Designing Gamification for Sustainable Employee Behavior: Insights on Employee Motivations, Design Features and Gamification Elements

Jeanine Krath
University of Koblenz-Landau
jkrath@uni-koblenz.de

Benedikt Morschheuser
Friedrich-Alexander University Erlangen-Nuremberg
benedikt.morschheuser@fau.de

Harald F.O. von Korflesch
University of Koblenz-Landau
harald.vonkorflesch@uni-koblenz.de

Abstract

Encouraging sustainable employee behavior is critical for companies in the face of increasing societal pressure towards sustainability. While gamification has been shown to influence employee behavior effectively, current attempts to design gamification for sustainability in the workplace largely neglect the importance of understanding personal factors and contextual characteristics. This work explores employees' motivations for sustainable behavior and expectations for design features through in-depth interviews with 27 employees from different SMEs. Our results show that many employees tend to be egoistically motivated, suggesting the design of appropriate narratives and individualistic-oriented design features. Employees expected utilitarian, hedonistic, and social design features that primarily serve to support them in achieving personal sustainability goals while highlighting that gamification at work should also integrate seamlessly with existing work routines. We contribute to gamification design research by discussing the particularities of the workplace sustainability context and shedding new light on involving users in gamification design.

1. Introduction

In light of the increasing political and societal pressure towards sustainable development, which becomes evident in developments such as the United Nation's Sustainable Development Goals (SDGs) [1], companies are challenged to shift from a mere focus on the economic dimension and to include ecological and societal engagement in their performance objectives [2]. However, alongside strategic decisions, individual employee behavior is decisive for companies' sustainability performance [3, 4]. Since employees are eventually responsible for implementing the strategic decisions, it is critical that they know and understand the company's sustainability goals [5] and change their current behavior to pursue these goals [6]. Recent studies, for example, point to the significant impact of employee behavior on energy expenditure [7], with potential savings of up to 20-40% of a corporate building's energy consumption [8, 9]. This demonstrates the relevance of employee engagement in improving a company's sustainability performance [10]. In particular, small and medium-sized enterprises (SMEs), which make up the vast majority of companies in the EU [11] and the U.S. [12] and are considered major contributors to global pollution [13], rely on employee engagement to improve their sustainability performance in the absence of financial resources for sustainability measures [14]. Consequently, there is a great demand for effective incentive mechanisms that involve employees in sustainability efforts.

Gamification represents one of the most promising developments in terms of influencing motivation and behavior toward sustainability [15]. It is broadly considered as the use of game elements in non-game contexts [16] with the aim to induce similar experiences as in games (e.g., fun, satisfaction, motivation) and to affect behavior [17]. Gamification has been shown to favorably change employee behavior in various contexts, such as knowledge sharing [18] and collaborative innovation [19], to support corporate training programs [20], or to improve performance in warehouse management [21]. Existing studies show that gamification in an organizational context can motivate employees to engage in sustainable behavior [22, 23].

However, the design features critical to the acceptance and continued use of such systems from the employees' perspective remain poorly understood. Current attempts to incorporate employees and their preferences into the design of gamification for sustainability have focused on quantitative evaluations of player types [24], motivational types [25], or dispositional parameters [26]. Yet, a profound understanding of employees' needs, motivations, and expectations, as well as the contextual characteristics of gamification in the workplace, is still lacking [21].

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However, this has been highlighted as critical to the success of gamification [27, 28].

The present study aims to fill this gap. In the course of a design science research (DSR) approach [29] to develop a gamified app for sustainable, especially pro-environmental behavior in different SMEs, we aim to include the perspective of our target group and seek to understand a) *their motivations for sustainable behavior* as well as b) *their expectations for design features* (e.g., utilitarian aspects and hedonic gamification elements) of such an app.

Consequently, we opt for semi-structured exploratory interviews as a basis for the future design in the DSR cycle [30] to identify employee expectations and motivations as well as contextual factors through in-depth discussion with employees of different SMEs striving to become more sustainable. In the course of the analysis, the value-belief-norm theory [31] serves as a guiding framework for classifying employees' motivations for sustainable behavior. The theory distinguishes between three categories of value orientation and according attitudes that shape intention to behave sustainably: *egoistic* value orientation and attitudes, which predispose people to protect the environment only when it affects them or those they care about, *humanistic* value orientation and attitudes, which lead people to care about the environment based on the costs or benefits to a human group or humanity as a whole, and *biospheric* value orientation and attitudes, that describe altruism directed toward the ecosystem beyond benefits to humans. This categorization supports our qualitative content analysis by providing a theoretically guided approach to classify different motivations for sustainable behavior.

The remainder of this paper is structured as follows. Section 2 describes the methodology, including participants, data collection, and data analysis, and Section 3 reports the results. Next, Section 4 provides a discussion of the findings. Finally, Section 5 highlights the limitations of our study and suggests avenues for further research.

2. Materials and methods

2.1. Participants

We interviewed 27 employees working in four different SMEs in Germany in February-March 2021. The companies operated in various industries and were selected to capture a wide range of different SME business activities. One focuses on industrial glass production, the second offers specialized software as a service, the third is in the web and media design industry, and the fourth deals with industrial technology development. We contacted the companies, and internal representatives recruited the interviewees. We asked the representatives to select participants to be as reflective of the company as possible. As a result, they ranged from service desk staff to software developers and product designers to team leaders and general managers, capturing the diversity of different employees for our study. Consequently, respondents formed a heterogeneous group in terms of gender, job description, position, and age (see Table 1). To maintain confidentiality and prevent individual identification, we report age as a range.

Table 1. Participants and their characteristics.

No.	Gender	Age	Position	Job description
P1	Male	20-29	Follower	Marketing
P2	Female	n.s.	Follower	Sustainability management
P3	Male	n.s.	Manager	Process management
P4	Male	n.s.	Follower	Product management
P5	Female	20-29	Follower	Software development
P6	Female	n.s.	Follower	Software development
P7	Male	40-49	Follower	Sales
P8	Male	20-29	Follower	Quality management
P9	Male	30-39	Follower	Media design
P10	Male	20-29	Follower	Software development
P11	Male	20-29	Follower	Media design
P12	Male	30-39	Manager	Executive board
P13	Female	30-39	Follower	Marketing
P14	Male	20-29	Follower	Media design
P15	Female	30-39	Follower	Internal organization
P16	Male	20-29	Follower	Software development
P17	Female	60-69	Manager	Human resources
P18	Female	30-39	Manager	Customer service
P19	Male	n.s.	Manager	Executive board
P20	Male	30-39	Manager	Customer service
P21	Female	30-39	Follower	Staff position executive board
P22	Female	30-39	Follower	Customer service
P23	Female	< 20	Follower	Procurement
P24	Male	30-39	Manager	Research & development
P25	Male	n.s.	Manager	Supply chain management
P26	Male	40-49	Manager	Marketing
P27	Male	n.s.	Manager	Production

2.2 Data collection

For data collection, we used semi-structured interviews as this method is considered suitable for gathering in-depth information about individuals' personal and social affairs while at the same time allowing the researcher to focus on identified research questions [32]. Due to the Covid-19 pandemic and associated restrictions on in-person communication, we conducted the interviews remotely via Microsoft Teams. Prior to the data collection, we informed each participant about the details of the research procedure and obtained their written informed consent. At the

beginning of each interview, which was conducted by a single researcher, the interviewer introduced the study context (workplace sustainability) and provided a brief explanation of gamification in relation to Deterding et al.'s definition, i.e., the "use of game elements in non-game contexts" [16]. Correspondingly, the interview followed a loose guideline, starting with the interviewee's daily work routines (*What does a typical working day look like for you?*), going over the topic of sustainability and motivations for sustainable behavior (*Would you say it is important or unimportant that people behave sustainably in the workplace? For what reasons or motives would you act sustainably or change your behavior?*), followed by an open discussion on the expectations for design features and game elements of a gamified app for sustainability in the workplace (*How would a gamified app for sustainability need to be designed for you to use it? Which criteria would be particularly important to you? Which game elements would you find motivating?*). The pertinent interview guide was pretested with two participants to identify and eradicate any misleading questions or wording. Interviews were recorded using screen recording software and lasted between 34 and 78 minutes. Except for one interview, which was conducted in English and also transcribed in English, all interviews were conducted and transcribed in German.

2.3. Data analysis

Following the approach of Mayring [33], we conducted a qualitative content analysis, as qualitative content analysis is not only the most popular text analytic method but also a suitable approach to extract findings relevant to the predefined research questions [34]. Accordingly, we opted for deductive coding concerning employees' motivations for sustainable behavior guided by Stern and Dietz's value-belief-norm theory [31] and inductive coding for design features for a gamified app (data-driven approach [33]). All transcripts were uploaded to the MAXQDA data analysis tool. The inductive coding process involved (1) determining the level of selection and abstraction of categories to be coded, (2) linking text passages with the defined level of abstraction either to existing categories or forming a new category, (3) revisiting categories after 30% of the material, and (4) coding the remaining material without changing existing categories and adding new categories as needed [33]. For reliability testing, intracoder agreement checking as a measure of stability [33] was performed for 10% of the material, with an intracoder agreement rate of 94.44%.

After the coding process, the categories were clustered into groups to provide overarching insights towards understanding employees' expectations and desires. The classification was inspired by the general aspects of user experience in hedonic information systems [35] to explore the role of these different aspects in the specific context of a gamified app for sustainable employee behavior in a structured way. In the following, excerpts from the interviews presented in the results are translated from German into English.

3. Results

3.1. Motivations for sustainable behavior

First, we investigated employee motivations for sustainable behavior to design appropriate narratives and pick up individuals with appropriate design features in the gamified app. In our interviews, we identified a large group of employees who expressed their concerns about the future of their own children and grandchildren in terms of resources such as fossil fuels, water, and food (P6, P8, P17, P19, P22, P27): *"Well, I actually think that this change has taken place in me because of my children, that you start to think about what kind of world do I want to leave to my children?"* (P22). When investigating their statements, we recognized egoistic aspects as a common reason for sustainable behavior. In addition, several employees indicated that they care about the environment based solely on social norms, citing pressure from acquaintances (P12, P13) and the increasing social relevance of sustainable behavior: *"You get to hear it everywhere. I mean, how you should behave and what is sustainable for the environment and environmentally friendly. And of course, you try to behave accordingly. Simply because it feels righter"* (P16). Moreover, participants in management positions particularly emphasized that sustainable employee behavior maintains the company's competitiveness and should therefore be strived for (P19, P25).

The second, smaller group of workers emphasized the prospects for future human civilization and criticized the short-term view of current policies (P7), which is why we classified them as humanistically motivated. In particular, they pointed to the importance of today's sustainable behavior for future generations of all humanity (P4, P14), beyond their own children (P20).

Finally, the third group of employees indicated biospheric motivations as reasons for sustainable behavior. They explained their sustainable behavior by the observation that unsustainable behavior has led to *"islands of trash"* (P21) in the oceans, the death of animals from human waste on land and in water (P3), or the pollution of rivers (P15). Some of them also equated the state of the ecosystem with the health of the planet itself, which should be protected at all costs: *"Sustainability is, of course, a very, very crucial issue, because I think we have done enough damage to our planet for a long time without thinking about it. And we*

must and should start counteracting this now at the very latest" (P26).

3.2. Design features and gamification elements

When asking for expected design features of a gamified app for sustainability, interviewees emphasized various factors that, according to the interviews, are of great importance for the acceptance and continued use of such an app at work. In particular, we identified that employees referred to *utilitarian, hedonic,* and *social* design features as well as the issue of *data protection and consent*.

3.2.1 Utilitarian design features and elements. According to [35], we clustered design features as utilitarian design features if they enhanced the value of the app towards intended outcomes and supported ease of use, which refers to an efficient and obstacle-free user experience, as well as perceived usefulness, i.e., that the app enhances sustainable behavior. Our analysis revealed seven clusters of utilitarian design features that were cited as important by the interviewees. These are *easy access*, *intuitive user interface*, *onboarding*, *intelligent support*, *goal setting*, *performance tracking*, and *appropriate incentives* (see Table 2):

Easy access. In terms of easy access, employees mentioned that a gamified app for sustainability should be accessible through their smartphone for them to use, especially since it should not distract from main work tasks and would be primarily used during breaks or at the end of the workday. In addition, some employees desired a complementary browser app that should not replace a smartphone app but increase its informational value. For example, it should provide advanced statistics on employees' sustainable behaviors, mentioned in particular by participants that lead the research project within the company (P2, P17), and overall sustainability performance. Particularly noteworthy is the suggestion of two employees who proposed facilitating the use of the gamified app by linking it to internal communication systems, such as MS Teams (P26).

Intuitive user interface. In addition, the employees emphasized the importance of an intuitive user interface that simplifies the use of the gamified app. A vital aspect of the user interface should be a pragmatic structure that *"(...) must not be cumbersome to use, because otherwise it quickly degenerates into work again"* (P16) and has an *"intuitive structure, (that) can be learned quickly"* (P21), i.e., the gamified app should not be overburdened with too many elements, tabs, and navigations. Instead, since the gamified app aims at sustainability in the work environment, it was important for employees to be able to use the app with as little time as possible and to have quick access to the main actions in the app. For example, they mentioned the introduction of checklists that allow quick input of sustainability actions performed during the day (P15, P16, P22). Such a design would enable employees not to have to actively search for how to enter their sustainability actions into the app but to remain in a time-efficient, reactive position where they can simply check off when they have completed an action (P19).

Onboarding. Furthermore, respondents cited the importance of onboarding in the form of a tutorial (P15), a go-through (P26), or a visual introduction (P21) as a relevant aspect for increasing usability. The onboarding should explain the most important functionalities of the gamified app to ease the entry, especially since the topic of sustainable behavior is not necessarily self-explanatory: *"The app must tell you 'Here, here I am, I can do that. Here you can do this, here you can do that.'"* (P14). One employee also mentioned that it would help usability if this introduction were accessible in the gamified app to view again after some inactivity (P26).

Goal setting. Concerning the support of sustainable behavior, many employees mentioned that the gamified app should allow them to set their own goals. Employees would like to choose which dimension of sustainable behavior, e.g., saving energy, reducing waste, or biking to work, they would like to work on (P2, P21), and they want to be able to change their focus from one week to another (P22). In addition, interviewees mentioned the assistive function of daily goals that should be provided (P4, P18, P20) to give them an idea of what they could work on that day. One employee emphasized that the goals set should be clear, measurable, and achievable, i.e., SMART, to be motivating (P20).

Intelligent support. Beyond goal-setting functionalities, employees expect the gamified app to provide intelligent support in pursuing their goals. Some respondents described that the gamified app should provide a clear path to the goal, i.e., tell them what they need to do to achieve their goals, e.g., by offering an overview of possible actions for sustainability (P11, P12). Several interviewees also mentioned personalized recommendations adapted to their current sustainable behavior and goals as an essential supporting element. For example, the gamified app should display sustainability actions based on active challenges (P9) and suggest further goals based on current objectives (P10). In addition, employees liked the app to consider situational factors for personalized suggestions, such as whether it is quitting time and one should turn off the computer (P20) or whether the employee is in a specific location (P12, P25). Similarly, employees emphasized the integration of reminders that actively encourage them to engage in sustainable behaviors, for example, in the form of push notifications (P1, P6, P19, P20).

Table 2. Utilitarian design features and elements.

General aspect	Cluster	Expected design features	Participants that cited the feature
Ease of use	Easy access	Smartphone app	P2, P3, P4, P6, P7, P8, P9, P10, P11, P12, P13, P14, P15, P16, P17, P18, P20, P21, P22, P24, P26, P27
		Browser app	P2, P10, P16, P17, P20, P22, P24, P26
		Integration with existing systems	P24, P26
	Intuitive user interface	Pragmatic structure	P2, P4, P5, P11, P14, P15, P16, P20, P21, P22, P25, P26, P27
		Quick access to main actions	P15, P16, P19, P22, P24, P25
	Onboarding	Explanatory introduction	P7, P14, P15, P21, P22, P26
		Access during use	P26
Usefulness	Goal setting	Customizable goals	P2, P4, P8, P18, P21, P22, P23
		Daily goals	P4, P18, P20
		Clear and achievable goals	P20
	Intelligent support	Path to the goal	P7, P8, P11, P12, P20
		Personalized recommendations	P5, P9, P10, P12, P20, P23, P25, P26
		Reminders	P1, P12, P18, P19, P20, P22, P25, P26
		Automatic tracking	P6, P24
	Performance tracking	Transparent impact metrics	P1, P2, P3, P4, P6, P7, P8, P10, P12, P13, P14, P17, P20, P22, P25, P26
		Explanation of abstract units	P4, P6, P17, P20, P24
		Trend indicators	P4, P25
	Appropriate incentives	Tangible rewards	P3, P9, P10, P12, P19, P21, P27
		Donations	P1, P5

Especially in the work context, the focus is not inherently on sustainable behavior, so reminders should be used to remind people to take quick and small actions toward sustainability, such as turning off the lights (P22, P25). Furthermore, some respondents advocated for automatic tracking of sustainability actions. Specific suggestions include connected sensors, such as smart light switches that measure whether the office light is on (P24), and Bluetooth gadgets on trash cans that track whether the employee has disposed of paper (P6).

Performance tracking. Several interviewees expressed that a gamified app for sustainability in the workplace should help visualize and understand personal sustainability performance and progress, e.g., by displaying various sustainability-related metrics (P3, P4, P10, P13, P26). Relatedly, employees also desired immediate feedback on how specific actions improved their performance (P3, P8), e.g., having the gamified app show a message that they saved 160 watt-hours of energy by turning off the lights, as well as an overview of their past activities and how they related to performance metrics (P4, P6, P8). Also, participants pointed out that sustainability metrics, such as kilowatt-hours of energy, need to be made understandable through tangible examples: *"So many kilometers not driven or something, one load of the washing machine not washed, for energy saved (...) Because only numbers are difficult to capture"* (P6). Moreover, some employees referred to the display of trend indicators that illustrate the direction of future performance (P4, P25).

Appropriate incentives. Finally, some employees requested tangible incentives for achievements in the gamified app, or redeemable points, as a prerequisite for being motivated to engage in sustainable behaviors through the app. Several employees seeking such rewards emphasized the importance of appropriateness in the context of sustainability, suggesting, for example, coupons for sustainable stores (P10), sustainable cooking recipes (P3), team parties (P12), or a parking lot for the *"sustainable employee of the week"* (P27). In addition, the employer could reward individual and team achievements with a donation to social and pro-environmental projects in their name (P1, P5).

3.2.2 Hedonic design features and elements. Hedonic design features serve to promote positive user experiences, such as enjoyment when using the app, and to frame desired behaviors as playful activities to increase fun [35]. In our interviews, we identified six thematic clusters of hedonic design features desired by the employees: *appealing visual design*, *continuous excitement*, *emotional reinforcement*, *ludic goals*, *playful learning*, and *exploration* (see Table 3):

Appealing visual design. In terms of the aesthetic design of the user interface, employees emphasized the use of sustainability-related signal colors and images in the gamified app. Colors such as green, blue, or yellow were associated with sustainability and considered appropriate for a coherent design concept (P15, P20, P23). In addition, some employees indicated that they would like to receive juicy and visually appealing feedback when using the app: *"I would be delighted if, for example, I confirm 'I just flushed the toilet for a third' and someone is jumping across the screen, yes, literally, with a toilet brush, or something like that, and he's making funny faces"* (P3). Moreover, some participants expressed the importance of aligning the appearance of the gamified app with the corporate identity, e.g., by using the company logo (P2, P26) or

Table 3. Hedonic design features and elements.

General aspect	Cluster	Expected design features	Participants that cited the feature
Enjoyment	Appealing visual design	Suitable colors	P9, P14, P15, P20, P23
		Juicy feedback	P3, P8, P14
		Brand customization	P2, P8, P26
	Continuous excitement	Variable content	P1, P14, P20, P25, P26
		Difficulty adaption	P4, P25
	Emotional reinforcement	Motivational messages	P1, P8, P9, P18
Playfulness	Ludic goals	Virtual achievements	P3, P4, P7, P9, P13, P15, P20, P25, P26
		Points and level systems	P3, P4, P9, P12, P14, P19, P20, P21, P26
	Playful learning	Quizzes	P3, P6, P7
		Informational hints and nudges	P1, P2, P4, P10, P13, P17, P18, P22, P25, P26
	Exploration	Unlockable content	P4, P9, P21
		Easter eggs	P2, P6

colors (P8), suggesting that customization is vital to foster employee relatedness.

Continuous excitement. To maintain enjoyment, respondents referred to the need to keep the gamified app exciting by continuously introducing new content, suggesting that employees fear a bit of a boredom effect after a certain period. New content could include new sustainability topics (P25) or promotional periods for specific themes (P1, P14, P20). The gamified app could also adapt the content to the season, e.g., suggest regular airing in summer and heating-related sustainability actions in winter (P25). Another possible design feature to promote long-term engagement mentioned by employees is dynamically adjusting the difficulty level depending on the players' experience, e.g., matching the points required for success to the user's experience (P4) and proposing new actions upon success with the pre-existing ones (P25).

Emotional reinforcement. As a third aspect related to enjoyment, the participants emphasized the inspiring effect of motivational messages to strengthen self-efficacy and further promote motivation. The gamified app should inform about the current successes and motivate to persist: *"again and again a 'yeah, you did super cool! Come on, keep going. If you do this next challenge now, then you'll be even more sustainable!' and so on."* (P9).

Ludic goals. In relation to the utilitarian features of goal setting, participants noted that the gamified app would be a great way to use multiple gamification elements that playfully frame the goals as part of a game, e.g., by introducing virtual badges for goal achievement, such as a badge for separating trash ten times (P9). Points and level systems should also be considered as gamification elements that allow the playful setting of personal goals related to overall sustainability performance (P4) and illustrate personal development (P20, P21).

Playful learning. Moreover, employees mentioned quiz games (P3, P6, P7) as gamification elements to learn about sustainability entertainingly and to compare their knowledge with others. In this context, a tip of the day (P13) or informative hints during the day (P26) could serve as a playful way to expand knowledge in small "appetizers" (P1) about how to improve one's own sustainability performance and why individual behavior is important (P4, P10) without employees having to actively and time-consumingly study these topics.

Exploration. As a final group of hedonic design features that promote positive experiences while using the gamified app, participants pointed to the possibility of exploration. Specific suggestions included introducing unlockable content (P4), such as avatar add-ons (P9, P21), and hiding Easter eggs that can be discovered when a specific combination of sustainable achievements is reached (P2, P6).

3.2.3. Social design features and elements. Finally, social design features refer to features that enable social influence, i.e., mutual influence among employees in using the app and performing sustainable behaviors, and that allow for social feedback and recognition [35]. In this context, employees mentioned design features in five thematic clusters: *performance comparisons*, *reciprocal support*, *fairness*, *social praise*, and *customizable presentation* (see Table 4):

Performance comparisons. First, respondents indicated that they would like the gamified app to display not only their own sustainability metrics but also those of their colleagues to enable peer comparison. In particular, upward comparisons could foster personal motivation to beat colleagues and behave more sustainably (P10, P13, P14). Employees would also like to see leaderboards and internal rankings that encourage them to achieve first place (P10) or at least a place in the top ten (P20). In this context, some participants emphasized rankings with different categories or periods, so that there is not just a one-time top performer, but each participant has the chance to become *"weekly leader"* (P4) or *"top challenger in a particular category, so to say, (...) 'veggie of the month*

Table 4. Social design features and elements.

General aspect	Cluster	Expected design features	Participants that cited the feature
Social influence	Performance comparisons	Peer statistics	P6, P7, P10, P13, P14, P16, P25
		Leaderboards and rankings	P1, P3, P4, P5, P6, P10, P12, P19, P20
		Challenges	P1, P2, P5, P12, P14, P18, P21, P26
	Reciprocal support	Team organization	P1, P2, P5, P6, P7, P8, P15, P16, P18, P20
		Ideation features	P4, P5, P6, P17, P21, P24, P27
		Idea voting	P3, P8
		Messaging features	P4, P23
	Fairness	Fraud detection	P1, P8, P12, P15, P27
Recognition	Social praise	Social media sharing	P1, P26
		Likes and comments	P8, P12, P26
	Customizable presentation	Profiles and avatars	P8, P20

is Klaus from the IT department'" (P26), indicating their need for equal chances of success to stay motivated. In addition, employees from SMEs with multiple sites (P1, P19) added rankings between companies as an encouraging feature. Moreover, competitive elements such as challenges, e.g., to go vegetarian for a week (P18), were highlighted as another gamification element to encourage sustainable behavior. One employee added the possibility to "annoy" colleagues in a playful way to promote the idea of competition: *"So hindering others in achieving their goals (...) you could have something like a kind of wild card and the other person then has to scratch the whole screen free before moving on to the next level"* (P14).

Reciprocal support. In addition to competitions, employees also mentioned collaborative gamification elements and design features to help them stay motivated. Several participants felt that organizing into teams was particularly important for achieving sustainability goals together (P16, P20), allowing for competition between teams while promoting cohesion within teams (P1, P2, P5, P6, P7). In addition, employees cited the potential to use the gamified app as a tool for collaboration and sharing, for example, by introducing idea features that facilitate suggesting sustainability actions that might be of interest to others. Voting on proposed ideas and goals was mentioned as an additional gamification element to make idea sharing among colleagues more fun (P3, P8). Messaging features were highlighted to ease exchange among team members (P4, P23).

Fairness. Apart from these positive aspects of introducing competitive and collaborative design features, several employees were concerned that other colleagues might cheat in the gamified app (P1, P8, P12, P15, P27) and stressed the introduction of some kind of fraud detection or social control mechanism to discourage cheating (P8). This indicates that fairness is an important aspect, especially in the workplace, for employees to adopt competitive gamification elements as motivational inducements for sustainable behavior.

Social praise. In terms of social recognition for successful sustainable behavior, some participants mentioned being able to like the actions of others (P8, P12) and openly praising colleagues for their contribution to shared goals (P26) as ideas for valuing individual performance. In addition, sharing accomplishments on social media could publicize employees' sustainability successes outside the company (P1, P26).

Customizable presentation. Finally, two employees mentioned the ability to present oneself in profiles and avatars, especially with photos (P8) and an area to showcase one's accomplishments (P20), as motivating social design features.

3.2.4. Data protection and consent

Beyond design features that relate to the general aspects of user experience in hedonic information systems [35], we identified another noteworthy aspect that was considered an important design feature of a gamified app in a work context, namely the issue of data protection and consent. Specifically, concerned employees requested consent forms for data processing within the app (P17, P22), admin roles for limited access to administrative overviews (P26), and protection from external access so that personal employee data is only displayed within the organization (P17). Although privacy may often be an uncomfortable and time-consuming topic for gamification designers, our results highlight its importance for gamified apps, especially in work-related contexts where employees entrust sensitive personal data to the company and thus to the app designer.

4. Discussion of the research findings

This study revealed novel insights into the design of effective gamified apps for engaging sustainability behavior at work. Besides this core contribution, the findings shed new light on the overall discussion of user involvement in the gamification design process [28, 36, 37].

In terms of reasons for sustainable behavior, we found that employees' motivations can be divided into three categories, similar to the distinction made by value-belief-norm theory [31]. First (I), the largest group of the interviewed employees noted egoistic reasons, such as motivation to contribute to a better future for their children and grandchildren. In addition, another group of interviewees (II) mainly emphasized social pressure as a core motivation for sustainable behavior, and a third (III) category of interviewees have already thoroughly engaged with the impact of today's behavior on future human generations (humanistic motivations) and ecosystem health (biospheric motivations).

To address these different target groups, gamification designers could draw on various design features highlighted in the interviews (Table 2, 3, 4). Employees mainly referred to utilitarian design features that support easy access, intuitive use, and personal development, e.g., goal setting, intelligent support, and performance tracking. Hedonic design features were primarily cited for reinforcing this individualistic progression by ludifying goals, enabling playful learning, and supporting continuous excitement. In contrast, social design features were expected mainly to enable social comparisons and team organization for inter-team competition. When encouraging employees to behave more sustainably, we recommend designers use engaging narratives and missions, such as "Save the future of your children" to address individualistic concerns of more egoistically motivated employees (I). Further, they should consider illustrating the impact of personal contribution in performance metrics and reinforce self-efficacy through immediate and appealing feedback as these features are known to engage sustainable behavior on an individual level [38]. Group II might be engaged with more social design features that exert social influence (Table 2). Group III is unlikely to need social pressure or persuasive narratives because they have already engaged with how their behavior contributes to sustainability. Instead, gamification designers should prioritize informational design features that support these employees in how to act (even more) sustainably by offering personalized recommendations, informational cues, and idea exchange features. These findings contribute to the existing literature in various dimensions:

First, we contribute to the ongoing discourse on the primary motivations for sustainable behavior by observing that several employees cite selfish motivations, i.e., the future of their own children and social pressures, and are thus not inherently motivated to do what they can to improve sustainability in the workplace. This result is exciting in light of previous studies in which humanistic and biospheric motivations were more prominent than egoistic ones [39, 40]. We explain our findings by noting that they have examined target groups that are likely already aware of the relevance of sustainable behaviors and the impact of their own actions (e.g., climate change mitigation [39] or students [40]). Our study can serve as an anchoring point for further studies and highlights the need to investigate the motivations of the target group, as these motivations influence which design features (e.g., persuasive elements that convey relevance versus informative elements that support behavior maintenance) should be prioritized in specific contexts.

Second, the results of this study yielded various insights that may be relevant to the future design of gamified apps for workplace sustainability. For example, we found that designers should explore how gamification can be seamlessly and effectively integrated into daily work processes, with as little interference as possible from main work tasks. Embedding gamification and sustainability goals into existing solutions and processes could therefore be beneficial compared to more monolithic gamification approaches. In addition, we found that designers should prioritize design features, both utilitarian (e.g., performance metrics, recommendations, and reminders), hedonic (e.g., virtual achievements, point, and level systems, and informational hints), and social (e.g., intra-, and inter-team challenges and leaderboards), that support individual goal setting and tracking. Previous research has shown that goal setting is one of the most effective mechanisms for sustainable behavior change [41]. Besides leaderboards, which can successfully support goal setting in a work context [42], our findings suggest that other elements such as achievements, reminders, levels, or challenges could also be helpful for goal setting, which provides a starting point to explore the implications of these elements for gamification design for workplace sustainability.

Third, although user involvement in the gamification design process is widely regarded as a critical design principle for successful gamification [36], our study revealed potential limitations of this approach. We found that employee expectations and previous research findings differ, suggesting that consideration of user feedback should be done with caution and related to quantitative research findings. For example, it is surprising that employees mentioned various design features and gamification elements primarily associated with individual effort, self-development, and competition, despite previous research indicating that sustainable behavior requires collective engagement rather than individualism [43]. Similarly, concerning rewards, studies in the work context have shown that extrinsic rewards usually have only short-term effects [44]. However, respondents in

our research cited appropriate rewards as an essential design feature. One possible explanation for this could be that the design features expected by users in advance differ from what they find motivating when using gamified apps. In addition, a variety of possible game elements known from research, such as storytelling, virtual assistants, or simulations [45], which might be particularly suitable to appeal to those employees who have yet to become aware of the impact of their own actions, were not mentioned at all by participants, possibly due to limited knowledge. These observations suggest that although user involvement in the design process is crucial [36], user perceptions should be interpreted with caution when designing gamification and supported by findings from previous studies and real-world experiments.

5. Limitations and further research

Our study has several limitations that open further avenues for further research in the context of gamification for sustainable employee behavior.

First, we exploratively investigated employee motivations for sustainable behavior and expectations for the design features of a gamified app in the workplace. While the in-depth interviews allowed us to explore employee perspectives in-depth and identify clusters of important design features in the context of workplace sustainability, future empirical studies should assess the generalizability of our findings using quantitative research designs. In particular, quantitative studies should further investigate the distribution of different motivations for sustainable behavior, as well as the relative importance of the design features and gamification elements we identified, both from an employee perspective and in terms of their influence on behavioral outcomes.

Second, we identified inconsistencies between employee perceptions and theoretical propositions about gamification design. However, our study was not able to draw a conclusion about which design hypothesis is more effective. Further research that draws on this observation and opt for comparative empirical research could give more evidence and add to the ongoing discourse [37] of benefits and limitations of user involvement in design processes.

Finally, our sample was limited to mainly male employees from four different SMEs in Germany and thus focused on a specific work environment, mainly in the industrial and IT services sector, with a particular cultural background. Further research encompassing employees from larger companies, other industries, and with different geographic and cultural backgrounds might be conducted to investigate how these contexts influence the successful design of gamification for sustainable employee behavior.

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