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ORIGINAL RESEARCH

Engaging and motivating crowd-workers in gamified crowdsourcing mobile apps in the context of logistics and sustainable supply chain management

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Abstract
This study attempts to explore the factors that engage (behavioural factors) and motivate (psychological factors) crowd-workers in the gamified crowdsourcing apps in the context of logistics and sustainable supply chain management. Thus, using the self-determination theory and theory of cognitive engagement, we conduct critical in-depth interviews with crowd-workers and their task. We conducted a qualitative thematic analysis to explore the psychological and behavioural factors for engaging and motivating crowd-workers in gamified crowdsourcing mobile apps in the context of logistics and sustainable supply chain management. This study adopted mono-method qualitative approach and in depth-interviews were done by a researcher who was well-trained in qualitative research and was acquainted with the knowledge of crowdsourcing. Using the non-probabilistic sampling method of purposeful sampling, interviewer virtually met 11 individuals to collect data on a pre-decided date and time. The interview questions been prepared based on the theoretical constructs of self-determination theory and theory of cognitive engagement and the thematic analysis was conducted using NVivo software.

Keywords Engagement · Psychological motivation · Gamification · Technological innovation · Crowd-workers · Mobile apps · Self-determination theory · Theory of cognitive engagement

1 Introduction

Over the last decade, there has been a growing trend towards gamification theories that go beyond human-computer interaction and span many different research domains (García-Mireles & Morales-Trujillo, 2019; Helmefalk, 2019; Rapp, 2020). The literature depicts gamification as the application of game mechanics in non-game contexts (García-Mireles & Morales-Trujillo, 2019; Helmefalk, 2019; Rapp, 2020). For example, GreenRoads, a gamified app, motivates individuals to contribute to a supply chain management which scores

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high on sustainability standards. This app enables users to report and track the environmental impact of transportation routes, identify areas for improvement, and earn rewards for their contributions (Greenroads, 2023). Similarly, Food Cowboy app addresses concerns relating to the food waste in the supply chain (Food cowboy, 2023). This organization gamifies the process by providing points and rewards for successful donations and efficient routing. Deterding et al. (2011) argued that current "gamified" applications present emerging phenomena that warrant research and new concepts. When connecting gamification with crowdsourcing apps, gamified crowdsourcing projects can be identified in several fields, including digital cartography and navigation.

Numerous articles in this field exist in the existing literature, such as compilations of digital maps based on crowd-sourced data, the acquisition of location-based sensory data (Macakoğlu, Çınar, & Peker, 2022), geospatial data (Yang, Ye, & Feng, 2021), measurements of location (Apostolopoulos & Potsiou, 2021) and indoor navigation data and information (Reinsch, Wang, Knechtel, Ameling, & Herzig, 2013). Therefore, the challenge of designing a crowdsourcing system that empowers and facilitates the establishment of positive incentives to crowdsourcing labour while simultaneously allowing it to be tailored to the type of activity involved is one of the key difficulties in inspiring individuals to participate. For instance, some crowdsourcing systems may implement incentive structures to encourage originality, whereas others may require contributions derived methodically (Estellés-Arolas & González-Ladrón-de-Guevara, 2012; García-Mireles & Morales-Trujillo, 2019; Hamari et al., 2016; Sailer et al., 2017).

In other words, just as crowdsourcing activities vary widely, so do the methods used to incentivize crowd-sources in a crowdsourcing project (Liu, Alexandrova, & Nakajima, 2011; Sailer et al., 2017; Seaborn and Fels, 2015). Gamification is discussed in a variety of fields, including health (Sardi, Idri, & Fernández-Alemán, 2017); exercise (Hamari & Koivisto, 2014); education (Kiryakova, Angelova, & Yordanova, 2014) and marketing (Huotari & Hamari, 2012). The major benefits of crowdsourcing application within the organisations include allowing employees to provide management with feedback whenever they desire (Howe, 2008; Huang et al., 2020) and employee involvement in the creative process of the company (Ling et al., 2021; Meftah, Rouvoy, & Chrisment, 2021; Morschheuser et al., 2017).

1.1 Importance of gamification based mobile apps in the context of logistics, sustainable supply chain management and crowdsourcing mobile apps

Mobile systems are used in logistics to coordinate and optimize transportation processes. (Marcucci et al., 2018). To assist truck drivers, tracking and routing information as well as communication systems are utilized (Marcucci et al., 2018; Miranda & Vergaray, 2021; Foo & Mårtensson, 2016). Various available systems include various peripheral devices, such as navigation systems, tachographs, or radios (Marcucci et al., 2018; Foo & Mårtensson, 2016). However, a consistent approach combining these different approaches is lacking. As the body of literature on gamification continues to expand, new domains and perspectives are being investigated (Looman, 2017; Behl and Pereira, 2021; Nurwahida, 2020; Benitez et al., 2022). Gamification based mobile apps might improve employee satisfaction and, therefore, organizational performance if it meets its promise (Nurwahida, 2020). Further, sensor technologies in the mobile apps have heavily permeated the production and logistics work

floor over the past decade (Xu, He, & Li, 2014), making it easier to integrate work data with common gamification technologies and principles, including scoring systems and leader boards (Looman, 2017; Behl and Pereira, 2021; Nurwahida, 2020; Benitez et al., 2022). Thirdly, automation of very complex tasks in this area has still been inefficient in terms of cost efficiency (Korn, Schmidt, & Hörz, 2012). Investment in workers, work processes, and conditions, as well as gamification, is therefore considered to be an attractive option.

When considering the gamification within supply chain management literature, it highlights several challenges and obstacles, including tolerance with time, ethical implications, resources, and differentiation between players (Harris & O'Gorman, 2014; Robson et al., 2016; Werbach and Hunter, 2015; Farzan et al. 2008; Hamari, 2013). The ethical implications of gamification appear to pose a significant challenge to its application in warehouse management (Robson et al., 2016; Werbach and Hunter, 2015; Farzan et al., 2008; Hamari, 2013). In competitive global business environments, warehouses are key links in the supply chain and due to rapidly evolving trends in technology, they must adapt to the changing needs of customers (Farzan et al., 2008; Hamari, 2013; Benitez et al., 2022). Recently, gamification has emerged as a potential way to increase employee engagement and operational efficiency (Marcucci et al., 2018; Miranda & Vergaray, 2021; Foo & Mårtensson, 2016).

When considering the crowdsourcing mobile apps, it should be noted that some crowdsourcing participants work as paid freelancers, while others perform small tasks on a voluntary basis (Brabham, 2010; Chen & Chankov, 2017). Platforms and apps for mobile crowdsourcing are increasingly being used in the field to collect data for both industrial and research reasons (Meftah et al., 2021). Crowdsourcing activities that are carried out on smartphones or other mobile devices are referred to as mobile crowdsourcing (Bergvall-Kåreborn & Howcroft, 2013; Helmefalk, 2019; Lin et al., 2012; Palomba et al., 2018). Many valuable methods for analysing the privacy-related behaviours of mobile apps have come out of smartphone security research (Bergvall-Kåreborn & Howcroft, 2013; Estellés-Arolas & González-Ladrón-de-Guevara, 2012; Helmefalk, 2019). These automated systems, on the other hand, are unable to assess people's perceptions of whether a particular behaviour is acceptable or how that activity affects their privacy. Although automated tools may detect that both a blackjack game and a map app use one's location data, people are more likely to regard the map's use of that data as legitimate than the game's (Lin et al., 2012).

When considering the main contribution from this study, firstly, several research projects have investigated application analysis to defend mobile users' privacy and security while gamified crowdsourcing mobile apps remain relatively under explored (Bergvall-Kåreborn & Howcroft, 2013; Lin et al., 2012; Meftah et al., 2021). Therefore, this paper contributes to the existing literature by exploring the factors that engage and motivate crowd-workers in the gamified crowdsourcing apps using self-determination theory and theory of cognitive engagement. Secondly, intrinsic **competence** within the firm for engaging and motivating crowd-workers in gamified crowdsourcing mobile apps is found to be effective with more focus towards technology, people and experience (Kim & Drumwright, 2016; Shi & Cristea, 2016). Thereby, mobile crowdsourcing is an interesting way for collecting insightful reports from the community of user devices (Meftah et al., 2021) which is another main contribution through the application of theory of cognitive engagement.

1.2 Psychological and behavioural factors for engaging and motivating crowd-workers

The crowdsourcing is an emerging paradigm of involving the public in the development of unique and community-based ideas by asking a group of people to solve a problem through creative challenges, hackathons, or other activities, and then sharing the results with the public. (DePasse et al., 2014; Huang et al., 2020; Tucker et al., 2018). The continuing participation of crowd workers has become a key issue affecting the expansion of the crowdsourcing platform, since crowd logistics has become a critical aspect of the last-mile delivery difficulty in many cities (Huang et al., 2020; Xie et al., 2021; Zhang et al., 2021a). It is vital for the industry to understand why people continue to participate in crowd logistics so that it can determine what policies and steps can be taken to support its continued development (Ling et al., 2021; Ossai & Wickramasinghe, 2021). Similarly, other crowdsourcing aspects that are carried out on smartphones or other mobile devices are referred to as mobile crowdsourcing (Bergvall-Kåreborn & Howcroft, 2013; Helmefalk, 2019; Lin et al., 2012; Palomba et al., 2018).

Through case studies, questionnaires, and conceptual discussions, several academics have investigated the motivations underlying crowd workers' continuous behavioural aspects on gamified mobile sourcing crowd apps (Bergvall-Kåreborn & Howcroft, 2013; Dahunsi et al., 2021; García-Mireles & Morales-Trujillo, 2019; Huang et al., 2020). Howe created the word "crowdsourcing" in 2006 and he later described it as "outsourcing an activity normally performed by selected agents, such as an employee or contractor, to an unknown but considerable number of people through open recruiting" (Howe, 2008). To offer the theoretical foundation for our study, we analysed the existing literature to discover theories presented to explain the motivations driving crowd workers' continuous engagement (Please refer Table 1).

This research offers theoretical and practical information for assessing and comprehending the factors that influence crowd worker participation (Liang et al., 2017; Zhang et al., 2021b). Existing research, on the other hand, has primarily concentrated on the characteristics that initially entice people to participate in crowdsourcing activities, overlooking the factors that encourage or discourage crowd workers from continuing to participate (Huang et al., 2020; Sailer et al., 2017; Zhang et al., 2021b). This leads to the formation of the

Table 1 Summary of the literature to explain crowd workers' participation

Source	Theory	Factors Affecting Participation
Deng et al. (2016)	Value-sensitive design theory	Access, autonomy, justice, openness, communication, security, responsibility, effect, and dignity are all important factors to consider
Ye and Kankanhalli (2017)	Social exchange theory	Financial compensation, skill development, work autonomy, happiness, and trust
d'Eon et al. (2019)	Equity theory	Shared interfaces, full collaboration, iterative tasks, awareness of workers, subcontracting, anonymous chat
Chen and Chankov (2017); (Huang et al., 2020)	Agency theory	The needed average detour time per crowd agent has decreased.
Liang et al. (2017); Zhang et al. (2021)	Theory of planned behaviour	Subject norm, participant motivation, and perceived behavioural control

Table 2 NVivo query findings on the intrinsic motivation within the firm

Theme	Codes	NVivo QSR query results
People orientation	Person	"…anything that is delivered by people and a wide range of" "…know, take more responses from people going beyond locomotor disability also" "….that. So, there could be people who could be visually impaired" "What happens is in general people say people with different abilities" "The motivation comes from the workforce itself. People should be positive minded and should work towards it"
	Experience	"That is not a seamless experience. I don't feel bad about" "Difference is your service experience back then and now. I think now you have improved"
Service orientation	Disability	"There needs to be some services to cater disabled people" "I think understanding the disabled people will help to survive in the long-run. It is about some values that our society should adhere upon"
	Accessible	"The accessible points or facilities are necessary"
Technology orientation	Gamification	"The young generation is focused more on the gamified apps and specially the generation z can be far more flexible to it than generation x and y" "Yeah, you can describe in detail like I told you about Mario GTA San Andreasright was my level three or four rows, I have it now calling it for the content. So, you can you feel these gamification features"

research question, *"what are the psychological and behavioural factors that affect engagement and motivation of crowd-workers in the gamified crowdsourcing mobile apps*?"

The gamification of production and logistics work floors has grown in popularity over the past five years (Looman, 2017; Behl & Pereira, 2021; Nurwahida, 2020; Benitez et al., 2022). By applying several applicable social psychology theories, including elaboration likelihood theory, cognitive dissonance theory, correspondent inference theory, and constitutional theory, it was determined that psychological and behavioral factors could influence crowd-worker engagement and motivation (Genschow et al., 2021; Kim et al., 2021; Stroebe & Hewstone, 2021). A review of the literature on supply chain management reveals that gamification faces several challenges and obstacles, including tolerance with time, ethical implications, resources, and differentiation between players (Harris & O'Gorman, 2014; Robson et al., 2016; Werbach and Hunter, 2015; Farzan et al., 2008; Hamari, 2013). The ethical implications of gamification appear to pose a significant challenge to its application in warehouse management (Robson et al., 2016; Werbach and Hunter, 2015; Farzan et al., 2008; Hamari, 2013).

In competitive global business environments, warehouses are key links in the supply chain, and due to rapidly evolving technology trends, they must conform to the changing needs of customers (Farzan et al., 2008; Hamari, 2013; Benitez et al., 2022; Behl et al., 2021). Gamification has recently been identified as a means of increasing employee engagement and operational efficiency (Marcucci et al., 2018; Miranda & Vergaray, 2021; Foo & Mårtensson, 2016). According to the United Nations Sustainable Development Goals transitions towards more sustainable societies and economies must be swift and substantial (Griggs et al., 2013). It has already been proven to be an extremely effective learning tool for education (Ravyse et al., 2017), as well as for professional and industrial training (Agogué, Levillain, and Hooge, 2015; Uskov and Sekar, 2014). Next section justifies the applicable theories for this study based on the respective psychological and behavioural fac-

tors that affect engagement and motivation of crowd-workers in the gamified crowdsourcing mobile apps.

2 Theoretical background

This section discusses the theoretical application of this study based on the self-determination theory and theory of cognitive engagement.

2.1 Self-determination theory

Self-determination theory, developed by Jean Piaget and Carl Rogers, is a holistic psychological worldview. It means that humans are a dynamic species with well-developed psychological growth and development tendencies (Deci, Koestner, & Ryan, 1999; Ryan and Deci, 2000). Between behaviours that are self-controlled and those that are regulated by factors outside the individual, there is a continuum (Deci et al., 1999; Ryan and Deci, 2000). SDT's motivation classifications are based on this continuum: internal motivation, extrinsic motivation, and amotivation. Intrinsically driven activities are governed by an individual's inclination to elaborate his or her organisational cognitive structure, which results in curiosity and inherent enjoyment (Deci et al., 1999; Ryan and Deci, 2000). Over the past thirty years, many authors have produced four mini-theories to address different but related issues since the early research of self-determination theory: Individual differences in general motivational orientations; the effects of social environments on intrinsic motivation; the development of autonomous extrinsic motivation and self-regulation through internalisation and integration; and the functioning of fundamental universal psychological needs that are essential for growth, integrity, and wellness (Ryan & Deci, 2000).

Gamification has captivated the interest of people from all walks of life during the last decade, from academics to professionals in numerous areas, and even popular media (Khan, Boroomand, Webster, & Minocher, 2020). Gamification in the workplace with the self-determination theory has been employed the majority of the time (Shi & Cristea, 2016). By proposing motivating gamification techniques anchored in SDT, as well as developing and testing these strategies, this study uses gamification to better understand the motivational benefits of implementing the Self-Determination Theory (SDT) in social adaptive crowd-workers in gamified crowdsourcing mobile apps (Huang et al., 2020; Sailer et al., 2017; Zhang et al., 2021b; Gupta et al., 2022).

The phenomenon of intrinsic motivation shows this dynamic human nature. Intrinsic motivation is the underlying predisposition to seek out challenges, novelty, and learning opportunities that begins from birth (Deci et al., 1999). Another example is internalisation, or an individual's lifelong desire to absorb and incorporate the social practises and values that surround him or her (Deci et al., 1999). In self-determination theory, these characteristics are referred to as psychological states, and they are viewed as the necessary supports for psychological development, integrity, and wellness (Deci et al., 1999). Further, three basic psychological demands are defined in SDT: autonomy, relatedness, and competence. In a social setting, these three requirements are supported and addressed in a way that promotes vitality, self-motivation, and well-being. Following the explanation above, the first research preposition is as follows:

RP1: Intrinsic motivation within the firm will be positively related to engagement and motivation of crowd-workers in gamified crowdsourcing mobile apps.

The social dimensions such as intrinsic competence within the firm based sustainable supply chain engagement and motivation of crowd-workers in gamified crowdsourcing mobile apps have received insufficient attention in the literature (Helmefalk, 2019; Liang et al., 2017); Deng et al., 2016). Therefore, collaborative software and game design features were utilized to engage the users in achieving the collective goal (Brito, Vieira, & Duran, 2015). Several popular platforms, including Foursquare, Stack Overflow, and Dropbox, have acknowledged the benefit of gamifying the user experience in order to increase cooperation (Morschheuser et al., 2017).

However, most gamification solutions are overly generic and do not emphasize the collaborative aspects of gamification (Brabham, 2010; Brito et al., 2015). Crowdsourcing is a distributed problem-solving strategy that draws on the expertise, energy, and creativity of an online community to solve problems collectively (Chen & Chankov, 2017; DePasse et al., 2014). The starting of this study was done by going over the existing research on collaborative crowdsourcing jobs. It was found that various forms of information that workers have access to during collaborative tasks plays a major role. Further, these characteristics aid in the identification of a number of various intrinsic competency categories of collaborative work, each encapsulating a different level of worker interaction (Brabham, 2010; Hamari et al., 2016).

As simulation games increase practical skills and procedural knowledge, they enable students and new employees to experience a possible real-life situation, allowing them to gain a better understanding of their future careers (Cohen, Niemeyer, and Callaway, 2016; Ayer et al., 2016). Nevertheless, simulation games can also be used by practitioners to test and evaluate new strategies and methodologies related to sustainable supply chain-based engagement and motivation of crowd-workers in gamified crowdsourcing mobile apps (Celio, Andriatsitohaina, and Zaehringer, 2019; Hardeveld et al., 2019). Based on the preceding explanation, the second research preposition unfolds as follows:

RP2: Intrinsic competence within the firm will be positively related to sustainable supply chain-based engagement and motivation of crowd-workers in gamified crowdsourcing mobile apps.

The consumer's sense of belonging or relatedness is a crucial part of the consuming experience (Estellés-Arolas & González-Ladrón-de-Guevara, 2012; Huang, Backman, Backman, & Chang, 2016; Liu et al., 2011; Ossai and Wickramasinghe, 2021). This is true not only in traditional buying situations, but also in social media environments (Dholakia, 2006; Huang et al., 2016). Nonetheless, little empirical research has been done on how customers' sentiments of "social relatedness" in social media marketing strategies with gamified mobile apps (Estellés-Arolas & González-Ladrón-de-Guevara, 2012; Huang et al., 2016). In marketing literature, self-determination has received more attention due to its implications for understanding consumer psychology and behavior (Dholakia, 2006; Huang et al., 2016).

There is, fortunately, a growing amount of evidence of psychological (Deci et al., 1999; Lepper et al., 1973) and philosophical (Bratman, 1999; Mele, 1997) research, as well as, more lately, marketing research (Bagozzi & Dholakia, 1999; Kivetz, 2005), that considers self-determination that provides a more detailed and realistic picture of clients on long-term connections and how will they react to various marketing messages. Thus, in gamified mobile apps, this philosophy can be further extended to the game design features which can

be utilised to engage users in achieving the collective goals among the users. As a result, the third research preposition is formed as follows:

RP3. Intrinsic relatedness within the firm will be positively related to engagement and motivation of crowd-workers in gamified crowdsourcing mobile apps.

2.2 Theory of cognitive engagement

The ICAP framework, previously known as DOLA for Differentiated Overt Learning Activities (Chi, 2009; Menekse et al., 2013) is a taxonomy that distinguishes four modes or kinds of involvement based on the overt behaviours that students display or perform. The positive psychology, which includes the domains of human resource and organisational development, is still developing concepts like engagement and psychological well-being (PWB) (Lin et al., 2012; Ossai & Wickramasinghe, 2021; Seaborn & Fels, 2015). People develop a natural predisposition towards positive transformation because they prefer exposure to positive energy physically, cognitively, emotionally, and behaviourally. In the world of online marketing, digital designers and social marketing practitioners have recently begun to integrate game design ideas to reward desirable user behaviour.

Recently, this method was dubbed gamification (Zichermann & Linder, 2010), which refers to adding game play features into non-gaming apps, systems, and services in order to increase user engagement. These non-game systems are "gamified" by incorporating game mechanics into their core functions. The ultimate purpose of gamification is to encourage non-game system users to engage in so-called game-like behaviour, such as focusing on the task at hand, multitasking under pressure, working overtime without being dissatisfied, and always retrying when something goes wrong (Lin et al., 2012; Ossai & Wickramasinghe, 2021; Seaborn & Fels, 2015; Zichermann & Linder, 2010).

ICAP is an active learning paradigm that categorises students' participation based on their actions. Interactive engagement, as evidenced by co-creative collaborative behaviours, is superior to constructive engagement, as evidenced by generating behaviours, according to ICAP (Chi, 2009). ICAP stands for four cognitive engagement modes, labelled as Interactive, Constructive, Active, and Passive (Chi & Wylie, 2014). Both types of engagement outperform Active and Passive engagement, which are characterised by manipulative and attentive activities, respectively (Beetham & Sharpe, 2007; Chi, 2009). One of the most well-defined characteristics of cognitive involvement is the type and degree of application of cognitive strategies. Survey items can be used to determine the extent to which a strategy is used (Beetham & Sharpe, 2007; Chi, 2009). Greene and Miller (1996) scale of cognitive engagement, for example, has three subscales: one for self-regulation, one for deep processing strategies and one for shallow processing strategies (Chi et al., 2018).

As a result of the proliferation of digital technologies designed to facilitate interaction and two-way information flows, investments have been made in employee engagement. To communicate with current and potential customers (e.g., Brodie et al., 2011), organizations are seeking to harness the power of digital media (Verhoef et al., 2010). For instance, organizations utilize social media platforms, or develop their own customized smart phone applications, to interact with customers in addition to traditional purchase exchanges (e.g., Roggeveen and Grewal, 2016). The purpose of customer-brand interactions for organizations is to foster positive sales outcomes and to improve organizational performance-both of which are at the core of retailing (Grewal et al., 2017).

Gamification based active learning is becoming an increasingly popular method of generating consumer engagement and enhancing consumer involvement (Grewal et al., 2017). Digital media's participatory nature and emphasis on interactivity provide organizations with an opportunity to connect with customers and create value for them. Active learning paradigms within firms are positively related to engagement and motivation of crowdworkers in gamified crowdsourcing mobile apps in supply chain management. Gamification is a one-way in which organizations engage with consumers and motivate behaviours that align with organizational goals (Butcher et al., 2019; Koivisto & Hamari, 2019; Yang et al., 2017). A game can be gamified in many ways, but common examples include providing users with leader board rankings, feedback, points, challenges, and badges or rewards for completing actions, such as liking a company on social media or checking into a store. Based on the preceding explanation, the fourth research preposition unfolds as follows:

RP4. Active learning paradigm within the firm will be positively related to engagement and motivation of crowd-workers in gamified crowdsourcing mobile apps in supply chain management.

The collaboration on a task has the potential to improve learning outcomes over working alone because it allows people to engage in a variety of positive behaviours (Bratman, 1999; Brito et al., 2015; Chi, 2009; Chi et al., 2018). Explaining, questioning, contrasting, and comparing perspectives, arguing and disputing, elaborating, and producing ideas are some of these behaviours (Chi, 2009; Chi et al., 2018). Positive organisational change is aided by a preponderance of good over negative situations (Chi, 2009; Chi et al., 2018). Heliotropic tendencies can help people change for the better by diminishing negative tendencies in positive environments (e.g., positive climate, positive relationships, positive communication, positive meaning, and positive energy). Active learning is a wide term that encompasses a variety of creative student-centred teaching approaches that actively engage students in the learning process (Chi & Wylie, 2014; Kershaw et al., 2019). The students' participation and engagement with tangible learning experiences, knowledge development through meaningful learning activities, and some degree of student interaction during the process are the fundamental characteristics of active learning (Chi, 2009; Chi et al., 2018; Chi & Wylie, 2014).

Many closely related areas, such as learning sciences, educational psychology, science education, and, more recently, engineering education, have investigated active learning. Therefore, active learning with emotional Self-Awareness is the first of the three Self-Awareness skills, and it emphasises the necessity of understanding one's own feelings and how they affect one's performance (Chi & Menekse, 2015; Menekse et al., 2013). Emotional Self-Awareness was discovered to be crucial in financial advisers' work success at a financial services organisation (Chi & Menekse, 2015; Goleman, 2001). The relationship between financial planners and their clients is sensitive, encompassing both financial matters and, when life insurance is discussed, the even more painful subject of mortality; planners seem to have managed their own emotions better by being self-aware (Chen, Lattuca, & Hamilton, 2008; Chi and Menekse, 2015; Menekse et al., 2013). Self-Awareness is also important for recognising one's own strengths and flaws. Accurate Self-Assessment was a trait shared by several hundred managers from twelve different companies who excelled (Beetham & Sharpe, 2007; Bergvall-Kåreborn & Howcroft, 2013; Chen & Chankov, 2017; Chen et al., 2008).

The active learning has been used in conjunction with problem-based, inquiry-based, discovery, collaborative, cooperative, team-based, and inductive learning methodologies in

numerous research (Chen et al., 2008; Chi & Menekse, 2015; Menekse et al., 2013). Therefore, in developing gamified crowdsourcing mobile apps, closely related areas, such as learning sciences (Bergvall-Kåreborn & Howcroft, 2013; Brabham, 2010; Chen & Chankov, 2017), educational psychology (Chen et al., 2008; Kiryakova et al., 2014; Menekse et al., 2013), science education (Beetham & Sharpe, 2007; Bergvall-Kåreborn & Howcroft, 2013; Chen et al., 2008; Kiryakova et al., 2014; Menekse et al., 2013), and, more recently, engineering education (Chen et al., 2008; García-Mireles & Morales-Trujillo, 2019; Kershaw et al., 2019; Menekse et al., 2013), have investigated self-awareness within the firm as a factor relating to motivating crowd-workers in gamified crowdsourcing mobile apps (Bergvall-Kåreborn & Howcroft, 2013; Brabham, 2010; Chen & Chankov, 2017; d'Eon et al., 2019; Howe, 2008; Huang et al., 2020). This gap in the current literature prompts the development of research questions of.

RP5. Emotional self-awareness within the firm will be positively related to engagement and motivation of crowd-workers in gamified crowdsourcing mobile apps.

3 Methodology

The in depth-interviews were done by a researcher who was well-trained in qualitative research and was acquainted with the knowledge of crowdsourcing. Using the non-probabilistic sampling method of purposeful sampling, interviewer virtually met 11 individuals to collect data on a pre-decided date and time (Francis et al., 2010). Data collection and analysis was done in an iterative manner to ascertain the information saturation point. The study experienced data saturation at the end of the seventh interview (Francis et al., 2010). The interview questions been prepared by considering the theoretical constructs of self-determination theory and theory of cognitive engagement.

The decision of meeting the informants virtually and not physically is to reduce the risk of COVID exposure. The informants were assured of anonymity and were also given an assurance that their responses will be used solely for the purpose of research. Everyone was an information-rich case (Creswell, Hanson, Clark, & Morales, 2007; Francis et al., 2010). The interviews were video recorded (average duration of 30 min) with due consent of the informant (Francis et al., 2010). Every interview was started with explaining the purpose of the study as ". The objective of this study is to explore the factors that engage and motivate crowd-workers in the gamified crowdsourcing apps." The interviewer then made a note of the interviewer details such as respondent number, respondent name, age (in years completed), gender, designation, current company, total work experience (in years completed), and work experience in the current company (in years completed).

3.1 Information of the participants

The interviewers were from different organizations in India. Out of the 11 interviewees, 1 was a female. Their work experience ranged from 3 months to 13 years and were in a variety of roles such as assistants to heads. The age of the respondents varied from 26 to 55 years. These interviews has three sections comprising ice-breaking questions including (1) What would you like to say about crowdsourcing apps? (2) How do you see the implementation of gamification in the crowdsourcing apps? and (3) Can you name a few crowdsourcing apps

that you like? The next section comprised core questions and probing were done whenever and wherever required. These questions were: (1) How, in your view, gamification can help crowdsourcing workers? (2) Why would crowd-workers like to invest their psychological energy into the app? (3) Why would crowd-workers not like to invest their psychological energy into the app? (4) How may a gamification help crowd-workers engage in the app? (5) What could be the possible challenges for the app in engaging crowd-workers in the gamified app? Next, the last section consisted of closing questions and were mainly focused on deciphering some residual information from the informant. Questions including (1) Can you give some examples of gamification features in a crowdsourcing app? (2) What else would you like to add to this interview? (3) Would you like to know the results of this study? (4) Can you suggest someone's name who can be a potential informant for this interview? were asked in this section.

3.2 Thematic analysis procedure

The recordings of these interviews were transcribed precisely using the software of otter.ai. The analysis of the transcripts was done by following Braun and Clarke (2006) thematic analysis technique. In its first step, the transcription was read and re-read to get familiarized with the content and interpret it properly. In the second step, transcription was coded based on significant phrases in the literature (Braun & Clarke, 2006; Creswell et al., 2007). In the third step, distinct themes were generated out of the codes termed as potential themes. Lastly, these themes were grouped together to generate fewer representative sets called reviewed major themes. The software, NVivo was used to assist in the analysis process. These potential themes were then defined keeping the responses of the informants and prior research in mind (Braun & Clarke, 2006; Creswell et al., 2007).

3.3 Robustness measures

Credibility and dependability of the results were ensured by following Corbin and Strauss (1990) subjective inter-coder reliability method. In this method, two experts in the area who were not involved in collecting the data and its related processes coded each interview transcript independently (Creswell et al., 2007). Later, these coders discussed their codes with the interviewer to read consensus. Discrepancies in the opinions, if any, were resolved in those discussions. The reliability of the themes were further justified based on the NVivo word cloud maps (Braun & Clarke, 2006; Creswell et al., 2007).

4 Qualitative thematic analysis

The qualitative methodological approach was adopted (Corbin & Strauss, 1990; Creswell et al., 2007). The major goal was to utilize the psychological lens of self-determination theory, and to explore the factors that engage and motivate crowd-workers in the gamified crowdsourcing apps. Thus, using the self-determination theory and theory of cognitive engagement, this study conducted critical in-depth interviews with crowd-workers and their tasks by asking to describe their views on how their motivation aspects become efficient through gamified crowdsourcing apps. The theoretical constructs of self-determination theory and

theory of cognitive engagement was used to develop the interview questions (Deci et al., 1999; Grant, 2008).

4.1 The intrinsic motivation within the firm on motivating crowd-workers

Employee engagement has just lately been identified as a topic of rising importance in the world of business and management research, but motivation has been an important managerial concern for decades. Individuals are self-directed to meet three fundamental needs: autonomy, competence, and relatedness, according to self-determination theory (Deci et al., 1999). The motivation to meet these demands, on the other hand, differs from individual to person. According to self-determination theory, people who have high intrinsic motivation are more likely to fully engage in employment that allows them to exercise autonomy, competence, and relatedness (Deci et al., 1999). Individuals that are intrinsically driven are more likely to willingly dedicate a higher amount of effort to the work and to stick with it (Grant, 2008). The urge to expend effort based on the interest, delight, and satisfaction of labour itself is known as intrinsic motivation (Deci et al., 1999; Grant, 2008). Employees participate in their work because they enjoy it and are interested in it, not because they are looking for quantitative results, according to intrinsic motivation (Deci et al., 1999; Grant, 2008). Employee intrinsic motivation has been experimentally related to a variety of desired outcomes, including innovation (Zhu, Gardner, & Chen, 2018), knowledge sharing (Hai & Park, 2021) and work performance (Zhu, Gardner, & Chen, 2018; Behl et al., 2022). The major concepts identified through this qualitative analysis includes people orientation, service orientation and technology orientation which directly links to the intrinsic motivation within the firm related for engaging and motivating crowd-workers in gamified crowdsourcing mobile apps.

Based on the word cloud (refer Fig. 1) NVivo QSR analysis, the concepts on people orientation, service orientation and technology orientation which directly links to the gamified crowdsourcing mobile apps in this study can be further justified.

4.2 The intrinsic competence within the firm on gamified sustainable supply chain

Due to rapid technological advancements and the introduction of new goods, customers have higher expectations for products and services (Bratman, 1999; Chen & Chankov, 2017; Dahunsi et al., 2021; Ji, 2012). In addition to more product options, customers have access to greater amounts of information and knowledge. Corporate core competence has three characteristics, according to Prahalad and Hamel: it should be capable of delivering market leadership through a wide range of possible channels; it should be able to produce customer value; and it should be difficult to copy. Furthermore, corporate core competencies possess characteristics such as variability, heterogeneity, scarcity, route dependency, and so forth (Ji, 2012). To understand a company's core competence, it is necessary to identify its characteristics. It is the primary indicator of long-term competitiveness (Ji, 2012).

Social dimensions, such as intrinsic competence within the firm-based sustainable supply chain engagement and motivation of crowd-workers in gamified crowdsourcing mobile apps have received insufficient attention in the literature (Helmefalk, 2019; Liang et al., 2017); Deng et al., 2016). These studies utilized collaborative software and game design features in order to engage the users in achieving the collective goal (Brito, Vieira, & Duran, 2015).

Fig. 1 NVivo software-based word cloud map for intrinsic motivation factor

There have been several platforms, such as Foursquare, Stack Overflow, and Dropbox, that have acknowledged the benefits of gamifying the user experience in order to promote collaboration (Morschheuser et al., 2017). However, most gamification solutions are overly generic and fail to emphasize the collaborative aspects of gamification (Brabham, 2010; Brito et al., 2015). By crowdsourcing we mean using the expertise, energy, and creativity of an online community to solve problems collectively (Chen & Chankov, 2017; DePasse et al., 2014). Several scholars begin by reviewing the existing research on collaborative crowdsourcing jobs. There are several types of information that workers have access to during collaborative tasks. These characteristics aid in the identification of a number of various intrinsic competency categories of collaborative work, each encapsulating a different level of worker interaction (Brabham, 2010; Hamari et al., 2016). In addition to increasing skills and procedural knowledge, simulation games allow students and new employees to experience a real-life situation and gain a better understanding of their future career paths (Cohen, Niemeyer, and Callaway, 2016; Ayer et al., 2016). Alternatively, simulation games can also be used by practitioners to test and evaluate new strategies and methodologies related to sustainable supply chain-based engagement and motivation of crowd-workers in gamified

crowdsourcing mobile apps (Celio, Andriatsitohaina, and Zaehringer, 2019; Hardeveld et al., 2019).

Evaluability: Corporate core competency should be favourable to increasing business efficiency and can assist a firm in creating value. The main criterion for determining whether or not an ability is a business core competency is if it has value and the capacity to give significant advantages to customers. Honda's main competence, for example, is its engine expertise. And dealing with dealer relationships isn't one of the company's main competencies. Honda's engine and transmission capacities provide excellent value to customers (Bratman, 1999; Chen & Chankov, 2017; Dahunsi et al., 2021; Ji, 2012).

Heterogeneity: In comparison to competition, a company's core skill should be a one-of-a-kind capacity. If your firm has a specific capability that other companies have as well, and we do it as well, it is due to the industry's universal ability rather than the company's fundamental expertise (Ji, 2012).

Scalability: Scalability refers to the economics of scale in corporate core capabilities. Businesses can use corporate core competency to penetrate a number of marketplaces and achieve a competitive advantage in the sector. If a company's core competency is limited to a specific product market and is not shared with other items, it is not considered its core competency. Sharp's LCD unique technology, for example, is the company's core expertise, helping it to stay ahead of the competition in laptops, pocket calculators, and large-screen TV technology (Ji, 2012).

Immobility: Corporate core competency is the sum of a company's individual and collective learning, and it is profoundly branded with the company's characteristics. Path dependency and fuzziness are characteristics that make rivals difficult to replicate. For example, Haier's key expertise in the service industry is founded on the company's social capital and culture, which are tough to mimic and reproduce. Many visitors to Haier in recent years have shared the impression that Haier is a wonderful firm with a core skill that is difficult to copy and mobile (Sun & Hong, 2022; Ji, 2012).

The major concepts identified through this qualitative analysis includes technology, people and experience (refer Table 3) which directly links to the intrinsic competence within the firm related for engaging and motivating crowd-workers in gamified crowdsourcing mobile apps.

Based on the word cloud NVivo QSR analysis (refer Fig. 3), the concepts on technology, people and experience which directly links to the gamified crowdsourcing mobile apps in this study can be further justified.

4.3 Intrinsic relatedness within the firm on motivating crowd-workers

Self-determination theory emphasises that intrinsically motivated acts are carried out to meet psychological needs and as a result, underlying notions of autonomy, competence, and social relatedness increase intrinsic motivation, each of which has separate effects in diverse situations (Deci et al., 1999). When one feels volitional in pursuing an activity, the desire for autonomy shows a desire to control one's activities (Dholakia, 2006; Ryan & Deci, 2000; Shi & Cristea, 2016). The need for competence is comparable to the idea of self-efficacy in that it relates to an individual's predisposition to perform successfully and accomplish a desired goal (Dholakia, 2006; Kim & Drumwright, 2016; Ryan & Deci, 2000; Shi & Cris-

Table 3 NVivo query findings on the intrinsic competence within the firm

Theme	Codes	NVivo QSR query results
Technology	Accessible	"The services should be accessible by the customers" " I think resource accessibility plays a major role here"
	Techniques	"I think the techniques should not be outdated" "Secondly, I mean, not specifically to, you know, these platforms Fiverr Freelancer were directly around, but in general, I know most of the top giants that I've worked with, okay, but most of them are usually, you know, use gamification things enhance their levels. So for example, within Amazon as well, for the vendor or seller, there is a step programme for every seller, for example, after you register for the Amazon, you will get a basic level"
Experience	Services	"The after-sale services and the free maintenance or installation services also plays a vital role when it comes to customer satisfaction" "So for example, there's a great Indian festival running on us now. We tell sellers, if you give, let's say, 10% of your customers, we are going to offer 20% off to the customers and we will afford the rest. Okay, right, because at this point, I mean, to qualify for this. So at the end, your customer will get 20% off, So it's a benefit for sellers as well buyers because sellers will grow in terms of volume.
	Reality	"In reality, the workplace should have some trained workforce to handle the day-to-day matters"
People	Person	"The personal skills such as language, communication and outgoing personality "I think some people are not technology oriented. So, they find it difficult to adjust to even for a small software installation in their company. For example, I can remember that my previous workplace changed the finance software system to another, and lot of people had a difficulty in adjusting to it even after six to eight months of training"
	Staff	"Proper staff training programs are necessary"

tea, 2016). Finally, the need for social relatedness refers to the want to feel linked to others and to have a sense of belonging (Kim & Drumwright, 2016; Pereira et al., 2022).

The need for social connectedness may be defined as the desire to engage with and be accepted by others. This is known as the yearning to connect or the need to belong. A "fundamental human motivation that all human beings possess…to develop and sustain at least a minimal number of durable, pleasant, and meaningful interpersonal relationships" is one example (Kim & Drumwright, 2016). The current context examines the demand for social relatedness in connection to the wider concept of a sense of community, which is defined as a sense of belonging and importance to other users in a social network (Kim & Drumwright, 2016). Feelings of social relatedness, according to SDT, contribute to the formation of relationships and lead to subsequent behaviours. Indeed, they aid in the maintenance of intrinsic motivation or the internalisation of extrinsic incentive (Deci et al., 1999; Kim & Drumwright, 2016). Therefore, the major concepts (refer Table 4) identified through this qualitative analysis includes peer pressure which directly links to the intrinsic relatedness within the firm related for engaging and motivating crowd-workers in gamified crowdsourcing mobile apps.

Based on the word cloud NVivo QSR analysis (refer Fig. 4), the concepts on peer pressure which directly links to the gamified crowdsourcing mobile apps in this study can be further justified.

Fig. 3 NVivo software-based word cloud map for intrinsic competence factor

Table 4 NVivo query findings on the intrinsic relatedness within the firm

Theme	Codes	NVivo QSR query results
Peer pressure	Think	" I strongly believe that it is not machinery but how people think about it. So even the manual work is accurate as long as if people can give a good focus on it" "I think overall the staff thinking ability and communication aspects needs to be developed'
	Service	"Classifying the entire consumption of service and these aspects is another milestone to be achieved by the employees" "We also should think about the accessibility of the service when consuming it"
	People	"People should be multi-skilled at least they should be able to focus on two tasks at once" "The more people oriented the more accurate and reliable the service will be"

Fig. 4 NVivo software-based word cloud map for intrinsic relatedness factor

4.4 Active learning paradigm within the firm

When considering the fact of active learning paradigm within the firm that will be positively related to engagement and motivation of crowd-workers in gamified crowdsourcing mobile apps in supply chain management, investing in employee engagement has become possible as a result of the proliferation of digital technologies designed to facilitate interaction and two-way information flows. As organizations strive to communicate with current and potential customers (e.g., Brodie et al., 2011), they are harnessing the power of digital media (Verhoef et al., 2010). For instance, organizations utilize social media platforms, or develop their own customized smart phone applications, to interact with customers in addition to traditional purchase exchanges (e.g., Roggeveen & Grewal, 2016).

Gamification is becoming an increasingly popular method to generate engagement and increase consumer participation (Grewal et al., 2017). The participatory nature of digital media, and its focus on interactivity, provide organizations with key avenues for connecting with customers and creating value as active learning paradigm within the firm will be posi-

Table 4 NVivo query findings on the active learning paradigm within the firm

Theme	Codes	NVivo QSR query results
Firm based resources	Physical Resources	"We think that having proper resources such as money, labour and infrastructure will improve the quality of the service" "The lack of resources leads to consumer dissatisfaction" "Definitely, the primary motive remains according to you as monetary and the secondary benefited gifts, uplift profile, right so that it looks good to the people, those who are searching for people like us in order to get the task done" "To be honest, there should be some motivation to you know, run a crowd sourcing project, any motivation, which motivates the crowd to do it, there's no motivation is they don't bother about it. I don't think I mean, people will even invest their energy, right? I mean, if I talk about yourself in myself, even we don't, we will not invest any energy. To do this. There are two things which will trigger, you know, which will bother me, which will make sure that I invest my time I at least know about it. Yeah, number one is curiosity. I would say, for example, this is an example where I'm really curious about how this particular project information, and if I get a chance to do it, I will do it. Right, if I'm qualified to do it, obviously, that is one second thing, I would say monetary again, monetary benefits approach a right"
	Knowledge	"I think it is not the economy and the money which is in recession but also the workforce lacks skills and knowledge"
Individual capacity	Service	"It is a project on service inclusion. So, we had to focus on several key aspects which showed the skills of our workforce" Similar to crowdsourcing apps, basically, vouchers are really good platforms, which for quality of work, and if the person wants to get something done, they have vast opportunities. And they can hire talent from anywhere in the world. And they can get those things done in very competitive prices. So crowdsourcing platforms are very good to get good things. With when we face time and resources, so I think are very helpful for individuals and companies.
	Skills	"Honestly. So I would say, let's say that choosing the right read areas, is the key point. Like let's say if if you are providing right criteria, that if you get distance, then you will get distance, if you get x you will get y if you do x you will get right. So, I would say it's the right challenge account conferencing app should follow is that choosing the right criteria. So as you can see all the criteria, all sorts of apps, and using different criteria's, which helps the users it has the sentence in different manners, right. So, for example, pirate is helping, let's face issue a 2,000,001. fiverr promoting to a level one, which brings some confidence to a seller. And which also means some trucks for buyers, that the seller is level one, so he or she sure has completed some very good products. And that's why you're seeing level one. So definitely, definitely try this setup"

tively related to engagement and motivation of crowd-workers in gamified crowdsourcing mobile apps in supply chain management. Gamification is a one-way in which organizations engage with consumers and motivate behaviours that align with organizational goals (Butcher et al., 2019; Koivisto & Hamari, 2019; Yang et al., 2017). Game-like features include leader board rankings, feedback, points, challenges, badges, and rewards for completing missions, such as liking a company on social media or checking into a store.

Economic shifts have an influence on the content and setting in which business education takes place, since more organisations are required to be competitive not just in their domestic markets, but also worldwide (Chi, 2009; Deci et al., 1999; Francis et al., 2010; Greene and Miller, 1996). Changes in business will have an influence on educational institutions in the new millennium, particularly on the conventional function of the business educator

(Deci et al., 1999; Kim & Drumwright, 2016). Managers and executives, for example, must improve their oral and written communication abilities as the nature of businesses becomes increasingly information sensitive.

Self-determination theory emphasises that active learning paradigm within the firm for engaging and motivating the workforce based on the idea of self-efficacy in that it relates to an individual's predisposition to perform successfully and accomplish a desired goal (Dholakia, 2006; Kim & Drumwright, 2016; Ryan & Deci, 2000; Shi & Cristea, 2016). Therefore, the major concepts identified through this qualitative analysis includes firm-based resources and individual capacity which directly links to the active learning paradigm within the firm related for engaging and motivating crowd-workers in gamified crowdsourcing mobile apps.

Based on the word cloud NVivo QSR analysis (refer Fig. 5), the concepts on firm-based resources and individual capacity which directly links to the gamified crowdsourcing mobile apps in this study can be further justified.

Fig. 5 NVivo software-based word cloud map for active learning paradigm factor

Table 5 NVivo query findings on the emotional **self-awareness** within the firm

Theme	Codes	NVivo QSR query results
Personal values and ethics	Personality	Because you have shared this instance and honestly it was triggered here. So, when it comes to the personality the personality of one person should be developed based on the ethics and values I think the ethical conduct and the employee discipline is a must to survive in the company
	Mindfulness	I think if you are at peace in your home, then your mind will be in peace in the workplace. So the mindfulness begins from your own home

Fig. 6 NVivo software-based word cloud map for emotional self-awareness factor

4.5 Emotional self-awareness within the firm

The ability to recognise and understand emotions in oneself and others, as well as the ability to control one's own affective states to improve one's well-being and the quality of one's personal and professional relationships, is referred to as emotional **self-awareness**. Life satisfaction (Killian, 2012), general health (Jordan & Ashkanasy, 2006), work and academic performance (Dahunsi et al., 2021; García-Mireles & Morales-Trujillo, 2019; Goleman, 2001; Jordan and Ashkanasy, 2006) and leadership potential have all been (Jordan & Ashkanasy, 2006). Therefore, the major concepts identified through this qualitative analysis (refer Table 5) includes personal values and ethics which directly links to the emotional **self-awareness** within the firm related for engaging and motivating crowd-workers in gamified crowdsourcing mobile apps.

Based on the word cloud NVivo QSR analysis (Refer Fig. 6), the concepts on personal values and ethics which directly links to the gamified crowdsourcing mobile apps in this study can be further justified.

5 Discussion of the findings

The discussion of the findings is based on the five major themes of intrinsic motivation, intrinsic competence, intrinsic relatedness, active learning paradigm and emotional self-awareness.

5.1 The intrinsic motivation within the firm on motivating crowd-workers

A particular emphasis on people orientation, service orientation and technology orientation has been shown to be effective in engaging and motivating crowd-workers in gamified crowdsourcing mobile apps (Deci et al., 1999; Greene and Miller, 1996; Morschheuser et al., 2017). In the context of sales technology expenditures (including sales automation and sales-based customer relationship management systems), people orientation can be explained as the need for realistic methods of calculating the returns on those expenditures (Akram, Mahar, Senin, & Ismail, 2020). Service orientation refers to anticipating, identifying, and satisfying the needs of others, often before they are voiced. A service-oriented person makes themselves available to others and focuses on delivering satisfaction.

This was defined as actively seeking ways to help others (Akram et al., 2020; Brito et al., 2015). In the technology orientation aspect, top management capacity, technological capability, commitment to learning, and commitment to change are the aspects of a reliable and valid multidimensional technology orientation measure (Bergvall-Kåreborn & Howcroft, 2013; Brito et al., 2015; Chen & Chankov, 2017; Chi & Menekse, 2015; Deci et al., 1999). This study theorizes gamification artefacts, including point rewards and feedback, and identifies four intrinsic motivations (such as self-presentation, self-efficacy, social bonds, and playfulness) in the context of crowdsourcing, in accordance with motivational affordances (Bergvall-Kåreborn & Howcroft, 2013; Brito et al., 2015; Chen & Chankov, 2017; Chi & Menekse, 2015; Deci et al., 1999).

5.2 The intrinsic competence within the firm on gamified sustainable supply chain

In gamified crowdsourcing mobile apps, intrinsic competence within the company can be effective for attracting and motivating crowd workers (Ji, 2012). To identify these intrinsic competency levels among employees, we first examined the nature of daily work. A large portion of workers are expected to self-manage to a great degree, directing their work activities toward critical company goals using their wits and knowledge (Zhang, Xiang et al., 2021; Zhao & Zhu, 2014). Thus, it was observed that employees provide value by creating, solving problems, and adapting to the conditions they face in order to meet the needs of their customers while using technology, people, and experience (Zhang, Xiang et al., 2021; Zhao & Zhu, 2014). Gamification literature has evolved in a way that has expanded the differences between how different areas implement the principle. Thus, gamification has been positioned as a context-dependent rather than a stand-alone concept. Accordingly, three principals have been identified as fundamental to how a gamification, or the person responsible for gamifying a process, implements gamification (Zhang, Xiang et al., 2021; Zhao & Zhu, 2014).

Technology, people and experience are identified as three major facts which leads towards intrinsic competence within the firm which is related to sustainable supply chain-

based engagement and motivation of crowd-workers in gamified crowdsourcing mobile apps (Zhang, Xiang et al., 2021; Zhao & Zhu, 2014). This finding can be further justified based on the similar studies as follows. Ji (2012) mentioned that corporate core competencies possess characteristics such as variability, heterogeneity, scarcity, route dependency, and so forth and understand a company's core competence, it is necessary to identify its characteristics. It is the primary indicator of long-term competitiveness (Ji, 2012).

Technology has received insufficient attention when addressing social dimensions, including intrinsic competence within firm-based sustainable supply chains and motivation for crowdworkers in gamified crowdsourcing apps (Helmefalk, 2019; Liang et al., 2017); Deng et al., 2016). A collaborative software program and game design features were utilized in these studies to engage users in achieving the collective goal (Brito, Vieira, & Duran, 2015). There are several services, such as Foursquare, Stack Overflow, and Dropbox, that have recognized the benefits of gamifying the user experience to foster cooperation (Morschheuser et al., 2017). Most gamification solutions, on the other hand, are extremely generic and fail to stress the collaborative parts of gamification (Brabham, 2010; Brito et al., 2015).

When considering the **People**, crowdsourcing refers to the use of an online community's skills, energy, and creativity to solve issues collectively (Chen & Chankov, 2017; DePasse et al., 2014). To establish intrinsic skill levels among personnel, we began by studying the nature of everyday labor. A substantial amount of self-management is required of employees, with their expertise guiding their job activities toward crucial corporate goals (Zhang, Xiang et al., 2021; Zhao & Zhu, 2014). Previous studies on collaborative crowdsourcing tasks are analyzed by several academics. During collaborative projects, workers have access to a variety of information. Each of these intrinsic competency categories encompasses a distinct level of worker engagement (Brabham, 2010; Hamari et al., 2016).

When considering the **Experience**, simulation games, in addition to improving skills and procedural knowledge, allow experienced workers and new workers to practise a real-world situation and develop a better grasp of their future job pathways (Cohen, Niemeyer, & Calaway, 2016; Ayer et al., 2016). Practitioners may also utilize simulation games to test and evaluate novel tactics and techniques for sustainable supply chain-based engagement and motivation of crowd-workers through gamified crowdsourcing mobile applications (Celio, Andriatsitohaina, & Zaehringer, 2019; Hardeveld et al., 2019).

5.3 Intrinsic relatedness within the firm on motivating crowd-workers

Intrinsic relatedness is widely regarded as the most productive factor driving people's actions (Kim & Drumwright, 2016). People, on the other hand, are frequently reported to lack intrinsic motivation for various activities they would like to engage in (Kim & Drumwright, 2016). As a result, numerous businesses, educational institutions, and organisations compete for these individuals' motivating resources (Wee & Choong, 2019). However, in games, we are frequently found to be deeply engaged and passionately driven, as well as to be able to obtain cognitive, emotional, and social benefits (Wee & Choong, 2019). Major concepts identified through this qualitative analysis includes peer pressure which directly links to the intrinsic relatedness within the firm related for engaging and motivating crowd-workers in gamified crowdsourcing mobile apps.

Immersion-related characteristics such as avatars, roleplay systems, storytelling, narrative frameworks, and personalization, all of which attempt to immerse the user in a self-directed learning experience (Liu et al., 2011; Morschheuser et al., 2017; Ossai & Wickremasinghe, 2021; Rapp, 2020; Wee & Choong, 2019). Avatars and personalization can give game players more freedom of choice and increase feelings of autonomy; in-game storytelling or narrative can help players understand the significance of their actions and the feeling of voluntary participation (Seaborn & Fels, 2015; Shi & Cristea, 2016). Gamification aspects such as groups, messages, blogs, connections to social networks, and chat can provide players with a deeper sense of intimacy and belonging owing to high-frequency communication, idea sharing, and reciprocity (Kim & Drumwright, 2016; Liu et al., 2011). These aspects of social networks can successfully reinforce interpersonal connections and increase social engagement (Kiryakova et al., 2014). Furthermore, good relationships with other group team members might motivate players to perform better (Ling et al., 2021).

5.4 Active learning paradigm within the firm

Learning from crowds frequently employs an active learning paradigm, with the goal of fast improving learning performance while also lowering labelling costs by selecting appropriate workers to (re)label relevant cases (Chen & Chankov, 2017; d'Eon et al., 2019; Howe, 2008). Previous active learning approaches for learning from crowds lacked a proactive mechanism to efficiently enhance worker dependability, which prevented learning curves from continually growing (Chen & Chankov, 2017; d'Eon et al., 2019; Howe, 2008). Active learning paradigm within the firm for engaging and motivating crowd-workers in gamified crowdsourcing mobile apps is found to be effective with firm-based resources and individual capacity (Ling et al., 2021; Meftah et al., 2021). Firm-based resources such as knowledge and tangible assets were identified as essential elements to improve engagement among crowd-workers in gamified crowdsourcing mobile apps (Huotari & Hamari, 2012; Ling et al., 2021; Meftah et al., 2021). Furthermore, digital technology may be utilised to re-design courses to incorporate active learning strategies and to enhance learning with rather than without the use of technology (Hamari et al., 2016).

5.5 Emotional self-awareness within the firm

According to several studies, leaders who have a high level of self-awareness are more likely to be recognised as effective leaders (Estellés-Arolas & González-Ladrón-de-Guevara, 2012; Hamari et al., 2016; Howe, 2008; Huang et al., 2020; Kershaw et al., 2019; Kiryakova et al., 2014). For example, Diggins (2004) claims that increased self-awareness enables leaders to notice and regulate the influence of their emotions on their actions and thinking, allowing them to build deeper personal ties with followers and therefore become more successful leaders. Furthermore, according to Atwater et al. (2005), highly self-aware leaders are better equipped to acknowledge their mistakes and achieve corporate goals. Emotional **self-awareness** is the capacity to recognise and understand emotions in oneself and others, as well as the ability to control one's own affective states to improve one's well-being and the quality of one's personal and professional relationships (Dahunsi et al., 2021; García-Mireles & Morales-Trujillo, 2019; Goleman, 2001; Jordan and Ashkanasy, 2006). Therefore, the major concepts identified through this qualitative analysis includes

personal values and ethics which directly links to the emotional **self-awareness** within the firm related for engaging and motivating crowd-workers in gamified crowdsourcing mobile apps.

6 Implications, Limitations, and future research directions

The purpose of this paper is to explore the factors that engage and motivate crowd-workers in the gamified crowdsourcing apps. Thus, using the self-determination theory and theory of cognitive engagement we conducted critical in-depth interviews with crowd-workers and their task. We conducted a qualitative thematic analysis to explore the psychological and behavioural factors for engaging and motivating crowd-workers in gamified crowdsourcing mobile apps (Helmefalk, 2019; Morschheuser et al., 2017). Main findings indicated that intrinsic motivation within the firm for engaging and motivating crowd-workers in gamified crowdsourcing mobile apps is found to be effective with more focus towards people orientation, service orientation and technology orientation (Deci et al., 1999; Greene and Miller, 1996; Morschheuser et al., 2017).

To enhance motivate and engage crowd-workers in gamified crowdsourcing mobile apps, companies need to focus on (1) people orientation, (2) service orientation and (3) technology orientation as discussed in the subsequent paragraphs.

(1) Focus on people orientation: This study reveals that people orientation is characterized by abilities and experience of the crowd workers. First, the priority areas within people abilities is inclusivity and positivity. Here, inclusivity requires companies to give increased attention to gamify the app for differently abled people such as visually impaired individuals and people with locomotor disability. Positivity is another important area within the "person" code which is reflected in the responses (refer Table 2). The companies may like to place greater emphasis on positive elements of the gamified process such as rewards and winning instead of penalties or defeating others. Second, experience of the crowd worker also has considerable significance. In that, the gamified app is expected to be work seamlessly and with continuous improvement.

(2) Taking steps to contribute to the society: As reflected in the responses of informants, companies gain from the society and thus, it is their duty to help that society grow. Gamifying the crowdsourcing app to empathize with the weaker sections of the society will be a valuable asset in the long run. These features may either be to facilitate such sections of the society better or to increase empathy among the crow workers about them.

(3) Technology orientation: The findings of this study suggest that technology orientation in the context of crowdsourcing apps pertaining to logistics and sustainable supply chain primarily relates to gamification. The insight that different generation will have different levels of flexibility provides evidence to the companies to design and develop the gamification intensity according to their target generation of crowd-workers. Specifically, gamification intensity should be highest for Generation Z, moderate for Generation Y, and lowest for Generation X.

This study has several weaknesses, including a small number of respondents, an age structure, and a geographical distribution that may not be representative of the study area. The collection process exacerbates this issue, as many potential volunteers may not be comfortable with digital technology. The number and structure of respondents can be used as

a boundary in the first phase. According to the self-determination theory and the theory of cognitive engagement (d'Eon et al., 2019; Deci et al., 1999; Dholakia, 2006), this study explores the factors that motivate and engage crowd-workers in gamified crowdsourcing apps. Therefore, authors used the theoretical constructs of these theories which limits the findings of this study due to limited scope (Chen et al., 2008; Corbin & Strauss, 1990; Deci et al., 1999).

As a future research suggestion, it is necessary to identify that, there is a lack of diversity in research designs and data analysis methods in this area (Mani & Chouk, 2017; Talwar et al., 2020; Tegarden et al., 2011). Research agendas that explore the drivers of resistance to emerging technologies as well as how to apply diverse research approaches are necessary to produce robust technology forecasting and growth trajectory results. In particular, there are several research possibilities. First, while reviewing literature, it is apparent that there are research works studying the impact of gamification features on the motivation and engagement of crowd workers, studies addressing this unique logistics-related crowdsourcing tasks are sparse. Thus, researchers in the future may like to explore the specific types of gamification factors responsible for motivating and engaging crowd workers. Second, in the similar way, the impact of job characteristics comprising skill variety, task identity, task significance, autonomy, and feedback on motivation and engagement is an important area for future research in the present context. Third, an interesting finding is about experience and expertise of the users in using the gamified app. While the findings of this study suggest that Gen Z are typically more comfortable in using these gamified apps compared to Gen X & Gen Y, the latter generations are likely to be more experienced users primarily due to their age. This conundrum needs to be demystified in the future works. Another related factor that the future research may like to consider is cultural differences that may help estimate behaviours of crowd-workers. Hofstede's cultural dimensions theory may be of particular use for theorization. Fourth, it is of paramount significance for the companies to comply with the law of the land, particularly data privacy and security which, though fall outside the scope of the present study, is an area that remains unexplored. It is because, to customize gamification in the app crowd worker-wise would require the company to collect data on demographics and interests. Such an attempt will open fresh arenas of compliance issues that would require researchers' attention.

7 Conclusion

To conclude, this paper contributes to enterprise competition and sustainable development through improving engagement of crowd-workers in gamified crowdsourcing mobile apps by focusing on people, service and technology orientations (Deci et al., 1999; Greene & Miller, 1996; Morschheuser et al., 2017). Several studies concluded that citizens play for 'innate psychological needs', including autonomy, competence, and relatedness (Atwater et al., 2005; Dholakia, 2006; Ryan & Deci, 2000; Shi & Cristea, 2016). The completion of a national cadastral registration has multiple benefits for society (Atwater et al., 2005; Dholakia, 2006; Ryan & Deci, 2000; Shi & Cristea, 2016). Crowd-workers may be motivated to participate in such a project if it is clearly communicated (Helmefalk, 2019; Morschheuser et al., 2017) to explore psychological and behavioral factors. Moreover, the citizen's ability to relate to and connect with others in a way that conveys security and instills social inclu-

sion and significance in participating in a large-scale national project should be considered and communicated through gamification (García-Mireles & Morales-Trujillo, 2019; Khan et al., 2020; Kiryakova et al., 2014).

Declarations

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