematic Literature Review; Motivation; Psychological Needs.

1 INTRODUCTION

Mobile information and communication technology (ICT) has become a fundamental part of society. Especially the use of smartphones has increased rapidly over the past years (ComScore, 2017a). One reason for smartphone's popularity are its mobile applications (mobile apps), which provide ubiquitous access to purposeful services and add to users' flexibility and mobility. Despite the general rapid growth of ICT use, individuals are sometimes reluctant to adopt mobile services. For instance, services related to mobile learning (Alrasheedi, Capretz, & Raza, 2015; Liu, Han, & Li, 2010), mobile banking (Ha, Canedoli, Baur, & Bick, 2012; Sitorus, Govindaraju, Wiratmadja, & Sudirman, 2016), or mobile health (Deng, Mo, & Liu, 2014) are adopted more slowly compared with other mobile services. Therefore, insights on the drivers of individual mobile ICT adoption are of fundamental interest for scholars and for practitioners.

The field of information system research has added to the understanding of the drivers of individual mobile ICT adoption. However, scholars have criticised the field to remain on a predictive level and fail to actually measure individual adoption behaviour (Bagozzi, 2007). Moreover, scholars have noticed a fragmented knowledge in explaining the drivers of individual technology adoption (Aldhaban, 2012; Bagozzi, 2007) in general, resulting in inconsistencies in findings (Gangwar, Date,

& Raoot, 2014; Kim, 2014). Moreover, researchers have observed a general tendency towards a technology-centric view when explaining individual technology adoption (Bagozzi, 2007; Benbasat & Barki, 2007; Sanakulov & Karjaluo, 2015). Overall, although existing empirical studies have offered valuable insights on the question why individuals adopt mobile ICTs, there exists a diversity of constructs to explain technology adoption (Benbasat & Barki, 2007). It seems that the explanations of why individuals adopt mobile ICTs have become just as widespread as the bandwidth of studies in this field. On that basis, Bagozzi (2007, p. 244) emphasised that the field of adoption research “[...] is at the threshold of crisis, if not chaos, in regard to explaining technology acceptance [...].” In essence, not much more is known than that perceived usefulness depicts an influential adoption driver (Arbore, Soscia, & Bagozzi, 2014; Benbasat & Barki, 2007). Such fragmented knowledge has hindered progress in the field of adoption research.

Additionally, today’s mobile ICTs such as the smartphone are more personal compared to traditional technologies (Arbore et al., 2014). In 2007, when the main critics of the field of technology adoption arose, personal mobile ICTs were about to emerge. Since then, the smartphone has largely transformed how people live their lives and cultivate social relationships. Smartphone users often interpret the use of their phones as similar to their social relationships (Salehan & Negahban, 2013; Walsh, White, & Young, 2010). Accordingly, such behaviour suggests that people exhibit personal reasons beyond usefulness that explain why they adopt mobile services and ICTs. Such personal factors have not yet been systematically captured. On this basis, this study maps the field of individual mobile ICT adoption research and organises the main drivers of mobile ICT adoption by means of a systematic literature review.

Systematic literature reviews synthesise large bodies of information and create foundations to advance knowledge (Petticrew & Roberts, 2010; Webster & Watson, 2002). In this manner, research gaps can be highlighted and new grounds for further progress in the field of research can be proposed. Few studies have provided a systematic literature review on individual mobile ICT adoption in general (Aldhaban, 2012; Ovčjak, Heričko, & Polančič, 2015; Sanakulov & Karjaluo, 2015; Shaikh & Karjaluo, 2015). Despite their valuable contributions and suggestions for further research in this field of study, the existing literature reviews have not been comprehensive (and do not claim to be) due to several reasons: they have only included quantitative studies that used established acceptance models such as the Technology Acceptance Model (TAM) to identify the most significant drivers of adoption (Ovčjak et al., 2015), or they have merely focussed on one type of mobile ICT such as mobile banking (Shaikh & Karjaluo, 2015). These literature reviews have not sought to capture a holistic picture of the most commonly investigated drivers of individual mobile ICT adoption across disciplines and technologies. Moreover, the majority of the literature reviews do not

represent the current data since they already date a few years back. Much empirical work has been undertaken since then. This calls for a systematic update on individual mobile ICT adoption research.

This study systematically collects, appraises, and synthesises studies on individual mobile ICT adoption research. The goal of this study is to advance the knowledge on the status quo of this research field and identify and summarise the main drivers of individual mobile ICT adoption. In so doing, this study investigates if the field of ICT adoption research has advanced in terms of moving away from its technology-centric perspective in the past few years. This study is an important contribution to the field of mobile ICT adoption as a novel comprehensive overview of recent empirical work on mobile ICT adoption. The findings of this study are discussed from a general human motivation perspective and directions for future research are provided.

2 INDIVIDUAL MOBILE ICT ADOPTION

In a general sense, the study of individual mobile ICT adoption reflects the endeavour to explain human behaviour. Adoption behaviour in this study describes an individual's voluntary decision to adopt and use a mobile ICT. Mobile ICT refers to any communication device or application that provides access to telecommunication services such as the internet, including hardware and software (Zuppo, 2012). In this study, mobile ICT encompasses any *mobile* communication technology. As indicated by other literature reviews (Ovčjak et al., 2015; Sanakulov & Karjaluoto, 2015), the main theories that generally inform technology adoption research are: (1) the TAM, (2) unified theory of acceptance and use of technology (UTAUT), (3) theory of planned behaviour (TPB), and theory of reasoned action (TRA), (4) diffusion of innovation theory (DIT), and (5) task–technology fit. The broad range of theories from scientific disciplines, including information systems technology, psychology, and sociology, may be one explanation for the diversity of drivers of technology adoption research in general. The key concepts are briefly described in the following:

The TAM introduced by Davis (1989) is an information systems theory that explains and predicts individual technology acceptance. This model defines the two individual beliefs, perceived usefulness and perceived ease of use, as the main determinants in forming users' intention to use a technology. At first, TAM was established to predict technology use in non-voluntary, organisational settings. Notably, TAM has gained broad acceptance across disciplines and contexts and is the most widely researched theoretical framework (Bagozzi, 2007; Hsiao & Yang, 2011).

Several models have evolved from the TAM. TAM2, for instance, includes additional variables such as subjective norm and experience (Venkatesh & Davis, 2000). As an alternative to the TAM, the

UTAUT was developed by Venkatesh et al. (2003) to predict users' intention for information technology use by means of four main determinants: performance expectancy, effort expectancy, social influence, and facilitating conditions (Venkatesh et al., 2003).

The TPB is a social psychological theory proposed by Ajzen (1991). The theory holds that individual behaviour can be predicted from behavioural intention, whereas behavioural intention is mainly informed by an individual's attitude, other people's influences (subjective norm), and an individual's perceived behavioural control (Ajzen, 1991). The TPB was developed from the TRA and extended by perceived behavioural control as a mechanism that directly and indirectly influences individual behaviour (Ajzen & Fishbein, 2011). The TPB serves as an integrative psychological framework to explain and predict human behaviour.

The TAM, UTAUT, TPB, and TRA engage in an individual user focus of technology adoption. By contrast, the DIT focusses on social groups and engages in a market focus of technology adoption. This sociological theory presented by Rogers (1962) attempts to explain how, why, and at what rate innovations are distributed in a society. The theory assumes that the adoption of innovation follows a normal distribution based on individuals' degrees of willingness to adopt the innovation. Individuals' readiness for adoption can be divided into five groups that range from early to late adopters: innovators, early adopters, early majority, late majority, laggards (Rogers, 2003).

Finally, the task–technology fit theory posits that technology is used when it provides features that fit and support the task to be performed (Goodhue & Thompson, 1995). Accordingly, the technology characteristics must comply with the task characteristics. The task–technology fit thereby determines the impact on the performance of the task, that is, the accomplishment of the task.

3 RESEARCH METHODOLOGY

This systematic literature review follows the fundamentals of Webster and Watson (2002) and the suggestions of Petticrew and Roberts (2010). Systematic literature reviews aim to minimise methodological errors by means of a comprehensive literature search and by systematically identifying, appraising, and synthesising all relevant studies in a given field to answer the research question(s) (Petticrew & Roberts, 2010). Thus, systematic literature reviews are scientific tools similar to other research methods used to make sense of a large body of knowledge and provide a scientific summary of evidence relevant to a particular question (Petticrew & Roberts, 2010). In addition to the general suggestions of Petticrew and Roberts (2010), this study draws on the methodical steps 2.1–2.6 of Ovčjak et al. (2015) to systematically collect, appraise, and synthesise

the empirical studies on individual mobile ICT adoption. The single steps 3.1–3.6 are introduced and described subsequently.

3.1 Specification of the research questions

The field of individual mobile ICT adoption research is extensive. The number of studies on individual mobile ICT adoption has likely increased with the rapid growth of smartphone use in general and the increasing number of monthly new offerings of mobile services in specific (AppleInsider, 2018). Influenced by the overwhelming numbers of available mobile services and increasing number of worldwide mobile app downloads (TechCrunch, 2018), new insights regarding the drivers of individual mobile ICT adoption should be obtained. Therefore, this literature review firstly provides an overview of the field of individual mobile ICT adoption research by answering the following research question (RQ):

- RQ1: How active was the field of individual mobile ICT adoption research from 2006–2016? Diverse mobile ICTs exist on the market. ICTs refer to hardware (e.g., smartphone) and software (e.g., mobile contents such as mobile apps) and comprise a wide range of mobile functionalities that appear in various use contexts. The functionalities include generic categories such as mobile communication services or more distinct categories such as mobile payment services. On this basis, this literature review aims to understand:

- RQ2: What type of mobile ICTs are investigated the most in the individual mobile ICT adoption literature?
- RQ3: What categories of mobile ICTs are investigated the most in the individual mobile ICT adoption literature?

Scholars have observed an overuse of TAM and claimed the technology-centric perspective was too dominant in technology adoption research (Bagozzi, 2007; Gretzel, 2011) in general. Such claims were made at a time when personal mobile ICT usage was on the verge of burgeoning. The field of individual mobile ICT adoption research may have advanced within the past few years. Therefore, this literature review aims to explore:

- RQ4: What research models and theoretical foundations are applied most in the individual mobile ICT adoption literature?
- RQ5: What are the most used research methods and research instruments in the individual mobile ICT adoption literature?

The seminal models of adoption research have already demonstrated a range of predetermined factors to explain technology adoption in general. Additionally, researchers have added new constructs to

the original models to construe unified models (Venkatesh et al., 2003; Venkatesh, Thong, & Xu, 2012). Although the adoption of mobile apps/mobile services has increased (TechCrunch, 2018), mobile app activity is concentrated in a handful of mobile apps; users regularly uninstall downloaded mobile apps because they do not use them (ComScore, 2017b). Moreover, the reasons for interacting with mobile ICTs have become increasingly multifaceted and complex (Zualkernan, Aloul, Shapsough, Hesham, & El-Khorzaty, 2017). Accordingly, this literature review seeks to understand:

- RQ6: What are the main drivers and determinants of individual mobile ICT adoption?
- RQ7: What relations among the adoption factors are investigated the most and which relations are most significant?

Two critical gaps in adoption research were indicated by Bagozzi (2007): the insufficiency of an explanation of what factors constitute perceived usefulness in the studies based on TAM, and the intention–behaviour gap. The intention–behaviour gap signifies to what extent people fail to do what they intended to do. Scholars have observed that the intention–behaviour gap is large and that intentions get translated into actions only one-half of the time (Sheeran & Webb, 2016). This concern is also related to technology adoption research (Bagozzi, 2007), that is, most research in the field of technology adoption remains predictive by measuring people’s intention without measuring the actual adoption behaviour. Accordingly, this study investigates both of these claims by exploring:

- RQ8: Do the collected studies based on TAM examine the determinants of perceived usefulness? If yes, what are the determinants for perceived usefulness?
- RQ9: Do the collected studies solely predict adoption behaviour from users’ intention or do they actually measure adoption behaviour?

3.2 Search process

Only studies in which adoption and use were outcome variables were considered appropriate for this literature review. A broad search was conducted to include a spectrum of potentially relevant literature; thus, this literature review was not restricted to a specific academic field or theoretical foundation and also included exploratory studies. Nevertheless, a selection of the main research disciplines was made to narrow the broad search process. As the focus of this study was to investigate general user-related mobile ICT adoption drivers, the following main disciplines were considered relevant in the search process: social sciences, information sciences, marketing, business, management and organisations, economics, tourism, hospitality and events, and computer sciences.

The most commonly used academic electronic databases and top online libraries and journal publisher sites depicted in Table 14 were browsed for appropriate journal articles. A separate cross-

check query by using the online search engine Google Scholar (<https://scholar.google.ch>) complemented the search process. The listed online libraries and journal publisher sites in Table 14 are the most influential, as ranked by the International Scientific Institute (2014).

Electronic Databases and Publishing Sites	Link
Science Direct	https://www.sciencedirect.com/
ABI/Inform	https://search.proquest.com
EBSCO	https://search.ebscohost.com
SAGE Journals	http://journals.sagepub.com/
Taylor & Francis	https://www.tandfonline.com/
Emerald Insight	https://www.emeraldinsight.com/
Wiley Online Library	https://onlinelibrary.wiley.com/

Table 14: Electronic databases and academic publishing sites used to identify relevant studies.

A timespan of 11 years, from January 2006 until December 2016, was chosen for this systematic literature review because the number of studies on individual mobile ICT adoption began to increase with the introduction of the iPhone in 2007 (Aldhaban, 2012; Mobile Industry Review, 2016). Several keywords were used in varying combinations to search for relevant studies. The keyword list from Sanakulov and Karjaluoto (2015) served as a rough guideline. The following keywords were identified as the most appropriate for the research process: “Mobile technology”, “smartphone”, “mobile application(s)/mobile app(s)”, and “mobile service(s)”. Each keyword was used separately and in various combinations with “adoption” and “use/usage”.

3.3 Study selection

A range of potentially relevant studies was achieved based on the broad search approach. The studies were systematically screened by scanning their titles and abstracts. Studies were excluded according to the following criteria in a first study selection round:

- Exclusion of studies based on the subject area;
- Exclusion of studies based on their access and availability;
- Exclusion of duplicate studies and;
- Exclusion of studies based on the inclusion and exclusion criteria.

3.4 Study inclusion and exclusion criteria

This literature review considered predefined inclusion and exclusion criteria for the systematic selection process of the studies. After the first study selection round, a more in-depth screening was conducted. Studies were only included for the final review when they met the following criteria:

- Related to the adoption and use stage of individual mobile ICT adoption and focused on the *why* of individual mobile ICT adoption (in contrast to *how* questions);
- Defined and reported the drivers of adoption;
- Examined the adoption of individual users (in contrast to the adoption by businesses and organisations);
- Focused on general mobile ICTs and generic use contexts, for example, mobile commerce contexts (in contrast to specific use contexts such as mobile health);
- Were of empirical nature (in contrast to conceptual papers, literature reviews and essays); and
- Reported the measurements of the drivers of adoption in the case of quantitative studies.

Studies were excluded from the final review when they contained the following issues:

- Focused on continuous use and loyal use of individual mobile ICT;
- Concentrated on a study context that was too specific including mobile learning and mobile health; and
- Focused on a type of mobile ICT that was too specific including wearable computing.

3.5 Quality assessment

Next, the studies included in this literature review were critically appraised on the basis of methodological soundness, measurements, and sample composition. The quality assessment (QA) criteria were derived from the following quality assessment questions:

QA1: Does the article explore or examine mobile ICT adoption with the help of a well-defined theoretical framework in the quantitative and qualitative studies?

QA2: Does the article include a description of the analysed factors in the quantitative and qualitative studies?

QA3: Is the sample in the article adequate and well-described?

QA4: Does the article actually measure adoption behaviour?

In detail, the QA criteria were defined as follows:

QA1: Yes (Y): The article examines or explores individual mobile ICT adoption with the help of a well-established adoption theory in quantitative studies and/or a well-defined theoretical framework in qualitative studies; the decision criteria for choosing the selected theoretical framework is provided in either approach.

Partly (P): The article examines or explores individual mobile ICT adoption with the help of a well-established adoption theory in quantitative studies and/or a well-defined theoretical framework in qualitative studies, but the decision for choosing the selected theoretical framework (the main theory) is not provided.

No (N): The article uses an assembly of various theoretical approaches without providing an explicit definition of the main theory used in the quantitative studies; the article does not clearly define the theoretical framework in the qualitative studies.

QA2: Yes (Y): All the constructs in quantitative studies are explicitly defined and include an explanation regarding the choice of constructs; the explored factors in qualitative studies are described and put into a theoretical context.

Partly (P): Only some of the constructs in the quantitative studies are explicitly defined, and/or an explanation regarding the choice of constructs is only partially provided; the explored factors in the qualitative studies are described, but only vaguely put into a theoretical context.

No (N): The constructs in the quantitative studies are not defined or only vaguely defined, and an explanation regarding the choice of constructs is not provided; the explored factors in qualitative studies are only vaguely described and not put into a theoretical context.

QA3: Yes (Y): The sample is adequate for the study purpose and, sample selection criteria are provided and clear.

Partly (P): The sample consists of a convenience sample, that is, student sample or street sample. Nevertheless, the reasons for choosing the sample and/or the sample selection criteria seem adequate for the study purpose. OR (in more general cases): The sample is adequate for the study purpose, but the sample selection criteria remain unclear.

No (N): The sample consists of a convenience sample, that is, student sample or street sample, and the sample selection criteria are not provided/remain unclear for the study purpose. OR (in more general cases): The sample composition is basically unclear.

QA4: Yes (Y): The article explicitly measures adoption behaviour, that is, adoption yes or no, with a specification regarding the actual adoption behaviour, for example, indication of usage frequency. OR (in more general cases): The study is of an explanatory nature and therefore measures adoption behaviour in retrospect. (Predictive and explanatory studies).

Partly (P): The article only predicts adoption behaviour but uses field study pre-tests or past usage experiences to improve the predictive power of the adoption behaviour. (Predictive studies).

No (N): The article only predicts adoption behaviour without actually measuring adoption behaviour. (Predictive studies).

The scoring procedure for the QA of the studies was defined according to Kitchenham et al. (2009): Y = 1, P = 0.5, and N = 0. A score of N = 0 is also allocated to studies that did not specify the information sought. The scoring helped to assess the quality of the studies included in the final literature review. It also provided a means of weighting the importance of the article when synthesising the results of the literature review.

3.6 Synthesis of results

This study synthesises the main findings of the literature review by discussing and reflecting on individual mobile ICT adoption research from a general human motivation perspective. Research gaps are identified and suggestions for further research are provided.

3.7 Data compilation

Several data were collected and compiled from the studies included in the final study pool. The data comprised basic information on the author(s), the journal in which the study was published, the research field, the research object, the sample composition, research methods, research instruments, main theories used, and the drivers that explain individual mobile ICT adoption. The primary interest was the main drivers of adoption and their (significant and non-significant) relations to other factors. The measures of adoption were also collected because one goal was to identify whether the collected studies measured the actual adoption and if so, how it was measured. In cases, in which the studies did not clearly specify the main theory, the researcher sought to identify the underlying theoretical model(s) based on the factors used in the study. When a combination of several theoretical models was used in the study, all models were indicated and listed on the data spreadsheet.

4 RESULTS

4.1 Search results

The search process of this study resulted in a final selection of 86 relevant studies (Figure 14). For each electronic database, the same search process was performed. The studies were then selected based on the steps described in the study selection process. First, the studies were scanned by title and abstracts on the basis of subject area (i.e., individual mobile ICT adoption) and research goal (i.e., identification of the drivers of adoption). Next, inaccessible studies and duplicates were excluded. Further studies were then excluded based on another evaluation round of the abstract and content of the study. In this first round, studies with a slightly different focus compared with the purpose of this study were excluded. For instance, studies that revealed a very restricted thematic focus such as only investigating the trust-related factors of mobile banking were excluded.

After these exclusion stages, 128 studies remained for the in-depth analysis of the full texts and measurements. In the second step, the studies were carefully read and examined according to their research question(s), study design, included measurements, that is, constructs and corresponding items in quantitative studies, and findings. A further 57 studies were excluded due to several reasons: Some studies did not neatly refer to the individual mobile ICT adoption understanding or revealed other content-related topics that did not serve the guiding research question of this study. For example, some studies concentrated on the stage of continuous use instead of adoption, focused on usage topics or emphasised cross-national comparisons of individual mobile ICT adoption. Such studies were excluded. Further and most importantly, many studies failed to disclose their measurement items. These studies were also excluded. This in-depth analysis resulted in 71 remaining studies. Finally, the remaining 71 studies were assessed for relevant cross-references that led to an inclusion of 15 new studies. In total, 86 empirical studies were identified as relevant for the analysis.

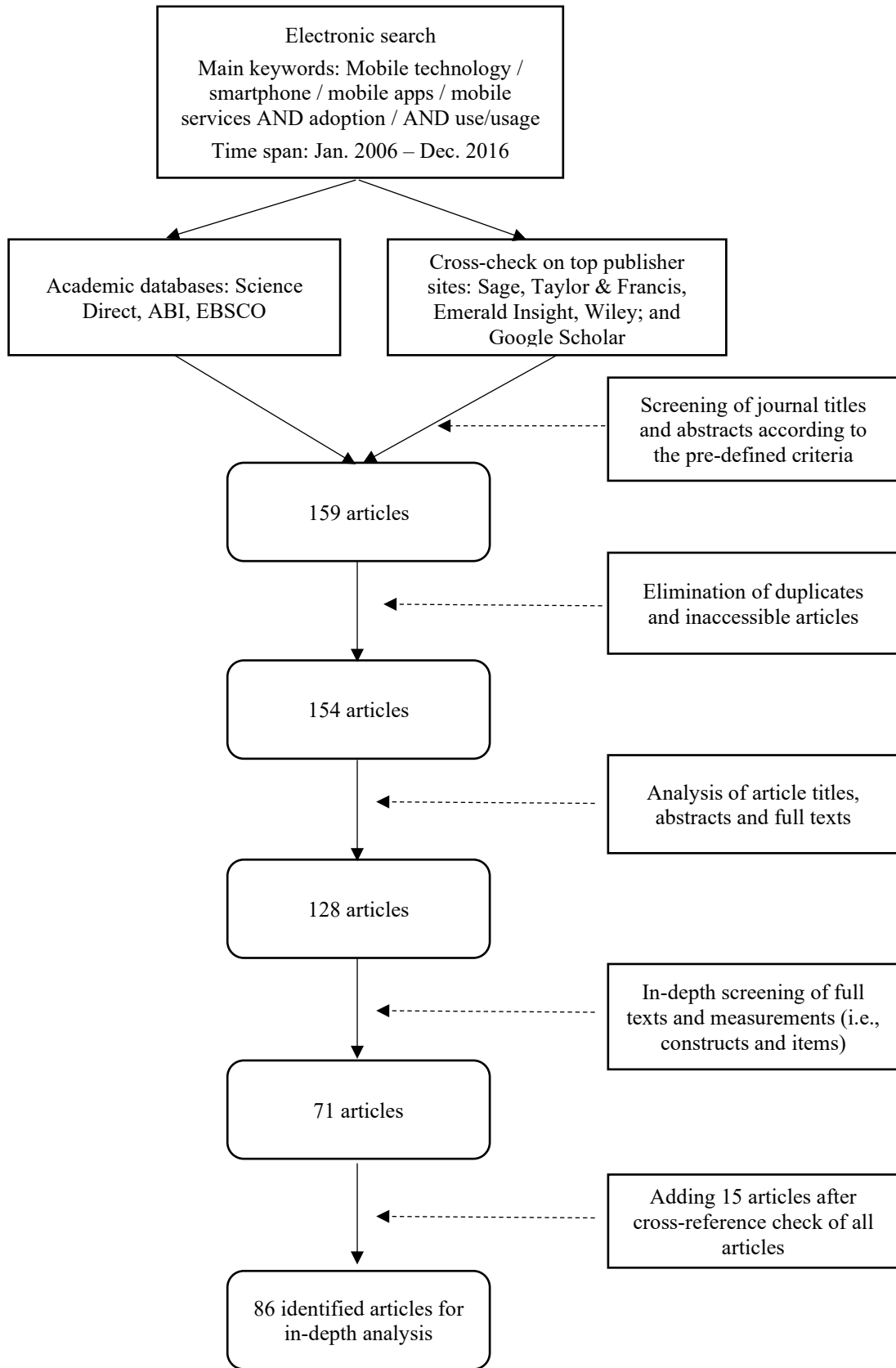


Figure 14: Systematic study selection process.

The studies in the final selection were systematically captured in a table that includes the following rubrics: author(s), source, journal of publication, research field that defines the ICT category, research object, sample, sample size, research method, research instrument, and main theory used. Table 15 provides an overview of the remaining 85 studies after eliminating one study in the QA process.

ID	Author(s), Source	Journal	Research Field	Research Object	Sample	Sample Size	Research Method	Research Instrument	Main Theory
1	Kim, Kankanhalli & Lee (2016)	Information & Management	Mobile commerce	Mobile app	Students & professionals	30 / 411	Mixed method	Interviews / Survey	MAT
2	Harris, Brookshire & Chin (2016)	International Journal of Information Management	Mobile information & communication systems	Mobile app	Students	128	Quantitative	Survey	VF
3	Rese, Baier, Geyer-Schulz & Schreiber (2016)	Technological Forecasting and Social Change	Mobile commerce	Augmented reality app	Students	978	Quantitative	Experiment	TAM
4	Morosan & DeFranco (2016)	International Journal of Hospitality Management	Mobile payment	NFC mobile payment	Consumers US population	794	Quantitative	Survey	UTAUT2
5	Leung & Zhang (2016)	Telematics and Informatics	Mobile information & communication systems	Tablet	Hong Kong population	348	Quantitative	Survey	UGs
6	Chong (2013)	Technological Forecasting and Social Change	Mobile commerce	Mobile device	Mobile phone users, Chinese population	517	Quantitative	Survey	MOT
7	Kleijnen, de Ruyter & Wetzels (2007)	Journal of Retailing	Mobile commerce	Mobile services	Mobile phone users	375	Quantitative	Survey	PCI
8	Liu & Li (2011)	Computers in Human Behavior	Mobile gaming	Mobile services	Students	267	Quantitative	Survey	TAM
9	Kim, Mirusmonov & Lee (2010)	Computers in Human Behavior	Mobile payment	Mobile payment	Mobile payment users	269	Quantitative	Survey	TAM
10	Wang, Xiang & Fesenmaier (2014)	Annals of Tourism Research	Mobile communication	Smartphone	Smartphone users, travellers	19	Qualitative	Interviews	--
11	Morosan & DeFranco (2014)	International Journal of Hospitality Management	Mobile commerce	Mobile device	US population, club members	737	Quantitative	Survey	TAM
12	Kourouthanassis, Boletsis, Bardaki & Chasanidou (2015)	Pervasive and Mobile Computing	Mobile commerce	Augmented reality app	Mobile phone users, tourists	105	Quantitative	Field study	UTAUT2
13	Chung, Han & Joun (2015)	Computers in Human Behavior	Mobile communication	Augmented reality app	Augmented reality app users, domestic visitors	145	Quantitative	Survey	TAM
14	Wang & Wang (2010)	International Journal of Hospitality Management	Mobile commerce	Mobile device	Mobile internet users	235	Quantitative	Survey	PV
15	Mallat, Rossi, Tuunainen & Öörni (2009)	Information & Management	Mobile commerce	Mobile services	Mobile ticketing users & non-users	360	Quantitative	Survey	TAM; DIT

16	Yu, Lee, Ha & Zo (2015)	Telematics and Informatics	Mobile information & communication systems	Tablet	Media tablets potential customers, non-users	450	Quantitative	Survey	PV
17	Yang (2012)	Journal of Retailing and Consumer Services	Mobile shopping	Mobile services	Mobile services users	400	Quantitative	Survey	TAM; TPB
18	Joo & Sang (2013)	Computers in Human Behavior	Mobile communication	Smartphone	Smartphone users	491	Quantitative	Survey	TAM; UGs
19	Verkasalo, López-Nicolás, Molina-Castillo & Bouwman (2010)	Telematics and Informatics	Mobile communication	Mobile app	Mobile services users & non-users	579	Quantitative	Survey	TAM
20	Tojib, Tsarenko & Sembada (2015)	New Media & Society	Mobile commerce	Mobile services	Smartphone users	414	Quantitative	Survey	Domestication, Apparateist theory
21	Lai (2015)	Journal of Hospitality and Tourism Research	Mobile communication	Mobile electronic tour guide	Travelers	205	Quantitative	Survey	UTAUT
22	Yang (2013)	Journal of Computer Information Systems	Mobile information & communication systems	Mobile app	Students	555	Quantitative	Survey	TAM; TPB; UGs
23	Yang, Lu, Gupta & Cao (2012)	International Journal of Human-Computer Interaction	Mobile information & communication systems	Mobile internet	Students, mobile internet users	507	Quantitative	Survey	TAM; PV
24	Kim, Yoon & Han (2016)	Journal of Marketing Communications	Mobile communication	Mobile app	Students, smartphone users	257	Quantitative	Survey	TAM; UGs
25	Kim & Preis (2016)	Journal of Travel and Tourism Marketing	Mobile communication	Mobile device	Smartphone/tablet users, travellers	241	Quantitative	Survey	TPB; MOT
26	Lu, Mao, Wang & Hu (2015)	Current Issues in Tourism	Mobile communication	Mobile app	Smartphone users, visitors tourism sites	613	Quantitative	Survey	TAM; DIT; SCT
27	Tom Dieck & Jung (2015)	Current Issues in Tourism	Mobile communication	Augmented reality app	Students, travellers	44	Qualitative	Focus groups	TAM
28	Okumus, Bilgihan & Ozturk (2016)	Journal of Hospitality Marketing and Management	Mobile commerce	Mobile app	Mobile app testers, restaurant visitors	395	Quantitative	Survey	TAM
29	Oh, Lehto & Park (2009)	Journal of Hospitality Marketing and Management	Mobile communication	Mobile device	Mobile phone users, travellers	283	Quantitative	Survey	TAM
30	Morosan & De Franco (2016)	International Journal of Contemporary Hospitality Management	Mobile commerce	Mobile app	US population, hotel guests	320	Quantitative	Survey	PPT

31	Hew, Lee, Ooi & Wei (2015)	Industrial Management & Data Systems	Mobile information & communication systems	Mobile app	Students, mobile app users	288	Quantitative	Survey	UTAUT2
32	Kim (2016)	International Journal of Contemporary Hospitality Management	Mobile commerce	Mobile app	Tablet owners, hotel customers	751	Quantitative	Survey	TAM
33	Carter & Yeo (2016)	Internet Research	Mobile communication	Mobile app	Students, smartphone owners	40	Qualitative	Questionnaire, qualitative content analysis	TPB
34	Song, Sawang, Drennan & Andrews (2015)	Information Technology & People	Mobile information & communication systems	3G technology	Mobile phone users, Chinese population	800	Quantitative	Survey	TAM; TPB
35	Upadhyay & Jahanyan (2016)	Internet Research	Mobile payment	Mobile payment	Mobile phone users	180	Quantitative	Survey	TAM; TTF
36	Im & Hancer (2014)	Journal of Hospitality and Tourism Technology	Mobile information & communication systems	Mobile app	Smartphone users, travellers	210	Quantitative	Survey	TAM
37	Ha & Im (2014)	International Journal of Retail & Distribution Management	Mobile shopping	Mobile services	US consumers	657	Quantitative	Survey	TAM; DIT
38	Lu & Su (2009)	Internet Research	Mobile shopping	Mobile services	Professionals	369	Quantitative	Survey	TAM; DIT
39	Morosan (2014)	International Journal of Contemporary Hospitality Management	Mobile commerce	Smartphone	Students, travellers	556	Quantitative	Survey	TAM
40	Liébana-Cabanillas, Sánchez-Fernández & Muñoz-Leiva (2014)	Industrial Management & Data Systems	Mobile payment	Mobile payment	Internet users	2012	Quantitative	Experiment	TAM; TAM2; TAM3; UTAUT
41	Peres, Correia & Moital (2011)	Journal of Hospitality and Tourism Research	Mobile information & communication systems	Mobile electronic tour guide	Tourists	400	Quantitative	Survey	TAM
42	Kim, Kim, Kim & Kim (2016)	International Journal of Contemporary Hospitality Management	Mobile communication	Mobile device	Mobile phone users	242	Quantitative	Survey	TAM
43	Liu, Zhao, Chau & Tang (2015)	Internet Research	Mobile shopping	Mobile app	Mobile coupon users	271	Quantitative	Survey	PV
44	Kwon, Bae & Blum (2013)	Journal of Hospitality and Tourism Technology	Mobile commerce	Mobile app	Students, smartphone users	235	Quantitative	Survey	TAM

45	Gerlich, Drumheller, Babb & De'Armond (2015)	Academy of Marketing Studies Journal	Mobile communication	Mobile app	Mobile app users	540	Quantitative	Survey	UGs
46	Park, Yang & Lehto (2007)	Journal of Electronic Commerce Research	Mobile information & communication systems	Mobile device	Mobile phone users	221	Quantitative	Survey	UTAUT
47	Standing, McManus, Standing & Karjaluo (2007)	International Journal of e-Collaboration	Mobile communication	Mobile services	Mobile service users	28	Qualitative	Interviews (laddering technique)	PV; Values
48	Zarpou, Saprikis, Markos & Vlachopoulou (2012)	Electronic Commerce Research	Mobile commerce	Mobile services	Mobile commerce consumers	445	Quantitative	Survey	TAM
49	Verkasalo (2008)	International Journal of e-Business Research	Mobile commerce	Mobile services	Smartphone users	548	Quantitative	Survey	TAM; TPB
50	Chong, Ooi, Darmawan & Lee (2010)	The Journal of Computer Information Systems	Mobile information & communication systems	3G technology	Mobile phone users	371	Quantitative	Survey	TAM; DIT
51	Zhu & Morosan (2014)	Journal of Hospitality and Tourism Technology	Mobile commerce	Mobile device	Students, travellers	262	Quantitative	Survey	TAM
52	Zhou (2015)	Information Systems Frontiers	Mobile commerce	Mobile location-based services	Mobile services users	278	Quantitative	Survey	TAM
53	Hew, Leong, Ooi & Chong (2016)	Journal of Computer Information Systems	Mobile entertainment	Mobile services	Students, mobile phone users	463	Quantitative	Survey	TAM
54	Wakefield & Whitten (2006)	European Journal of Information Systems	Mobile communication	Mobile device	Students	185	Quantitative	Survey	TAM
55	Chan & Chong (2013)	Online Information Review	Mobile commerce	Mobile services	Mobile commerce users	402	Quantitative	Survey	TAM
56	Lin & Lu (2015)	Internet Research	Mobile communication	Mobile app	Mobile services users	318	Quantitative	Survey	PV
57	Yoon, Jeong & Rolland (2015)	Information Technology & Management	Mobile communication	Mobile instant messaging	Mobile messaging users	396	Quantitative	Survey	TAM
58	Park & Yang (2006)	International Journal of Mobile Marketing	Mobile communication	Mobile device	Mobile phone users, travellers	252	Quantitative	Survey	PV
59	Kim, Park & Morrison (2008)	International Journal of Tourism Research	Mobile information & communication systems	Mobile device	Travelers	283	Quantitative	Survey	TAM
60	Kim, Ahn & Chung (2013)	Asia Pacific Journal of Tourism Research	Mobile communication	Mobile services	Tourists	279	Quantitative	Survey	TAM; IS success
61	No & Kim (2014)	International Journal of Tourism Research	Mobile communication	Smartphone	Smartphone users, travellers	400	Quantitative	Survey	UTAUT; eSAT

62	Slade, Dwivedi, Piercy & Williams (2015)	Psychology & Marketing	Mobile payment	Mobile payment	Students & professionals	268	Quantitative	Survey	UTAUT
63	Mang, Piper & Brown (2016)	International Journal of Tourism Research	Mobile communication	Smartphone	Tourists, smartphone users	493	Quantitative	Survey	UTAUT
64	Kim, Chun & Lee (2014)	Journal of the Association for Information Science and Technology	Mobile information & communication systems	Smartphone	Students, smartphone users & non-users	354	Quantitative	Survey	TAM; DIT; PV; SIM
65	Ko, Kim & Lee (2009)	Psychology & Marketing	Mobile shopping	Mobile services	Mobile services users	511	Quantitative	Survey	TAM; PV
66	Qi, Li, Li & Shu (2009)	Systems Research and Behavioral Science	Mobile communication	Mobile services	Mobile services users	802	Quantitative	Survey	TAM
67	Wang, Lin & Luarn (2006)	Information Systems Journal	Mobile commerce	Mobile services	Mobile services users	258	Quantitative	Survey	TAM; TPB
68	Lu, Yang, Chau & Cao (2011)	Information & Management	Mobile payment	Mobile payment	Internet payment services users	961	Quantitative	Survey	DIT; VF
69	Kim, Chan & Gupta (2007)	Decision Support Systems	Mobile commerce	Mobile internet	Students & professionals	161	Quantitative	Survey	PV
70	Kim & Hyun (2016)	Computers in Human Behavior	Mobile information & communication systems	Augmented reality app	Students, augmented reality app users	134	Quantitative	Field study, Survey	TAM; IS success
71	Schierz, Schilke & Wirtz (2010)	Electronic Commerce Research and Applications	Mobile payment	Mobile payment	Mobile services users	1447	Quantitative	Survey	TAM
72	Cobanoglu, Yang, Shatskikh & Agarwal (2015)	Hospitality Review	Mobile payment	Mobile payment	Smartphone users	258	Quantitative	Survey	TAM
73	Thakur & Srivastava (2014)	Internet Research	Mobile payment	Mobile payment	Mobile phone users	774	Quantitative	Survey	TAM; UTAUT
74	Xu & Gupta (2009)	Electronic Markets	Mobile commerce	Mobile location-based services	Students, mobile phone users	176	Quantitative	Survey	UTAUT
75	Yang (2010)	Journal of Consumer Marketing	Mobile shopping	Mobile services	Mobile services users	400	Quantitative	Survey	UTAUT
76	Kuo & Yen (2009)	Computers in Human Behavior	Mobile commerce	Mobile services	Students, mobile phone users	269	Quantitative	Survey	TAM
77	Tsai (2010)	African Journal of Business Management	Mobile communication	Mobile electronic tour guide	Mobile travel guide users	175	Quantitative	Field study, Survey	TAM; TPB
78	Mallat (2007)	Journal of Strategic Information Systems	Mobile payment	Mobile payment	Mobile phone users	46	Qualitative	Focus groups	DIT

79	Wei (2008)	Telematics and Informatics	Mobile information & communication systems	3G technology	Mobile phone users	208	Quantitative	Survey	UGs
80	López-Nicolás, Molina-Castillo & Bouwman (2008)	Information & Management	Mobile commerce	Mobile services	Mobile phone users	542	Quantitative	Survey	TAM; DIT
81	Wang & Lin (2012)	Managing Service Quality	Mobile commerce	Mobile services	Mobile service users	304	Quantitative	Survey	TAM; IS success
82	Yang & Jolly (2006)	International Journal of Mobile Marketing	Mobile communication	Mobile services	Mobile services users	200	Quantitative	Survey	PV
83	Gross (2015)	The International Review of Retail, Distribution and Consumer Research	Mobile shopping	Smartphone	Students, mobile shopping users	128	Quantitative	Survey	TAM
84	Wang, Liao & Yang (2013)	International Journal of Marketing Studies	Mobile commerce	Mobile app	Mobile app users	282	Quantitative	Survey	PV
85	Lin, Fang & Hsu (2014)	Future Information Technology	Mobile communication	Mobile app	Mobile app users	441	Quantitative	Survey	UGs

Table 15: Overview of reviewed studies.

4.2 Quality assessment of studies

The collected studies were then systematically examined according to the QA criteria described in chapter 3.5. The maximum score per study was 4. One article achieved a total average score less than 1 and therefore had to be discarded due to insufficient quality. As Table 16 shows, the remaining 85 studies were of good quality with an overall average score of 2.45 for all the studies. Although the overall average score of 2.45 may seem low at first, the score represents a satisfactory average considering the rigorous QA criteria and specifically the strict evaluation criteria of QA4.

ID	Year	Quality Assessment				Score
Study	Year	QA1	QA2	QA3	QA4	Total Score
1	2016	0.5	1	1	0	2.5
2	2016	0.5	1	0	0	1.5
3	2016	0.5	0.5	0.5	0.5	2
4	2016	1	1	1	0	3
5	2016	0.5	1	1	1	3.5
6	2013	0.5	0.5	1	1	3
7	2007	1	0.5	0.5	0	2
8	2011	0.5	1	0.5	0	2
9	2010	0.5	0.5	1	0	2
10	2014	1	1	1	1	4
11	2014	1	1	1	0	3
12	2015	0	0	0.5	0.5	1
13	2015	1	1	1	0	3
14	2010	1	1	1	0	3
15	2009	0.5	0.5	1	0	2
16	2015	1	1	1	0	3
17	2012	0.5	0.5	1	0	2
18	2013	1	0.5	0	0	1.5
19	2010	0.5	0.5	1	0	2
20	2015	1	0.5	1	1	3.5
21	2015	0.5	0.5	0.5	0	1.5
22	2013	0.5	0.5	0.5	1	2.5
23	2012	1	1	0.5	0	2.5
24	2016	1	0.5	0.5	0	2
25	2016	1	1	1	1	4
26	2015	0.5	1	0.5	0	2
27	2015	0.5	1	0.5	0.5	2.5
28	2016	0.5	0.5	0.5	0.5	2
29	2009	0.5	0.5	0.5	0	1.5
30	2016	1	1	1	0	3
31	2015	1	1	0.5	0	2.5

32	2016	1	1	1	0	3
33	2016	0.5	1	0.5	1	3
34	2015	1	1	1	0	3
35	2016	0.5	0.5	0.5	1	2.5
36	2014	0.5	1	1	0	2.5
37	2014	1	0.5	0.5	0	2
38	2009	0.5	1	0.5	0	2
39	2014	1	1	0.5	0	2.5
40	2014	1	1	1	0	3
41	2011	1	1	1	0	3
42	2016	0.5	0.5	1	0	2
43	2015	1	1	1	0	3
44	2013	0.5	0.5	0.5	0	1.5
45	2015	0.5	0	0.5	1	2
46	2007	1	1	1	0	3
47	2007	1	0	0.5	1	2.5
48	2012	1	1	0.5	0	2.5
49	2008	0.5	0	1	1	2.5
50	2010	0.5	1	1	0	2.5
51	2014	1	1	0.5	0	2.5
52	2015	0.5	0.5	1	0	2
53	2016	0.5	1	0.5	0	2
54	2006	0.5	1	0.5	0	2
55	2013	0.5	0.5	1	1	3
56	2015	1	0.5	1	0.5	3
57	2015	0.5	1	0.5	0	2
58	2006	0.5	0.5	0.5	0	1.5
59	2008	0.5	1	1	0	2.5
60	2013	0.5	1	1	0	2.5
61	2014	0.5	0.5	1	0	2
62	2015	1	1	0.5	0	2.5
63	2016	0.5	0.5	0.5	1	2.5
64	2014	1	0.5	1	1	3.5
65	2009	0.5	1	1	0	2.5
66	2009	1	0.5	1	0	2.5
67	2006	0.5	0.5	0.5	0	1.5
68	2011	1	0.5	1	0	2.5
69	2007	1	1	0.5	0	2.5
70	2016	0.5	0.5	0.5	0.5	2
71	2010	1	0.5	1	0	2.5
72	2015	0.5	0.5	1	0	2
73	2014	0.5	1	1	0	2.5
74	2009	1	1	0.5	0	2.5
75	2010	0.5	1	1	0	2.5

76	2009	1	0.5	0.5	0	2
77	2010	0.5	0	0.5	0.5	1.5
78	2007	1	1	1	1	4
79	2008	0.5	0.5	1	1	3
80	2008	0.5	0	1	0	1.5
81	2012	0.5	1	1	0	2.5
82	2006	1	1	1	0	3
83	2015	1	1	0.5	1	3.5
84	2013	1	1	1	0	3
85	2014	0.5	0	0	1	1.5
						2.45
						average score
						all studies

Table 16: Quality assessment of reviewed studies.

The quality of the studies distributed over the years reveals an overall average increase of quality with the peak in year 2013 (Figure 15). The first two years seem to deviate from the average development of the increasing overall quality of studies and already reveal relatively high quality scores. This result might be because in the pre- and early smartphone era relatively few studies were published compared to the subsequent years. The high ranking of some of these studies therefore had a greater impact on the total score of the first two years. Overall, the 85 selected studies fulfilled the quality requirements of this systematic literature review and were considered appropriate for further analysis.

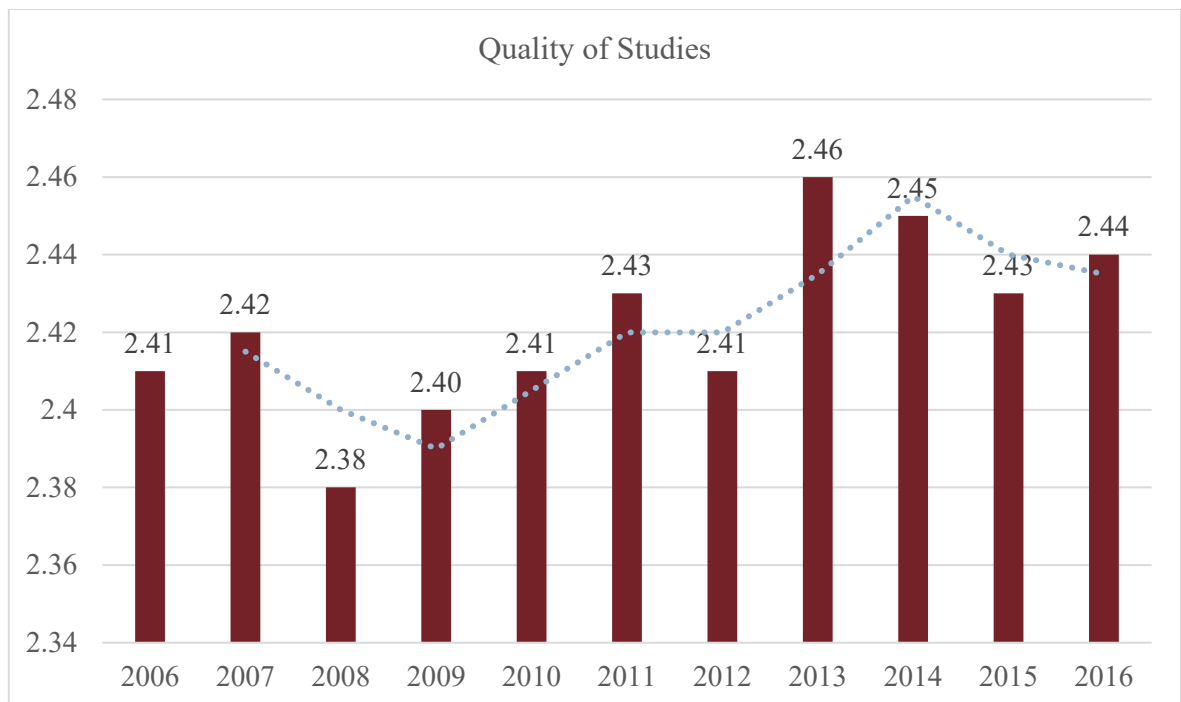


Figure 15: Quality assessment of reviewed studies per year.

5 DISCUSSION OF RESULTS

The main findings from the literature review of the 85 collected studies are presented and discussed by answering the research questions presented in chapter 3.1.

5.1 How active was the field of individual mobile ICT adoption research from 2006–2016?

Figure 16 shows the distribution of the collected studies by year. Overall, the field of individual mobile ICT adoption research shows a steady increase in publications from 2011–2015, with a peak of 17 studies in 2015. The results also reveal a slow development of publications in the early phase of the smartphone era, from 2006–2008, followed by two stronger years in 2009 and 2010, and a decline in 2011. These results correlate with Ovčjak et al.'s (2015) literature review on the adoption of mobile services because they show a similar distribution pattern for publications between 2009 and 2014. Generally, the number of publications corresponds with the increasing number of mobile data traffic (Ericsson, 2017) and advancement of mobile technologies and mobile services in general, as also observed by Ovčjak et al. (2015). Such advancements provide new content for research and business practices. Finally, there is a concentration of studies in the last three years, from 2014–2016, that accounts for greater than half of the studies from the total study pool. The decrease in studies in 2016 may have been a short-term result of the rapid growth in publications in the preceding years.

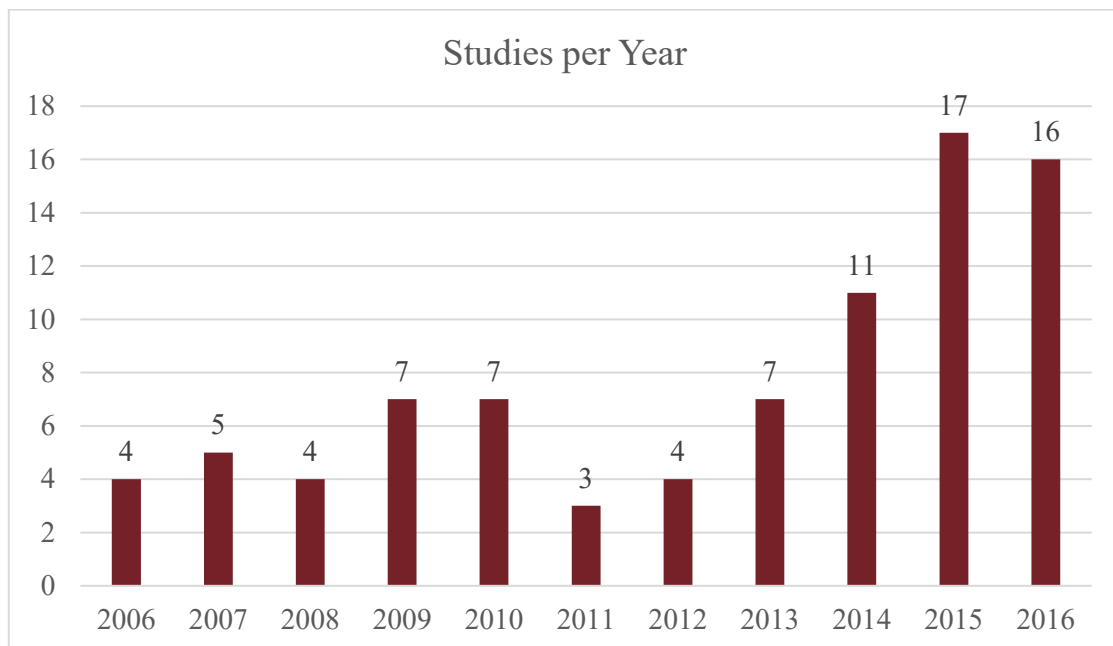


Figure 16: Distribution of reviewed studies by year.

5.2 What type of mobile ICTs are investigated the most in the individual mobile ICT adoption literature?

The field of individual mobile ICT adoption is diverse and includes a range of studied ICTs (Figure 17). Mobile services (25%) and mobile apps (21%) are the most commonly researched mobile ICTs. These mobile ICTs account for 46% of the total study pool. Generally, mobile ICT services (software) are studied more often than mobile ICT instruments (hardware). The studies on mobile services include broadly defined services such as mobile apps and more specific services such as mobile payments (11%). The greater number of studies on mobile ICTs as software compared with mobile ICTs as hardware may be because smartphone adoption has reached the point of saturation in many countries, but the number of available mobile contents is still increasing (AppleInsider, 2018; ComScore, 2017a).

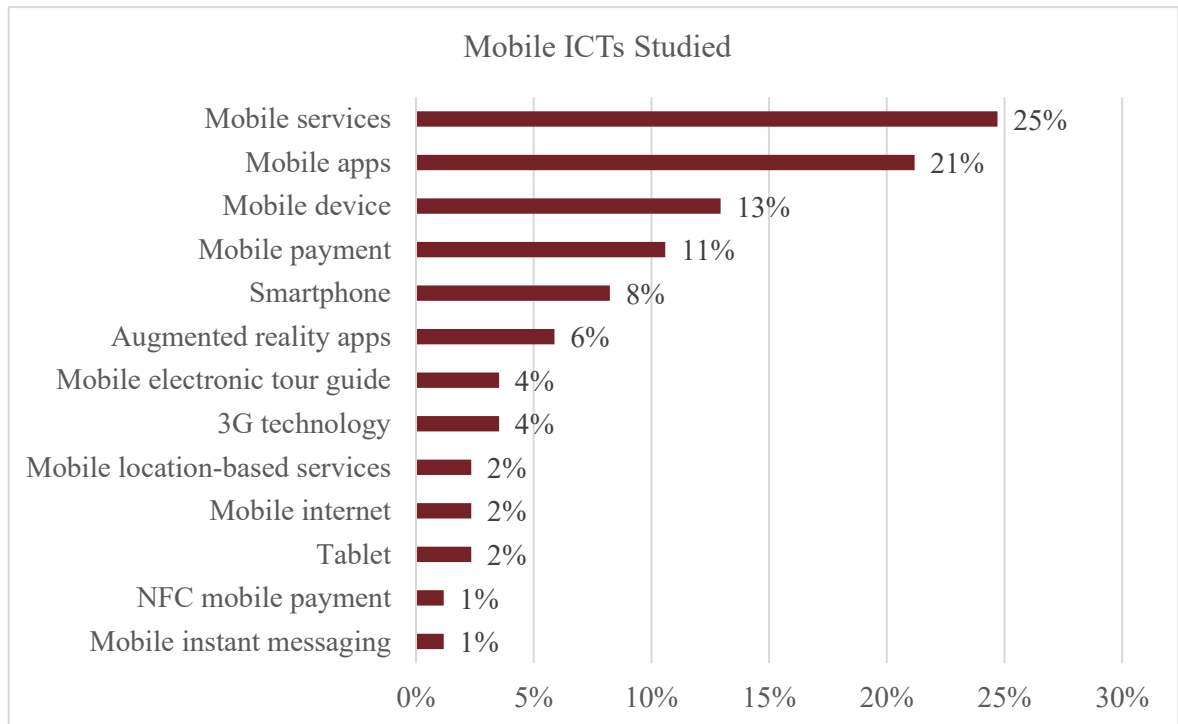


Figure 17: Mobile ICTs studied in the articles.

5.3 What categories of mobile ICTs are investigated the most in the individual mobile ICT adoption literature?

The literature review reveals seven major categories of mobile ICT adoption (Figure 18). A majority of the identified studies relates to mobile commerce (31%), followed by mobile communication

(29%). Two further main categories are general mobile information and communication systems (18%) and mobile payment (12%). The categories were identified based on the research field of the study. Most studies explicitly indicated the field of study, including mobile payment, mobile shopping, mobile entertainment, and mobile gaming. The categories of mobile communication, mobile commerce, and mobile information and communication are more general and include studies that not clearly specified the research field. These general categories were created based on the following criteria: studies that mainly discussed the adoption of mobile devices for general communication purposes were allocated to the category of mobile communication; studies on the adoption and initiation of any commerce activity, such as mobile booking, mobile reservation, and mobile ticketing, were summarised as mobile commerce; and generic studies on mobile ICT adoption in its very broad sense were summarised as mobile information and communication systems. Studies allocated to information and communication systems neither specified the technology nor the adoption purpose of the technology. These studies simply referred to mobile devices in general.

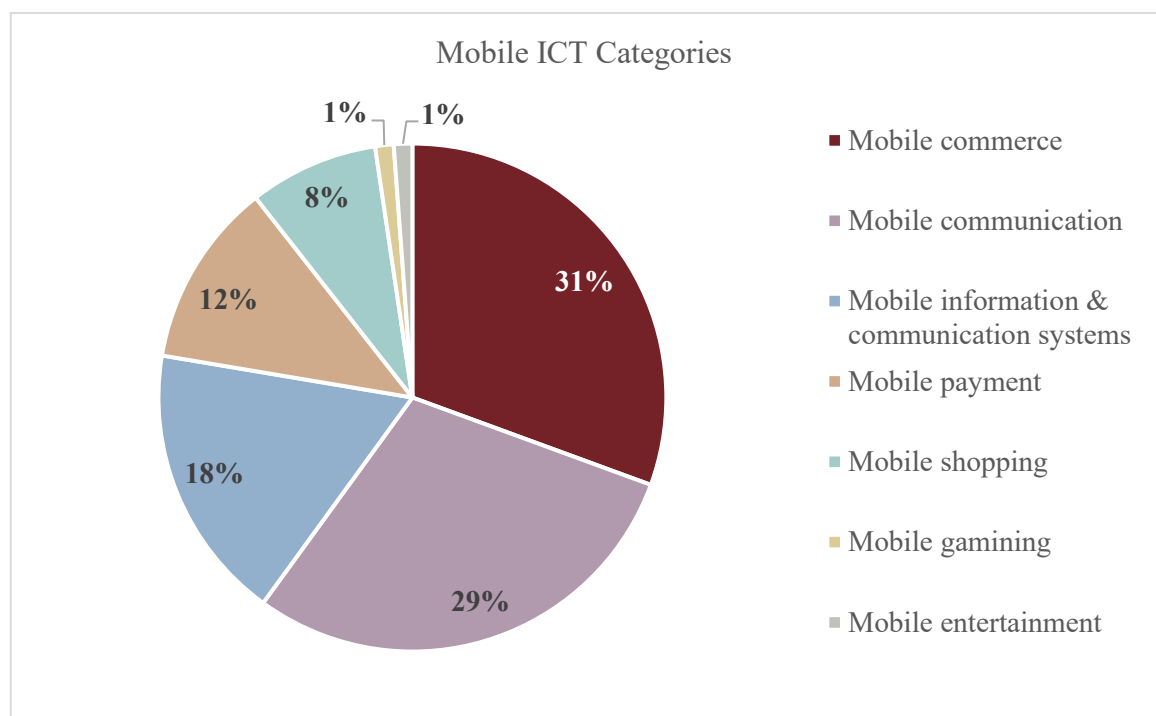
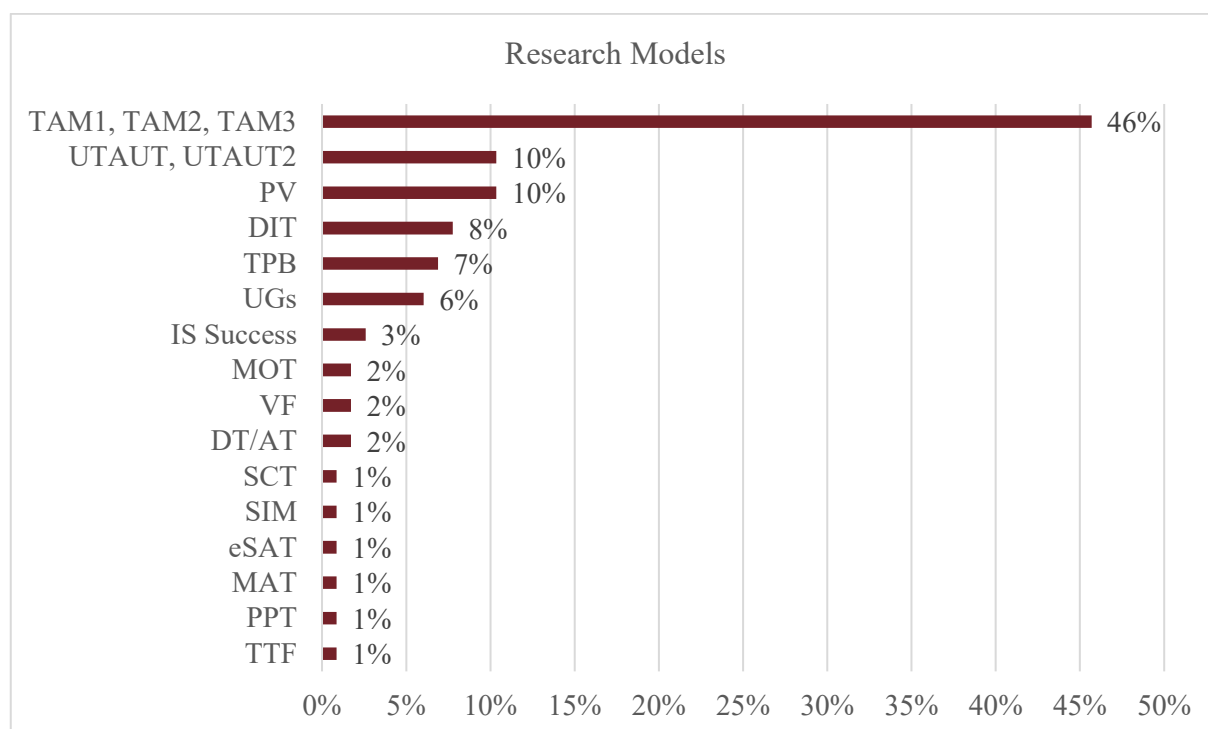


Figure 18: Mobile ICT categories.

5.4 What research models and theoretical foundations are applied the most in the individual mobile ICT adoption literature?

Figure 19 shows that the most commonly applied research models in the identified studies are the various TAM versions, that is, TAM1–TAM3. In total, 46% of the analysed studies base upon TAM

and applied elements of either the original TAM or one of the adapted TAM versions. The second most used research model is the UTAUT with 10%, which is the successor of TAM and combines elements from TAM, TRA, and DIT. Moreover, the adoption models based on perceived value (PV) are applied in 10% of the studies, followed by DIT with 8%. Other studies looked at individual mobile ICT adoption from a social psychology-driven perspective and grounded their work on the TPB. The TPB accounts for 7% of the total study pool. Overall, the analysis showed that the studies frequently combine elements of several research models or theoretical underpinnings to investigate individual mobile ICT adoption.



Legend: TAM: Technology Acceptance Model; UTAUT: Unified Theory of Acceptance & Use of Technology; PV: Perceived Value Adoption Model; DIT: Diffusion of Innovation Theory; TPB: Theory of Planned Behaviour; UGs: Uses & Gratifications Theory; IS Success: Information Systems Success Model; MOT: Motivation Theory; VF: Valence Framework; DT/AT: Domestication Theory, Appartgeist Theory; SCT: Social Cognitive Theory; SIM: Social Influence Model; e-SAT: e-Satisfaction; MAT: Mental Accounting Theory; PPT: Personalization Privacy Theory; TTF: Task-Technology Fit Theory.

Figure 19: Research models used by the reviewed studies.

In a next step, the identified studies were grouped based on their theoretical underpinning to provide an overview of the underlying scientific disciplines. Table 17 shows the applied research models grouped by their scientific discipline. Some research models were informed by more than one discipline. The UGs theory, for instance, is rooted in communication research and only later emerged

as a motivation theory to identify media use based on personal and social needs (Ruggiero, 2000). In such cases, the research models were grouped according to their most recent uses and theoretical underpinning. Moreover, TAM was originally informed by the TRA and TPB (Davis, 1986), but conceptualised and used as an information systems model. Therefore, the models based on TAM and its successor UTAUT were grouped as information systems studies.

Information Systems										Social Psychology							Sociology	
TAM-based studies				UTAUT-based studies					IS studies	Media communication studies	Social cognitive studies		Motivation-based studies	Value-based studies			Sociology-based studies	Innovation studies
TAM 1	TAM 2	TAM 3	TTF T	UTAUT	UTAUT 2	UTAUT & PPT	eSAT	SIM	IS success	UGs	TPB	SCT	MOT	VF	PC	MAT	DT/AT	DIT
51	1	1	1	9	3	1	1	1	3	7	8	1	2	2	12	1	2	9

Table 17: Scientific discipline of identified studies.

Multiple references occurred because some studies used more than one theory by combining scientific perspectives. In such cases, all related theories were counted and included in the list. Overall, individual mobile ICT adoption research is informed by three main theoretical disciplines: information systems, social psychology, and sociology. The information systems discipline includes the largest number of studies and constitutes the main scientific branch of individual mobile ICT adoption research, which is mainly due to Davis' (1986) seminal model of technology acceptance. Many studies have continued to draw on the traditional TAM or its elements to explain individual mobile ICT adoption. Moreover, social psychology reflects another important scientific discipline of individual mobile ICT adoption. The literature review shows that studies often use elements of TAM and combine them with concepts from psychological or sociological theories.

5.5 What are the most used research methods and research instruments in the individual mobile ICT adoption literature?

The literature review further indicates that the quantitative research method is used most often, because the majority of the reviewed studies are based on TAM and similar models. Figure 20 illustrates that 91% of the collected studies employed a quantitative research method. Only 6% of the collected studies were of a qualitative nature. The remaining 3% of studies used a mixed-method approach. Notably, studies with mixed-method approaches have emerged only during the last few years as these studies were published between 2014 and 2016 (year of publication not disclosed in Figure 20).

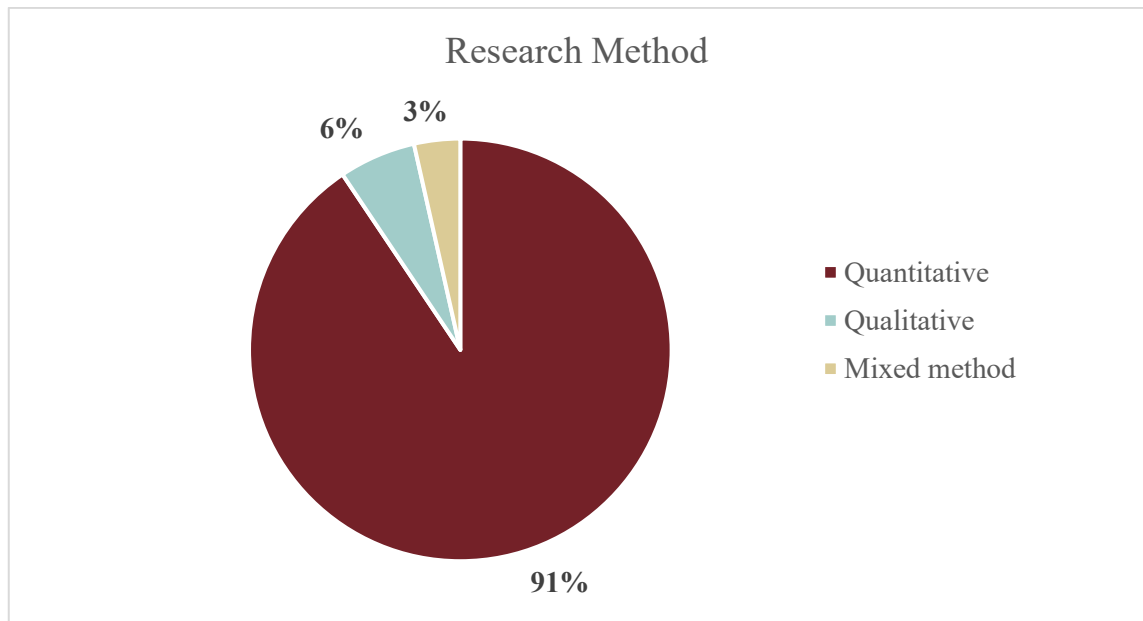


Figure 20: Research methods of the reviewed studies.

Moreover, as a result of the overrepresentation of quantitative studies in individual mobile ICT adoption research, surveys are used most commonly in the reviewed studies (Table 18). The qualitative studies mainly employed personal interviews and focus group discussions as research instruments.

Method	Instrument	No. of Studies
Quantitative	Survey	73
	Field Study, Survey	2
	Experiment	1
	Field Study	1
Qualitative	Interviews	2
	Focus groups	2
	Qualitative content analysis	1
Mixed Method	Qualitative interviews, Survey	2
	Laboratory experiment, Survey	1

Table 18: Research instruments applied by the reviewed studies.

5.6 What are the main drivers and determinants of individual mobile ICT adoption?

The literature review further revealed a large number of drivers of individual mobile ICT adoption. Table 19 lists the identified independent variables, including their number of counts in the reviewed studies. Perceived usefulness (57 counts) and perceived ease of use (42 counts) are applied the most.

This finding reflects that most studies employed research models based on TAM. Further evidence thereof is the variable ‘attitude’ with 28 counts. Moreover, perceived enjoyment (27 counts), personal innovativeness (15 counts), effort expectancy (14 counts), and social influence (14 counts) are also studied often. Overall, no clear pattern could be identified in the drivers of adoption because the results are heterogeneous. Nevertheless, the main drivers can broadly be summarised and clustered in technology-related, supplier- and context-related, user-related, and social-related drivers.

Independent Variable	No. of Counts	Independent Variable	No. of Counts
Perceived usefulness	57	Prior knowledge	3
Perceived ease of use	42	Social value	3
Attitude	28	Social image	3
Perceived enjoyment	27	Expressiveness	3
(Personal) innovativeness	15	Mobility	2
Effort expectancy	14	Informativeness	2
Social influence	14	Emotional value	2
(Perceived) risk	13	Hedonic motivation	2
(Perceived) cost/fee	12	Involvement	2
Facilitating conditions	12	Satisfaction	2
Trust	11	Cognitive absorption	2
Performance expectancy	10	Cognitive effort	2
Compatibility	10	Pleasure	2
Subjective norm	10	Anxiety	2
System quality	9	Trip experience	2
Perceived behavioural control	8	Status gain	2
(Perceived) security	7	Interface design	2
Perceived value	7	Experiential value	1
Ubiquity, immediacy, information access	6	Technology readiness	1
Convenience	6	Mobile skilfulness	1
Habit	6	Affiliation	1
Utilitarian value	6	Epistemic value	1
(Perceived) privacy	5	Attachment	1
Information quality	5	Self-identity	1
Service quality	5	Individual mobility	1
Monetary value	4	Media influence	1
(Perceived) personalization	4	Perceived critical mass	1
Playfulness	4	Technical barriers	1
Self-efficacy	4	Task-technology fit	1
User review/WOM	4	Brand experience	1
Social norm	4	Contextual offering	1
(General) privacy concern	4	Coupon proneness	1
Use context	4	Perceived popularity	1
Entertainment	3	Adopter types	1

Hedonic value	3	Desire	1
Cognitive concentration/flow	3	Symbolic use	1
Past experience	3		

Table 19: Independent variables of individual mobile ICT adoption including the number of counts.

The literature review also identified several drivers from qualitative and UGs studies. These variables are summarised separately and captured in Table 20 because they differ from the variables presented in Table 19. The qualitative and UGs studies emphasised personal motivational factors to explain why people adopt mobile ICTs, rather than focussing on the question, ‘What factors predict adoption?’ Thus, these studies examined adoption behaviour in a retrospective manner in contrast to the studies that measure adoption behaviour in a predictive manner such as most studies based on TAM. Table 20 depicts a summary of the independent variables used in the qualitative and UGs studies.

Intrinsic Factors	Extrinsic Factors	Values
Intrinsic motivation (e.g., pass time)	Extrinsic motivation (e.g., social fun, to keep connected/ informed, plan trips)	Self-esteem
Relaxation (escape from pressure)	Information seeking (e.g., find out what is going on in society)	Achievement
Enjoyment (e.g., enjoy photos and videos on larger screen)	Communication facilitation (e.g., obtain news and information)	Individuality
To pass time (e.g., relax)	Instrumentality (e.g., schedule appointments)	Belonging
Disengagement (e.g., relax)	Work management (e.g., organise work)	Well-being
Knowledge and education (e.g., educate myself)	Immediate access and mobility (e.g., share information with friends)	
Entertainment	Relational (e.g., keep in contact)	
Pursuit of happiness (e.g., feel a sense of achievement)	Social connection (e.g., keep in touch with others)	
Reassurance (e.g., have a feeling of safety)	Sociability (e.g., let others know you care for them)	
	Social benefits (e.g., increased interaction with friends)	
	Socialising (e.g., meet new people)	
	Self-status seeking (e.g., show-off to friends)	
	Fashion/status (e.g., look stylish)	
	Engagement (e.g., create new things)	
	Relative advantage (e.g., have the possibility to avoid queues)	

Table 20: Independent variables used in UGs studies and qualitative studies.

The underlying premise of the UGs studies is that individuals actively seek to use technologies to gratify their needs (Katz, Gurevitch, & Haas, 1973). Accordingly, most of the variables could be organised as intrinsic and extrinsic motivational factors. Moreover, one study explored the sought values of mobile ICT use from a deeper personal values perspective. This study demonstrated that people use technologies to satisfy deeper needs and values, such as self-esteem, individuality, and belonging (Standing, McManus, Standing, & Karjaluoto, 2007).

5.7 What relations among the adoption factors are investigated the most and which relations are most significant?

The collected studies revealed a large amount of investigated relations. For a better overview, only relations that had been analysed in at least two studies were included. Table 21 shows that the relation of ‘perceived usefulness’ to ‘behavioural intention’ is used most often in the collected studies. This TAM-specific relation occurs in 32 of the 74 papers that applied a structural equation model or a regression model. Moreover, the relation of ‘attitude’ to ‘behavioural intention’ (24 studies) and ‘perceived usefulness’ to ‘attitude’ (21 studies) is also applied often. Overall, these investigated relations are a further indication that TAM depicts the dominant research model in the reviewed studies.

By considering only the most often investigated relations regarding ‘behavioural intention’, ‘attitude’ depicts the most significant construct. In 21 of 24 cases, attitude has a significant influence on behavioural intention. This influence results in an 88% probability of significance between attitude and behavioural intention. Another important determinant of behavioural intention among the most often investigated relations is PV. PV performs an 86% probability of significance on behavioural intention.

Moreover, a comparison of the dominant constructs ‘perceived usefulness’ and ‘perceived ease of use’ regarding ‘behavioural intention’ reveals that perceived usefulness shows a higher probability of significant influence than perceived ease of use on behavioural intention. Hence, perceived usefulness is a more reliable measure of behavioural intention than perceived ease of use. The finding that the predefined TAM relations ‘perceived usefulness’–‘behavioural intention’ and ‘attitude’–‘behavioural intention’ are the most studied relations is in accordance with other literature reviews, which included only quantitative studies (Ovčjak et al., 2015; Sanakulov & Karjaluoto, 2015).

Relations	No. of Studies	Correlations		Significant (%)
		Significant	Non-Significant	

PU-BI	32	25	7	78%
AT-BI	24	21	3	88%
PU-AT	21	20	1	95%
PEOU-BI	19	10	9	53%
PEOU-PU	19	16	3	84%
PEOU-AT	16	12	4	75%
PV-BI	14	12	2	86%
SN-BI	14	10	4	71%
PEN-BI	9	6	3	67%
PE-BI	8	8	0	100%
SI-BI	8	6	2	75%
PEN-AT	8	7	1	88%
Trust-BI	7	4	3	57%
Compatibility-BI	7	7	0	100%
PBC-BI	6	5	1	83%
Risk-BI	6	6	0	100%
EE-BI	6	4	2	67%
Cost-BI	6	3	3	50%
SN-PU	5	4	1	80%
IN-BI	5	5	0	100%
BI-U	4	4	0	100%
PEN-BI	4	3	1	75%
FC-BI	4	4	0	100%
PP-BI	4	2	2	50%
SN-AT	4	4	0	100%
PEN-PV	4	4	0	100%
Use context-BI	3	3	0	100%
Past behaviour-BI	3	2	1	67%
PBC-PU	3	2	1	67%
Fee-PV	3	3	0	100%
EE-PV	3	3	0	100%
Risk-PV	3	2	1	67%
PU-PV	3	3	0	100%
PBC-PEN	3	3	0	100%
SN-PEN	3	3	0	100%
HM-BI	2	2	0	100%
HA-BI	2	2	0	100%
PS-BI	2	1	1	50%
ENT-BI	2	1	1	50%
Mobility-BI	2	1	1	50%
Prior knowledge-BI	2	2	0	100%
Advantage-BI	2	2	0	100%
Credibility-BI	2	2	0	100%
Self-efficacy-BI	2	2	0	100%
Service quality-BI	2	2	0	100%

System quality-BI	2	2	0	100%
Info quality-BI	2	2	0	100%
CC-AT	2	2	0	100%
Trust-AT	2	2	0	100%
SI-AT	2	2	0	100%
PS-AT	2	2	0	100%
System quality-PV	2	2	0	100%
Social image-PV	2	1	1	50%
EV-User satisfaction	2	2	0	100%
FC-AT	2	1	1	50%
PE-AT	2	2	0	100%
EE-AT	2	1	1	50%

Legend: PU: Perceived Usefulness; PV: Perceived Value (monetary, characteristics of ICT); BI: Behavioural Intention; AT: Attitude; PEOU: Perceived Ease of Use; SN: Social Norm; PEN: Perceived Enjoyment; PE: Performance Expectancy; SI: Social Influence; EE: Effort Expectancy; PBC: Perceived Behavioural Control; IN: Innovativeness; FC: Facilitating Condition; PP: Perceived Privacy; HM: Hedonic Motivation; HA: Habit; PS: Perceived Security; ENT: Entertainment; CC: Cognitive Concentration; EV: Experiential Value; WOM: Word of Mouth; TRIAL: Trialability; PB: Perceived Benefit; SP: System-Related Privacy.

Table 21: Most commonly investigated relations among the adoption factors including the degree of significance.

5.8 Do the collected studies based on TAM examine the determinants of perceived usefulness? If yes, what are the determinants for perceived usefulness?

A next step investigated if the reviewed studies based on TAM also examined the determinants of perceived usefulness. In total, 34 (60%) of the 57 studies that included perceived usefulness did so. Table 22 shows the determinants of perceived usefulness including the number of counts. The results are heterogeneous and reveal diverse determinants of perceived usefulness. Perceived ease of use is applied most often, that is, in 73% of the cases in the 34 studies. All other determinants are only applied a few times with no consistent pattern identified in the listed determinants. Nevertheless, the determinants of perceived usefulness can be roughly grouped into personal, social, and technological factors. Personal factors include cognitive factors such as perceived enjoyment or factors related to users' personal characteristics such as innovativeness. Social factors refer to social influences and technological factors refer to technology-specific characteristics, such as system quality, service quality, or functionality.

Determinants of Perceived Usefulness	No. of Counts	Determinants of Perceived Usefulness	No. of Counts
Perceived ease of use	25	Perceived mobility	1
Perceived enjoyment	3	Task-technology fit	1
System quality	3	Mobile skilfulness	1
Service quality	3	Knowledge	1
(Personal) innovativeness	3	Relationship drivers	1
Trust	2	Cognitive absorption	1
Functionality	2	Ubiquitous connection	1
Information quality	2	Identification	1
Social influence	2	Technology experience	1
Perceived privacy/privacy concern	2	Perceived financial resources	1
Perceived personalisation	2	Individual mobility	1
Perceived compatibility	2	Perceived status benefit	1
Perceived behavioural control	1	Perceived flexibility benefits	1
System characteristics (mobility, reachability, compatibility, convenience)	1	Attitude (mobile innovations)	1
Convenience	1	Perceived credibility	1
Computer playfulness	1	Trip experience	1
Social norm	1	Visual appeal	1
Perceived informativeness	1	Brand name	1
Trust	1	Price	1
Cost	1	Motivation for ritualised use	1
Use context	1	Connectivity	1
Technology readiness	1	Contextual offerings	1
Content	1	Perceived critical mass	1
Motivation for instrumental use	1		

Table 22: Determinants of perceived usefulness in the reviewed studies.

5.9 Do the collected studies solely predict adoption behaviour from users' intention or do they actually measure adoption behaviour?

The results reveal that behavioural intention is the most commonly used construct to measure individual mobile ICT adoption. In total, 86% of the total 85 reviewed studies applied behavioural intention as the measure for adoption. Only 10% of these studies also effectively examined the actual adoption of the respective mobile ICT (Figure 21). Although intention serves as a predictor of behaviour and can therefore be used as an alternative measure of actual behaviour, it does not measure the actual behavioural act. Intention is a pre-behavioural notice of intent that solely represents a person's readiness to perform a behaviour (Fishbein & Ajzen, 2010). The actual behaviour should still be measured and if possible, in retrospect (Fishbein & Ajzen, 2010). Therefore,

most of the reviewed studies remain probabilistic in nature because they predict, but do not effectively measure adoption behaviour.

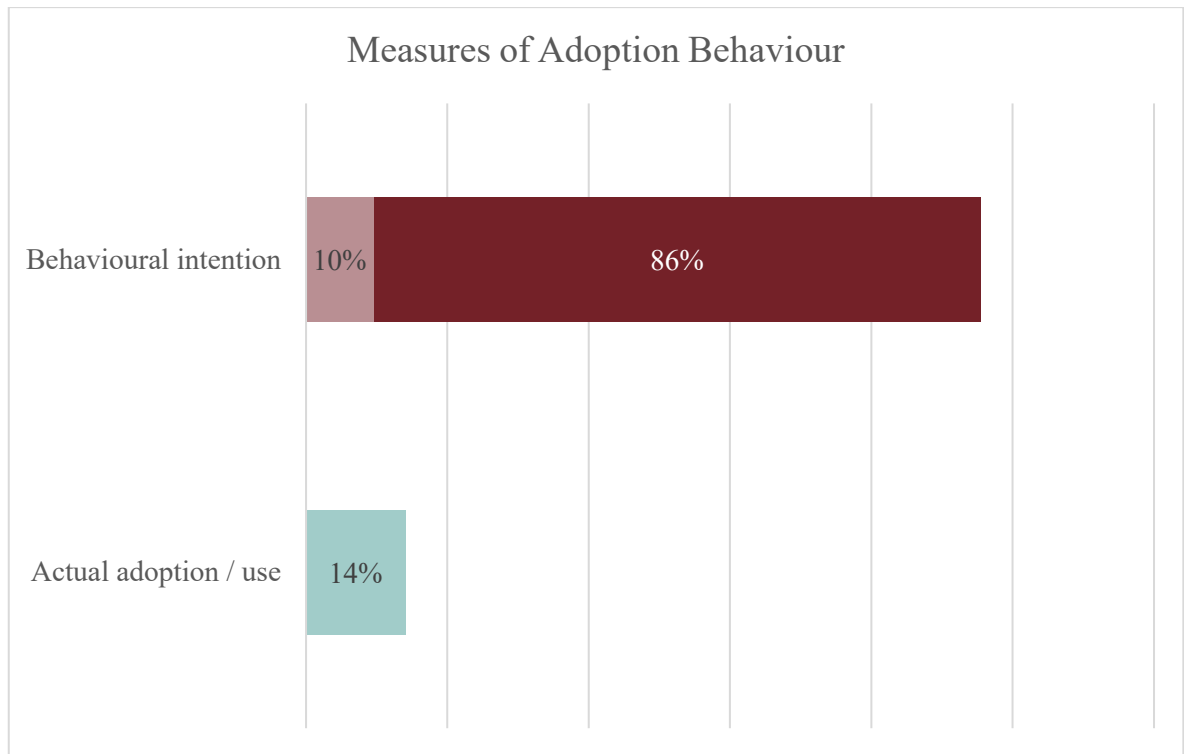


Figure 21: Measures of adoption of individual mobile ICTs.

Studies that measure the actual adoption behaviour of mobile ICTs are scarce because most of the identified studies are based on TAM or similar models. TAM and its related models measure behavioural intention instead of actual adoption. Only 14% of the reviewed studies measure individual's actual adoption and/or use of mobile ICTs. They do so in retrospect by using a sample that has already had experience with the respective mobile ICT.

6 SYNTHESIS OF THE MAIN FINDINGS OF INDIVIDUAL MOBILE ICT ADOPTION RESEARCH AND SUGGESTIONS FOR FUTURE RESEARCH

Section 6 synthesizes the main findings from the literature review and presents a critical discussion from the perspective of general human motivation. Finally, suggestions for further research are provided.

6.1 The technology-centric view is predominant in adoption research

Overrepresentation of technology-related drivers

The purpose of individual mobile ICT adoption research is to find answers on the question, ‘Why do people adopt and use a technology?’ Overall, the main drivers of adoption identified in this literature review can be summarised in three generic clusters of adoption: technological, supplier and context-related, and human-related, that is, personal and social. The technology-centric view is clearly predominant in adoption research. This view emphasises the instrumental aspects of adoption and conceptualises adoption behaviour as being mainly determined by technological drivers. Thereby, perceptions about technology-inherent characteristics are decisive for adoption. The most commonly used constructs ‘perceived usefulness’ and ‘perceived ease of use’ are typical examples thereof. Although these variables conceptualise users’ cognitive perceptions towards technology, they exhibit a strong system belief focus (Benbasat & Barki, 2007) and can therefore be interpreted as technology-centric. In this conceptualisation, design features and instrumentality of the technology, such as usability, efficiency, and performance, reflect the main motivation for adoption (Davis, 1986).

The technology-centric view is dominant because TAM represents the main theoretical foundation and thus the main paradigm to study individual mobile ICT adoption. As a result, most of the identified studies conceptualise the technology itself to act as the stimulus for adoption. Such a view ignores the motivations beyond the technological aspects of adoption and implicitly assumes that users adopt mobile ICTs due to technological and practical reasons in the first place. Even though technology-related aspects are important determinants of adoption, technology may not be the prime reason for adoption. Instead, the technology with its inherent assets should be regarded as a means in users’ fundamental goal achievement process. Similarly, Bagozzi (2007) asserted that the determinants of adoption should be conceived as functions towards achieving users’ superior motives, goals, and values. Thus, users’ motivations and goals beyond the technological aspects are fundamental to activate adoption.

Predictive measures of adoption

The research on individual mobile ICT adoption is largely informed by attitudinal models (i.e., TAM, TRA, and TPB) and measures adoption in a prospective manner. This observation is in line with the aforementioned predominant use of TAM in the reviewed studies. Models based on TAM assume that adoption behaviour can be predicted from users’ intention of use. Therefore, most studies from

the literature review remain predictive. This means, the identified studies do not actually measure users' adoption of mobile ICT as they only measure users' intention towards adoption. The attempt to explain individual mobile ICT adoption by drawing conclusions from people's intentions of use may lead to an incomplete understanding of adoption. People do not always do what they claim or predict they will do. The phenomenon that intentions do not always lead to the planned action has been observed in the intention-behaviour gap research (Sheeran & Webb, 2016). Meta-analyses have confirmed that actual behaviour can be predicted only to a certain degree from intention (Armitage & Conner, 2001; Sheeran, 2002). Thus, more in-depth research is needed to explain users' actual adoption behaviour.

Attitude towards technology versus attitude towards abstract goals

Attitude towards the mobile ICT depicts an additional main driver in the reviewed studies. Most studies from the literature review measure users' attitude towards the object, that is, the mobile ICT, or the object-related behavioural act, that is, mobile ICT adoption. This finding provides further evidence for a technology-centric perspective of the reviewed studies. The reviewed studies regard adoption behaviour as an isolated behavioural act by detaching the study of technology adoption from people's fundamental goals of behaviour. As noticed by other scholars, however, attitudes should be linked to users' abstract goals and end-states of existence beyond technology use (Bagozzi, 2007; Eagly & Chaiken, 1998). In other words, technology is not used as an end in itself, but often functions as a means towards more abstract user-related goals (Bagozzi, 2007). Moreover, attitude is insufficient to predict individual mobile ICT adoption. People may explicitly not have the desire to adopt mobile ICTs in some contexts or in relation to specific needs, although they generally hold a positive attitude towards the technology (Bagozzi, 2007). As such, questions related to individual mobile ICT adoption should be linked to users' personal needs and values and with that also to the context and circumstances of adoption.

6.2 User-centric view remains under-researched

Intrinsic motivation of adoption

Few studies from the literature pool investigated users' intrinsic motivation and personal needs related to mobile ICT adoption. Notably, such studies were either of a qualitative nature or based on UGs research. These studies used a human-centric view to study mobile ICT adoption and hence contrast with the technology-centric view followed by majority of the reviewed studies. Although the motivation-related studies remained limited in number, they provided in-depth insights on why

people adopt mobile ICTs. These studies demonstrated that users often seek to satisfy deeper internal needs, such as self-esteem or a sense of belonging (Leung & Zhang, 2016; Standing et al., 2007). Such deeper psychological needs represent the higher-order goals users are attempting to achieve when adopting ICTs (Standing et al., 2007). In contrast to the motivation-related studies, the reviewed quantitative studies based on TAM and its alike models only measure users' perceived enjoyment and compatibility as generic intrinsic motivational drivers of adoption. In this regard, more research is required that also considers users' deeper needs of adoption because individual mobile ICT adoption is not only a question of a technology's hardware or software (Gretzel, Sigala, Xiang, & Koo, 2015), but primarily of personal and social needs beyond the instrumental aspects of ICT use. Especially users' intrinsic sources of motivation including needs, cognitions, and emotions in relation to mobile ICT use (Zhang, 2008) are worth to be investigated.

Emotional drivers of adoption

Emotions are an additional important aspect in explaining users' deeper motivational reasons for adoption (Bagozzi, 2007). Notably, emotional drivers are underrepresented in the reviewed studies. The reviewed studies were mainly informed by deterministic and predictive models, such as TAM and TPB. Thus, most studies assume rationality of the user. Although some studies recognised the relevance of emotions regarding actual adoption behaviour (Kim & Preis, 2016), they investigated only a handful of generic emotional factors including pleasure, satisfaction, and anxiety.

Emotional factors depict an important dimension of human–technology interaction in general (Cernea & Kerren, 2015; Zhang & Li, 2005). With regards to individual mobile ICT, emotions may play a central role because smartphone use is more personal compared to the use of traditional technologies (Arbore et al., 2014). Studies outside of this literature review have demonstrated that mobile ICTs such as the smartphone provide emotional support and provoke affective outcomes (Lalicic & Weismayer, 2016; Lin, Fang, & Hsu, 2014). Therefore, emotional factors may be a promising new dimension for individual mobile ICT adoption research that could disclose additional reasons for adoption. Therefore, future research should more specifically address the role of emotions in individual mobile ICT adoption. Exploratory approaches are suggested to gain more profound insights into the emotional aspects of individual adoption behaviour, thereby contributing to a more in-depth understanding of users' reasons for adoption.

6.3 Perspective for future research

Psychological needs and motivations for individual mobile ICT adoption

These days, people have become accustomed to mobile ICT use in general. As a result, the technology-related questions of individual mobile ICT adoption need to shift perspective to human-related questions. One important theoretical perspective to explain human behaviour is motivation. Being motivated means being moved to do something (Ryan & Deci, 2000). Accordingly, the person must have sufficient motivation to adopt and use mobile ICTs. Only then, technology-related questions should be considered. Similarly, Fogg (2009) argues that three factors must be given for a target behaviour to happen: sufficient motivation, sufficient ability, and an effective trigger (e.g., technology). With regards to individual mobile ICT adoption, the motivational approach allows the connection of people's fundamental needs with the technological elements. The technological elements thereby serve as a supportive means to fulfil users' needs. In this conceptualisation, users' intrinsic motivation antecedes technology-related questions such as perceived usefulness.

A promising motivational approach to study individual mobile ICT adoption depicts the concept of *motivational affordances* (Zhang, 2008). The concept of motivational affordances originally suggested by Norman (1999) connects the concept of affordances from perceived opportunities for action with questions of motivation, specifically the needs satisfaction theory of motivation (Deterding, 2011). According to the needs satisfaction theory, people seek activities that promise to satisfy fundamental psychological needs, such as autonomy, competence, or relatedness (Ryan & Deci, 2002). Motivational affordances are achieved when the object—in this case the mobile ICT—helps to satisfy people's motivational needs (Zhang, 2008).

Mobile ICT can, for instance, be autonomy supportive by allowing the users to act in a self-determined way (Zhang, 2008). When people act autonomously, they perceive their behaviour as an expression of the self that matches with their own interests and integrated values (Ryan & Deci, 2002). The autonomy-supportive interaction with mobile ICTs promotes several positive outcomes including developmental gains such as greater perceived competence and engagement gains such as increased engagement on the system (Zhang, 2008). Moreover, it also stimulates performance gains like, for instance, improved performance and higher achievements (Zhang, 2008).

The motivational affordances approach to study individual mobile ICT adoption is especially promising because personal technologies have increasingly become part of people's identity (Sheth & Solomon, 2014). Human-centric views are gaining relevance because they emphasise users' intrinsic psychological needs. According to this view, when users' psychological needs are

successfully translated into the mobile ICT design (Zhang, 2007), users' willingness to adopt and engage with mobile ICTs increases. Therefore, people's fundamental psychological needs and goals should be the centre of reference for finding answers on the question 'Why do people adopt or reject mobile ICTs?'

7 CONCLUSION AND IMPLICATIONS

This literature review provides an overview of and in-depth insights into the current status of individual mobile ICT adoption research. The review identified, appraised, and synthesised empirical studies on the basis of an extensive systematic research approach. Thereby, the systematic literature review was primarily interested in the main drivers of individual mobile ICT adoption. Other systematic literature reviews had not extensively reviewed the mobile ICT adoption literature, because they only investigated specific aspects of adoption. As such, the literature review at hand provides important insights for academics and practitioners in the form of a summary of the main factors that contribute to individual mobile ICT adoption and an elaboration of useful recommendations for future research.

Moreover, the literature review adds to the debate on the paradigm shift of technology adoption research (Bagozzi, 2007; Benbasat & Barki, 2007; Hirschheim, 2007) with an overview of the status quo of the field of research. The findings of this study show that adoption research is dominated by a technology-driven perspective. Models based on TAM still depict the major theoretical underpinning of majority of the investigated studies on individual mobile ICT adoption. This yields to an overrepresentation of technology-related drivers of adoption. These findings demonstrate that the field of individual mobile ICT adoption advances slowly because a notable shift in perspective to study adoption behaviour has not been observed. It is suggested that future research shifts the perspective towards a more user-centred view in investigating individual mobile ICT adoption and use.

Future research should strive for a holistic view of individual mobile ICT adoption. In particular, adoption behaviour should not be viewed as an isolated behavioural act. Questions related to people's adoption are embedded in the complex fabric of people's modern life, in which mobile ICTs serve to achieve higher-order goals (Bagozzi, 2007). Especially today, in a time in which the adoption of smartphones has reached saturation and the number of newly available mobile services increases steadily, a functional perspective in explaining individual mobile ICT adoption might not be sufficient any more. Zhang (2008) points out that users' psychological factors play an important role

in using technologies in general. Therefore, users' fundamental needs beyond the system use are of primary interest.

Although this literature review followed a rigorous and systematic research process, the study has the following three limitations. First, this study was mainly interested in the main drivers of individual mobile ICT adoption. This goal was achieved through the broad collection and synthesis of the drivers of adoption. The adoption drivers and the investigated paths between the identified constructs were primarily summarised and interpreted descriptively. Although such a qualitative approach is appropriate to map a specific field of research (Petticrew & Roberts, 2010), future research should analyse the paths between the identified constructs by means of a statistical correlation analysis to add to the understanding of which constructs perform the strongest effect on adoption. Second, this literature review was conducted in a broad manner to map the field of individual mobile ICT adoption as comprehensively as possible. The comprehensive approach is one of the strengths of this literature review. Nevertheless, the broad approach at the same time risks remaining too general. Although the search terms in this study allowed for a broad inclusion of diverse studies of quantitative as well as qualitative nature, future studies should more specifically search for and investigate emotional drivers of adoption. Third, this study investigated the adoption factors only. This is in line with the research goal of this study. Nevertheless, future studies should also investigate factors for non-adoption of individual mobile ICTs. This way, a more holistic understanding can be achieved.

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Appendix H: Study 2

Study 2: Aebli, A. (2019): Tourists' motives for gamified technology use. *Annals of Tourism Research*, 78. <https://doi.org/10.1016/j.annals.2019.102753>.

Appendix I: Study 3

Study 3: Aebli, A. (2019): Uses and gratifications of gamified technology in pleasure vacations.
Under review (November 2020).

Uses and Gratifications of Gamified Technology in Pleasure Vacations

Abstract

Gamified technology is suggested as a promising tool to engage people at a deeper level of involvement. By using game elements that address people's intrinsic motivation, gamified technology is designed to support users' individually beneficial behaviour. In tourism contexts, gamified technology holds the potential to contribute to tourists' co-creation of meaningful experiences. However, tourists' motivations for engaging with gamified technology and the consequences thereof are under-researched. Drawing on the uses and gratifications theory, this study investigates tourists' socio-psychological motivations for engaging with gamified technology during a pleasure vacation. The results of this study show that tourists' need for competence experience, enjoyment, and social connectedness are among the main drivers for engagement with gamified technology, and engagement with the gamified technology contributes to the overall tourist experience.

Keywords: Gamified Technology, Uses and Gratifications, Meaningful Tourist Experience, Persuasion, Well-Being

1 INTRODUCTION

Modern technology has become an essential instrument for tourists' interaction with tourism settings and environments. In the last decade, a powerful stream of research has emerged that highlights the nature and dynamics pertaining to 'persuasive' technologies for engaging the consumer at a deeper level of cognition by including motivational mechanisms and thereby fostering meaningful experiences (Deterding, 2011; Hamari, Koivisto, & Pakkanen, 2014a). The goal of persuasive technology is to motivate the consumer towards individually beneficial behaviour (Hamari et al., 2014a). Gamification is one such concept of persuasive technology. Defined as "the use of game design elements in non-game contexts" (Deterding, 2011, p. 1), gamification uses the power of games in real-world, non-game contexts. Gamified technology thus connects the fundamental values of game play with regular information systems.

Integrating gamified technology in tourism settings has been identified as valuable because gamified technologies have the potential to contribute to personalised and meaningful tourist experiences (Bulencea & Egger, 2015; Xu, Buhalis, & Weber, 2017). In real-world contexts, gamified technology is characteristically designed and implemented for more than users' mere entertainment or fun. Instead of functioning as an end in itself, gamified technology is aimed at behavioural reinforcement (Tussyadiah, 2017). Accordingly, gamified technology in vacation contexts seeks to merge the

purposes of game play with real-world activities and behaviours at the tourism destination. Despite the recognised potentials of gamified technology for meaningful tourist experiences, however, empirical knowledge of tourists' motivations for engaging with gamified technology and the effects thereof on the tourist experience are sparse. The few studies that have explored tourists' use of gamified technology (Liu, Wang, Huang, & Tang, 2019; Xu, Tian, Buhalis, Weber, & Zhang, 2016) do not provide a deeper psychological understanding of why tourists' engage with gamified technology and how the gamified features play a role in the tourist experience. This study fills the void of research on gamified technology use in tourism by investigating socio-psychological motivations for gamification engagement during a pleasure vacation at a ski resort. Specifically, the study applies the uses and gratifications (U&Gs) framework to investigate the extent to which eight socio-psychological motivations explain tourists' engagement with gamified technology and the gratifications thereof for the overall tourist experience.

This study adds to the discussion of how game elements satisfy various psychological and social motivational needs of tourists, based on the knowledge that needs satisfaction is theoretically known for fostering motivation both in tourism (Filep & Pearce, 2014) and games (Ryan, Rigby, & Przybylski, 2006). As one of the first studies to investigate tourists' engagement with gamified technology, this study contributes to the understanding of the role of gamified technology engagement in the overall tourist experience. With tourists' increasing use of their smartphone during travels and vacation (Wang, Xiang, & Fesenmaier, 2016), gamified technology represents a promising means to support tourists in their shaping of personally meaningful experiences. From a tourism supplier perspective, engagement with gamified technologies is expected to lead to a number of positive outcomes by increasing customer value and encouraging value-creating behaviours such as continuous user engagement in the gamified system, increased willingness to pay, greater loyalty, and product advocacy (Blohm & Leimeister, 2013; Harwood & Garry, 2015; Zichermann & Cunningham, 2011). Consequently, integrating gamified technologies in tourism settings is valuable for both the tourist and the tourism supplier.

2 THEORETICAL BACKGROUND

2.1 Uses and Gratifications

Both in human-computer interaction and media research, U&Gs are used as a framework to explain people's situational selection of interacting with technologies (Ruggiero, 2000). The U&Gs provide information on consumers' motivations for media use and posit that individuals actively choose a certain media to gratify their needs (Katz, Haas, & Gurevitch, 1973). The U&Gs approach thus

provides information on the question of ‘what people do with media’ and mainly focuses on identifying the social and psychological needs of individuals that motivate their use of a particular medium. The extent to which the technology gratifies users’ needs eventually impacts the amount of time spent with the technology (van Roy, Deterding, & Zaman, 2018). On a more general level, the U&Gs provide information on what ‘affordances’ offered by the technological object are perceived and realised by the users.

According to the U&Gs theory, every medium has standard gratifications. In the gamification literature, the standard gratifications are labelled as so-called ‘affordances’, which refer to the design-inherent motivational mechanisms that structure games and aid in inducing gameful experiences within the systems (Koivisto & Hamari, 2019). The self-determination theory thereby represents the core theoretical underpinning of the affordances understanding of games in general (Ryan & Deci, 2000b). Based on the self-determination theory, the motivations for and experiences with games are basically considered to induce senses of autonomy, competence, and relatedness (Ryan et al., 2006). Typical game functions of gamified technology include ‘performance tracking,’ ‘points,’ ‘badges,’ and ‘leaderboards;’ these performance-related functions are often implemented as the main game features and motivational mechanisms for gamified technology (Koivisto & Hamari, 2019). Accordingly, these features are suggested to particularly afford performance-related experiences such as feelings of competence and are characteristically considered as within the game effects in the game-related literature. In addition to the technology-inherent affordances, however, user-specific gratifications can be obtained that consider the context of use.

The user-specific gratifications are partially co-shaped by users’ needs and the environmental setting the user is in at the point of use. Notably, affordances of the technological artefact are not necessarily derived from the features of the game artefacts’ materiality only but from personal interactions in the situational context of use (Hutchby, 2001). Thus, the underlying motivations for use are not solely defined by the specific properties of the game design but are particularly dependent on the nature of the activity, the context, and the specific situation in which the gamified technology is being used (Deterding, 2011; Hutchby, 2001). Research on gamified technology use is thus in need of more in-depth approaches to investigate why people choose to engage with gamified technology. In the pleasure vacation context, tourists’ diverse needs and motivations related to pleasure vacation activities must be considered in addition to the game-specific affordances.

2.2 Pleasure Vacation at Ski Resorts

Pleasure vacations represent an ideal setting for personal growth and enhancement of social relationships (Crompton, 1979). The primary behavioural activity at which the gamified technology is targeted in the context of a pleasure vacation at a ski resort is engaging in winter sports for recreational purposes. Skiing and snowboarding and the social activities related to them, for instance, spending time with loved ones, are thereby considered as the main means to satisfy intrinsic valued states (Gibson, Attle, & Yiannakis, 1998). Therefore, of particular interest are tourists' specific needs and goals related to these activities. From a socio-psychological perspective, achievement motivation theory (McClelland, 1987) is among the dominant motivation theories related to physical activities and socio-psychological needs (Spray, Wang, Biddle, & Chatzisarantis, 2006). Based on the fact that self-determination theory represents the backbone of the gamification understanding (Deterding, 2011; 2014), this study draws on self-determination theory and the achievement motivation theory including the concepts related to these theories to study tourists' engagement with gamified technology during a pleasure vacation at a ski resort. Although conceptually related to self-determination theory, achievement motivation theory describes social needs that arise from interacting with the environment. The self-determination theory, on the contrary, relates to the psychological needs inherent in human nature.

Achievement motivation theory refers to social needs to preserve one's own identity, values, and interpersonal relationships and includes the needs for achievement, power, and affiliation (McClelland, 1987). **Achievement** is a learned social need and relates to the desire to do something better, comprising competition with the self (Heckhausen, 1967). The need for achievement is closely related to the need for competence, a psychological need that cultivates feelings of having the ability to master a task and achieve goals (Reeve, 2018). **Power** is a learned social need and characterises the desire to impact others or strive for leadership (McClelland, 1987). Whereas power refers to a *competence-demonstrating* need, the need for competence and achievement is more intrinsically oriented and describes a *competence-expanding* need. **Affiliation** is people's basic need to be with others (McClelland, 1987). Affiliation relates to the desire to belong and can include various types of emotional interpersonal attachments. Social interaction is the primary condition of social belonging. Affiliation is connected to the psychological need for relatedness, which can be evoked through mere interaction (Reeve, 2018).

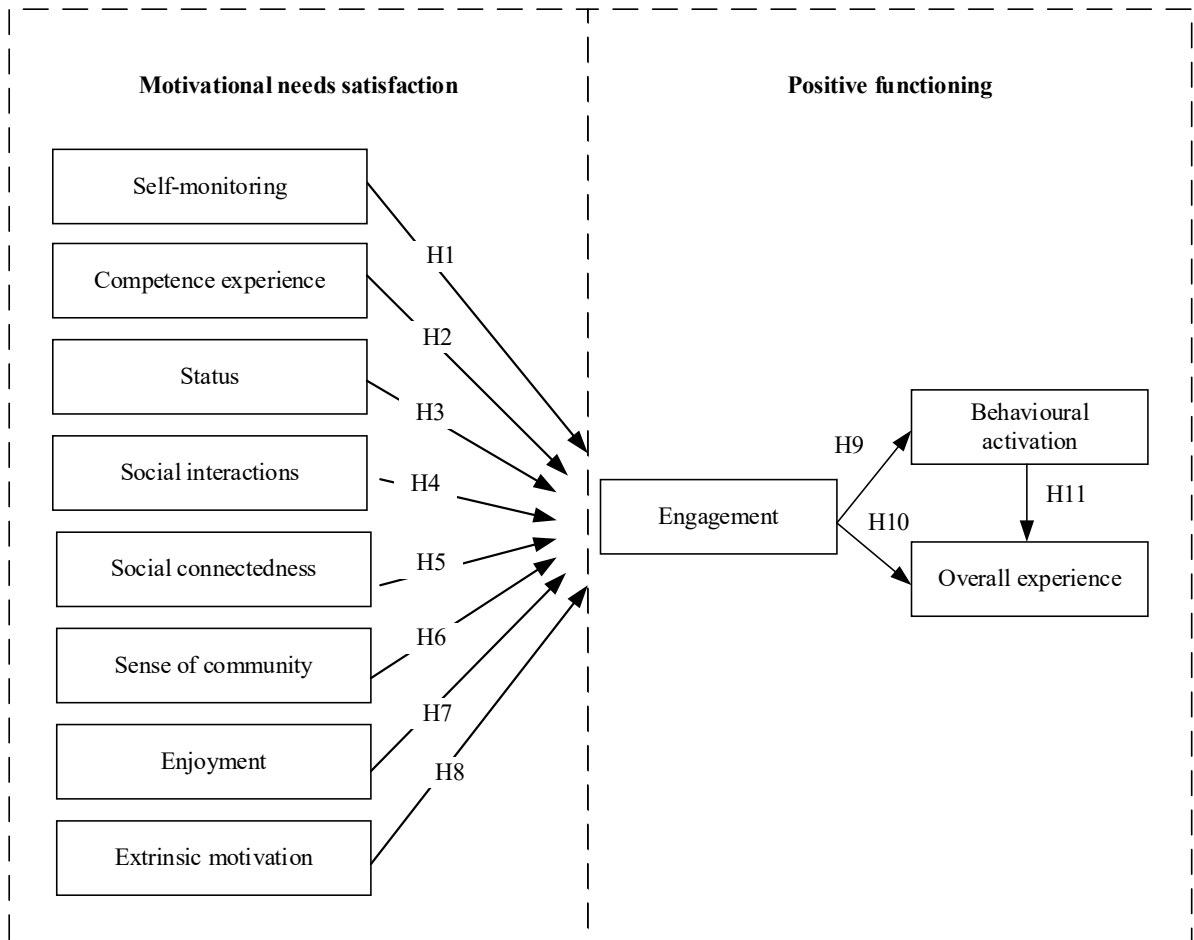
Based on self-determination theory and achievement motivation theory, this study derives and suggests socio-psychological motives from health and well-being contexts, which are particularly relevant for gamified technology engagement in a sports-related pleasure vacation context. Then,

based on tourists' engagement with the gamified technology, gratifications for tourists' overall experience are examined. On that basis, this study investigates how tourists' engagement with the gamified technology is associated with the gratifications for tourists' overall experience.

3 RESEARCH MODEL AND HYPOTHESES

The research model of this study comprises two conceptual dimensions: motivational needs satisfaction and positive functioning. The motivational needs dimension refers to tourists' motives that explain tourists' engagement with gamified technology. Positive functioning indicates to what extent tourists' engagement with the gamified technology influences their overall tourist experience. Positive functioning thereby describes the satisfaction of psychological and social needs, which, together with other elements of well-being such as positive emotions and engagement, are regarded as central for the tourist experience and human flourishing (Filep & Pearce, 2014; Seligman, 2011). It is expected that the way the gamified technology satisfies socio-psychological needs is positively associated with users' engagement with the gamified technology and consequently, the gratifications thereof for the overall tourist experience. Because the gamified technology is targeted at real-world behaviour, that is, in this context skiing/snowboarding, and thus aimed at behavioural reinforcement, the relationship between tourists' engagement with the gamified technology and tourists' overall experience is proposed to be mediated by behavioural activation. Figure 22 presents the research model of this study.

Figure 22: Proposed motivators of gamified technology engagement and the effects thereof for the overall tourist experience.



3.1 Motivators

Self-monitoring: One of the most fundamental functions of gamified technology includes performance tracking features, typically used in health-related contexts. These features allow users to record and track their physical activities by providing them with direct feedback on their physical performance (Lee & Cho, 2017; Munson & Consolvo, 2012), thus working towards users' goal achievement. Researchers have identified that self-monitoring activity is a fundamental motivation for users' engagement with performance-tracking features (Burke et al., 2012; Lee & Cho, 2017; Munson & Consolvo, 2012). Self-monitoring describes the information collected about one's own performance of a physical activity; it is often used as a motivational mechanism in combination with activities related to goal-setting, performance feedback, or review of goals (Munson & Consolvo, 2012). Munson and Consolvo (2012) assert that self-monitoring can work towards self-set goal achievement, assigned goals, or simply reflecting on one's activities. In this study, self-monitoring

is defined as tourists' desire to record and reflect on their skiing/riding activities at the ski resort for goal achievement-related self-monitoring or simply for reflecting and mentally re-experiencing the performed activities. Thus, the following hypothesis is suggested:

H1: The extent to which gamified technology satisfies users' need for self-monitoring is expected to be positively associated with users' engagement with the gamified technology.

Competence experience: 'Competence experience' from self-determination theory is a basic psychological need and refers to people's seeking out to master challenges that are optimal for one's own capacity (Ryan & Deci, 2000a; 2002). In game-related literature, competence experience is often used as a core motivational mechanism and major gratification for users' engagement with gamified technology (Koivisto & Hamari, 2019; Scharnow, Festl, Vogelgesang, & Quandt, 2015). In the context of a pleasure vacation at a ski resort, experiencing feelings of competence together with successful mastery of challenges are important motivators for tourists' active participation in physical activities such as skiing/snowboarding (Hungenberg, Gray, Gould, & Stotlar, 2016). Competition with the self and positive feelings of self-worth are particularly relevant motivators when practising physical activities for recreational purposes because these psychological needs *have been identified as important mechanisms for recovery and mental well-being* (Newman, Tay, & Diener, 2014; Sonnentag & Fritz, 2007). This study defines competence experience as tourists' need to experience positive feelings of self-worth and personal confirmation through skiing/riding. Thus, the following hypothesis is suggested:

H2: The extent to which gamified technology contributes to users' need for competence is positively associated with users' engagement with the gamified technology.

Status seeking: 'Power' from achievement motivation theory is represented by the variable *status seeking* in this study. Power-striving people often exhibit a strong need for recognition, status or position (Zhang, 2007). Status is a social motivation and describes the need to be recognised by others in the form of praise for one's achievements (McClelland, 1987). Status and the need for recognition represent a main social benefit from gamification engagement (Koivisto & Hamari, 2014) and significantly influence people's attitude towards using gamified services (Hamari & Koivisto, 2015b; 2015a). In this study, status is defined as the degree to which individuals gain social recognition within as well as outside of the gamified system through their achievements on the gamified system, for instance, their ranking on the leaderboard. It describes the value that one derives from gaining acceptance from and approval of other members, and the enhancement of one's social status within a community (Baumeister, 1998). Although skiing/snowboarding is practised for recreational purposes in the context of this study, perceived social recognition and appraisal from

others are basic social needs and crucial drivers for playing games and participating in sports in general (Hungenberg et al., 2016). Thus, the following hypothesis is suggested:

H3: The extent to which gamified technology satisfies tourists' desire for status is positively associated with tourists' engagement with the gamified technology.

Social interactions: Social interaction is the primary condition for affiliation and social belonging (McClelland, 1987). In a gamified context, social interaction refers to the extent to which players use the system as a social environment to facilitate interactions with others (Wei & Lu, 2014) and meet new people (Scharnow et al., 2015). Social interaction has been identified as a significant motivator and essential social gratification for gamification engagement in several studies (Chen & Pu, 2014; Chen, Zhang, & Pu, 2014; Li, Liu, Xu, Heikkilä, & van der Heijden, 2015; Scharnow et al., 2015; Wei & Lu, 2014). The social value derived from establishing and maintaining interactions with other players has been identified as a crucial motivational factor for gamification use behaviours (Chen et al., 2014; Chen & Pu, 2014). In a geographically concentrated action space such as tourism destinations, it can therefore be assumed that tourists may participate in the gamified technology because of the opportunities to socially interact with others in a playful and fun manner. Accordingly, engagement with the gamified technology may help to foster social interactions with existing social groups and establish new contacts outside of the system. Thus, the following hypothesis is suggested:

H4: The extent to which gamified technology contributes to users' desire for social interactions is positively associated with users' engagement with the gamified technology.

Social connectedness: Social connectedness describes people's degree of companionship and shared emotional connection (McClelland, 1987). Social connectedness and the conceptually related 'social relatedness' from self-determination theory (Ryan & Deci, 2002) have been identified as notable motivational mechanisms and gratifications for gamified technology use in general (Koivisto & Hamari, 2019) and in relation to health contexts in specific (Klenk, Reifegerste, & Renatus, 2017). In game-related settings, social connectedness accordingly refers to a player's psychological desire to interact and establish a personal connection with others through playing. Moreover, the enhancement of kinship relationships is a fundamental motivation for pleasure vacations in general (Crompton, 1979). Social activities build social relationships and encourage positive emotions (Rook, 1987). Shared social experiences during vacation thus convey a sense of belonging and a connection to others, which are essential human needs (Baumeister & Leary, 1995), and an important mechanism of recovery (Newman et al., 2014). In the pleasure vacation context, gamified technology may therefore represent a tool to foster existing social bonds and to establish new social connections

to other tourists through ‘playing’ via the gamified technology. Thus, the following hypothesis is suggested:

H5: The extent to which gamified technology contributes to users’ need for social connectedness is positively associated with users’ engagement with the gamified technology.

Sense of community: ‘Affiliation’ from achievement motivation theory is represented by the variable *sense of community* in this study. Affiliation describes the social need to belong and to win the affection of others (McClelland, 1987). Studies in the health context have shown that the need to belong to certain groups and gaining approval from affiliated others are notable social gratifications from gamification engagement (Hamari & Koivisto, 2015a; Koivisto & Hamari, 2014). Other studies have found that contributing to and receiving social support from one’s social community through engagement with the gamified technology leads to continued physical activities in health contexts (Lee & Cho, 2017; Munson, 2011). In this study, the sense of community is defined as individuals’ experiencing membership and belonging to the vacation destination through shared experiences by engaging with the gamified technology. Shared experiences not only help to develop connectedness to others but can transfer feelings of being part of something higher such as a community (Reeve, 2018). Thus, the following hypothesis is suggested:

H6: The extent to which gamified technology satisfies tourists’ desire for being part of the vacation community is positively associated with tourists’ engagement with the gamified technology.

Enjoyment: Fun and enjoyment refer to a general socio-psychological motivation related to pleasure vacation and playing games. The need for fun, relaxing, and stimulating experiences is a common motivation for pleasure vacations (Pearce, 2011). Similarly, the need to play describes people’s acting for ‘fun’ without further purpose and their seeking relaxation to reduce stress (McClelland, 1987). In the context of technology use, enjoyment can be defined as the values generated solely from the experience of using the technology and thus refers to the extent to which using the system is perceived as enjoyable in its own right (Li et al., 2015). Several studies have proven that enjoyment is a strong intrinsic motivation for engagement with gamified technologies (Hamari & Koivisto, 2015b; Koivisto & Hamari, 2014; Li et al., 2015; Wei & Lu, 2014). This study defines enjoyment as the extent to which the gamified technology contributes to individuals’ mental pleasure while skiing/snowboarding. Thus, the following hypothesis is suggested:

H7: The extent to which the gamified technology contributes to tourists’ enjoyment of skiing/snowboarding is positively associated with tourists’ engagement with the gamified technology.

Extrinsic Motivation: One basic functional motivation for engaging with gamified technology refers to the collection of points and badges, which can be redeemed for vouchers and products. Points, badges, and tangible rewards have been identified as foundational components of gamified interventions in health contexts and are typically classified as extrinsic motivations of gamified technology use (Lewis, Swartz, & Lyons, 2016). Extrinsically motivated activities are performed to achieve an outcome separable from the activity itself, similar to rewards, and have been reported to thwart intrinsic motivation (Deci & Ryan, 2012). However, despite intrinsically motivated behaviour being more sustainable and longer-lasting than extrinsic motivated behaviour (Ryan & Deci, 2000a), extrinsic motivation seems to play a role in people's engagement with gamified technology (Hamari & Koivisto, 2015b). In combination with intrinsic motivations, extrinsic motivational factors such as rewards can contribute to technology engagement (Kankanhalli, Tan, & Wei, 2005). Some people may only engage with the gamified technology to collect rewards; thus, the following hypothesis is suggested:

H8: The extent to which the gamified technology satisfies tourists' extrinsic motivation is positively associated with tourists' engagement with the gamified technology.

3.2 Engagement

Engagement with the gamified technology is defined as a user's positively valenced cognitive, emotional, and behavioural activity during or related to interaction with the gamified technology; engagement is conceptualised as a three-dimensional concept that includes cognitive processing, affection, and activation (Hollebeek, Glynn, & Brodie, 2014). On this basis, the cognitive processing refers to users' level of game-related thought processing and elaboration in the interaction with the gamified technology. The emotional dimension describes users' degree of positive affect in the interaction with the gamified technology. Activation is defined as the user's level of energy, and effort and time spent on the gamified technology while at the vacation destination, representing the behavioural dimension of engagement.

3.3 Consequences of Engagement

Engagement with gamified technology in real-world contexts aims to reinforce a behavioural action beyond technological system use with the end goal to contribute to an overall meaningful experience. The overall tourist experience can be defined as how tourists derive personal meaning from interactions with tourism products and services (Gretzel, Fesenmaier, & O'Leary, 2006). As a part of the destination setting, the gamified technology thereby represents an artefact which tourists

voluntarily interact with and derive personal value from for their overall experience. As tourists increasingly use diverse digital tools during travels and vacation, they have become co-creators of meaningful experiences (Gretzel et al., 2006). In this regard, gamified technology has been highlighted as a promising means to actively engage tourists at a deeper level of cognition and support them in the co-creation of meaningful experiences (Tussyadiah, 2017). Accordingly, this study captures how the gamified technology contributes to a meaningful stay and tourists' overall experience at the destination. Thus, the following hypothesis is suggested:

H9: Tourists' engagement with the gamified technology is positively associated with how gamified technology influences tourists' behaviour and consequently (H10), the overall tourist experience.

Behavioural activation represents the mediating variable and refers to increased physical activities stimulated by the gamified technology. Thus, the following hypothesis is suggested:

H11: Behavioural activation through gamified technology is positively associated with tourists' overall experience.

4 METHODOLOGY

An online survey was administered for data collection in this study. Data were collected from users of a gamified mobile app called 'INSIDE LAAX'. 'INSIDE LAAX' gamifies skiing/snowboarding at the tourism destination Flims/LAAX/Falera, Switzerland. The gamified features included 'performance tracking,' 'points,' 'badges,' a 'leaderboard,' and 'my friends' function. Thus, with the features 'performance tracking,' 'points,' 'badges,' and 'leaderboard,' the motivational design of the system mainly consists of affordances related to performance such as competence/achievement and rewards. The 'my friends' feature allows users to connect with and challenge other users to skiing/riding duels. This feature is thus targeted at performance-related affordances and social affordances.

The performance-related features 'performance tracking,' 'points,' 'badges,' and 'leaderboard' work through automatic tracking, so-called 'gate tracking.' That is, every time users pass the gates at the lifts or cable cars, performance data are tracked and therewith, the associated features, points, badges, and leaderboard are activated. Based on the tracked data, the system enables users to gain points and badges. For instance, when a user skies a particular slope, the system tracks the vertical metres and calculates the point value that the user gains with the performance. On the basis of the point values, pre-defined badges can be unlocked. Additionally, the system automatically calculates a ranking on

the leaderboard based on users' total vertical metres covered, and amount of ski lifts used. Table 23 describes the gamified features addressed in this study.

Table 23: Gamified features addressed in this study (based on Aebli, 2019).

Gamified feature	Core service activity of gamified feature
Performance Tracking	System records the performed skiing/snowboarding activities at the destination, that is, what slopes the user has been skiing/riding, the number of lifts used, and vertical metres covered.
Points, Badges	System provides immediate performance feedback in the form of collected points and badges. Badges are similar to trophies that can be collected through performed activities and are linked to the points system. The badges provide incentives for certain actions. Collected points can be redeemed for vouchers or merchandise articles (extrinsic motivators).
Leaderboard	System provides a ranking of the results of users' performed skiing/snowboarding activities based on the vertical metres covered, and amount of ski lifts used.
My Friends	System allows users to connect themselves with other users and to challenge them in skiing/snowboarding duels.

This study was conceptualised using a cross-sectional, non-experimental design. The survey was conducted by posting a description of the study and the survey link on the gamified mobile app 'INSIDE LAAX'. Hence, the questionnaire was accessible to users of the gamified mobile app only. Because the mobile app also included regular information and commerce services, a filter question was used at the beginning of the survey to evaluate whether the user actively used the gamified services on the mobile app. Before the actual data collection, a pilot study was initiated to pre-test the research model. The final survey was conducted from the end of March until the beginning of April 2019. Respondents of the survey were entered in a prize drawing for free skiing day passes.

4.1 Participants

Participants of the study were tourists who were highly engaged users of the gamified services on the mobile app 'INSIDE LAAX' during their stay at the ski resort Flims/LAAX/Falera, Switzerland, in winter 2019. In total, data from 1'914 participants were collected in the German and English language; of these, responses from 322 participants were removed because they were incomplete, provided unrealistic answers or were filled out in less than four minutes. Moreover, 136 responses

were from local visitors. As this study was interested in responses from tourists only, the 136 responses from local visitors were eliminated. The final sample was 1'456 participants. Of these, 895 participants were male (61.1%) and 561 participants were female (38.9%). Participants' ages ranged between 11 and 79 years. Age distribution can be described as normal, with the age group of 46–55 years old as the biggest category. Majority of the guests were vacation-home owners (64.1%) and travelled with their families (58.7%). Table 2 provides an overview of the demographics of the participants of this study.

Table 24: Demographics of participants.

	Frequency	Percent		Frequency	Percent
Gender (n=1'456)			Type of Guest (n=1'456)		
Male	895	61.1%	Day visitor	75	5.2%
Female	561	38.9%	Hotel guest	84	5.8%
			Vacation rental apartment guest	363	24.9%
			Vacation-home owner	934	64.1%
Age (n=1'451)			Travel Companion (n=1'456)		
≤ 20	100	6.87%	Friends	190	13.0%
21–30	167	11.47%	Partner, girlfriend/boyfriend, spouse	370	25.4%
31–45	343	23.56%	Family	854	58.7%
46–55	459	31.52%	School class, sports camp	1	0.1%
56–65	250	17.17%	Alone	34	2.3%
> 65	132	9.07%	Others	7	0.5%
Missing values	5				

4.2 Measures

This study used an online, self-report survey which consisted of 48 items in the main section that referred to participants' socio-psychological motivators and their engagement with the gamified technology. All items were measured on a five-point Likert scale ranging from '*strongly disagree–strongly agree*' anchor statements. All measures of the survey are described as follows.

Self-monitoring. Self-monitoring was measured with the variable 'recordability'. Both variables self-monitoring and recordability describe the information collection about one's own performance

of a physical activity (Munson & Consolvo, 2012). A four-item scale was used to measure recordability by adopting items from Lee and Cho (2017) on gratifications from fitness apps and Kaplan et al. (2003) on the use of health technology.

Competence experience. A six-item scale was adopted from Sheldon et al.'s (2001) study on psychological needs to measure competence experience. To best capture competence experience motivation for the context of this study, two additional items were adopted from Sonnentag and Fritz (2007) on mastery needs and Ryan et al.'s (1997) study on sports psychology.

Status seeking. Status seeking was measured with the variable 'social enhancement' and based on a four-item scale adopted from Lin et al. (2017) and Okazaki (2009), both studies on gratifications of social technology use. Additional conceptual support for these items came from studies on gratifications from social networking sites (Cheung, Chiu, & Lee, 2011; Dholakia, Bagozzi, & Pearo, 2004).

Social interactions. A three-item scale was used to measure social interaction gratifications. The items were adopted from general social interaction gratifications (Jahn & Kunz, 2012; Lin, Fang, & Hsu, 2014) and intrinsic motivations for physical activities (Ryan et al., 1997).

Social connectedness. A five-item scale was used to measure social connectedness. The items were adopted from Klenk et al.'s (2017) study on gratifications from fitness apps and studies on the more general psychological need 'social relatedness' (Jang, Reeve, Ryan, & Kim, 2009; Sheldon et al., 2001). Further conceptual support for the items came from Lee and Robbins (1995) on social connectedness and Jahn and Kunz (2012) on social relationship value.

Sense of community. Sense of community was measured by means of a four-item scale adopted from Peterson et al. (2008) on the principal theory of sense of community.

Enjoyment. Enjoyment motivation was measured with a four-item scale based on hedonic gratifications from playing online games adopted from Li et al. (2015).

Extrinsic motivation. Four items were adopted from Kankanhalli et al. (2005) and Bock et al. (2005) on general information system use to measure extrinsic motivation.

Engagement. A six-item scale was used to measure participants' engagement with the gamified technology, adopted from Hollebeek et al.'s (2014) consumer brand engagement with social media. Six out of a total of 10 items were adopted to measure engagement for the context of this study, with two items each for the cognitive, emotional, and behavioural dimension of engagement.

Behavioural activation. Behavioural activation through gamified technology was measured with a four-item scale based on Tussyadiah and Zach's (2012) items of 'en-route experience' and Hamari et al.'s (2014a) conceptualisation of behavioural outcome of gamified technology use. In this study, behavioural activation includes measures such as 'being more active' during the stay at the destination, 'better use of time,' and 'skiing/riding more different slopes.'

Overall tourist experience. The overall tourist experience was measured with a four-item scale adopted from Tussyadiah and Zach's (2012) concept of meaningful tourist experiences. It measures how the use of gamified technology generates gratifications related to a meaningful stay and overall positive experience.

All items were positively worded and adjusted for the context of this study. Moreover, support for the conceptualisation of the items was from qualitative in-depth interviews with 18 tourists who were highly engaged users of the examined gamified features in this study (Aebli, 2019) (Appendix A). Prior to final data collection, the developed items were evaluated by two experts from the field of gamification and two experts from the field of tourism. Item sets were randomised in the survey to mitigate order effects and reduce the potential for response sets.

4.3 Validity and Reliability

Convergent and discriminant validity was used to measure validity of the model. Convergent validity describes the degree to which dimensional measures of the same concept are correlated (Nusair & Hua, 2010). Convergent validity was assessed with the three metrics average variance extracted (AVE), composite reliability (CR), and Cronbach's alpha (Alpha). All of the convergent validity metrics exceeded the recommended thresholds by Fornell and Larcker (1981), suggesting that internal consistency of the model was met: AVE measures were greater than 0.5, CR was greater than 0.7 (Fornell & Larcker, 1981), and Cronbach's alpha was greater than 0.7 (Nunnally, 1978). Moreover, discriminant validity describes the extent to which the conceptually similar concepts are distinct, thus requiring that the measures of the theoretically different constructs have low correlations with each other (Nusair & Hua, 2010). Discriminant validity was also met in the model, firstly, with the square root of the AVE for each of the constructs higher than the correlation between the construct and all the other constructs in the model (Fornell & Larcker, 1981). Secondly, no inter-correlation between constructs was higher than 0.9 (Pavlou, Liang, & Xue, 2007). Overall, it can thus be concluded that internal consistency and reliability of the model was met.

Table 25 shows the results of the validity calculations. Only well-established measurement items were used to measure the constructs. Data analysis was conducted with the software SPSS.

Table 25: Convergent and discriminant validity.

Variable	AVE	CR	Alpha	Square Root AVE												
				1	2	3	4	5	6	7	8	9	10	11		
1 Engagement	0.583	0.893	0.855224	0.764												
2 Extrinsic motivation	0.629	0.869	0.787533	0.428	0.793											
3 Self-monitoring	0.657	0.884	0.815893	0.404	0.180	0.811										
4 Competence experience	0.737	0.944	0.928173	0.564	0.354	0.544	0.858									
5 Status	0.850	0.958	0.941070	0.412	0.264	0.361	0.577	0.922								
6 Social connectedness	0.743	0.935	0.912168	0.499	0.230	0.392	0.506	0.587	0.862							
7 Sense of community	0.871	0.964	0.950332	0.476	0.284	0.345	0.482	0.434	0.660	0.933						
8 Social interactions	0.819	0.932	0.889757	0.496	0.258	0.301	0.487	0.487	0.600	0.547	0.905					
9 Enjoyment	0.863	0.962	0.946989	0.553	0.352	0.451	0.619	0.443	0.445	0.499	0.573	0.929				
10 Behavioural activation	0.709	0.907	0.860565	0.520	0.371	0.394	0.632	0.445	0.415	0.451	0.471	0.661	0.842			
11 Overall experience	0.773	0.931	0.900983	0.593	0.359	0.449	0.618	0.47	0.497	0.558	0.547	0.718	0.755	0.879		

Note. Square roots of AVEs are reported in bold in the diagonal.

5 RESULTS

5.1 Descriptive Statistics

Data of this study were assessed for missing values and common method bias. There were 20 cases with missing values in the demographics data and the construct ‘loyalty.’ Missing value analysis using Little’s MCAR test (Little, 1988) was non-significant, suggesting that the data were missing completely at random. Accordingly, missing value was not a concern in this study. Because the missing values did not concern the key measurement constructs, they were not replaced with substituted values, that is, no imputation method was applied. Moreover, exploratory factor analysis with one factor (no rotation) revealed that the variance explained by a single factor was less than 50% (38.5%), suggesting that the data was free from common method bias (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). The descriptive statistics for the socio-psychological motivators are presented in Table 26.

Table 26: Descriptive statistics of socio-psychological motivators for gamified technology engagement.

Variable	Mean	Standard deviation	Skewness	Kurtosis
Self-Monitoring	3.85	0.79	-0.59	-0.11
Competence Experience	3.31	1.00	-0.46	-0.39
Status	2.08	1.04	0.70	-0.38
Social Interactions	3.03	1.03	-0.30	-0.65
Social Connectedness	2.69	1.06	0.08	-0.86
Sense of Community	2.90	1.11	-0.22	-0.80
Enjoyment	3.23	1.09	-0.48	-0.40
Extrinsic Motivation	3.79	0.79	-0.62	0.02

5.2 Socio-Psychological Explanations for Gamified Technology Engagement and Consequences of Engagement

To test how well the socio-psychological motivators explained ‘engagement’ with the gamified technology, multiple linear regression analysis (MLR) was conducted. Data were first tested for normal distribution, homoscedasticity, and normal distribution of residuals (Cohen, Cohen, West, & Aiken, 2015). Normal probability plots and scatterplots of the standardised residuals indicated that

assumptions of normality, homoscedasticity, and linearity of residuals were met. Outliers were identified for the variables' engagement, extrinsic motivation, self-monitoring, and the socio-demographic measure of participants' 'loyalty' to the tourism destination. After eliminating the outliers, a sample of N = 1'387 was retained.

Independence of residuals was measured by means of the Durbin Watson Test. A Durbin Watson value between 1.5 and 2.5 indicates that residuals are independent of each other and auto-correlation is not a concern (Chatterjee & Simonoff, 2012). Independence of residuals was met with a value of 2.009. Moreover, collinearity was acceptable in this study with all VIF values < 3 (2.451). MLR accounted for 47.7% of variance for engagement with gamified technology (F = 156.97, p < 0.05). ANOVA results indicated an excellent model fit, thus, it can be assumed that the model explains a significant amount of the variance of gamified technology engagement. Table 27 shows the model fit for engagement with the gamified technology.

Table 27: ANOVA model for engagement with gamified technology.

		ANOVA ^a				
		Sum of squares	df	Mean square	F	Sig.
1	Regression	398.974	8	49.872	156.974	.000 ^b
	Non-standardised residuals	437.802	1378	.318		
	Total	836.776	1386			

Note.

a. Dependent Variable: Engagement

b. Independent Variables: Self-monitoring, competence experience, status, social interactions, social connectedness, sense of community, enjoyment, extrinsic motivation.

In descending order, the most variance was positively explained by the variable extrinsic motivation, competence experience, enjoyment, social connectedness, social interactions, self-monitoring, and sense of community. Status was the only variable that showed a negative, non-significant correlation. The regression coefficients and significance (p-values) are displayed in Table 28.

Table 28: Socio-motivational MLR coefficients for explaining engagement with gamified technology.

		Coefficients ^a			
		Unstandardised Coefficients		Standardised Coefficients	
Variable		B	Std. Error	Beta (β)	sr2
	Extrinsic motivation	.206	.021	.211	.192***

Competence experience	.155	.023	.199	.130***
Enjoyment	.123	.020	.173	.120***
Social connectedness	.116	.022	.158	.101***
Social interactions	.087	.021	.115	.081***
Self-monitoring	.076	.024	.077	.063**
Sense of community	.040	.019	.057	.040*
Status	-.026	.020	-.035	-.026

Note. a. Dependent Variable: Engagement

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

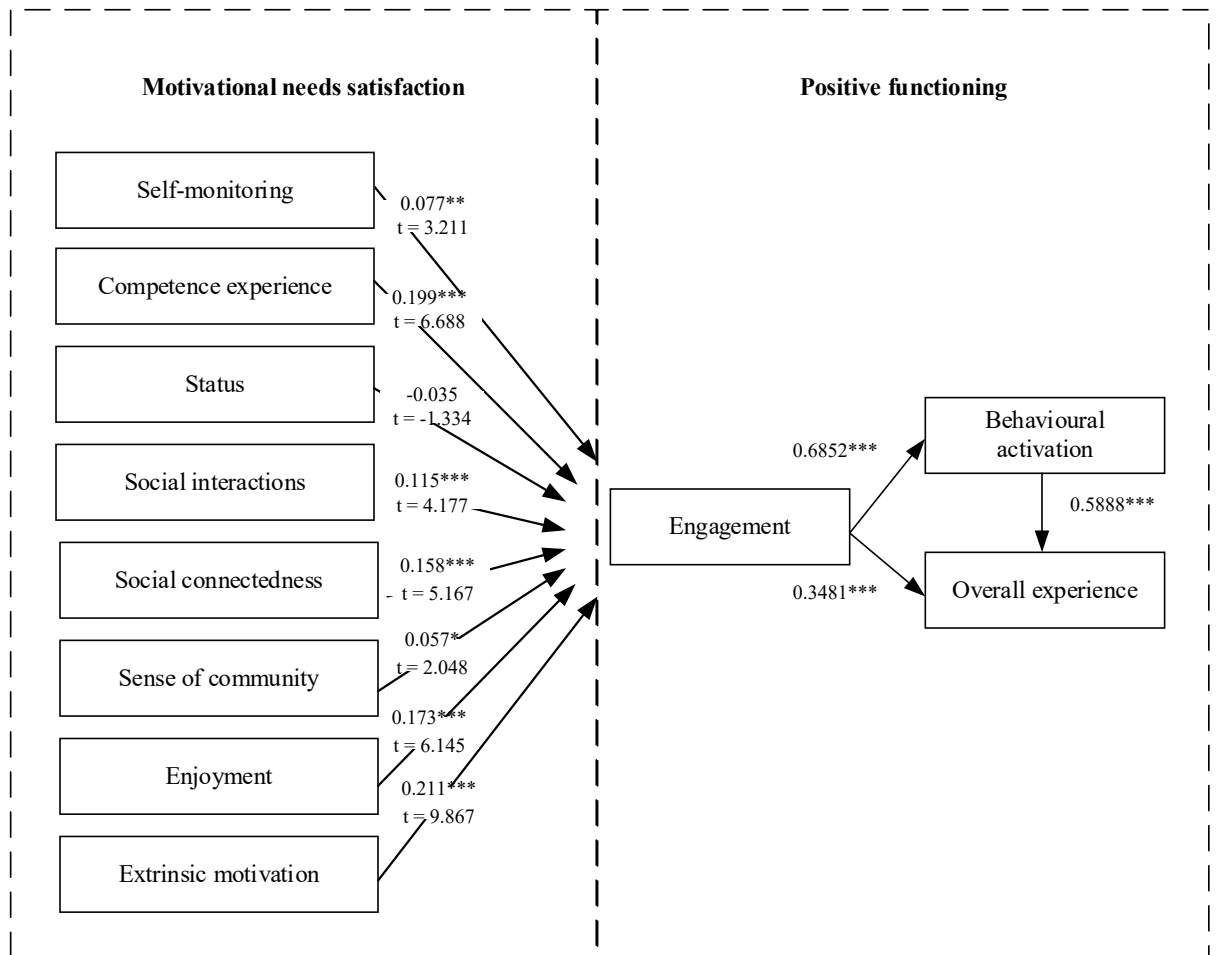
As indicated by the results of MLR, except for status seeking, all the paths between the independent variables (IVs) and the dependent variable (DV) ‘engagement’ in the research model were positive and statistically significant. Therefore, the model supports hypotheses H1–H2 and H4–H8. Only H3 was not supported, because status seeking was not significantly, positively associated with engagement with gamified technology. To further test whether tourists’ ‘engagement’ with gamified technology is positively associated with the influence the gamified technology has on tourists’ ‘overall experience’, and more specifically whether ‘behavioural activation’ through gamified technology mediated the relationship between ‘engagement’ and ‘overall experience’, structural equation modelling using mediation test was conducted.

The mediation test was conducted based on the steps presented by Hayes (2009) using bootstrapping. According to Hayes (2009), simulation research has shown that bootstrapping is one of the more valid and powerful methods for testing intervening variable effects (Mackinnon, Lockwood, & Williams, 2004; Williams & Mackinnon, 2008). Therefore, Hayes (2009) posits that bootstrapping has more explanatory power than the traditional causal steps approaches based on Baron and Kenny (1986). The mediation test was performed with the PROCESS function in SPSS.

The findings indicate that behavioural activation fully mediated the relationship between tourists’ engagement with the gamified technology and the extent to which gamified technology influences tourists’ overall experience. In Step 1 of the mediation model, the regression of tourists’ engagement with the gamified technology on their overall experience, ignoring the mediator, was significant, $b = .7516$, $t(1'385) = 27.43$, $p = <.001$. Step 2 showed that the regression of tourists’ engagement with the gamified technology on the mediator, behavioural activation, was also significant, $b = .6852$, $t(1'385) = 22.66$, $p = <.001$. Step 3 of the mediation process showed that the mediator (behavioural activation), controlling for engagement with the gamified technology, was significant, $b = .5888$, $t(1'384) = 31.79$, $p = <.001$. Step 4 of the analyses revealed that, controlling for the mediator

(behavioural activation), tourists' engagement with the gamified technology scores were a significant predictor of tourists' overall experience, $b = .3481$, $t(1'384) = 14.27$, $p = <.001$. A Sobel test was conducted and found full mediation in the model ($z = 18.45$, $p < .001$). Total indirect effect of engagement with gamified technology (X) on tourists' overall experience (Y) through behavioural activation (M) accounted for 0.4035, with a 95% confidence interval which did not include zero, that is, the effect was significantly greater than zero at $\alpha = .05$. Overall, the mediator could account for approximately half of the total effect, $P_M = 0.54$. Thus, hypotheses H9–H11 were supported. Figure 23 shows the path model results of the MLR and mediation analysis including the coefficients and confidence intervals (CIs).

Figure 23: Path model results.



Reported paths: Standardized Coefficients Beta (β)

Reported paths: Coefficients

Note. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

In addition to the hypotheses presented in the research model, we controlled for the effects of age, gender, and tourists' loyalty to the tourism destination on the dependent variable of the MLR, that is, engagement with gamified technology. Two of the control variables provided statistically significant effects: both gender and loyalty had an effect on engagement with the gamified technology (R² of engagement increased by 0.124), indicating that women reported somewhat higher engagement with the gamified technology ($t = 2.559^*$) and highly loyal guests reported a considerably higher engagement with the gamified technology ($t = 7.400^{***}$).

6 DISCUSSION

This study examined socio-psychological motivators for engagement with gamified technology and the gratifications thereof for the overall tourist experience. The proposed socio-psychological motivators explained the model relatively well. Seven of the eight socio-psychological motivators significantly explained users' engagement with gamified technology during their vacation at the ski resort. As demonstrated by the results of this study, tourists' engagement can most strongly be explained by tourists' extrinsic motivation, their need for competence experience, enjoyment, social connectedness, and social interactions (in descending order). Tourists' needs for self-monitoring and sense of community contributed less strongly to engagement with the gamified technology. Status seeking was the only motivator not significantly associated with gamified technology engagement. These results indicate several findings:

The results of this study suggest that the basic function of being able to collect points, badges, and rewards in the form of tangible benefits is valuable to tourists in their engagement with the gamified technology. Tangible benefits such as collecting merchandise products from the vacation destination may be an important expression for guests' identification with the vacation destination. Although, extrinsic motivation has been discussed controversially in game-related literature because extrinsic motivation may be detrimental to intrinsic motivation towards gamified technology engagement (Johnson et al., 2016; Zichermann & Cunningham, 2011), this study shows that a mix of intrinsic and extrinsic motivational factors contribute to tourists' engagement with gamified technology.

The finding that the psychological needs factors 'competence experience' and 'social connectedness' based on self-determination theory (Ryan & Deci, 2002) are significant predictors of engagement is in accordance with previous research. Competence experience and relatedness have been identified as fundamental explanations of why people play games in general (Rigby & Ryan, 2011). On that basis, the desire for competence experiences and personal confirmation has been recognised as a significant motivator for using gamified technology in various contexts such as festival tourism (Liu

et al., 2019) and sustainable mobility (Weiser, Bucher, Cellina, & Luca, 2015). Because feelings of competence together with successful mastery of challenges are notable motivations for performing one's favourite winter sports activity during vacation (Hungenberg et al., 2016), the results suggest that gamified technology represents a valuable tool to successfully contribute to these values and with that, tourists' positive feelings of self-worth. Similarly, social relatedness has been identified as a notable psychological motivator for engagement with gamified technology in general (Koivisto & Hamari, 2019). As indicated by the results of this study, tourists engage with the gamified technology because it provides them with feelings of shared experiences and connectedness to other tourists through 'playing' via the gamified technology.

Moreover, social motives are crucial for tourists' engagement with the gamified technology. Tourists engage with the gamified technology because it provides them with interesting discussions with other tourists. This result is insightful because it suggests that engagement with the gamified technology stimulates social interactions outside the gamified system and that the gamified technology creates important social dynamics around the game. Social interactions and fostering social relationships are fundamental motivations of pleasure vacations (Crompton, 1979) that seem to be particularly fostered by the gamified technology in this study. Although the value of social interactions has been recognised as a significant social motivation for gamification engagement (Chen et al., 2014; Chen & Pu, 2014), these studies have examined social interaction as effects *within the game* and typically related to games that are played in groups, for instance, through cooperation with other players. This is not the case in this study. The findings of this study show that gamified technology functions as an exogenous activator for fostering social interactions in the real-world. Additionally, tourists' desire to be part of the vacation community positively explained tourists' engagement with the gamified technology. This result is particularly interesting because mutual engagement with gamified technology could foster community-building in a tourism destination. This finding is in line with studies that have generally discussed strengthening social bonds and fostering senses of community through gamified technology in tourism (Liu et al., 2019), environmental contexts (Lee et al., 2013), and education contexts (Li, Dong, Untch, & Chasteen, 2013).

Enjoyment and self-monitoring depict further significant predictors of gamified technology engagement. Accordingly, tourists engage with the gamified technology because it makes skiing/snowboarding more fun and exciting. This finding suggests that gamified technology contributes to tourists' pleasure during vacation, what eventually holds the potential to contribute positively to tourists' mental well-being (Ryan, Huta, & Deci, 2008). Enjoyment has been identified as a hedonic explanation for gamified technology use in general (Hamari & Koivisto, 2015b; Koivisto & Hamari, 2014; Li et al., 2015). Further, tourists' need to record and reflect on their

skiing/riding activities at the destination and comparing these performances over time provides additional explanations for engagement. This result is in line with previous studies that have asserted that self-monitoring is a fundamental motivation for engaging with gamified technology in health- and sports-related contexts (Burke et al., 2012; Lee & Cho, 2017; Munson & Consolvo, 2012), suggesting that tracking features are promising for pleasure vacations at ski resorts for several reasons: they not only allow tourists to record their skiing/riding performances but at the same time represent a means to recollect experiences.

Although researchers have identified the need for recognition and status to be positively associated with gamified technology engagement (Hamari & Koivisto, 2015b; 2015a; Koivisto & Hamari, 2014), status seeking showed a negative, non-significant relation to engagement with gamified technology in this study. This result is in contrast to Zichermann and Cunningham's (2011) rhetoric of social status as one of the most central rewards and drivers for gamified technology engagement. This finding is particularly remarkable because the examined gamified features referred to performance-driven mechanisms, which would typically fuel humans' innate desire for status competition, as asserted by Zichermann and Linder (2010). However, the non-significant result in this study could be a matter of socially desirable responding, a commonly reported concern of self-report research methods (Paulhus, 2017). Although confidentiality and anonymity of the respondents in this study were ensured to minimise effects of socially desirable responding, bias of social desirable responding may still occur due to the positively worded measurement items such as 'impressing others' in measuring status seeking in this study.

Overall, the results reveal that engagement with the gamified technology contributes to tourists' behavioural activation and overall experience. More specifically, tourists' engagement with the gamified technology is positively associated with how the gamified technology contributes to tourists' overall experience, mediated by behavioural activation. This result suggests that when the gamified technology addresses those values that are personally meaningful to the tourists, gamified technology contributes to a meaningful overall experience. Because tourists voluntarily engage with the gamified technology, gamified technology represents a promising means to actively involve tourists and add to their overall positive functioning during the stay at the destination. This finding represents an enhancement of the gamification conceptualisation (Koivisto & Hamari, 2019) by showing that successful behavioural activation through gamification engagement additionally leads to positive psychological experiences.

7 CONCLUSION

7.1 Theoretical and Practical Implications

This study is one of the first to investigate why tourists' engage with gamified technology during their vacation and how the engagement thereof contributes to the overall tourist experience. Self-determination theory and achievement motivation theory provided a suitable theoretical framework to explain the underlying socio-psychological motivations for engaging with gamified technology. Findings of this study suggest that especially tourists' psychological motives for competence and relatedness, social motives for social interactions and a sense of community, and the emotional motive for enjoyment played a role in their engagement of these features. Engagement with the gamified technology further contributes to tourists' overall vacation experience.

Based on these findings, the theoretical contributions of this study are threefold: **First**, this study contributes to the game-related literature on the motivational needs underlying users' engagement with gamified technology (Hamari, Koivisto, & Sarsa, 2014b; Ryan et al., 2006; Zhang, 2008). In particular, this study adds to the literature of gamified technology (Deterding, 2011; Koivisto & Hamari, 2019) by demonstrating that in addition to general psychological factors of competence and relatedness, social as well as emotional factors depict a significant motivational reason for engaging with gamified technology in specific contexts. This finding directly contributes to the research on social motivators of gamified technology engagement (Hamari & Koivisto, 2015b; 2015a). **Second**, the findings of this study add to the tourism literature on the value of gamified technology for the tourist experience (Xu et al., 2016), and more specifically, the role thereof in facilitating tourists in their goal achievement. **Third**, on a more general level, this study adds to the discussion on the value of motivational design and gamified technology to contribute to human positive functioning and mental well-being (Deterding, 2014; Jones, Scholes, Johnson, Katsikitis, & Carras, 2014). This study underlines the perspective of persuasive technology as playing an active role in shaping human experiences by providing an empirical application thereof. In particular, based on the finding that gamified technology is positively associated with meaningful tourist experiences, this study lays the foundation for further research on how to design meaningful and memorable tourist experiences with the principles of gamified design, contributing to the conceptualisation of gamification in tourism (Bulencea & Egger, 2015). Thus, the findings of this study link insights from positive psychology (Seligman, 2011) and motivational design (Zhang, 2007; 2008).

Practically, this study provides tourism destinations with specific insights into the motivational mechanisms of how engagement with gamified technology can be fostered. The findings of this study

further reveal the effects of gamified technology for the overall tourist experience. For tourism destinations, it is vital to offer technological tools that support tourists in their shaping of personally meaningful vacation experiences. Gamified technology is a promising means to do so as it demonstrates a relatively new approach to engage tourists in a meaningful manner during their stay at the destination. The results of this study are applicable to comparable tourism destinations that seek to provide their tourists with gamified technologies to contribute to meaningful vacation experiences.

7.2 Limitations and Future Research

There are some limitations that must be considered when interpreting the results of this study. **First**, as it is commonplace with studies conducted by online surveys, the data is self-reported and respondents are self-selected. Using self-reported data may affect the findings as the users are potentially more actively engaged with the gamified services and more willing to participate than less engaged users. Overall, participants indicated themselves as relatively highly engaged users of the gamified technology. Thus, the results of this study disregard the perceptions of less active users of the services. Relatedly, participants were highly loyal guests to the vacation destination including a relatively high number of apartment owners. Nonetheless, the results of this study confirm previous findings on gamified technology from Liu et al. (2019) and Xu et al. (2016) from other tourism contexts. Future studies should also include the perception of less-engaged users of gamified technology in tourism contexts. Additionally, the reasons for not becoming involved in the gamified technology should be addressed in future studies to increase robustness of this research topic.

Second, this study surveyed the gratifications of gamified technology engagement for the overall tourist experience and examined the association between tourists' engagement and their overall experience. Future research should use experimental designs including users and non-users of gamified technology to investigate whether gamified technology engagement affects tourists' overall experience. Koivisto and Hamari (2019) already identified a general need for empirical research on gamification that uses controlled, experimental research settings. Moreover, this study represents a one-time excerpt of the phenomenon under investigation. Future research could use longitudinal studies to investigate how motivations for engaging with gamified technology evolve over time and with the usage experience of the participants.

Third, it is also common in quantitatively-aligned studies that the results are reductionist and geared toward generalizable indications of the phenomenon under investigation. Therefore, this study potentially did not investigate all possible motivations behind using the gamified technology. Despite

these limitations, this study provides notable theoretical and practical insights into the relevance of gamified technology for the tourist experience. With today's broad acceptance of technology use during vacation, this study shows that user-centric design can play an important role in tourists' co-creation of meaningful experiences and the stimulation of positive emotions during vacation.

APPENDIX

Appendix A. Results of the exploratory study (Aebli, 2019)

Functional motives	Psychosocial motives	End values
	<i>personal</i>	
arouses interest & learning arouses ambition compete/compare with others challenge each other create own game tangible benefits/consumption	challenge myself/explore limits improve skills/progress knowledge/learning personal confirmation/competence experience set new goals	be part of it/sense of community bonding with family & friends fun & enjoyment/happiness self-respect/self-esteem sense of accomplishment/progress social recognition/status
	<i>social</i>	
	entertainment have something to talk about impress others/show off	
	<i>affective</i>	
	creates memories/reminiscence daydreaming/escape everyday life excited anticipation excitement/feeling excited re-experience/enjoy again feeling connected	

	joy satisfaction/fulfilment	
	Behavioural consequences	
	adjust route/ride different slopes ride more connect/meet up with others at the destination	

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