

Theme: Towards disruptive sustainability: new business opportunities and challenges
Title: The Application of Gamification in Mobile Banking: A Systematic Review of the Literature

Track: Innovation

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Abstract

This systematic literature review paper explores existing literature on the adoption of gamification within a mobile banking context. Since gamification in the general banking context is nascent in research and practice, the TCCM (theory, context, characteristics, and methodology) framework was adopted to explore existing literature and make inferences for further study.

Findings from the literature review synthesis exposed various areas of potential contribution within gamification in the mobile banking context. The study emphasises the need to explore the effect of game-design elements in the mobile banking domain. Furthermore, due to the overemphasis on the quantitative research design, further studies should adopt a mixed methods design to uncover relevant themes and insights and provide a deeper understanding of gamification in mobile banking. Lastly, the use of social and psychological theories in the gamification for mobile banking context is greatly emphasised in this research.

Within the mobile banking sector, this research provides insight into gamification adoption's hedonic, utilitarian, and social value effects to enhance the adoption of sustainable financial behaviours and improve the subjective economic well-being of gamified mobile banking customers.

Keywords: Banking, Game design elements, Gamification, Mobile Banking, TCCM

1. Introduction and Research Background

Digitalisation has become central to the behaviour of younger ‘tech-savvy’ generations in areas as diverse as retail, bill payment, financial transaction, and audiobooks. Central to this experience is the utilisation of apps on various mobile devices. Likewise, digitisation is emphasised in the banking sector, citing advantages such as ease, convenience, cost savings, and client pleasure. (Sathiyavany and Shivany, 2018). While research is abundant on the factors that influence technology adoption within the banking context (Southern et al. 2021; Carranza et al. 2021; Rahi et al. 2020), there is limited empirical focus on the adoption of gamified banking technology among customers, even though extant literature within the gamification context has suggested that the adoption of game-design elements will aid the ongoing transition from conventional banking to online banking (Rodrigues et al. 2016a).

Before the adoption of gamification, mobile banking apps provided primarily utilitarian services related to functional, economic, and rational activities like paying bills and transferring money (Martinez-Lopes et al., 2014). Hence, most mobile banking services were considered boring and mundane since they solely provided transactional services. However, the application of game mechanics within the banking context triggered an explosive growth in the use of mobile banking apps as they have now become multidimensional devices that provide a wide range of utilitarian, hedonic, and social benefits, with a full range of services tailored to suit various customers’ needs (Negahban and Chung, 2014). In recent years, many banks and financial enterprises have incorporated game dynamics and game design aspects into their platforms and offerings. For instance, personal finance management (PFM) apps like Chip and Plum help users merge their accounts in one place and monitor and plan their earnings, spending, savings, and investments. These apps also help users construct budgets, set financial ambitions, save, and streamline investment procedures (Bitrian et al. 2021). More recently, digital banks like Monzo, Starling, and Revolut have gamified their mobile apps so that consumers can simultaneously enjoy the experiences that a mobile banking app and PFM app provides. Hence, in addition to enabling seamless transactions, these bank apps allow customers to set monthly budget restrictions against all expenditure categories, notify them of the balance in each category as they spend, and earn rewards and achievements for doing so.

Gamification is a contemporary phenomenon as the term was introduced in 2002 and became academically and practically popular in 2010 (Gatautis, 2016). Since then, it has been adopted in various contexts like consumer behaviour (Tobon et al. 2020); healthcare (Jang et al. 2018); education (Kusama et al. 2018), and training (Dale, 2014), amongst others. Notwithstanding the widespread acceptance of gamified technologies for improving user satisfaction and increasing scholarly attention paid to gamified technology, there is a shortage of coherence in comprehension. About what key gamified elements are, the sorts of research undertaken in smartphone banking, the methods used in these studies and the results such research has yielded. Hence, the current literature synthesis aims to summarise what we know and need to know about gamified technology in the emerging mobile banking context. The review synthesises research findings and identifies gaps in our understanding of the topic. It offers a direction for future research around the development of mobile banking gamification and its impact on consumers. Practically, this study will uncover a wide-ranging blueprint of various gamification elements that can be incorporated into the users’ interface of mobile gamified banks to enhance customers’ banking experience (Chauhan et al. 2021).

To achieve the objectives of this literature review, the following research questions are addressed:

1. What are the trends and focus of the existing literature on gamification within the mobile banking context?
2. What are the primary theoretical foundations of previous studies on adopting game-design elements in mobile banking?
3. What research methods have been employed in previous studies on this topic?
4. What theoretical, conceptual, and methodological gaps exist in the current literature on gamification in mobile banking?

2. Method

To answer the above research questions, the TCCM framework is adopted for this systematic literature review. It is a new and innovative approach to developing the dynamic aspects of gamification adoption within the banking context (Chauhan et al., 2021). The TCCM framework draws analyses from different research perspectives based on theory (T), context (C), characteristics (C), and methodology (M) within a research domain. Furthermore, using the TCCM framework for a literature review would provide organisation and coherence in evaluating chosen research. (Srivastava et al. 2020). Various studies have further recommended the TCCM framework for uncovering and summarising uncovered research domains and extracting relevant research gaps within existing literature to derive future implications (Sharma et al., 2020; Paul and Rosado-Serrando, 2019).

2.1. Journal Selection

The literature search comprised multiple databases: The Google Scholar database was utilised for searching and classifying articles (Antonaci et al. 2019; Johnson et al. 2016) because it is a well-known and extensive repository with vast and dependable articles across all spheres of academics (Caviggioli and Ughetto, 2019), and is regarded as a key database covering the greatest number of academic papers (Falagas et al. 2008). It also has the biggest citation and abstract archive of peer-reviewed literature, with over 21,000 journals that are refreshed monthly (Borrett et al., 2018). The Web of Science database was also utilised to search scholarly articles since it has a complete collection of material on human connections (Chauhan et al. 2021). Other top research databases like Taylor & Francis, Elsevier, Emerald, and Wiley were also rigorously searched to extract relevant articles (Chauhan et al. 2021).

2.2. Article Selection

A detailed literature investigation on designated repositories was done to discover research linked to the implementation of gamification and its related features within the framework of Internet banking. Appropriate keywords were chosen to facilitate the selection of noteworthy studies pertinent to this research and to avoid the exclusion of any similar research; the researcher has acknowledged and adopted a complete and abridged group of vital keywords capturing gamification, banking, personal finance management, financial behaviour, and financial well-being in the following search strings: “gamification” OR “game-based elements” OR “game mechanics” OR “gamified systems” AND “banking” OR “internet banking” OR “online banking” OR “e-banking” OR “mobile banking” AND “sustainable financial well-being” OR “personal finance” OR “financial management” OR “financial wellness” OR “financial satisfaction” OR “financial behaviour”.

These keywords were searched for in diverse combinations using Boolean operators from academic journals' titles, abstracts, and keywords sections. The inclusion criteria for selecting

relevant articles were as follows: peer-reviewed, fully published, available in full-text English, fully explained research methods, reported effects regarding (a) affective, behaviour, or cognitive impacts, and (b) user experience. While the exclusion criteria were as follows: not published in English Language, published before 2012, not peer-reviewed, related to gamification in any other domain other than banking and personal finance management (PFM), mentioned the concept of gamification without evaluating its effect, and publications were in the form of a thesis, dissertations, working papers, or conference papers.

After an extensive literature search using a sequence of gamification-related terms in an Internet banking setting, 280 articles were initially generated. After removing duplicates, 277 articles were left. Afterwards, the application of all exclusion criteria resulted in 14 articles. Following a comprehensive manual examination of the selected papers' reference lists, four more articles were added as they were found suitable based on the inclusion criteria. Finally, 18 articles were chosen for this literature review synthesis.

3. Analysis and Findings

The TCCM framework was employed to provide a thorough literature evaluation grounded in theory, context, features, and methods in the existing literature on gamification in banking (Rajan et al. 2020) (See Figure 1). The *theories* section provides a clear understanding of the research objective and direction; the *context* section presents a systematic classification of chosen research to discover the dynamic characteristics of gamification in the banking area. This section further reviews studies based on sub-contexts and game elements across terrestrial boundaries; the *characteristics* section describes the constructs used in the banking context of gamification; the *methodology* section describes the various research methods adopted by each study.

“Insert Figure 1 Here”

3.1.Theory

This section describes the theoretical models used in prior research to conceptualise their various gamification models in the banking setting.

3.1.1 Technology Acceptance Model (TAM)

Davis (1989) introduced this theory, which Internet banking academics have broadly accepted to understand better the inherent elements that determine the acceptance or rejection of new technologies (Okocha and Adibi, 2020; Priya et al., 2018). The TAM is formed by perceived utility (P.U.) and perceived ease of use (PEOU). Perceived usefulness is the user's conviction that a system would improve effectiveness. In contrast, perceived ease of use is the user's perception that using an accepted system will not need additional work (Davis, 1989). As a result, when people love using a particular technology and find it beneficial and interesting, they believe it to be simple to use (Laumer et al., 2012; Venkatesh et al., 2003) and useful (Roca and Gagne, 2008).

Various studies within gamification in the banking domain reviewed (see Table One) have applied TAM, respectively. For instance, Bitrian et al. (2021) adopted TAM with the self-determination theory (SDT) to explore the adoption of gamified PFM apps. Hence, their study showed that perceived usefulness and ease of use create more favourable attitudes towards gamified PFM apps. Also, further findings revealed that when users have a positive attitude towards a gamified PFM app, they would be willing to continue using it and refer it to others

(Hamari and Koivisto, 2013). Finally, their study contributed to TAM by specifying an enhanced description of the antecedents to users' attitudes towards gamified PFM apps. Rodrigues et al. (2016b) also adopted the *hedonic TAM* to investigate the effect of enjoyment and ease of use on bank customers' intention to adopt gamified e-banking software. Their research contributed to the TAM framework by including and conceptualising *enjoyment*, ease of use, and usefulness. They will use it, referring to it as the hedonism perceived by bank customers when using gamified business software. Third, Rodrigues et al. (2016c) adopted TAM to identify the main variables that influence bank customers' adoption of gamified e-banking applications. Following up on their previous study above (Rodrigues et al. 2016b), they further contributed to TAM by expanding the model to explain the effect of actual gamification adoption on the banking business. A significant association between actual gamification adoption and banking business performance also confirmed the validity of their contribution. Finally, Salimon et al. (2021) adopted TAM to predict the potential effect of gamification implementation on smartphone banking usage. They also contributed to TAM by using gamification, time perception, context, and hedonic motivation as model variables, along with perceived ease of use and usefulness. The validity of their contribution was also confirmed with a significant association between gamification adoption and hedonic motivation to use smartphone banking.

3.1.2 Self-Determination Theory (SDT)

As proposed by Deci and Ryan (2000), self-determination theory has emerged as one of the most important theories for gamification studies (Tobon et al. 2020). SDT has been popularly applied within this research context because gamification facilitates the application of motivational affordances to persuade individuals to behave in certain ways, thereby making it important to understand these individual motivations to address gamification effectiveness. According to Deci and Ryan (2015), this theory further differentiates between autonomous and controlled motivation, depending on whether individuals act under pressure or deliberately with full control of choice. Controlled motivation refers to behaviours undertaken by individuals under external (e.g., to attain a reward or evade punishment) or internal influences (to gratify ego needs or avoid humiliation) (Deci and Ryan, 2015), while autonomous motivation refers to the process by which individuals behave voluntarily, seeking fun and enjoyment, while also acting consistently with behaviours they find individually significant and esteemed (Deci et al. 1996). Research studies have rated autonomous motivation as a more valuable SDT element because it improves behavioural performance and psychological well-being (Gagne et al. 2015; Deci et al. 1996). Thus, SDT-based studies suggest that individuals' autonomous motivation is enhanced when their need for competence and autonomy is satisfied (Ryan and Deci, 2000).

Gamification studies further propose that game-based elements or motivational affordances like feedback, rewards, customisation, avatars, and challenges foster competence and autonomy (Bitrian et al., 2021; van Roy and Zaman, 2019). Within the gamification in the internet banking and PFM domain (see Table One), Bitrian et al. (2021) adopted SDT in conjunction with TAM to explore how gamification enables users' motivation and intention to use PFM apps. They proposed that user interaction with game-based elements in gamified PFM apps will positively influence their perceived competence and autonomy. They further suggested that competence and autonomy significantly influence autonomous motivation to use gamified PFM apps. To contribute to SDT, they additionally adopted TAM in conjunction to give fresh insights about how customers utilise PFM apps. As a result, they hypothesised

that users' autonomous drive to use gamified PFM applications influenced their judgements of utility and ease of use substantially.

3.1.3 Theory of Planned Behaviour (TPB)

The theory of planned behaviour is recognised as an important and reliable paradigm for understanding, evaluating, and controlling human social behaviour (Ajzen, 2011). The key component of TPB is that a person's willingness to do a specific behaviour serves as a crucial precursor for establishing attitude and behaviour (Ajzen, 1991). TPB goes on to discuss the impact of behavioural attitudes, subjective norms and perceived behavioural control on behavioural intention and behaviour (Krath et al. 2021). Within gamification, TPB has been significantly applied as a foundation of social factors influencing users' attitudes and behaviour (Ab Jalil et al. 2020; Silva et al. 2019). Within the gamification in the Internet banking and PFM domain (see Table One), Pal et al. (2021) adopted TPB to examine the moderating role of gamification on the relationship between an individual's financial attitude, financial self-efficacy, financial planning, and financial behaviour. Their study contributed to the applicability of TPB by highlighting that the adoption of gamification elements significantly moderates the influence of financial attitude on financial behaviour.

3.1.4 Unified Theory of Acceptance and Use of Technology (UTAUT)

The UTAUT model developed by Venkatesh et al. (2003) was established using the foundation of eight prominent theories: the theory of reasoned action (Fishbein and Ajzen, 1975); the innovation diffusion theory (Rogers, 2014); the technology acceptance model (Davis, 1989); social cognitive theory (Compeau and Higgins, 1995); P.C. utilisation model (Thompson et al. 1991); theory of planned behaviour (Taylor and Todd, 1995); motivational model (Davis et al. 1992); and an integrated model of planned behaviour and technology acceptance (Taylor and Todd, 1995). Performance expectation (P.E.), effort expectancy (E.E.), facilitating conditions (F.C.s), and social influence (S.I.) are the four components in the UTAUT paradigm (Venkatesh et al. 2012). P.E. is described as the advantages that users obtain from incorporating an innovative device, E.E. is the convenience and ease of technology incorporation, F.C. is the personal impression that an organisation will endorse the introduction of novel technologies, and S.I. is the extent of the significant role played by relatives and peers on the use of a distinctive software (Venkatesh et al. 2012).

Various studies within gamification in the Internet banking domain reviewed (see table one) have applied UTAUT, respectively. For instance, Angelina et al. (2016) adopted UTAUT to examine the effect of gamification on customers' intention to adopt and recommend Internet banking. Their study combined the impact of P.E. and E.E. constructs with web design, web features, innovativeness, and compatibility on intention to adopt and recommend Internet banking using gamification as a moderating variable. Secondly, the studies of Rahi and Ghani (2018; 2019) expanded the model to examine the moderating impact of gamification on the relationship between P.E., E.E., compatibility, innovativeness, security, perceived technology, and user's intention to adopt and recommend internet banking within social networks. Lastly, Baptista and Oliveira (2017) examined the direct effects of the mobile banking acceptance elements using the extended UTAUT model (UTAUT2) developed by Venkatesh (2012). This comprehensive model comprised three more variables (habit, hedonic motivation, habit) and three moderating variables (experience, gender, age) to examine the impact of behavioural intention on the actual usage behaviour of a chosen technology.

3.2.Context

In this section, the synthesis of literature results is classified based on journal title, publication year, banking context, gamification elements, and impact. Figure 2 below represents the classification of articles according to the publication year. Most of the studies were conducted in 2016, 2019, and 2021 with most of the empirical research related to gamification in Internet banking published in 2016. However, 2017, 2018, and 2020 show the minimum number of published studies.

Regarding journal title, most of the articles were published in *Computers in Human Behaviour* (n=4) (Rodrigues et al. 2017; Rodrigues et al. 2016a; 2016b; 2016c), while others were published in *International Journal of Bank Marketing* (n=2) (Bitrian et al. 2021; Bayuk and Altobello, 2019), *International Journal of Human-Computer Studies* (n=1) (Nasirzadeh and Fathian, 2020), *Internet Research* (n=1) (Baptista and Oliveira, 2017), *Young Consumers* (n=2) (Chauhan et al. 2021; Pal et al. 2021), *Journal of Social Sciences and Humanities* (n=1) (Sabri et al. 2019), *Electronic Journal of Information Systems in Developing Countries* (n=1) (Salimon et al. 2021), *The European Journal of Finance* (n=1) (French et al. 2020), *The International Journal of Information and Learning Technology* (n=1) (Rahi and Ghani, 2019), *World Journal of Science, Technology and Sustainable Development* (n=1) (Rahi and Ghani, 2018), *Journal of Business Research* (n=1) (Allal-Cherif and Makhlouf, 2016), *Business and Entrepreneurial Review* (n=1) (Angelina et al. 2019), and *Specialty Journal of Psychology and Management* (n=1) (Golian and Ghasemi, 2018).

“Insert Figure 2 Here”

The Appendix contains a categorisation of publications depending on the banking environment, with the allocation indicating that most of the gamification research has focused on online banking (9), followed by PFM (5), mobile banking (2), banking intranet (1), and credit cards (1).

The classification of articles based on gamification elements in Table 1 below shows the adoption of diverse game-based elements within the banking context. Four studies evaluated Avatars, rewards, and points as the most common gamification elements. Secondly, leaderboards, information, progress, badges, and graphics design were assessed in three studies. The third most common elements evaluated in the two studies were personalisation, interactivity, and easy navigation. While the least common gamification elements assessed in only one study were credit scores, alerts, budgets, tracking, security process, images, reviews, blogs, social networks, customisation, video images, task performance, goals, and achievements. Animation, competition, level, efficiency, attitude, feedback, lottery, penalty, epic meaning, countdown, and prizes.

Lastly, based on the classification of articles in the current review synthesis regarding gamification impacts, as presented in the Appendix, all empirical studies displayed a positive effect of gamification elements within Internet banking.

3.3.Characteristics

Within this review framework, *characteristics* describe the use of constructs in the studies within the selected contexts (see Table 1). The characteristics further classify the antecedent and outcome variables across the fields of knowledge (Sharma et al., 2020). The most common outcome variables were the intention to adopt a gamified banking/PFM application (Bitrian et al., 2021; Rahi and Ghani, 2019; Angelina et al., 2019; Bayuk and Altobello, 2019; Rodrigues et al., 2017; Rodrigues et al. 2016c). Other outcome variables were financial capability (French et al., 2020), customer loyalty (Golian and Ghasemi, 2018), intention to recommend (Rahi and

Ghani, 2018), knowledge management and benchmarking practices (Allal-Cherif and Makhoul, 2016), actual usage of a gamified banking/PFM app (Salimon et al. 2021; Baptista and Oliveira, 2016a), financial behaviour (Pal et al. 2021; Sabri et al. 2019), business impact (Rodrigues et al. 2016b). While gamification/game-based elements served as an antecedent variable in most reviewed studies within the banking and PFM context, it served as a moderating variable in other studies (Pal et al., 2021; Rahi and Ghani, 2019; Angelina et al., 2019; Rahi and Ghani, 2018).

3.4. Methodology

In this section, the synthesis of literature results is classified based on the data collection method, research design, and sample size range. Firstly, from the total of 18 reviewed studies, 17 were empirical, while one was conceptual. Out of the empirical studies, 13 studies adopted the survey method of quantitative data collection; one study adopted the randomised control trial (RCT) method of quantitative data collection; two studies adopted the qualitative data collection approach using an open-ended survey and a case study, while one study adopted the mixed method of data collection through semi-structured interviews and surveys. For most empirical studies, convenience sampling was adopted as the sampling technique. The sample size for quantitative studies ranged from 180 to 500, while that of qualitative studies ranged from 3 to 53. Regarding data analysis, structural equation modelling was the most used method. Other adopted data collection methods include semantic text analysis and an ordinary least square (OLS) regression analysis.

4. Discussion

This section highlights gaps in the available literature and proposes future research options. Based on the number of published studies in the previous five years, research into the use of gamification in the banking environment is still in its early stages, with more important findings predicted in the future years. This section would further adopt the TCCM framework to present thematic, methodological, and theoretical dimensions by which future research would contribute to gamification and its impact on consumers within the banking context.

4.1. Thematic (Contextual and Characteristics) Dimensions

Scholars' usage of gamification components in the banking setting is extremely scattered. Although several game design elements have been validated to produce favourable outcomes, there is no clarity on the all-encompassing values that gamified mobile banking app users derive from adopting. This is the case even though relevant gamification literature has suggested that gamification is a multifaceted socio-technological phenomenon with the potential to deliver hedonic, utilitarian, and social values (Mulcahy et al., 2020; Hamari and Koivisto, 2015). For instance, Bitrian et al.'s (2021) research examined the effect of five elements/affordances (credit scores, alerts, budgets, tracking, and personalisation) on users' competence, autonomy, perceived ease of use, and perceived usefulness. Hence, their research focused solely on the utilitarian benefits of gamification but ignored the hedonic and social benefits.

Similarly, Rodrigues et al. (2017) researched the utilitarian benefits of gamification without any emphasis on hedonic and social benefits. Also, while empirical studies of Rodrigues et al. (2016b; 2016c) examined the interrelationship between socialness, enjoyment, ease-of-use and usefulness, there was no emphasis on the effect of any specific game-design element on these

constructs. Therefore, future research will contribute significantly by examining the perceived (hedonic, utilitarian, and social) value users derive from their gamified mobile banking apps.

Secondly, relevant gamification studies recognise that gamification has three major components: (a) the affordances within a gamified system (various elements that enable gameful experiences), which results in (b) perceived values/benefits (utilitarian, hedonic and social), and then leads to (c) the desired behavioural outcomes, i.e., the activities and behaviours that gamification aims to support and stimulate (Koivisto and Hamari, 2019; Hamari et al. 2014). Most gamification advocates think that gamified apps should result in demonstrable behavioural improvements. Through the mediating effects of perceived values (Morganti et al. 2017), yet there is a lack of empirical evidence about the downstream impact of gamification on positive financial behaviours within the mobile banking context, even though gamification studies within other business contexts like health and consumer behaviour link the adoption of gamification to sustainable behaviours like energy conservation (Mulcahy et al. 2020), reduction in alcohol consumption (Mulcahy et al. 2015), and exercising (Hamari and Koivisto, 2015). Therefore, future studies should consider this.

Lastly, extant literature within the gamification in mobile banking context has failed so far to explore the impact of sustainable financial behaviours on users' financial well-being despite literature suggestions that the adoption of gamified banking and PFM apps would have a positive effect on users' financial well-being (Bayuk and Altobello, 2019). Similarly, the studies of Bitrain et al. (2021) examined the role of gamification on the behavioural intention to use gamified personal finance apps without considering whether these gamified personal finance apps would influence users' financial well-being. According to core financial behaviour and financial well-being literature, financial behaviours appear as the most significant predictors of financial well-being (Joo and Grable, 2004; Shim et al., 2009). Studies further suggest that engaging in hazardous financial behaviours like exceeding credit limits costs twice the benefits of performing desirable financial behaviours like active saving, cash flow management, or budgeting (Jian et al. 2014; Xiao et al. 2009). Furthermore, findings from the research by Joo (1998) conclude that exhibiting sustainable financial behaviours is positively related to financial well-being, while the study of Xiao et al. (2006) also affirms that positive financial behaviours are associated with financial well-being. Hence, further research should contribute to existing knowledge by exploring the potential effect of sustainable financial behaviours on users' financial well-being.

4.2.Theoretical dimensions

Gamification studies within the banking context have been built on the established models of TAM (Rodrigues et al. 2017), TPB (Pal et al. 2021), and UTAUT (Rahi and Ghani, 2018; Baptista and Oliveira, 2017) to study the behavioural intentions towards its adoption. Though these theories are seen to be effective at predicting intention and behaviour, their intricacy, removal of key crucial factors, and poor categorisations of some elements of the models are thought to be serious flaws (Sumak and Sorgo, 2016), thereby making these models weak in this research context. For instance, according to researchers, TAM components are utility orientated and do not consider hedonic or social values (Taherdoost, 2018). According to Gallego et al. (2015), the applicability of the TAM is also limited when technology acceptance and adoption are not only aimed at achieving certain tasks or procedures but also at fulfilling emotional needs. On the other hand, the UTAUT model and TPB are unsuitable for investigating game design elements' direct effects on desirable outcomes. Hence, future gamification studies that adopted these theories could further investigate the moderating effects

of gamification and not their direct effects (Pal et al., 2021; Angelina et al., 2019; Rahi and Ghani, 2019; Rahi and Ghani, 2018).

Further research could also adopt other relevant theories like self-determination (SDT), which postulates that an individual's actions may be externally or internally motivated (Deci and Ryan, 1985). Extant literature has suggested that utilitarian and social values are externally motivated through perceived usefulness, ease of use, recognition, and social influence (van der Heijden, 2004), while hedonic values are internally motivated through enjoyment and playfulness (Hamari and Koivisto, 2015; Ryan et al. 2006). Furthermore, there is an urgent call to establish future gamification in banking research on psychological and sociological theories to explore the dynamic relationship between gamification adoption and sustainable consumer behaviours (Chauhan et al. 2021).

4.3.Methodological Dimensions

13 of the 18 empirical studies reviewed employed quantitative data collection methods, with far fewer using qualitative or mixed-method approaches. While there is a significant practical focus on the cause-and-effect relationship between gamification and various outcome variables, relevant literature suggests that the application of gamification is a much broader concept than just a means to an end (Chauhan et al. 2021), hence validating the need for adopting a mixed-method research design. While the quantitative approach enables investigating how gamified mobile banking apps influence users' sustainable financial behaviours and financial well-being, a qualitative approach would further allow a useful in-depth understanding of users' experiences with these gamified elements.

5. Conclusion

This systematic review aimed to gather and synthesise all published peer-reviewed studies on gamification in mobile banking. This review aimed to bring attention to this topic amongst researchers in the emerging field of gamification application and to promote future empirical research. Although gamification is a relatively new concept, significant research has been carried out in the hospitality, higher education, and healthcare sectors. The mobile banking domain lacks practical and empirical research focusing on the adoption of gamification, even though there has been a practical shift of customer focus from traditional to digital gamified banks (Bayuk and Altobello, 2019). Therefore, this research has used the TCCM framework to uncover relevant insights into gamification adoption within the mobile banking context and made recommendations for further research.

Findings from the literature review synthesis exposed various areas of potential contribution within gamification in the mobile banking context. The study emphasises the need to explore the effect of game-design elements in the mobile banking domain. Furthermore, due to the overemphasis on the quantitative research design, further studies are recommended to adopt a mixed methods design to uncover relevant themes and insights and provide a deeper understanding of gamification in mobile banking. Lastly, the use of social and psychological theories in the gamification for mobile banking context is greatly emphasised in this research.

From a practical perspective, this research provides insight into gamification adoption's hedonic, utilitarian, and social value effects to enhance the adoption of sustainable financial behaviours and improve the subjective financial well-being of gamified mobile banking customers. Addressing the research themes proposed in this study will improve individuals'

and families' financial behaviour and financial well-being, thereby positively impacting their quality of life, happiness, mental health, and general well-being. Similarly, financial service providers will learn how to facilitate sound behaviours among their users. This knowledge can be used to improve their services and user experiences to enhance financial well-being.

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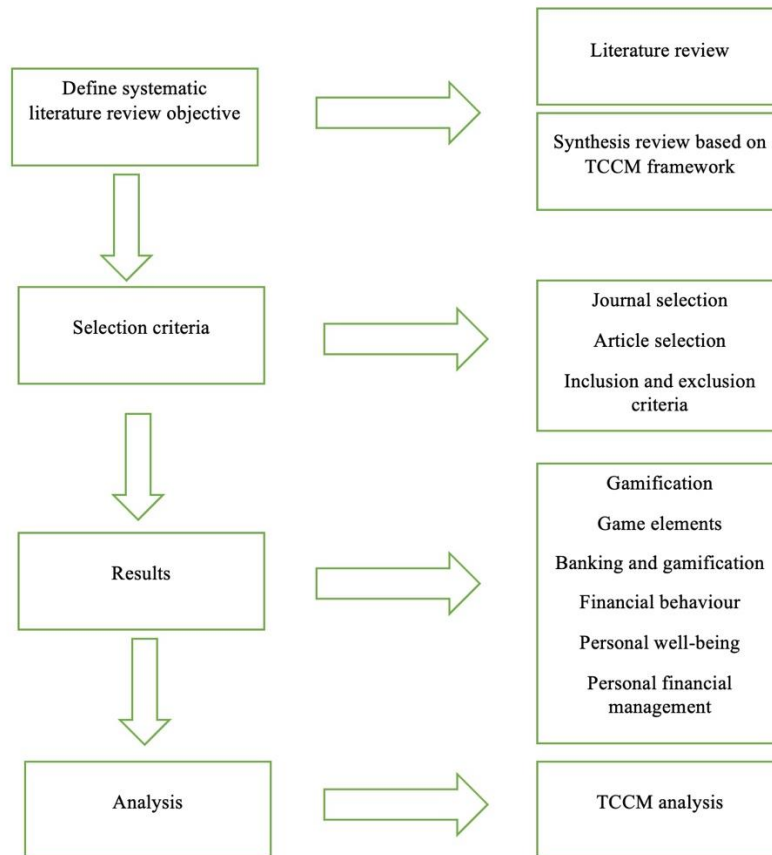
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Appendix

Figure 1: Literature Selection Guide



Source: Adapted from Chauhan et al. (2021).

Figure 2: Classification of Articles according to Publication Year

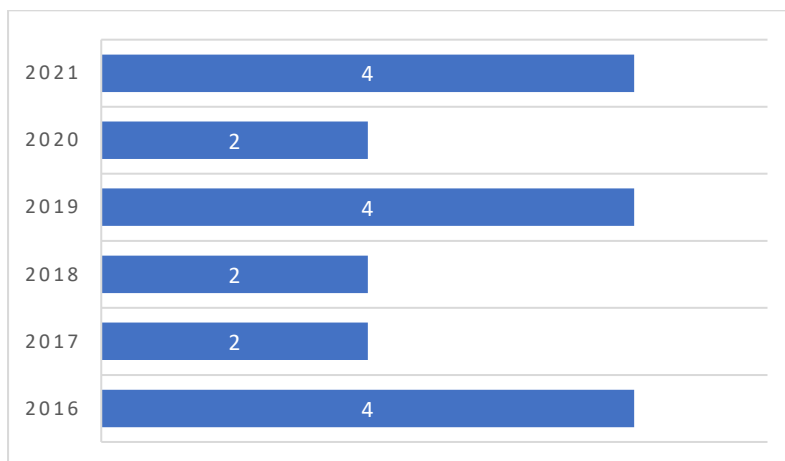


Table One: Literature evidence of gamification studies within the banking and PFM context

Reference	Research Aim	Game elements	Variables studied	Research context	Theory used	Research design	Key findings
Bitraian et al. (2021)	To examine how gamification enhances users' motivation and intention to adopt PFM apps	credit score, alerts, budgets, tracking, personalisation	motivational affordances, autonomous motivation, autonomy, competence, perceived ease of use, perceived usefulness, attitude, behavioural intention	personal finance management	self-determination theory and TAM	empirical/quantitative (cross-sectional survey)	Gamifying PFM apps satisfy users' need for competence, autonomy, and autonomous motivation; users' stimulation enhances their perception of ease of use and usefulness and causes them to develop favourable attitudes and behavioural intention to use them
Rodrigues et al. (2016a)	To invent a framework for software gamified in e-banking	product, game, information, security process	Users' design preferences in five cases of banking software gamified	Internet banking	none stated	empirical/qualitative (open-ended survey)	The e-banking gamification software development framework is categorised into five major features (rules, objectives, functionality, design, appearance) and elements (product, game, information, security process)
Rodrigues et al. (2016b)	To investigate the effect of ease of use and enjoyment on the intention of bank customers to adopt gamified e-banking software	avatars	socialness, ease-of-use, enjoyment, usefulness, intention to use	Internet banking	TAM	empirical/quantitative (online survey)	Ease of use and enjoyment are interconnected, significantly influencing the intention to adopt e-banking.
Rodrigues et al. (2016c)	To identify the main variables that influence the adoption of gamified e-banking applications by bank customers	avatars, leaderboards, images, reviews, blogs, social network	gamification, socialness, ease-of-use, enjoyment, usefulness, intention to use, business impact	Internet banking	TAM	empirical/quantitative (online survey)	Gamification adoption enhances bank customers' perception of social interaction and intention to use gamified e-banking applications.
Rodrigues et al. (2017)	To examine the effect of game design elements within a banking	none stated	Ease of use, ease of use, website features, information,	Internet banking	none stated	empirical/quantitative (survey)	Game design elements significantly influenced ease of use, website features,

	website on customers' intention to use e-banking		gamification, intention to use				information, and intention to use e-banking.
Chauhan et al. 2021	To explore the theoretical and empirical dimensions of the gamification literature in the banking context		Games and play, game design elements, banking context	Internet banking, mobile/app banking, banking intranet, and credit cards	none stated	Meta-analysis	The study emphasises the adoption of social and psychological theory-building in the banking sector. Secondly, research on adopting game design elements within the banking domain is validated to be underexplored.
Salimon et al. (2021)	To examine the potential influence of gamification implementation, perceived usefulness, perceived ease-of-use, hedonic motivation, and cultural influences on smartphone banking adoption	none stated	Gamification, perceived usefulness, perceived ease-of-use, hedonic motivation, context perception, time perception, smartphone banking adoption	mobile banking	TAM	empirical/quantitative (survey)	The exogenous variables (gamification implementation, perceived usefulness, and perceived ease of use) significantly influenced smartphone banking adoption. Hedonic motivation also mediated the relationship between the exogenous variables and smartphone banking adoption.
Rahi and Ghani (2018)	To investigate the moderating role of gamification between users' intention to adopt and recommend Internet banking within social networks	customisation, interactivity, graphics design, easy navigation	Performance expectancy, effort expectancy, perceived technology security, intention to adopt, intention to recommend, compatibility, innovativeness, gamification	Internet banking	UTAUT modified	empirical/quantitative (survey)	The more gamification was used, the stronger significantly the relationship between users' intention to adopt and recommend Internet banking within social networks
Rahi and Ghani (2019)	To examine the factors that influence	Information, animation, and navigation	Website features, performance expectancy, effort expectancy, website	Internet banking	UTAUT modified	empirical/quantitative (survey)	Gamification significantly mediates the association between the intention to adopt and recommend. Good website

	gamification adoption		design, self-confidence, intention to adopt, intention to recommend, gamification				design also greatly influences performance expectancy and reduces effort expectancy towards Internet banking.
Nasirzadeh and Fathian (2020)	To examine the association between users' demographic and behavioural attributes, and their preferences for gamification elements and perceived expected benefits	Points, leaderboard, competition, level, rewards, progress, feedback, avatar, information, lottery, badges, penalty, epic meaning, countdown, social interaction	Gamification, expected benefits, personality traits, demographic features	Internet banking	None stated	empirical/mixed methods (semi-structured interviews and surveys)	users' demographic and behavioural attributes significantly influenced their unique preferences for gamification elements and perceived expected benefits
Baptista and Oliveira (2017)	To examine the potential effect of the utilisation of game mechanics and game design techniques	prizes, points, rewards	Performance and effort expectancy, social influence, hedonic motivation, price value, habit, facilitation conditions, behavioural intention, user behaviour, gamification impact	Mobile banking	UTAUT2	empirical/quantitative (online survey)	Performance and effort expectancy, social influence, hedonic motivation, price value, and habit significantly influenced behavioural intention to adopt mobile banking; gamification significantly influenced intention to adopt mobile banking; and behavioural intention positively influenced mobile banking user behaviour.
Bayuk and Altobello (2019)	To examine the potential benefits of gamification adoption for saving motivation and financial well-being	badges, progress bars, rewards, points	financial anxiety, subjective financial knowledge, objective financial knowledge, intention to adopt, ability to achieve saving objectives	personal finance management	None stated	empirical/quantitative (cross-sectional survey)	gamified apps with more social features were perceived as more useful to individuals with usage experience (vs individuals without) user experience. Both experience groups perceive gamified apps with more economic features as similarly useful.

Pal et al. (2021)	To examine the moderating role of gamification on the association between an individual's financial attitude, financial self-efficacy, financial planning, and financial behaviour	badges, leaderboards, personalisation, goals, graphics, achievements	financial attitude, financial self-efficacy, financial planning activity, financial management behaviour	personal finance management	theory of planned behaviour	empirical/quantitative (cross-sectional survey)	financial attitude, financial self-efficacy, and financial planning activity influence financial management behaviour; gamified-based elements significantly moderate the influence of financial attitude and financial planning on financial management behaviour
French et al. (2020)	To assess whether personal finance smartphone apps can be utilised to improve the financial capability of low-income individuals	none stated	Financial knowledge, understanding, and basic skills, financial attitudes and motivations, financially capable behaviours, and financial well-being	personal finance management	none stated	empirical/quantitative (randomised control trial; survey)	frequent app usage positively influenced users' financial knowledge, understanding and basic skills, attitudes and motivations, and these factors all resulted in better financially capable behaviours. However, the overall improvement in users' financially capable behaviours did not positively influence their financial situation.
Sabri et al. (2019)	To examine the impact of smart money kits on users' financial knowledge, skill, and behaviour	none stated	financial learning, financial skills, financial behaviour	personal finance management	none stated	empirical/quantitative (online survey)	The smart money kit significantly improved users' financial knowledge, skill, and behaviour.
Allal-Cherif and Makhlouf (2016)	To analyse the emerging knowledge management and benchmarking practices assembled by the serious games of three financial firms	Progress bars, avatars, task performance, graphics, video images	serious games adoption, externalisation, socialisation, combination, knowledge internalisation, benchmarking	Banking intranet	none stated	empirical/qualitative (case study)	Serious games significantly influenced externalisation, socialisation, combination, knowledge internalisation, and benchmarking.

Angelina et al. (2019)	To examine the effect of gamification on customers' intention to adopt and recommend Internet banking	points, rewards	Compatibility, innovativeness, web features, web design, effort expectancy, performance expectancy, intention to adopt, intention to recommend, gamification	Internet banking	UTAUT	empirical/quantitative (online survey)	Intention to adopt Internet banking is significantly influenced by effort expectancy, performance expectancy, web design, and innovativeness.
Golian and Ghesemi (2018)	To examine the influence of attitude and gamification adoption on customer behaviour	efficiency, attitude	gamification, efficiency, attitude, customer behaviour	Internet banking	none stated	empirical/quantitative (survey)	Adoption of the gamification dimensions (efficiency and attitude) significantly influence bank customers' behaviour.

