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Emotions and consumers' adoption of innovations: An integrative review and research agenda

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ABSTRACT

The dominant models of innovation adoption have traditionally overlooked the role of emotions, despite the relevance of this construct in consumer decision-making. To address this historical gap, a notable stream of research on emotions in innovation adoption has emerged in recent years. To enrich our understanding of the psychology of innovation adoption, this paper integrates insights from research on emotions in psychology with a systematic review of the literature on consumer emotions in innovation adoption. Drawing on well-established theories of emotions and decision-making, we derive five fundamental dimensions that help define the role of emotions in the consumer adoption of innovations. A systematic review of existing evidence within the specific field of innovation adoption summarises the existing evidence through the lens of the five dimensions. The contributions of the paper are twofold. First, the paper offers a novel perspective that provides a deeper understanding of emotions as a psychological mechanism enabling or impeding innovation adoption. Second, we set an agenda for invigorating research in this important domain.

1. Introduction

Given the high rate of failure of innovations (Claudy et al., 2015), understanding why and under what circumstances consumers adopt innovations is a pivotal issue in both practice and theory. Traditionally, scholars have focused on the rational drivers or motives of innovation adoption, while the role of emotions has been overlooked. This is evidenced by meta-analyses (Arts et al., 2011) or reviews of the innovation adoption literature (e.g., Lu et al., 2018; Marikyan et al., 2019), which have omitted emotions as antecedents of consumers' adoption of innovations. Similarly, the four dominant theories on innovation adoption (van Oorschot et al., 2018) have downplayed the role of emotions. The four theories—innovation diffusion theory (Rogers, 1983), the theory of planned behaviour (TPB) or decomposed TPB (Taylor and Todd, 1995), the technology acceptance model (TAM) (Davis, 1987) and the unified theory of acceptance of technology (UTAUT2) (Venkatesh et al., 2012)—propose that intentions to adopt innovations are a function of consumers' cognitive judgements concerning three aspects: (1) the perceived usefulness of the innovation, with most studies focusing on technology as innovation, (2) social pressure to adopt, and (3) individual ability or opportunity to adopt an innovation. Such judgements are

posited as linear and independent predictors of intentions to adopt or to use an innovation.

However, adoption is driven not only by what consumers think of innovations but also by how they feel about them. Research from multiple domains of the social sciences shows that emotions are fundamental to decision-making (Lerner et al., 2015), consumer behaviour (Bagozzi et al., 1999) and social change (Barberá-Tomás et al., 2019; Turner and Stets, 2005). Emotions contribute to shaping perceptions of risk (Lerner and Keltner, 2001), which are often critical to embrace new technology (Rogers, 1983). Moreover, since innovation adoption typically requires a volitional, effortful choice, emotions can offer motivational energy, which is the inner drive required for adoption (Bagozzi et al., 1999). Emotions are also fundamental for interpersonal communication and social dynamics (Turner and Stets, 2005; Van Kleef et al., 2010); in fact, emotions can be observed by or shared with others, thereby shaping the diffusion of innovations (Mimoun et al., 2021; Valor, 2020). Consequently, the social expression of emotions is fundamental for the acceptance (or rejection) of social and technological innovations (Barberá-Tomás et al., 2019; Mimoun et al., 2021). Different streams of scholarship show that emotions operate jointly with cognition to shape our choices (Lerner et al., 2015; Pham, 2007). In this sense,

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rather than being two independent systems, emotions and cognitions are systematically intertwined with and influence each other. Managers and policy-makers wanting to promote the uptake of innovations, therefore, need to rely on a broader toolkit that leverages critical insights about the cognitive influences of innovations established in the literature while incorporating lessons on the role of emotions.

Indeed, scholarly research on the affective drivers of consumer adoption has emerged in recent years (Steinert and Roeser, 2020). To advance knowledge on the psychology of innovation adoption, we draw from psychological research on emotions and its influence on cognition and behaviour (hereafter referred to as emotions and decision-making) to articulate five fundamental research dimensions (e.g., Angie et al., 2011; Lerner et al., 2015; Pham, 2007) that together explain how emotions affect innovation adoption. Specifically, these dimensions explicate which discrete emotions influence adoption, which targets of emotions are implicated in the decision to adopt, how emotions affect the different stages of innovation adoption, how emotions are regulated, and how emotions and appraisals interact to influence decisions to adopt and use innovations. Further, we systematically review studies on emotions and consumers' adoption of innovations and interpret the evidence in light of these dimensions. By integrating these two fields of research (i.e., the psychology of emotions and decision-making AND emotions in innovation adoption), we show that while making notable advances, past scholarship does not fully reflect the fundamental and multifaceted role that emotions play in consumer decision-making (Adnan et al., 2017; Bagozzi, 2007; Steinert and Roeser, 2020; Rezvani et al., 2015). Through this process of analysis and critique, this review identifies research gaps and proposes fruitful areas for further research.

The theoretical contributions of our paper to the research on innovation adoption are twofold. First, the paper shows how insights from emotion and decision-making can extend the psychological foundations of innovation adoption research. More specifically, the paper presents an integrated perspective articulated along the five research dimensions listed above. This novel perspective provides a deeper understanding of emotions as a psychological mechanism enabling or impeding adoption that can further enrich the existing conceptualisation of innovation adoption while also helping managers address the high rate of failure of innovations. Second, the paper offers an agenda for future research organised around five key questions that warrant scholarly attention. Both contributions pave the way towards the development of a rich stream of scholarly work on how emotions shape consumers' responses to the wide range of technological and nontechnological innovations introduced by businesses, governments and other private and public institutions.

2. Insights from emotion theory: emotions and innovation adoption

We begin with an overview of the dominant and widely shared insights into the psychology of emotions. This section presents five dimensions that have emerged in the psychological literature as constitutive of the emotional experience and fundamental to explaining the influence of emotions on cognition and behaviour. These five dimensions will lead us to pursue five research questions in the literature on consumer emotions in innovation adoption.

2.1. Constitutive elements of emotions and emotional experience

Emotions are complex and intense reactions elicited by events or situations that individuals find personally significant and typically involve a subjective experience, a physiological response, and a behavioural tendency (Baumeister et al., 2007; Lerner et al., 2015; Pham, 2007). Emotions are differentiated from moods that are less intense, less specific and less clearly tied to specific external elicitors (Beedie et al., 2005; Steinert and Roeser, 2020). Emotions have four

constitutive elements (Lazarus, 1991; Pham, 2007; Roseman, 1991): the cognitive appraisals associated with an emotion, the valence of emotion, the arousal linked with emotions, and the action tendencies triggered by an emotional experience. We define and discuss each of these constitutive elements in turn.

Emotions are goal-relevant experiences (Lazarus, 1991; Pham, 2007; Roseman, 1991). Positive emotions are therefore linked with pleasant, goal-congruent experiences, and negative emotions are linked with unpleasant, goal-incongruent situations (Lazarus, 1991). However, the specific emotion triggered, as well as its intensity, often depend on the specific goal at stake and the evaluation or interpretation of the relevant event. The latter is what emotion theorists typically refer to as an emotional appraisal (Lazarus, 1991; Roseman, 1991). For example, individuals might feel frustrated if an innovation is difficult to use. In contrast, individuals might feel angry if the emotional appraisal suggests that the company selling the innovation failed in its responsibility to train users (Roseman, 1991). Moreover, the intensity and type of emotion experienced will depend on the goal involved: if an innovation is important for monitoring one's health, a lack of proficiency in using the innovation might trigger fear as well as frustration. Different emotions are, therefore, consistently linked with different goals and associated with specific cognitive appraisals (Lazarus, 1991; Pham, 2007; Roseman, 1991).

The dimension of valence focuses on the subjective feelings linked with an emotion, and it is therefore used to differentiate between emotions that are generally positive and others that are negative (Lazarus, 1991; Pham, 2007; Roseman, 1991). In this respect, some authors refer to the hedonic quality of an emotion or its relative pleasantness (Colombetti, 2005). Notwithstanding some rare exceptions (e.g., compassion; Goetz et al., 2011), it is relatively simple to assign valence to a specific emotion. For example, anger and sadness share a negative valence, while pride and happiness share a positive valence. Valence is also attributed to stimuli so that individuals often immediately describe the pleasantness and attractiveness of the object, such as the innovation they are appraising (Colombetti, 2005).

Arousal refers to the immediate physiological response linked to an emotion and, by extension, to the level of excitement the emotion generates or the perceived intensity of an emotion (Fowles, 2009; Heller, 1993; Russell, 2003). As discussed above, the goal at stake contributes to explaining the arousal level. As with valence, arousal is a foundational element of emotions. Emotion theories concur that, at the minimum, emotions are formed by a combination of valence and arousal (Russell, 2003). Importantly, arousal is considered a short-term reaction and, as such, a distinguishing feature of emotions when compared with the more diffused, long-lasting affective categories such as mood (Fowles, 2009).

Emotions have a wide range of cognitive and behavioural consequences that are often summarised under the umbrella term "action tendency" (Frijda, 2007). Action tendencies concern the urge for action linked with emotional experiences (Arnold, 1960; Scherer et al., 2001). Action tendencies are differentiated based on the response aroused from the elicitor of a certain emotion (Frijda, 2007; Lazarus, 1991). The literature distinguishes between approach and withdrawal tendencies (Maxwell and Davidson, 2007). Approach emotions such as anger imply a desire to engage directly with the target of the emotion. Withdrawal implies a desire to move away and avoid the target of the emotion. Within each of these broad classes, more specific action tendencies can be identified and attached to specific discrete emotions. For example, anger has been linked to more constructive responses and a desire to work with the target, while rage implies a desire to seek revenge and punish the target of the emotion (Antonetti et al., 2020).

All four components discussed above, namely appraisals, intensity, valence, and action tendency, are important for explaining the differences between discrete emotions. For example, anger is a high arousal, negative emotion typically associated with the appraisal of a goal-incongruent outcome caused by others. As such, anger leads to a

desire to seek a resolution or to re-establish balance that can minimise a certain goal-incongruent, negative outcome (Antonetti et al., 2020; Roseman, 1991).

Emotion theories have also shown that individuals may experience different emotions concurrently, which is a phenomenon called emotional ambivalence. These different emotions may be contradictory in terms of valence or action tendency (Andrade and Cohen, 2007; Williams and Aaker, 2002). The experience of emotional ambivalence can have particular effects on innovation adoption, depending on how emotional conflict inherent to the experience of ambivalence is resolved (see Section 2.4, emotion regulation) and/or the type of emotion having the greatest influence on decision-making.

Building on the above insights, we systematically review research on the role of emotions in innovation adoption to answer the following research question: *RQ1. Which emotions have been studied as influences of innovation adoption? How does emotional ambivalence shape innovation adoption?*

2.2. The targets of emotions: innovation, replacement, self, and other

Another defining element of emotions is that they are directed against a target or are elicited by a particular stimulus (contrary to moods, which do not have a clear target; Lazarus, 1991). Innovation adoption theories (Davis, 1987; Taylor and Todd, 1995; Venkatesh et al., 2012) show that consumers consider four targets in the assessment of an innovation: the innovation, the replacement or existing artefact, the self and significant others. If the appraisal of any of these four targets shapes decision-making, it is plausible to assume that emotions could be triggered by the very same targets (Cuddy et al., 2008), thereby contributing to explaining the adoption process.

Existing emotions concerning the replacement of the innovation, namely, existing artefacts used by consumers to perform similar tasks or to achieve similar goals, can shape the decision to adopt, so that positive emotions elicited by a replacement negatively influence the decision to adopt the innovation. In a similar way, if a replacement activates negative emotions such as anxiety or boredom, the innovation may be better assessed and eventually adopted.

An important elicitor of emotions is the self as an object of reflection. Emotions that are elicited by self-evaluations are labelled “self-conscious emotions” (Tracy and Robins, 2004) and comprise discrete emotions such as pride, guilt, or embarrassment. There is agreement that self-conscious emotions involve complex cognitive appraisals, such as self-reflection and causal attributions (Tracy and Robins, 2004). Self-conscious emotions provide fundamental information to the individual about social well-being (Leary, 2007) and social approval (Tracy and Robins, 2004). Self-conscious emotions can be activated by appraisals of ability; if an individual thinks that an innovation is difficult to use and attributes the responsibility to the self, the emotion of shame will be experienced (Tangney, 1999; Tangney et al., 2007).

Self-conscious emotions may also arise when an innovation is assessed in terms of its fit with consumer identity (Tracy and Robins, 2004; Stets, 2005). In particular, guilt and pride are self-conscious emotions activated by identity-enactment appraisals (Baumeister et al., 2007). When a consumer performs a behaviour that is identity inconsistent, guilt is experienced, which provides the motivational force to address the situation by performing identity-consistent actions (Baumeister et al., 2007; Carver and Scheier, 1998; Stets and Burke, 2005). In contrast, pride is experienced when the individual engages in identity-consistent behaviour (Baumeister et al., 2007; Tangney, 1999).

Finally, the perceived social evaluations of the self (Tracy and Robins, 2004) are an elicitor of self-conscious emotions. Self-conscious emotions matter in innovation adoption, as the desire to feel connected with and/or to belong to a given community that shares one's identity is a goal of innovation adoption (Lu et al., 2018; Steinert and Roser, 2020). Beyond self-conscious emotions, other discrete emotions may be relevant, such as envy or admiration. Activated by others'

adoption of the innovation, these emotions have been shown to influence the adoption of responsible brands (Antonetti and Maklan, 2016) and innovations more broadly (Schikofsky et al., 2020).

In view of the above arguments, the review examines how emotions towards four key targets, that is, innovation, replacement, self, and others, influence innovation adoption: *RQ2. Which targets of emotions have been studied in innovation adoption? How do emotions towards these targets influence innovation adoption?*

2.3. Time-bound effects of emotions: the distinction between anticipated, experienced, and retrospective emotions

Emotional experiences can be differentiated depending on the time relationship with the stimuli or target into anticipated, experienced, and retrospective emotions (Baumeister et al., 2007). Consumers do not encounter emotions only when presented with a stimulus (experienced emotions); rather, they are able to anticipate what their feelings are likely to be. The cognitive process of envisaging the experience of adoption triggers an anticipated emotional response (anticipated emotions), which, in turn, influences appraisals and behavioural intentions (Loewenstein and Lerner, 2003). Moreover, as consumers learn from the past (Hutchinson and Eisenstein, 2008), past emotional experiences might be recalled (Levine et al., 2009) to influence current decision-making. Given the ongoing exposure to innovations, consumers may recall emotions felt in the past towards innovations that might have (or might not have) been adopted. Such retrospective emotions are easily recalled, providing useful information concerning the relationship between past events and current goals (Levine and Edelstein, 2010). When evaluating innovations, recalled emotions may affect the adoption process, as individuals assess the likelihood that a past experience might be encountered (or pre-empted) again (Levine et al., 2006, 2009).

The conceptual distinction between anticipated, experienced and retrospective emotions is important given that innovation adoption is a dynamic process typically unfolding over three stages: awareness or contemplation, initial trial and learning and habituation or continued usage (Arts et al., 2011; Bagozzi, 2007; Straub, 2009). Anticipated emotions may affect the contemplation stage, while experienced emotions might be more prominent once the innovation has been trialled. Moreover, at any of the three stages, retrospective emotions towards one innovation or the other might be at play.

Anticipated emotions have been found to be influential in shaping consumer decisions to go through the innovation adoption process (Loewenstein and Lerner, 2003). Notably, anticipated emotions do not irreversibly affect decision-making (Bagozzi, 2007; Steinert and Roeser, 2020) for two reasons. First, anticipated emotions may change over time. This is consistent with affective forecasting theories (e.g., Loewenstein and Lerner, 2003) that show that individuals cannot accurately forecast future preferences; thus, anticipated emotions do not usually correspond to experienced emotions. In the phenomenon under investigation in this paper, it can be expected that as innovation diffuses, consumers will change appraisals, which may result in an emotional shift. A case in point concerns situations where peers have already adopted a given innovation and consumers may experience shame at the prospect of nonadoption. Likewise, as consumers try the innovation, anticipated emotions may change. The intensity of emotions might also change (e.g., anticipated anxiety towards innovation may subside once an individual learns to use it) or discrete emotions change if anticipated emotions morph into different experienced emotions. To illustrate, past work on IT learning in workplace contexts supports the idea that anticipated anxiety may morph into experienced helplessness at the learning stage if employees do not find learning support (Stein et al., 2015). A second reason why anticipated emotions may not deterministically influence adoption is that consumers engage in self-regulation strategies to manage emotions (Bagozzi, 2007; Mick and Fournier, 1998), a mechanism discussed in Section 2.4 of this paper.

Based on the above discussion, we examine how different emotions

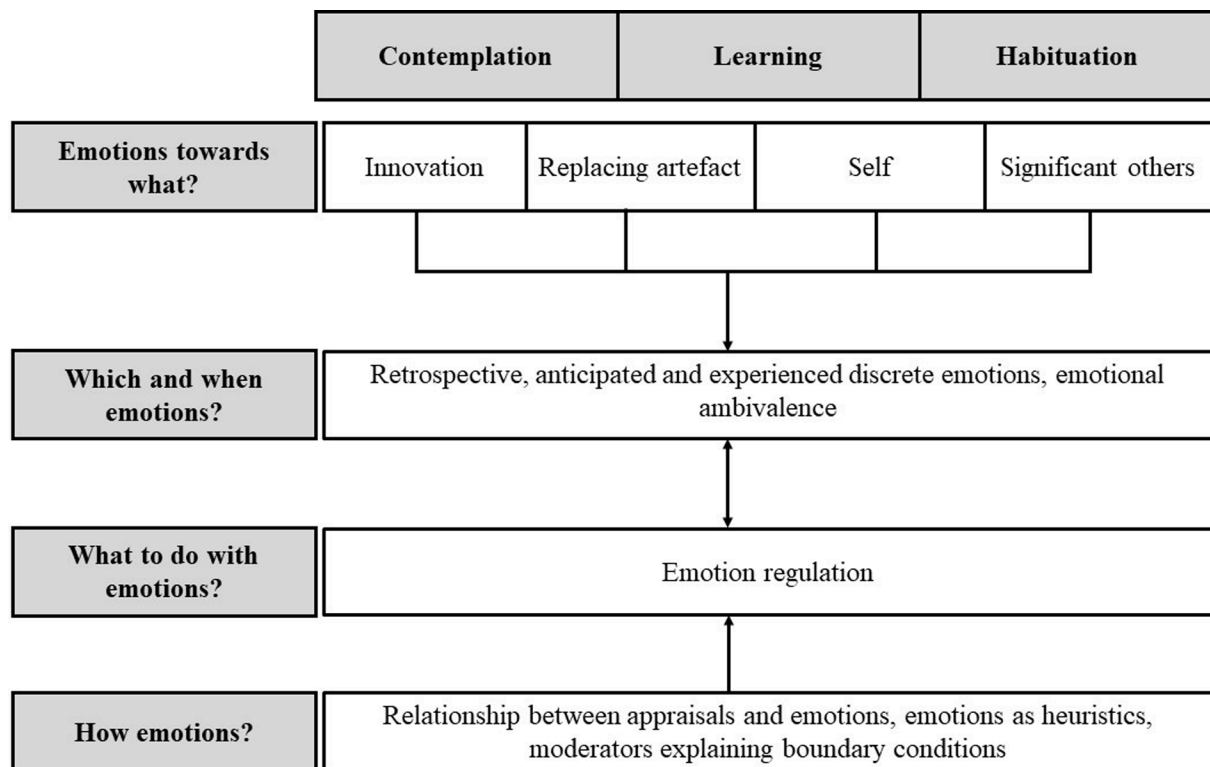


Fig. 1. Integrated perspective of the role of emotions in innovation adoption.

affect each of the stages of innovation adoption and examine the following question: *RQ3. When do emotions influence innovation adoption? How does their influence on innovation adoption change over time?*

2.4. Emotion management: regulatory processes

Emotions are unlikely to deterministically influence adoption decisions, as there are often intervening emotion regulatory processes (Bagozzi, 2007; Mick and Fournier, 1998). Such regulatory processes are especially relevant when conceptualising the effect of emotional ambivalence and the emotion shift throughout the innovation adoption process. Emotion regulation allows individuals to achieve instrumental, hedonic or identity-related goals (Gross, 1999) and to resolve emotional ambivalence triggered by an innovation or the prospect of its adoption (Mick and Fournier, 1998).

In particular, emotion regulation represents a key mechanism during the habituation stage of adoption. As shown by Beaudry and Pinsonneault (2010), in workplace contexts, emotion regulation processes explain how emotions of anxiety and excitement influence IT use at the habituation stage once an IT solution has been implemented. In workplace settings, Stein et al. (2015) find that employees recur to regulatory processes such as experimenting with new tasks or venting frustration about the newly implemented technology in an attempt to overcome the ambivalence of emotions. Anticipated or experienced emotions may be voluntarily regulated as consumers engage in coping strategies, that is, “the constant changing of cognitive and behavioural efforts to manage specific external and/or internal demands appraised as taxing or exceeding the person’s resources” (Folkman et al., 1986, p. 993).

The literature on coping distinguishes between two main forms of coping: emotion-focused and problem-focused (Duhachek, 2005; Lazarus, 1991; Lazarus and Folkman, 1984). Problem-focused coping entails proactive, direct actions to resolve a situation. For example, when feeling anxiety towards an innovation because it is perceived as difficult to use, problem-solving would entail asking others for support and help to learn how to use the innovation. In contrast,

emotion-focused coping involves indirect actions aimed at minimising negative emotions and associated stress. An example of this process would entail the reappraisal of one’s ability to manage previous innovations and/or the reappraisal of the innovation in light of important identity-related or socially relevant goals, which are likely to be accomplished by means of innovation adoption. As a form of emotion-focused coping, venting anger can help consumers let off steam and recuperate emotional stability (e.g., Beaudry and Pinsonneault, 2010; Bushman et al., 2001).

Given that emotions can be regulated, the review examines the regulatory processes employed by consumers in the process of innovation adoption and/or the coping strategies used in an attempt to answer the following research question: *RQ4. How do consumers use emotions at different stages of the innovation adoption process? What do consumers do with their emotions?*

2.5. Processes or mechanisms by which emotions influence decision-making

Research on emotions and decision-making consistently shows that emotions and judgements are not separate entities or processes (Keren and Schul, 2009). Emotions affect decisions by shaping the content of thoughts and the depth of information processing or by communicating the alignment between environmental stimuli and one’s own goals (Baumeister et al., 2007; Lerner et al., 2015; Pham, 2007). Although there is scholarly agreement that emotions and cognitions are inter-linked, the process by which emotions and appraisals influence one another and consequent behaviour remains unclear and is an issue still open for debate.

To date, theories on emotions and decision-making have identified two major mechanisms (Lerner et al., 2015; ; Pham, 2007). A first mechanism conceptualises emotions as mediators of the effect of cognitive appraisals on behaviour. According to the mediating process, emotions would be activated by the appraisal of a given entity (i.e., innovation, replacement, self and others). The same emotions would

then act as a motivational force in accomplishing a certain behaviour (Lerner et al., 2015). A second mechanism conceptualises emotions as drivers of cognitive appraisals (Lerner et al., 2015). Individuals often lack clear preferences, and/or their preferences are constructed when forced to express a choice (Angie et al., 2011; Schwarz, 2012). In such circumstances, emotions are likely to influence consumers' appraisals of innovations (Bagozzi, 2007). Such a process is consistent with scholarship on affect-as-information theory (Clore et al., 2001), suggesting that emotions can, at times, precede cognitions and, thus, result in less deliberate decision-making than that predicated by the dominant theories in innovation adoption. Considering the phenomenon under investigation in this paper, the cognitive evaluation of an innovation follows from the immediate feelings of consumers (e.g., if one feels anxious about using the innovation, then the innovation must be difficult to use) (Read et al., 2011; Valor, 2020). Accordingly, emotions affect risk estimates and overall attitudes, either directly or indirectly (for a detailed review, see Greifeneder et al., 2011 and Forgas, 1995).

Contextual and individual factors explain the prevalence of one or the other mechanism. Past work identifies a set of boundary conditions or moderators that explain whether the cognitive or affective route dominates judgement and decision-making in the context of innovation adoption. The identified boundary conditions concern innovation-related or consumer-related characteristics. For instance, one innovation-related characteristic concerns the degree of newness of an innovation. Consistent with emotion theories (Forgas, 1995; Greifeneder et al., 2011), emotions are more likely to influence judgements that are novel, and no prior judgement is stored in consumer memory. This would suggest that judgements of disruptive innovations are possibly more influenced by emotions than judgements of incremental innovations (Onwezen et al., 2019). Furthermore, when innovations become popular and are adopted by a critical mass of consumers, self-conscious emotions may dominate decision-making for the reasons explicated in Section 2.2 (Wu et al., 2017). The features and ultimate goal of the innovation may also influence whether more deliberate or affective decision-making is followed. The adoption of innovations used for hedonic reasons might be more affect-driven than the adoption of innovations used for functional, utilitarian goals (Zhang, 2013). With regard to consumer-related characteristics, low involvement with the decision appears to increase the influence of affect on judgements (Greifeneder et al., 2011). Conversely, consumers' knowledge about an innovation may attenuate the influence of emotions on decision-making (Winter et al., 2020).

In sum, understanding how emotions influence innovation adoption, the processes by which emotions and appraisals interact, and the circumstances under which a certain mechanism (appraisals-*elicit-emotions* vs. *emotions-guide-appraisals*) dominates decision-making warrant attention. This leads to our final research question: *RQ5. How do emotions affect (or are affected by) appraisals of innovations, and how do such appraisals influence innovation adoption?*

Fig. 1 depicts our theoretical, integrated perspective showing that emotions are a multifaceted and dynamic construct in innovation adoption decisions. This perspective is applied to the literature on innovation adoption to identify the current state of knowledge and the potential limitations in current theory.

3. Method

We carried out an integrative literature review, following the conventions set out by Torracco (2005), which are based on a systematic search of the literature (Tranfield et al., 2003). Although very similar to systematic reviews in the procedure for obtaining a pool of studies (Snyder, 2019; Torracco, 2005), integrative reviews differ in their approach to analysing evidence, wherein synthesis and the critique of existing evidence are combined (Zaheer et al., 2019). Integrative reviews are considered most suitable when the review aims to propose a revised perspective for the study of a phenomenon (Snyder, 2019),

which is at the core of our paper. The three-stage procedure defined by Tranfield et al. (2003)—planning, execution and reporting—was applied.

At the planning stage, an initial scoping of the research domain (Tranfield et al., 2003) enabled us to identify the most commonly used keywords in the phenomenon under study. To gather the pool of studies, the electronic database Web of Science Core Collection was selected, as it provides wide coverage of the most influential scholarly journals (De Alcantara and Martens, 2019) and is typically used for selecting quality papers (Tranfield et al., 2003). The keywords and search strings revolved around four terms, namely, innovation, adoption, consumers and emotions. Accepting that innovations can be of different kinds—predominantly technological (e.g., m-payment, Wu et al., 2017), social (e.g., peer-to-peer car sharing, Valor, 2020) or mixed (e.g., low-carbon transportation modes, Wolf and Schroder, 2019)—we did not limit our search to a particular type of innovation. Similarly, we included both incremental or continuous innovations and disruptive or discontinuous innovations (Wood and Moreau, 2006).

We employed the search string (*adoption OR acceptance OR purchas* OR acqui* OR use OR usage*) AND (*innovate* OR "new technology"*) AND (*emotion OR affecti* OR feeling OR mood OR "affect-laden"*) AND (*consumer OR user*) in the title, abstract or keywords. We only searched for papers published or accepted for publication in peer-reviewed journals (thus, excluding conference papers and/or book reviews) and written in English, German, French, Italian and Spanish. No time exclusions were employed. This search resulted in 1475 journal papers.

At the execution stage, we selected papers in two steps. First, the author team read the title and abstract of all selected papers and checked whether these met the inclusion criteria. Three inclusion criteria were used: (1) the paper examined emotions, moods, or feelings; (2) the population studied included consumers; and (3) the outcome variable was related to adoption, regardless of the stage of the innovation adoption process (Arts et al., 2011). Regarding the exclusion criteria, papers examining diffusion or "the process by which an innovation is communicated through certain channels over time amongst the members of a social system" (Rogers, 1983, p. 5) were omitted. Likewise, papers focusing on resistance to innovations were excluded based on evidence that resistance to innovations is an entirely different construct from adoption (Claudy et al., 2015). Disagreements were resolved by discussion amongst authors (Tranfield et al., 2003). This process resulted in 150 papers obtained for further evaluation.

Second, the papers were read in full. Upon review, 62 papers did not meet the inclusion criteria and were therefore excluded. For papers that included more than one empirical study, only those studies that met the inclusion criteria were selected (e.g., Radford and Bloch, 2011). Concurrently, backwards citation was employed to widen the pool of papers (Thomé et al., 2016) so that papers referenced in the full texts consulted would be included in our pool if these met the inclusion criteria. This resulted in a final sample of 94 journal papers (112 studies).

Last, at the reporting stage, papers were coded based on 23 fields, applying a coding protocol created by the authors. Such coding enabled verifiable data extraction (Tranfield et al., 2003) and allowed for a granular analysis of papers by elucidating, for instance, the empirical findings, theories, and methodology adopted. Additionally, the pool of papers was systematically coded against the five dimensions structuring the theoretical perspective. Each author separately analysed the coded papers, and the findings were discussed jointly. The five-dimensional structure presented in Section 2 served to capture the variability in the pool of papers. However, the coding also showed that the majority of papers examined emotions towards innovation at the contemplation stage and that the two questions on mechanisms (emotional regulation and the interlink between emotions and appraisals) have been largely overlooked.

A twofold qualitative synthesis of the pool of papers was conducted (Tranfield et al., 2003). First, a classification of papers according to the

Table 1
Summary of findings.

Research question	Key insights	Main references
Which emotions?	Positive hedonic affective experiences positively influence intention to adopt.	Baptista and Oliveira, (2015); Barrena et al. (2017); Dai et al., (2015); Gupta & Dogra (2017); Hong et al. (2017); Hur et al., (2012); Hussain et al., (2019); Li et al., (2019); Lin et al., (2015) Lin et al. (2020); Oh and Yoon (2014); Rezvani et al. (2018); Rouibah and Hamdy, (2009); Schikofsky et al. (2020); Shu et al. (2020); Song (2014).
	Valence-aggregated emotions show that the direction of influence matches valence	Ahn and Shin (2015); Evanschitzky et al. (2015); Pelegrin-Borondo et al., (2017); Qian and Yamada (2020); Qu et al. (2019); Rice et al. (2019); So et al. (2018); Syed-Abdul et al. (2019); X. Wang et al. (2019).
	Emotional ambivalence may hinder innovation adoption	Hurmerinta and Sandberg (2015); Lin et al. (2020); Onwezen et al. (2019); Tuccillo et al. (2020); Wakefield (2015)
Emotions towards what?	Positive (negative) emotions towards the replacement of an innovation help (hinder) intentions to adopt	Gerlach et al. (2014); Moons and De Pelsmacker (2015); Read et al. (2011); Wolf and Schroeder (2019); Waheed et al. (2015); Sweet and Laidlaw (2020); Valor (2020)
	Although shame has not been specifically examined, other evidence would suggest that emotions activated by an assessment of inability negatively influence innovation adoption	Di Giacomo et al. (2020); Igbaria et al. (1994); Naco et al. (2008); Nymberg et al. (2019); Thatcher and Perrewe (2002); Vapourtzis et al. (2017)
	Anticipated pride (guilt, shame) positively (negatively) influences adoption	Mamonov and Koufaris (2020); Moons and De Pelsmacker (2015); Rezvani et al. (2017); Shu et al. (2020); Sirieix et al. (2017); Song (2014); Stokk (2016); Yoon and Lim (2020)
When emotions?	Positive (negative) anticipated emotions help (hinder) intentions to adopt	Adnan et al. (2017); Bettiga and Lamberti (2018); Gerlach et al. (2014); Gupta et al. (2015); King and Slovic (2014); Onwezen et al., (2019); Quian and Yamada, (2020); Rezvani et al. (2018); Rice et al. (2019); Ryu et al., (2009); Shih and Schau (2011); Singh et al., (2020); Sirieix et al. (2017); So et al. (2018); Spekman et al. (2018); Sullivan and Koh (2019); Tuccillo et al. (2020); Upadhyay and Chattopadhyay, (2015); Valor (2020); Wakefield (2015); Winter et al. (2020)
	Positive (negative) experienced emotions increase (decrease) usage and satisfaction, whereas anxiety decreases such responses.	Barrena et al. (2017); Hong et al. (2017); Soni et al. (2019); Sullivan and Koh (2019); Thatcher and Perrewe (2002); Wei et al., 2019; Yen et al., (2019)
	Emotions dynamically change throughout the adoption process.	Bettiga and Lamberti (2018); Torta et al. (2014); Wood and Moreau (2006)
What to do with emotions?	Consumers engage in coping strategies to regulate their negative emotions towards innovations.	Bingen et al. (2011); Spekman et al. (2018); Viswanathan and Sreekumar (2019)

Table 1 (continued)

Research question	Key insights	Main references
	The most studied coping strategy is innovation rejection; nonetheless, if consumers are committed to innovation use they may use emotion and problem-focused coping strategies.	
How emotions?	Emotions are elicited by appraisals; they mediate between appraisals and innovation adoption	Bettiga and Lamberti (2018); Silva and Martins (2016); Ding (2019); Lee et al. (2011); Moons and De Pelsmacker (2015); Onwezen et al. (2019); Rezvani et al. (2018); Seegebarth et al. (2019); Su et al. (2020); Wakefield (2015)
	Emotions elicit appraisals of innovation risk, benefits or usefulness, ease of use and quality assessment of innovations	Beath and Siegrist (2019); Boeuf (2019); Gerlach et al. (2014); Igbaria et al. (1994); King and Slovic (2014); Lu et al. (2009); Park et al. (2020); X. Wang et al. (2019); Wells et al. (2010); Wu et al. (2017); Wu et al., (2017)

first three research questions is depicted in Table A (Appendix A). The greatest number of papers on innovation adoption that examined emotions was published in the period from 2014 until 2020 (see Fig. A1, Appendix A). In terms of publication outlets, there is a predominance of journal articles published in Marketing and Information Management journals, specifically *Computers in Human Behaviour*, *International Journal of Information Management and Psychology & Marketing* (Fig. A2). Second, a comprehensive description of the studies analysed is provided in Appendix A. Most of the studies are empirical (106 studies out of 112); of these, 70 adopted a survey method, 25 employed an experimental design, and 11 used interviews or focus groups (see Fig. A3). The conceptual papers are literature-review based. Studies clearly show a predominance of participants from the USA and China (see Fig. A4), since over a third of the studies (37 percent) have been conducted with participants based in these two countries. With respect to the type of innovations investigated (see Fig. A5), the vast majority examine innovations in digital technology (50 studies), mobility (15), and food (10).

4. Findings

This section summarises the findings of the reviewed papers through the lens of the research questions articulated in the theoretical perspective (see Section 2). Table 1 offers an overview of the key findings within the field of innovation adoption. Our review also discusses the assumptions underpinning the findings described.

4.1. Which emotions?

The literature analysed suggests that emotions have been considered primarily as an evaluative component rather than as a construct that captures distinct emotional reactions to innovations (e.g., Nasco et al., 2008; Wakefield, 2015). Such an approach implies the measurement of emotions as an overarching psychological reaction that either favours or discourages innovation adoption. For instance, feelings of enjoyment, fun and pleasure are conceptualised as favouring adoption (e.g., Ahn and Shin, 2015; So et al., 2018; Syed-Abdul et al., 2019; X. Wang et al., 2019), while feelings of anxiety, concern, dislike or fear discourage adoption (e.g., Evanschitzky et al., 2015; Rice et al., 2019; Qian and Yamada, 2020; Qu et al., 2019).

The studies presented in these papers can be differentiated based on their operationalisation of emotions. One group of studies examines

emotion-laden constructs that tap broadly into how enjoyable (or not) an innovation is perceived to be. Examples of such constructs include hedonic gain (Rezvani et al., 2018), product hedonism (Shu et al., 2020; Y. Wang et al., 2019), hedonic perception (Song, 2014) and hedonic motivation (Gupta and Dogra, 2017; Lin et al., 2020; Schikofsky et al., 2020). In most cases, hedonic responses are positively correlated with innovation adoption (e.g., Rezvani et al., 2018; Shu et al., 2020; Song, 2014). The relative impact of hedonic considerations, however, depends on the context. If an innovation focuses on an instrumental goal that is not necessarily linked to personal enjoyment and fun, hedonic experiences might bear low relevance (Barrena et al., 2017; Hong et al., 2017).

The second group of studies measures a range of discrete emotions yet aggregates these into two second-order constructs. For example, Wakefield (2015) examines positive emotions with five items and negative emotions with four items. Wood and Moreau (2006) use a more detailed list of 12 items borrowed from earlier psychological research (Izard, 1977), measuring emotions that differ greatly in terms of appraisals and action tendencies, such as pride, frustration, anger, and joy. In both studies, the different items are aggregated and analysed based on a commonly shared feature, that is, positive or negative valence. Such an approach is therefore similar to the one employed by the first group of studies wherein emotions are operationalised as a general, aggregate response to the innovation. Moreover, such an approach assumes that positive emotions will have a corresponding positive effect on adoption.

We argue that the above assumption that valence of emotions has a linear positive or negative effect on adoption does not hold. This is because the effect of emotions on adoption is likely to depend on the emotion in question (e.g., relaxation negatively influences adoption, whereas excitement shows a positive influence on the intention to adopt, Ahn and Shin, 2015) or the specific appraisals associated with the emotion (e.g., regret for product deprivation may drive adoption, whereas regret for adopting an innovation now that can be upgraded later may deter adoption (Bettiga and Lamberti, 2018; Shih and Schau, 2011)). Furthermore, the aggregation of emotions based on valence hinders the understanding of emotional ambivalence and its impact on innovation adoption (Hurmerinta and Sandberg, 2015; Onwezen et al., 2019; Wakefield, 2015). For example, when buying a new technological gadget such as a new smartphone with advanced features, individuals might feel anxious about an innovation that is expensive yet difficult to use, angry because the tutorial fails to explain how to use the gadget effectively but equally hopeful and even joyful about the opportunities offered by the new device (Lin et al., 2020). Existing evidence shows that mixed emotions reduce adoption on the basis that negative emotions counterbalance the productive influence of positive emotions (Hurmerinta and Sandberg, 2015; Wakefield, 2015). Consequently, the adoption process of innovations causing emotional ambivalence is likely to be lengthier and more resource intensive (Hurmerinta and Sandberg, 2015; Onwezen et al., 2019).

Notably, recent evidence shows that such a negative effect as emotional ambivalence cannot be generalised across situations. In fact, in some cases, holding contradictory emotions can foster adoption. For instance, Lin et al. (2020) show that high anxiety increases adoption when consumers also experience high hope about the possibility of obtaining positive outcomes from the innovation. The argument is that both hope and anxiety are future-orientated and goal-focused emotions, and consequently, such emotions create a motivation to mentally elaborate on how the innovation can help to achieve relevant personal goals. Such a mental process ultimately increases adoption, thereby confirming a specific situation where ambivalence can favour adoption¹ (Lin et al.,

2020). Others, however, argue that a particular emotion may override others (e.g., excitement overrides disgust towards eating insects) (Tuccillo et al., 2020), consistent with a hierarchical ordering of emotions.

4.2. Emotions towards what? The multiple targets of emotions in the adoption process

The innovation to be adopted has traditionally been at the core of investigations in the literature reviewed (73% of studies). Emotions towards other targets implicated in the decision to adopt (the replacement and the self) and their influence on innovation adoption have been less studied.

Studies examining emotions towards the replacement of the innovation consistently show that consumers' positive emotions towards the replacement technology negatively influence adoption (Gerlach et al., 2014; Moons and De Pelsmacker, 2015; Read et al., 2011; Sweet and Laidlaw, 2020; Valor, 2020; Wolf and Schroeder, 2019; Waheed et al., 2015). Crucially, emotions appear to be elicited towards an existing replacement as well as towards a future replacement. For instance, anticipated regret towards adopting an innovation that might shortly need an upgrade negatively influences intentions to adopt (Ha, 2018; Shih and Schau, 2011).

A second group of papers has examined how self-conscious emotions influence adoption. Few studies have measured self-conscious emotions activated by judgements' perceived ability. Most studies have factored in emotions that would be activated by the intrinsic perceived difficulty of an innovation (Davis, 1987), such as worry, anxiety or discomfort (Upadhyay and Jahanyan, 2016). However, in practice, if consumers attribute the difficulty of an innovation to themselves and their own abilities (a flawed self; Tracy and Robbins, 2004), then feelings of shame or inadequacy might arise. Although the influence of shame on adoption has thus far not been isolated, past studies show that similar constructs affect consumers' assessments of innovation, particularly feelings of inadequacy (Di Giacomo et al., 2020; Vapourtzis et al., 2017) or lack of self-trust (Nymberg et al., 2019). Nasco et al. (2008) find that perceived limited ability (termed "low dominance" by the authors) and perceptions of a high level of difficulty improve attitudes towards the innovation because users attribute the difficulty of using the innovation to their limited ability, rather than to potential flaws inherent to the innovation. Similarly, other studies show that dispositional emotions can affect perceived ability, so individuals with dispositional negative affect (trait anxiety) are more likely to experience computer anxiety and to appraise themselves as being unable to use an innovation (Igarria et al., 1994; Thatcher and Perrewe, 2002).

Furthermore, research shows that innovation adoption is driven by the innovation's fit with consumers' desired self-identity or self-expression (Choi and Kim, 2016; Cho et al., 2019; Dietrich et al., 2016; Lee and Quan, 2013; Sweet and Laidlaw, 2020) and in particular with individual moral identity (Rezvani et al., 2018; Rezvani et al., 2015). Self-conscious emotions such as pride, guilt and shame can be drivers for, or barriers to, the adoption of an innovation, as such emotions signal the innovation's fit with the consumer's desired identity (Tracy and Robbins, 2004). The few studies examining this phenomenon support the influence of these self-conscious emotions on intentions to adopt. For instance, anticipated pride towards using an innovation that is congruent with one's environmental norms is found to influence the adoption of eco-innovations (Rezvani et al., 2017; Sirieix et al., 2017). Similarly, the desire to be perceived as "technocool"—a form of pride—is found to predict the adoption of smart thermostats (Mamonov and Koufaris, 2020). Perceptions that car driving is a polluting activity activate negative self-conscious emotions such as guilt that positively predict intentions to adopt electric vehicles (Moons and De Pelsmacker, 2015). Conversely, innovations with a limited, or even a negative, fit with one's identity are unlikely to be adopted. A case in point concerns the adoption of pendant alarms, which are perceived as useful and easy to use yet also stigmatising, thus often are rejected (Stokk, 2016).

¹ This study might offer a good explanation of why the uptake of COVID-19 vaccines in many Western countries has proved to be higher than originally expected (Reuters, 2021) and suggests that the coverage of potential risks associated with vaccines might even increase vaccine uptake, at least for those who also have high hopes for their effectiveness.

Finally, self-conscious emotions can be activated by perceived social evaluations of the self (Tracy and Robins, 2004). Such emotions matter as the desire to feel connected with and/or to belong to a given community is a goal of innovation adoption (Lu et al., 2018; Steinert and Roser, 2020). For instance, users' adoption of a doggy bag, where this innovation is not culturally prevalent, is unlikely if consumers anticipate shame for breaching a social norm (Sirieix et al., 2017). Conversely, the desire to gain face (a construct similar to pride) or to avoid the loss of face (shame) is found to predict innovation adoption (Shu et al., 2020; Song, 2014; Yoon and Lim, 2020).

Importantly, studies measuring self-conscious emotions such as pride or shame have aggregated such discrete emotions with other positive and negative emotions towards other targets (e.g., Moons and De Pelsmacker, 2015; Rezvani et al., 2018; Zhang and Mao, 2020) merely on the basis of valence (as also discussed in Section 4.1). The aggregation of emotions irrespective of the target is problematic for two reasons. First, positive self-conscious emotions do not always have a positive effect on adoption and the opposite is also true for negative self-conscious emotions. For example, guilt, a negatively valenced emotion, can increase adoption, as previously discussed. Valence-based aggregation is therefore problematic in that it could weaken the ability to accurately predict the behavioural consequences of emotions. Second, the aggregation of emotions into a single construct could hide the conflicting effects of different emotions linked to specific targets. This was a key finding of the interpretive work by Sirieix et al. (2017). Examining the use of doggy bags as a potential solution to food waste, the authors find that consumers report anticipated guilt for not asking for a doggy bag, on the basis that such an action would be a betrayal of personal moral norms. In contrast, asking for the doggy bag activates anticipated shame when doggy bags are not socially accepted in a particular country. The same authors conclude that these conflicting self-conscious emotions are a major barrier to adopting this eco-innovation.

4.3. When emotions? The changing role of emotions throughout the adoption process

Researchers in the innovation adoption domain have mostly studied intentions to adopt (61% of studies). It is therefore not surprising that their focus has been predominantly on capturing anticipated emotions. Only a handful of studies have focused on the role of experienced emotions at the learning stage (15% of studies) and/or the habituation stage or on the continued use of the innovation (12% of studies) (see Table A.1). Moreover, these studies have examined the effect of two emotions at most (experienced enjoyment and/or anxiety) on continued use and/or satisfaction. No study has examined the role of retrospective emotions.

The findings suggest that negative anticipated emotions block the intention to adopt, as they signal low goal attainment (Bettiga and Lamberti, 2018). This is the case for anticipated discomfort, anxiety, stress, disgust, or fear of using an innovation (Adnan et al., 2017; Gupta et al., 2015; Onwezen et al., 2019; Quian and Yamada, 2020; Tuccillo et al., 2020; Winter et al., 2020). Conversely, positive anticipated emotions such as enjoyment, curiosity or excitement signal the possibility of achieving a goal in the future and increase intentions to adopt across different types of innovations (e.g., Rezvani et al., 2018; So et al., 2018; Sullivan and Koh, 2019; Wakefield, 2015). Reinforcing the point made in Section 4.1, negative anticipated emotions could be a driver of intentions to adopt. This is the case for the anticipated emotions for product deprivation, such as regret or sadness, that positively influence intentions to adopt (Bettiga and Lamberti, 2018; Shih and Schau, 2011; Sirieix et al., 2017).

The few studies on experienced emotions at the trial and learning stages show a similar pattern and suggest that experienced enjoyment increases usage and satisfaction, whereas anxiety decreases such responses (e.g., Barrena et al., 2017; Hong et al., 2017; Soni et al., 2019; Sullivan and Koh, 2019; Thatcher and Perrewe, 2002).

However, past studies do not conclusively establish whether or how anticipated emotions affect actual future adoption or the future assessment and use of innovations. On the one hand, existing evidence suggests that anticipated emotions affect judgements of benefits and risks about an innovation (Gerlach et al., 2014; King and Slovic, 2014; Spekman et al., 2018; Sullivan and Koh, 2019) so that anticipated emotions towards an innovation may become a heuristic to judge the innovation (Rice et al., 2019; Valor, 2020; Winter et al., 2020), thus explaining its (non)adoption. On the other hand, existing research provides evidence that emotions dynamically change, as explained in Section 2.3 Wood and Moreau (2006) show that consumers form expectations about the difficulty of using an innovation at the contemplation stage, and that these expectations activate anticipated positive and negative emotions. If negative expectations are confirmed at the learning stage, then negative emotions are activated. If, on the contrary, expectations are disconfirmed, positive emotions follow. Thus, experienced emotions at the learning stage, unlike anticipated emotions, affect product evaluations and eventually adoption (Wood and Moreau, 2006). Not only anticipated emotions may in practice have no bearing on adoption but such emotions can also change at the learning stage. Similarly, Torta et al. (2014) show that enjoyment diminishes over time, reinforcing the idea that anticipated emotions do not remain constant. This wearing-off effect implies that anticipated emotions lose intensity so that their motivational force dissipates across adoption stages.

Other studies show that the influence of emotions may change when moving from the contemplation stage of adoption to the habituation stage. Consistent with affective forecasting (Loewenstein and Lerner, 2003), value perceptions and anticipated emotions have been found to change from the contemplation stage to usage (Bettiga and Lamberti, 2018). Finally, evidence demonstrates that consumers engage in self-regulation strategies to manage emotions; this process is discussed further in Section 4.4 of this paper.

4.4. What to do with emotions? The role of regulation and coping

Existing studies on innovation adoption have rarely accounted for emotion regulation processes and/or coping strategies. Only three of the papers in our sample explicitly discussed coping. One such paper is based on exploratory evidence from focus groups with local food consumer activists coping with the challenges of implementing an innovation, that is, eating local food within the constraints of finding, buying, and preparing such food (Bingen et al., 2011). The paper shows that more committed, pure activist consumers engage in problem-focused, confrontational coping strategies more than less committed consumers do, who instead recur to emotion-focused and avoidance coping. Such evidence advances the idea that the choice of coping strategies depends on consumers' individual commitment towards goal attainment, such as the goal of supporting local food and the entire supply chain behind local food production.

In innovation studies, the rejection of an innovation is the coping strategy most often associated with negative emotions such as anxiety. Anxiety is, in fact, often linked with adverse responses (e.g., Barrena et al., 2017; Hong et al., 2017; Soni et al., 2019; Sullivan and Koh, 2019; Thatcher and Perrewe, 2002). This view, however, neglects that anticipated emotions could shift over time as a result of problem-focused coping strategies, such as acquiring knowledge about an innovation (Mick and Fournier, 1998), and emotional regulation processes actively enacted by consumers, as also discussed previously in Section 2.4. As shown by Beaudry and Pinsonneault (2010), anxiety can eventually lead to IT use when individuals engage in adaptation behaviour that minimises the perceived risk of adoption. In some circumstances, emotions themselves act as catalysts towards activating coping processes that encourage adoption. One such emotion is hope. As demonstrated by Lapointe and Rivard (2007) in workplace settings, hope can help employees adapt new technology to work routines. When mixed with high anxiety, hope is found to enable consumers to positively reframe

Table 2
Summary of suggested theoretical approaches and future lines of research.

	Suggested theoretical approaches	References from emotion theory	Future research lines	Examples of specific research questions
Which emotions?	<ul style="list-style-type: none"> ■ Avoid the aggregation of emotions solely on the basis of valence; rather, aggregate emotions on the basis of their action-tendency ■ Theorise the influence of discrete incidental and integral emotions on innovation adoption ■ Examine the effect of emotional ambivalence arising from combinations of discrete emotions 	<p>Andrade and Cohen (2007); Baumeister et al. (2007); Beedie et al. (2005); Colombetti (2005); Fowles (2009); Frijda (2007); Heller (1993); Lazarus (1991) Lerner et al. (2015); Maxwell and Davidson (2007); Pham (2007); Roseman (1991); Russell (2003); Steinert and Roeser (2020); Williams and Aaker (2002)</p>	<ul style="list-style-type: none"> ■ Examine the distinct role of specific discrete emotions on adoption ■ Develop taxonomies of emotions based on action tendency vis-à-vis adoption ■ Examine mixed emotions or emotional ambivalence and the influence on adoption ■ Inspect incidental emotions and their influence on innovation adoption 	<ul style="list-style-type: none"> ■ How are anger, anxiety, and fear differentiated in terms of their impact on adoption? ■ What is the influence of hope or admiration combined with fear or anger on adoption? ■ How do incidental feelings of anger influence responses to different types of innovation?
Emotion towards what?	<ul style="list-style-type: none"> ■ Consider the role of different targets in emotion elicitation: the innovation, the replacement, other users, and judgements of the self ■ Consider the different discrete emotions elicited by these targets 	<p>Antonetti and Maklan (2016); Baumeister et al. (2007); Carver and Scheier (1998); Cuddy et al. (2008); Leary (2007); Schikofsky et al. (2020); Stets (2005); Stets and Burke (2005); Tangney (1999); Tangney et al. (2007); Tracy and Robins (2004)</p>	<ul style="list-style-type: none"> ■ Examine discrete self-conscious emotions (e.g., pride, shame, embarrassment) and their influence on adoption ■ Examine other-focused emotions (i.e., envy or admiration) and their influence on adoption ■ Explain when consumers experience ambivalent emotions towards different targets and the consequences of ambivalence 	<ul style="list-style-type: none"> ■ How does shame influence adoption at different phases? ■ What is the influence of embarrassment for different consumer groups? ■ How does the interplay of envy and admiration for different users explain adoption? ■ What are the consequences of feelings of contempt and admiration on adoption?
When emotions?	<ul style="list-style-type: none"> ■ Consider the role of emotions at all adoption stages, not anticipated emotions only. ■ Examine the wear off and/or self-regulation of anticipated emotions ■ Theorise the role of experienced emotions and their relationship with anticipated emotions ■ Theorise the influence of retrospective emotions and their relationship with anticipated and experienced emotions 	<p>Bagozzi (2007); Levine and Edelman (2010); Levine et al. (2006); Levine et al. (2009); Loewenstein and Lerner (2003); Steinert and Roeser (2020)</p>	<ul style="list-style-type: none"> ■ Examine the influence of anticipated emotions on cognitions, emotions, and behaviours at different stages of the adoption process ■ Explain whether and how a discrete emotion may morph into a different emotion throughout the adoption process ■ Identify the boundary conditions to the effect of anticipated emotions on intent to adopt and adoption behaviour ■ Explain how and under what circumstances retrospective emotions affect the adoption of other innovations 	<ul style="list-style-type: none"> ■ How do negative anticipated emotions at the contemplation stage (e.g., regret, anxiety) influence negative emotions at the learning phase (e.g., frustration, anger)? ■ How do retrospective emotions influence the anticipated emotions towards an innovation? ■ How does objective/subjective knowledge influence emotions at different stages? ■ What mechanisms explain how emotions shift or morph throughout the stages?
What to do with emotions?	<ul style="list-style-type: none"> ■ Theorise emotion regulation and its consequences for adoption ■ Theorise the role of coping on emotion elicitation and its influence on adoption 	<p>Bagozzi (2007); Beaudry and Pinsonneault (2010); Bushman et al. (2001); Duhachek (2005); Folkman et al. (1986); Gross (1999); Lazarus (1991); Lazarus and Folkman (1984); Mick and Fournier (1998)</p>	<ul style="list-style-type: none"> ■ Examine self-regulation at different stages of adoption through longitudinal methods ■ Explain which coping strategies are preferred by different consumer groups ■ Elucidate the interplay between primary and secondary emotions and their influence on adoption 	<ul style="list-style-type: none"> ■ What coping strategies—emotion- or problem-focused—are used to regulate anticipated and/or experienced emotions? ■ How do the different coping strategies impact adoption? Are there any differences amongst consumer groups? ■ How and to what extent do coping strategies influence emotions through the stages?
How emotions?	<ul style="list-style-type: none"> • Theorise the links between cognition and emotions • Differentiate between situations where adoption is a predominantly cognitive, deliberate process and situations where emotions are most influential 	<p>Angie et al. (2011); Baumeister et al. (2007); Clore et al. (2001); Forgas (1995); Greifeneder et al. (2011); Lerner et al. (2015); Loewenstein and Lerner (2003) Pham (2007); Schwarz (2012)</p>	<ul style="list-style-type: none"> ■ Examine when emotions are used as heuristics and influence cognitive appraisals ■ Establish the chain of effects from specific appraisals to discrete emotions and adoption of innovations ■ Examine boundary conditions to the effect of cognition on emotions (and vice versa) 	<ul style="list-style-type: none"> ■ What conditions drive a more affective (rational) assessment process? ■ How do appraisals and emotions interact to produce a judgement about the innovation and about the intention to adopt (use)?

adoption in light of the likely prospect of accomplishing important personal goals (Lin et al., 2020).

Conceptually, there are suggestions that the choice of coping strategies is dependant on the consumer's characteristics and the features of the innovation. In an editorial piece, Viswanathan and Sreekumar (2019) discuss how highly unfamiliar technology may be intimidating to low-literate users experiencing fear that adoption might expose their cognitive limitations. Fear might, in turn, lead such users to avoid the

technology altogether in an effort to reduce stress. The only paper that tests the effect of potential coping strategies on adoption is Spekman et al. (2018). In a study of consumer perceptions of health care robots, Spekman et al. (2018) show that emotion-focused coping strategies and appraised coping potential (i.e., appraised individual ability to cope with the situation) are most influential towards shaping perceptions of the robots' affordances, ethics, aesthetics and intentions to use the robot in the future. The paper advances the idea that consumers' assessment of

their own individual ability to cope with emotions, as retrieved from their past experiences of emotionally charged events, can be as influential as the emotion itself.

In sum, the handful of studies accounting for the role of emotion regulatory processes refer to coping as a mechanism enacted to overcome negative emotions, such as anxiety (e.g., Barrena et al., 2017). The behavioural outcome of coping is, however, not always detrimental, as coping mechanisms are linked to the rejection of innovations as well as to the promotion of adoption behaviour. Existing research does not conclusively establish whether and how self-regulation strategies help consumers to manage anticipated emotions and/or emotional ambivalence. The existing evidence points towards the idea that emotion regulation helps consumers to resolve emotional ambivalence triggered by an innovation or the prospect of its adoption (Mick and Fournier, 1998). Furthermore, there remains a dearth of research examining how emotion regulation processes unfold throughout the stages of innovation adoption. It seems plausible to expect that different emotion regulation processes might be enacted at various stages of the innovation adoption process, with downstream consequences on behaviour. Anticipated emotions linked to innovation, such as anxiety, might be overcome through problem-focused coping at the contemplation stage. In the next stage, by contrast, emotion-focused coping might be enacted in an attempt to overcome feelings of frustration if, for instance, the innovation proves difficult to use.

4.5. How emotions? The relationship between emotions, cognitions and adoption

Although emotions and cognitions are interlinked, the dominant approach in the literature is to treat emotions as separate constructs from appraisals or judgements of the benefit-risk ratio of an innovation. In particular, studies applying UTAUT2 or TAM have included anticipated enjoyment with the use of an innovation as a linear predictor of intentions and as independent of appraisals of difficulty or complexity (e.g., Ahn and Shin, 2015; Choi and Kim, 2016; Gupta and Dogra, 2017; Igarria et al., 1994; Lee et al., 2013; Reinares-Lara et al., 2018; Rice et al., 2019; Soni et al., 2019; Tan et al., 2018). Similarly, studies examining the influence of anticipated anxiety on intentions have introduced this emotion as independent of appraisals of difficulty or complexity (Di Giacomo et al., 2020; Evanschitzky et al., 2015; Gbongli et al., 2019; Gerlach et al., 2014; Lu et al., 2009; Reinares et al., 2020; Sullivan and Koh, 2019; Winter et al., 2020). Such an approach of introducing emotions as independent of cognitive constructs is also found in the unified model of consumer acceptance of technology (CAT) (Dietrich et al., 2016; Ferreira et al., 2014; Nasco et al., 2008; Zhang and Mao, 2020).

Studies examining the relationship between appraisals and emotions provide evidence that the two mechanisms identified in emotion theories occur. On the one hand, emotions are mediators between appraisals of an innovation and intentions to adopt (e.g., Bettiga and Lamberti, 2018; Silva and Martins, 2016; Ding, 2019; Lee et al., 2011; Moons and De Pelsmacker, 2015; Onwezen et al., 2019; Rezvani et al., 2018; Seegebarth et al., 2019; Su et al., 2020; Wakefield, 2015). On the other hand, emotions are antecedents of appraisals. For instance, anticipated emotions are found to influence appraisals of risk and usefulness of innovations Wu et al., 2017. Likewise, emotions towards nuclear power affect quality assessments of microbial decontamination strategies (Bearth and Siegrist, 2019), primed nostalgia leads to negative assessments of innovative products (Boeuf, 2019), primed liking towards an existing artefact drives negative appraisals of innovations (Gerlach et al., 2014) and both positive and negative emotions influence appraisals of benefits, risks and ease of use (Igarria et al., 1994; King and Slovic, 2014; Lu et al., 2009; Park et al., 2020; X. Wang et al., 2019; Wells et al., 2010; Wu et al., 2017).

In sum, existing research has not yet provided a definite answer on the issue of whether emotions shape consumers' judgements of an

innovation or vice versa. Likewise, there is no conclusive evidence on the circumstances under which one or the other observed mechanisms bear greater relevance. The dominant use of correlational studies and the limited investigation of moderators in existing models have hindered our understanding of the mechanisms whereby emotions may affect innovation adoption.

5. Discussion and conclusions

Emotions are a fundamental driver of adoption (Bagozzi, 2007; Steinert and Roeser, 2020; Straub, 2009), although their role in innovation adoption contexts is not yet fully understood. To the best of our knowledge, this paper presents the first integrated theoretical perspective to understanding the role of emotions in innovation adoption while also providing a summary of the current state of the art in this domain of knowledge. Consistent with the threefold aim of integrative reviews (Snyder, 2019; Torraco, 2005), this study synthesises the existing evidence on emotions and consumer adoption of innovations, offers a critique of assumptions from past studies vis-à-vis theories on emotions and decision-making, and proposes a way forward to invigorate scholarship in this field. Notably, we offer a critique of the existing literature regarding the role of emotions in innovation adoption that serves as the basis to propose a research agenda that explicates the multifaceted role of emotions across innovation adoption stages.

5.1. Emerging lines of enquiry and research agenda

Existing research has not yet provided a complete answer to the five questions we identified at the outset. In this section, we propose key lines of inquiries that emerged from our integrative review. The proposed lines of enquiry warrant further research to advance knowledge on how consumers engage (or do not engage) with technological innovations. Table 2 summarises the suggested theoretical approaches along with specific research questions emerging from our integrated perspective.

To expand our knowledge of *which emotions* influence innovation adoption, future work should move beyond the operationalisation of emotions as aggregate, valence-based reactions. Instead, the role of discrete emotions should be explicitly considered in theorising specific cognitive and behavioural consequences of emotions in the adoption of innovations. Beaudry and Pinsonneault (2010) take an initial step in this direction, even though their examination is related to IT use in a professional context. The same authors classify emotions on the basis of two fundamental appraisals: whether the technology is perceived as an opportunity or a threat and the level of control that the individual has over it. The variable of control is arguably much less relevant for consumers than it is for individuals in a professional context; therefore, the model cannot be directly applied to a consumer context. Notwithstanding, the appraisal of control has the merit of demonstrating that, first, different emotions lead to specific outcomes, and second, aggregating emotions based on action-tendency towards the innovation rather than on valence is a meaningful approach to studying emotions. Future research should take this logic further. For example, Beaudry and Pinsonneault (2010) conceptualise anger and disgust as belonging to the same category of emotions yet we know that the two emotions have very different cognitive and behavioural outcomes (Hutcherson and Gross, 2011) and are relevant in different contexts (Qian and Yamada, 2020). Furthermore, emotions towards different targets should be considered, and their specific influence should be isolated to advance theories on how different discrete emotions explain innovation adoption. Notably, the role of self-conscious emotions (i.e., pride, guilt, and shame) and other-related emotions (i.e., envy and admiration) warrants more attention in future studies.

Future research could also focus on extending our knowledge of emotional ambivalence by specifically examining the interaction between two (or more) discrete emotions towards the same target or

emotion elicitor. The study by Lin et al. (2020) discussed in Section 4.1 is exemplary in this respect, given its focus on the interaction between anxiety and hope. However, this is the only study in our sample that considers the relationship between discrete emotions experienced concurrently and in relation to the same innovation. Applying this approach to other innovations and in different adoption contexts is expected to yield important insights (e.g., Morales et al., 2012). Similarly, further research is needed to identify whether emotional ambivalence occurs as a result of emotions towards different targets (e.g., positive emotions towards the innovation but also negative emotions when thinking about abandoning the current solution) and the mechanisms by which consumers manage and resolve conflicting emotions.

When considering the interplay between emotions and innovation adoption, a systematic examination of the potential effects of incidental emotions is warranted. Incidental emotions concern emotional experiences that are not directly related to the decision at hand but nonetheless contribute towards shaping cognitive and behavioural reactions to innovations (Lerner et al., 2015). Research on the Appraisal Tendency Framework has demonstrated that incidental emotions are influential in activating a specific set of cognitive appraisals that systematically influence decision-making ((Han et al., 2007) Jhang et al. (2012) have shown that experiencing incidental positive emotions makes consumers more receptive to very incongruous new products, indicating that positive emotions improve the response to extremely innovative ideas. This is because positive emotional experiences increase the cognitive flexibility necessary to process complex product ideas (Estrada et al., 1997; Isen, 2001).

Another area that warrants more research concerns the dynamic influence of emotions on innovation adoption, namely, how the emotions felt by consumers at one stage of the adoption process affect cognitions, emotions and behaviour at subsequent stages, as well as how emotions change during the innovation adoption process. The existing literature accounts for changes in anticipated emotions either as a result of self-regulation strategies voluntarily enacted by consumers or as a result of other mechanisms described in prior research (e.g., expectation disconfirmation in Wood and Moreau, 2006; wearing off in Torta et al., 2014; mistaken affective forecasting in Bettiga and Lamberti, 2018). Crucially, research that disambiguates which mechanism is activated under certain circumstances remains scant. Future work in this area might propose a comprehensive account that links the different mechanisms and explains their role under different circumstances. In particular, the moderating role of consumer subjective and objective knowledge (Klerck and Sweeney, 2007) could be studied. Consumers' knowledge of an innovation has been shown to be one of the predictors of innovation adoption (Moreau et al., 2001). However, the interplay of knowledge and anticipated/experienced emotions has been overlooked in past studies. Highly subjective knowledge of an innovation may attenuate anxiety at the contemplation stage, as consumers anticipate the innovation to be easy to use and likely to deliver benefits. However, if the gap between subjective and objective knowledge is wide, consumers may realise their limited ability to use an innovation at the learning stage, resulting in heightened anxiety and frustration. Consequently, we advance consumer subjective/objective knowledge as an important moderating factor that deserves further attention, especially with respect to the relationship between the expectations and actual experiences of an innovation (Wood and Moreau, 2006). To complement the above area of work and to fully understand the time-dependent nature of emotions, future work could explore the role of retrospective emotions on consumers' decisions to adopt an innovation, which is an issue left unaddressed in past studies.

Emotion regulation and its role in innovation adoption is another important conceptual area that warrants investigation. Research is needed on the relationships between emotional response components and the circumstances under which individuals regulate (or not) emotions (Gross, 1999). The above is especially relevant in innovation adoption contexts, where adoption occurs at different stages and

emotions can unfold over time. Further longitudinal research is warranted to address a time-bound perspective on emotions in innovation adoption, which accounts for emotional regulation processes across multiple stages of adoption. Concurrently, future work could examine the circumstances under which consumers are likely to employ certain coping strategies. This includes individuals' characteristics, such as their goals and resources. Some characteristics have been discussed in prior literature, including literacy (Viswanathan and Sreekumar, 2019) and commitment to a specific innovation (Bingen et al., 2011). The availability of resources is pivotal towards navigating the choice of a coping strategy. Individuals' internal resources, such as self-efficacy and emotional intelligence (Bandura and Locke, 2003; Salovey and Mayer, 1990), as well as external resources from their social context (Aldwin, 1994; Duhachek, 2005) and cues to the coping potential inherent to a particular event or innovation (Spekman et al., 2018), are important and deserve further attention.

Furthermore, the emotion literature has a long tradition of conceptually separating the concepts of emotions and regulation. In his seminal work, Lazarus (1991) distinguishes between primary and secondary emotional responses to an event. While the primary emotional response is unregulated and concerns individuals' immediate raw emotions concerning the event, the secondary response relates to coping enacted by emotion regulation (Baumann et al., 2007), which may occur almost concurrently. In line with the above view, much research has described coping as a consequence of emotion regulation, involving cognitive and behavioural responses (Duhachek, 2005). Existing studies in the innovation field do not explicitly address the type of emotional responses—whether primary or secondary. This can result in the conflation of emotions and regulation processes. Further research is needed to disentangle the effects of emotions and regulation in innovation adoption contexts.

The relationship between appraisals and emotions is another area where more research is necessary. Since most research is based on correlational studies, it is difficult to decipher how cognitive judgements and emotions interact so that an overall judgement of the innovation or a decision to adopt the innovation is made. Much work has thus far examined emotions resulting from judgements yet overlooking the reverse relationship by which emotions shape judgements (Lerner et al., 2015; Loewenstein and Lerner, 2003; Pham, 2007). Further research could elucidate whether the decision to adopt an innovation is dominated by deliberative, rational judgements of benefits and risks or whether decision-making is more driven by emotions (Loewenstein and O'Donoghue, 2004). With survey-based studies, proxies such as time to reach a decision could help to understand whether decision-making is dominated by deliberative or affective processes (Slovic et al., 2002). When decision-making is dominated by affective processes, decisions are made more rapidly since integral affective responses arise faster (Pham, 2007). Likewise, decisions based on integral emotions are more extreme and polarised than those based on cognitions (Pham, 2007).

Lastly, future research might examine the boundary conditions or moderators that explain whether the cognitive or affective route dominates judgement and decision-making in the context of innovation adoption. Specifically, the moderating role of innovation-related characteristics (e.g., the degree of newness of an innovation, the degree of diffusion of the innovation and the features and ultimate goal of the innovation) and consumer-related characteristics (e.g., the consumer's involvement with the innovation or the consumer's knowledge of the innovation) could be explicated in future work. To complement the above, future studies could examine the direct effects of exposure to new information on anticipated and experienced emotions throughout the adoption process, along with the indirect or mediated effects of new information on changed cognitions.

5.2. Further implications for theory

The review addresses earlier scholarly calls for a deeper and more

nuanced examination of the role of emotions in innovation adoption (Steinert and Roser, 2020). Crucially, it provides the necessary counterpart to conceptual papers on emotions and the adoption of technological innovations in organisational (Zhang, 2013) or educational contexts (Loderer et al., 2020). The findings complement bibliometric analyses on the adoption of innovations (van Oorschot et al., 2018) and/or reviews on consumers' technology acceptance (Bögel and Upham, 2018), where emotions went unmentioned.

First, this paper synthesises and integrates findings from studies on different types of innovations (technology-based, social-based and mixed), with different degrees of newness, published across different disciplines (e.g., innovation, consumer behaviour, management, energy, food, and tourism, inter alia) and sociocultural contexts (i.e., studies being conducted on all continents). Second, the paper highlights how existing studies on innovation adoption have followed a narrow approach to the study of emotions. We contend that such a narrow approach does not account for evidence from theories of emotions and decision-making and thus fails to offer a nuanced understanding of how and under what circumstances innovations are adopted. By approaching the topic of innovation adoption from existing theories of emotions, this study proposes a revised and integrated perspective on the role of emotions in innovation adoption.

The question of *which emotions* foregrounds the need for studying discrete emotions, linked appraisals and action tendencies. It also calls for unveiling and explaining emotional ambivalence as a driver of emotion regulation and as a mechanism that could explain why innovations are (not) adopted. The question of *when emotions* draws attention to innovation adoption as a multistage process and justifies the need for understanding the concurrent role of retrospective, anticipated and experienced emotions at each of the adoption stages and the influence that emotions at one stage might have on subsequent stages. *Emotions towards what* explains that emotions can be elicited not only by innovations but also by replacing artefacts, the self or significant others. These four elicitors of emotions should be considered, as these represent fundamental antecedents of adoption. The question of *what to do with emotions* emphasises that emotions—and especially anticipated emotions—do not deterministically influence adoption since individuals can, to some extent, regulate their emotions to achieve personal goals. Finally, the question of *how emotions* highlight the important, yet hitherto underresearched, relationship between emotions and cognitive judgements concerning an innovation to predict adoption. For each of the five questions, we propose the inclusion of boundary conditions, notably emotional ambivalence and emotion regulation, and the dominance of affective or cognitive routes in judgements and choices of innovations. The perspective proposed in this paper broadens the focus of past research while drawing attention to the manifold ways in which emotions can influence innovation adoption.

5.3. Implications for managerial practice and policy

The findings from our review provide notable implications for managers and policy-makers. First, our review highlights the need for managers to measure and monitor consumers' emotions to build a fine-grained understanding of adoption. The analysis should not be limited to anticipated emotions at the contemplation or trial stage but extend to the subsequent stages of adoption concerning learning and habituation. We argue that while anticipated emotions can function as a heuristic when contemplating innovation, the emotions experienced can vary after a trial based on whether expectations are met (or not). To modulate emotions, marketing communications could tap into consumers' anticipated emotions to encourage contemplation while setting realistic expectations about the likely performance of the innovation.

Second, the review stresses the importance of raising managerial awareness about the various targets of emotions that include the innovation but also the replacement or existing artefacts, the self and significant others as potential users of a certain innovation. Especially in

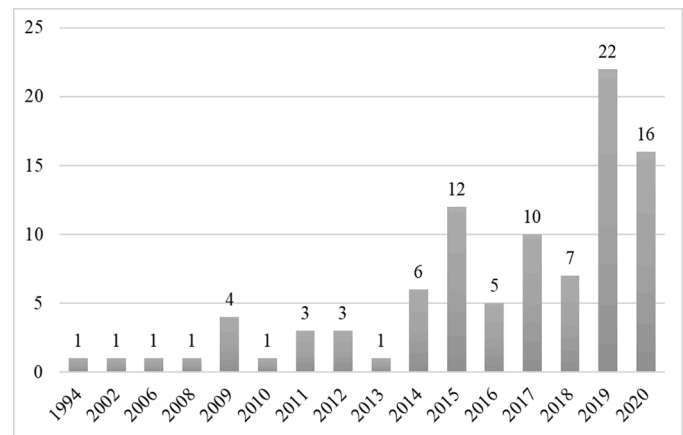


Fig. A1. Published journal articles by year.

contexts where consumers have profound feelings towards an existing technology, the offer of a replacement might not be contemplated. Managers are, therefore, advised to communicate the rationale and/or offer an incentive for substituting an existing technology based on associated emotions. Leveraging consumers' self-conscious emotions could also be instrumental in fostering adoption. This could be accomplished in different ways: (1) by giving consumers confidence in their own ability to use the innovation, for instance, through a free trial and/or with the help of a sales representative, (2) by diminishing dispositional negative affect (e.g., trait anxiety), or (3) by tapping into consumers' social identity needs or by creating social pressure to adopt in such a way that elicited pride and admiration act as motivational forces to adopt. Alternatively, managers can consider creating circumstances for enacting emotion regulation processes, for instance, by creating discussion forums for consumers to share experiences and tips on how to use the innovation and acquire knowledge and confidence for continued usage.

From a policy perspective, our review provides a useful platform to initiate conversations on how the adoption of innovations, such as technological innovations, can drive social change, as with, for instance, the role of technology adoption in fostering sustainability transitions. Notably, the findings from our review suggest that emotions represent an essential component of technology adoption, and innovation adoption and diffusion more generally, yet hitherto overlooked according to recent reviews (Clausen and Fichter, 2019). Consistent with scholarly calls for greater consideration of the psychology of actors in the transitions literature (Bögel and Upham, 2018), the addition of emotions to agency models (Geels, 2020) may provide fruitful insights into designing, launching and managing successful innovations aimed at societal change.



Fig. A2. Journal article sources (≥ 3 articles).

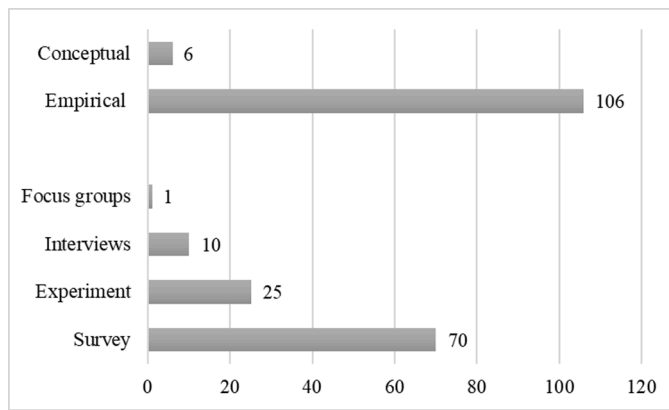


Fig. A3. Research methods employed by the reviewed studies.

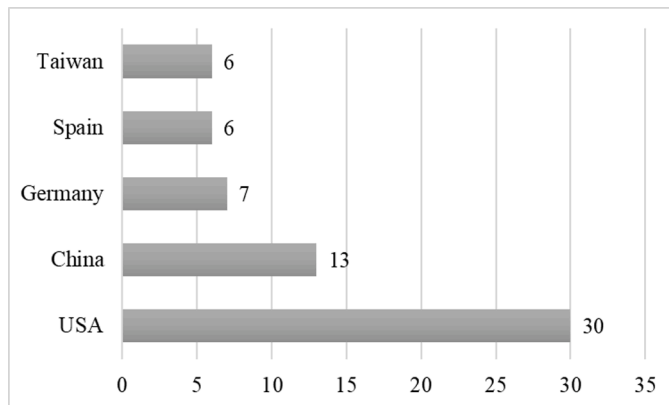


Fig. A4. Number of published studies per country (≥6 studies).

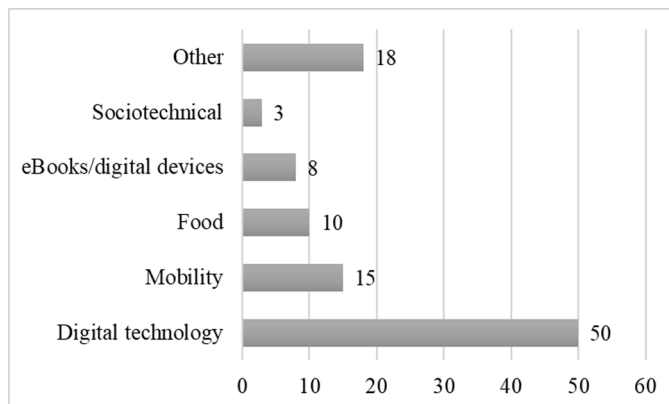


Fig. A5. Domain of innovations.

CRedit authorship contribution statement

Carmen Valor: Conceptualization, Investigation, Writing – original draft, Writing – review & editing, Visualization, Project administration. **Paolo Antonetti:** Conceptualization, Investigation, Writing – original draft, Writing – review & editing. **Benedetta Crisafulli:** Conceptualization, Investigation, Writing – original draft, Writing – review & editing.

Appendix A: Description of studies

Supplementary materials

Supplementary data associated with this article can be found, in the online version, at [10.1016/j.techfore.2022.121609](https://doi.org/10.1016/j.techfore.2022.121609).

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