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ROLE OF ENTERPRISE GAMIFIED SYSTEM IN FOSTERING INNOVATION CAPACITY: A FIELD EXPERIMENT

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Abstract: In this paper, we explore the role of enterprise gamified system in innovation capacity. Taking a design thinking perspective, and drawing on literature on Innovative Work Behavior (IWB), we hypothesize that Perceived Organization Support (POS) is positively associated with innovation capacity. This relationship is mediated by the employee`s engagement and IWB. We further argue that the implementation of sustainable enterprise gamified system will improve POS and thus will enhance innovation capacity. Following instrumental approach in our research, we offer practical solution of aligning the enterprise gamified system to the needs and peculiarities of an organization. Main opportunities and limitations are discussed.

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Introduction

Kaplan and Orlikowski (2014) exploring current challenges for companies define as the most crucial one "making strategy under the uncertainties posed by turbulent environments, intensified competition, emerging technologies, shifting customer tastes and regulatory change". In our research we focus on one important mean of dealing with this challenge – innovations.

The ultimate goal of our research is to create a methodological tool for the companies, which helps to adjust fostering innovation strategies to their peculiarities and specific circumstances. To reach this goal, we defined the following tasks: (1) to specify the model of innovation; (2) to offer a practical solution of aligning enterprise gamified system to the needs and peculiarities of an organization; (3) to explore a method of field experiment for testing the suitability of a specified theoretical model and selected enterprise gamified system design.

In order to reach the first goal we focus on the role of employees in innovation capacity of the organization. The classic source of ideas is R&D department, due to the dominance of "producers' model" of innovation in generating higher profits, introduced by Schumpeter in 1934 (Baldwin and von Hippel, 2010). It implied that companies should be interested in being innovative, as it brings them exceptional profits until their novel solutions are copied by competitors. Nevertheless in order to avoid being idea generation-poor company or idea conversion-poor company a firm has an opportunity to open an idea-generation and an idea-selection processes to other individuals then workers of R&D department (King and Lakhani, 2013). This approach is based on the statistical principles that the more ideas generated, the better the quality of the best one is likely to be, and that the value of the best idea generally increases with the variability of the ideas received.

This is in line with recent shift to "experience economy", which leads to democratization of innovation, providing new sources of valuable ideas. Pine and Gilmore (2011) argued that the "experience economy" is the next economy after the agrarian, the industrial, and the service economy. The experience economy fully utilizes the concept of Design thinking, which among other cultural and technological advances helps to create appealing consumer and user experiences that enhanced business performance. This socio-technical shift is raising new questions and is opening opportunities for empirical work and for theory development, as well as for methods development in terms of the role, impact, and application of design, not only to products and services but also to management science (Gruber, 2015). Design thinking, being empathy-based approach, is well suited to emerging method of gamification for introducing, transforming and operating a service system that allows players to enter a gameful experience to support value creation for the players and other stakeholders (Herger, 2014). Therefore, we apply gamification as a method to foster innovation capacity in organizations. Our empirical unit of analysis is individual innovation behavior (IWB), as employees are one of the valuable forces for innovations.

Relying on employees' perception creates certain limitations, which force us to reconsider the model of innovation in the first section. As result in the first chapter, we discover the role of existing environment in the innovation process and elicit the motivational factors behind innovative work behaviour. Then we proceed with the analysis of the gamification as a method of fostering innovation capacity in organizations. Assuming that there is no one-fit-all solution, we develop a managerial tool which helps organizations to match offered methodology with their needs and limitations. This is a two-step tool: the first step consists of assessment and investigation of the current state and needs; the second step includes empirical test of the implemented approach. For the second step we propose a design of field experiment. Finally we discuss our findings, implications and limitations of our research.

Model of innovation

In line with Hennessey and Amabile (2010), by innovation we understand successful implementation of creative ideas. Innovation capacity relates to the firm's capacity to engage in innovation, meaning excellence in acquisition, filtering, and implementation of the most valuable creative ideas. Hansen and Birkinshaw (2007) called this funnel "the innovation value chain". To improve innovation capacity the authors offered to assess current state of the chain, find a weakest link in it and treat it. Zahra and George (2002) used similar funnel introducing terms of "potential" and "realized absorptive capacity" for the second and the third stages of the innovation value chain. The issue with such framework is recent general shift of researches from linear to evolutionary approach to innovation, implying that all processes from acquisition to exploitation are interconnected and should not be treated as separate steps such as "potential" and "realized absorptive capacity" or "idea conversion" and "idea diffusion" mentioned above.

The employees' impact into the company's innovation capacity could be both controlled and routinized. One of the positive examples of a controlled impact is organizational crowdsourcing initiatives. A company broadcasts innovation challenges in the form of open calls, often using online platforms, and employees can participate in the idea generation process, bringing diversity of knowledge and their opinions to the firm (Jeppesen and Lakhani, 2010). King and Lakhani (2013: 43) add additional value brought by employees – support in filtering ideas, warning about "need of balance between the desire for honest feedback and the civility and respect that is necessary to encourage participation".

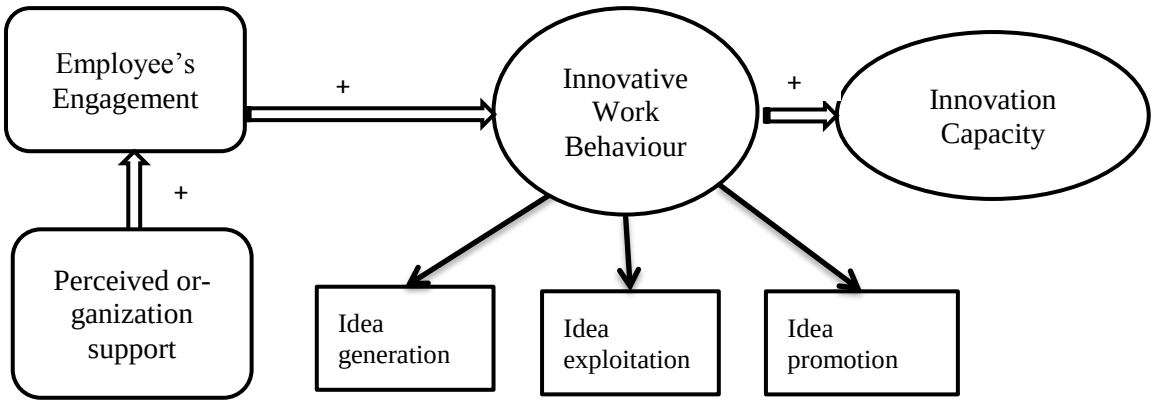
Dell and IBM pioneered online crowdsourcing idea contests. Researches of these trials noticed that employees behave differently, often following "90-9-1 rule": the majority only read the content; some commented helping to evaluate offered solutions and only few brought new ideas (Bayus, 2013; Stewart et al., 2010). Anderson et al. (2004) assumed that difference in behavior of individual innovativeness depends both on capability and on motivation of employees to participate in such contests. Shalley et al. (2004) in literature review mention many personal characteristics influencing innovativeness in general like demographic and biographic variables, different personality traits and cognitive abilities. Zhu et al. (2014) defined four behavior types of the crowdsourcing platform users outlining just two main employees' personality factors needed for controlled innovation: creativity as a basement for ideas generation, and proactivity as preferred cognitive ability for ideas promotion. In line with these are research findings of Dyer et al. (2009) that not just value these two cognitive characteristics named in their research 'discovery' and 'delivery' matters, but also a balance of them. Moreover authors state that these abilities could be trained, e.g. discovery could be improved through training associating, questioning, observing, experimenting skills, or through learning new technics how to innovate. **Summing up, one way to increase innovation capacity is to select personnel with needed personal skills for idea generation, exploitation and promotion and to support their development along with learning via special methods and approaches.**

The main drawback of such approach is its long-run procedure. Moreover West (2002) stresses that personal characteristics are necessary but not sufficient for innovation, meaning high role of supportive environment (Axtell et al., 2000). Usually perceived organization support (POS) is defined as valuation of the employees' contribution and care about the employees' well-being (Rhoades and Eisenberger, 2002). According to organizational support theory, POS should produce several favourable psychological results: implicit obligation to care about the organization's welfare, create positive emotions in the workplace causing employees to embark corporate identity, support the employees' beliefs that the organization carefully tracks and rewards improved performance. These processes should have favorable outcomes resulted in higher employee engagement (EE).

Shuck and Wollard (2010: 103) define EE as "an individual employee's cognitive, emotional, and behavioural state directed towards desired organizational outcomes". It usually includes different aspects like motivation, work alienation, commitment, job satisfaction, empowerment, organizational citizenship behavior, willingness to 'go the extra mile' for the employer (Allen and Meyer 1990; Macleod and Clarke 2009; CIPD 2008; Gatenby et al. 2009; Shuck et al., 2011). Based on self-determination theory, environment influences EE through fulfillment of innate psychological needs: autonomy, competence and relatedness. (Deci and Ryan, 2000: 263). Autonomy is defined as "experience of integrity, volition, and vitality that accompanies self-regulated action" (Deci and Ryan, 2000: 254). Demotivation arises from anything that takes away one`s sense of control and choice. Competence is the ability to succeed in meeting the goals of an activity; it is always relational, based on the capacities of the individuals within their environment as outlined within ecological psychology (cf. Linderoth 2012). Relatedness is defined as the feeling of connection to others: trust, love and care (in the context of the organization, feeling connected could be extended to the corporate goals and practices). **Summing up, increased EE will improve IWB, therefore increase innovation capacity in the short-run. For this purpose we can improve perceived organizational support.**

POS and EE are especially important for routinized innovativeness. As noticed by Drazin et al. (1999), routinization of innovativeness means refusal from static approach and treating creativity as person's psychological engagement in creative activity. This suggestion could be easier aligned with mentioned above evolutionary approach, when we treat innovation in a broader sense as a problem-solving approach. In such way the focus of a research moves from to Innovative Work Behavior (IWB), which is often defined as individual behavior aiming to introduce and implement new useful ideas, processes, products or procedures (de Jong et al, 2010). IWB is usually assigned to continuous and evolutionary changes - incremental type of innovation, e.g. renewal of products, services, procedures, processes, evolution of management systems (Crossan & Apaydin, 2010). The main challenge with this approach is high correlation between innovation factors: idea generation, exploitation, promotion, implementation (de Jong et al., 2010). Janssen (2014) provided a systematic literature review of the influence of HRM practices on IWB. It turned out that most of recent articles present on Scopus, Web of Science and Google Scholar used IWB as one dimension construct due to high correlation between dimensions in case of multidimensional approach and continuous innovation. Keeping in mind this observation, and following Janssen (2000), and de Jong et al. (2010) we also combine dimensions additively to create an overall scale of IWB. In addition, all recent articles, based on Janssen's literature review, selected cross-sectional research design, while the goal of our working paper is to work out design of a practical managerial tool. It means that we should exclude from the model expectations about long-term results, associated with the idea implementation factor (Figure 1).

Figure 1: Theoretical model of Innovation for controlled innovativeness



Determination of perceived organizational support by Human Capital Management approach

Following Khan et al. (2015) by human capital management (HCM) we assume processes related to education, training, and other professional initiatives for increasing the levels of knowledge, skills, abilities, values, and social assets of employees, leading to satisfaction and performance of the employees, and eventually increasing firm performance.

POS is often included by authors into an innovation model under different titles: high involvement HRM practices (Lepak and Snell, 2002), commitment based HR system (Collins and Smith, 2006), commitment-oriented HRM system (Zhou et al., 2013), collaboration-oriented HRM system (Lepak et al, 2002), transaction-based HR practices (Tsui et al, 1995), etc. However preliminary literature review leads to conclusion that most authors select only one HCM reference set and measure matureness of existing processes, comparing it with the normative benchmark level. Expectations of short-term outcomes limit our ability to change reference set and even its matureness. That is why we can only count for it while designing treatment. Moreover having single reference set is often misleading. For example analysis of how autonomy influences IWB leads to dependence on intrinsic motivation (Ohly et al., 2006; Sanders et al., 2010; De Spiegelaere et al., 2012). Intrinsic motivation is mostly used by High Involvement Based HCM reference set, formulated by Lawler early in 1986. When De Spiegelaere (2012) controlled moderating effect of occupational group on the link between ability to organize own tasks and IWB, he discovered that blue-collar employees were actually demotivated by autonomy. Therefore it had negative effect on IWB. It supports our suggestion about initial orientation of applied HCM reference set on certain types of motives and importance of fit. For blue-collar employees Productivity-Based HCM set is more often applied (Lepak et al., 2002) with a very high dependence on extrinsic motivation like external regulation or at least introjection. Therefore, shift to higher autonomy than usually could lead to employees` demotivation. Another support of our guess about high effect of HCM approach we meet in findings of Zhang and Begley (2011) who studied link between autonomy and IWB in China, and discovered that only in US-owned companies this relation was positive and in Chinese-owned companies - statistically insignificant, although both companies employ Chinese language.

Knowledge-Based HCM approach (Lepak et al., 2002) is different from both mentioned above sets due to high uniqueness of firm's employees and their high strategic value. No wonder that in research of Lu et al. (2012) the link between Learning Orientation Goal and Autonomy was insignificant: employees who are managed with this type of approach usually strive to higher quality and are risk-averted, while higher autonomy implies certain level of entrepreneurial readiness to take a risk. Therefore, perceived autonomy despite the authors' assumptions could not moderate influence of LGO on Innovative performance.

Summing up, in line with Ingham (2007) and Bartlett and Ghoshal (2002) we believe that company might apply any of three general HCM approaches, based on the evolving focus of strategy and the role of employees in a firm:

- Productivity-Based HCM in support of defensible product-market position;

- Knowledge-Based HCM in support of sustainable competitive advantage;

- High Involvement-Based HCM in support of continuous self-renewal.

The first two are well defined by Lepak et al. 2002, the third - by Wood et al. (2008).

Productivity-Based HCM assumes perception of employees as factors of production, following cost-cutting strategy. Outputs of people management – value for money (Ingham, 2007). Jobs are standardized throughout the industry. Recruitment is comprehensive, involves

screening many job candidates, and relies on many different recruiting sources. Selection is usually based on skills and knowledge. Development activities emphasize improving current job performance, emphasize the job experiences, and seek to increase short-term productivity. Motivation is based on objective, quantifiable results, assessment of output quality and quantity of output. Reward is based on salary, which is often a market wage, and designed to ensure equity with peers. Usually reward includes individual incentive/bonus component, based on short-term productivity (Lepak et al., 2002). Concentration on the needs and wishes of the consumers or the market can enhance the organisation's innovativeness. The focus on control and standardization may constitute a major barrier to innovation, especially as concerns radical and breakthrough innovation (Mantzler, 2013). Due to high turnover it is expected that the strongest impact on innovation happens due to high idea exploration results. Autonomy, competence and relatedness are often limited due to predefined job description and unitized tasks across industry. If OPS and EE are high, then it is advised to apply controlled employees' involvement into innovation and transparent monetary based reward.

Knowledge-Based HCM assumes perception of employees as valuable resources, following adding value strategy. Outputs of people management strategy – return on investment (Ingham, 2007). The environment is more stable, so employees have a high degree of job security. Jobs allow employees to routinely make changes in the way they perform their jobs, empower them to make decisions. Development activities for these employees are comprehensive, continuous; require extensive investments of time/money. Employees strive to develop firm-specific skills/knowledge. Performance appraisal is often based on input from multiple sources (peers, subordinates, etc.), it emphasizes employees' learning, focus on their contribution to strategic objectives, include developmental feedback. Rewards system is usually based on extensive benefits package providing incentives for new ideas (Lepak et al., 2002). Organizational members are driven through vision, shared goals as well as outputs and outcome and bonded with loyalty and shared objectives (Mantzler, 2013). However, the strong inward focus on loyalty, tradition and internal maintenance could lead to a lack of attention to changing market needs (Deshpandé et al., 1993). Moreover due to high attention on quality it is expected that the strongest impact on innovation happens due to high idea exploitation results. Autonomy, competence and relatedness are stronger then with previous HCM approach, but is limited by high risk aversion. If OPS and EE are high, then it is advised to apply mixed - controlled and routinized employees' involvement into innovation and commitment based reward.

High Involvement-Based HCM assumes perception of employees as human and intellectual capital, following created-value strategy. Outputs of people management – intangible capability that improves potential to excel business prosperity. (Ingham, 2007). Jobs use flexible job descriptions, team-working, responsibility for own quality, suggestion schemes allowing functional flexibility. The recruitment implies acquisition both from within and from outside the company, based on talent management pipeline needs. Trainability and intrinsic motivation are considered as major selection criteria. Company creates explicit career ladders and openly announces progression. It discloses information about staffing needs, investment plans, and financial position. Development activities are comprised of team briefing, problem solving, training in human relations skills, provide coaching, mentoring, on-the-job induction. Reward is based on self-development appraisals, and often utilizes profit-related pay. (Wood et al., 2008). External focus causes an emphasis on innovation, creativity, growth, and development of new resources. Cohesion is created through entrepreneurship, flexibility, tolerance and risk (Mantzler, 2013). Autonomy, competence and relatedness are the highest, so it is expected that the strongest impact on innovation happens due to high idea generation. If OPS and EE are high, then it is advised to apply routinized employees' involvement into innovation, based on intrinsic motivation.

If OPS and EE are low, then we assume suitability of mixed approach application, focusing more on missing motivation opportunities, as work alienation usually happens due to mismatch between HCM and employees' innate psychological needs.

Summing up, our research goals require careful embedment of an enterprise gamified system into existing HCM approach considering its opportunities and threats.

Understanding sustainable enterprise gamified system

Gamification is usually referred to as "use of the elements of game design in non-game contexts" (Deterding, 2011). For the corporate purposes, three non-game contexts are of particular importance: external (to increase engagement and loyalty of the customers, clients, and partners), behavior-changing (long-term internal or external social initiatives), and internal (to enhance EE and working innovative behavior; for training purposes; for onboarding for newcomers), which is actually our case. Gamification is usually implemented through the applying of game design thinking to non-game applications to make them more engaging and fun.

Gamification has been called one of the most important trends in technology by several industry experts. From the industry viewpoint, gamification as a business is expected to generate 10.2 billion US dollars by 2020 (Research and Markets, 2015).

In essence, gamification reflects the trend toward experience economy meaning that current generation is more likely to value experience at life and at work more than other achievements and results (Pine & Gilmore, 2011; Gruber et al, 2015). Clearly, gamification is an important cultural trend with significant social and economic influences. Moreover, the interest of scientific society to the concept of the gamification is growing continually. However, gamification as a field of research is still in its infancy.

As far as being rooted in `motivational science` and having appealing elements of game design, gamification is perceived as a promising alternative to more traditional forms of EE, process improvement and organizational design. Fundamentally, however, gamification is a persuasive technology, and persuasive technologies can be just as exploitative as traditional forms of enterprise management, depending on the inherent values, intent and transparency of the system design. If the current enterprise engagement crisis is an outcome of people feeling a lack of meaningful connection, intrinsic motivation and contribution to a system, then gamified persuasive design will not be the sustainable solution that it is hoped to be (Raftopoulos, 2014).

Nevertheless, properly design enterprise gamified system can become a decisive factor for the design of a successful human-technology relationship (Marache-Francisco and Brangier 2013). This is attained through attractiveness (triggering emotions and providing immersive experiences), opportunities for self and social competition (goal setting, evaluation, rewards), and freedom of choice (voluntary participation and control of the sequence of events).

Key features of the enterprise gamified system design include co-design or participatory design with stakeholders at each stage of the design process and the development of a set of project values that frames the terms of reference for the project. This approach has its challenges (Manders-Huits and Zimmer 2009) but provides a tested, theoretically grounded basis that may help circumvent some of the value-destroying aspects of gamification features.

Simultaneously with increasing amount of the research on gamification implementation and effectiveness the amount of criticism towards the gamification is also rising (van Roy and Zaman, 2015; Fuchs, 2014).

Firstly, by implementing gamification, users are asked to start playing even in contexts where playing is culturally inappropriate. Deterding calls this effect of mandatory play `embarrassment` (Deterding 2014, p. 311). However, people might adapt their expectations of how to behave, transforming the existing culture into one of play and games. Furthermore, the

typical ‘trial & error` behavior of games may become a part of the culture of the society, and people may start to use this behavior in real life, which may cause problems in such sectors as healthcare or jurisdiction.

There is also some concern about transferability of the engagement of gameplay into gamified enterprise applications. Traditional games and play are based on voluntary participation to opt-in and opt-out (Llagostera, 2012); whereas gamification in the workplace raises an implicit or explicit obligation to play within the context that management is potentially watching and assessing employees at play in the system.

Another morally questionable feature of the enterprise gamification is extracting value from workforce through the shaping of emotions (Bogost, 2007, 2011; Dyer-Witherford and de Peuter 2009; Schell 2011), using persuasive technologies where human actions and behaviors are shaped and reinforced through technologies such as surveillance, conditioning and channelling. Gamification also possess a data privacy concern as it is not obviously clear whether it operates under full transparency, disclosure and permissions to minimize the potential for misuse of the information stored in the system.

Besides, competitiveness promoted in a sense of `zero-sum` game facilitates a more selfish-centered society and discourage admirable characteristics such as volunteer work or gratuitous help for people. What is more, the system provokes ‘system conform reactions’ and such technology may have a normative influence on the affected workforce, which raises issues on a reduction of capacity for divergent thinking for creative problem-solving and innovation if people are gathered into the behavioral presets of the persuasive technology (Kuka and Oswald, 2012).

Next concern is that most gamified systems rely on extrinsic motivational cues by rewarding activities with badges or by encouraging competition. Consequently, by replacing the existing higher order intrinsic motivation with its extrinsic counterpart, gamification can potentially harm highly motivated people (Hanus and Fox, 2015). Besides, in the case of removal of the gamification system and therefore also the corresponding extrinsic motivation there is a risk of disappearance of any motivation for the people.

Furthermore, if gamification becomes omnipresent, its utility becomes questionable. Some scholars argue that the positive effects of gamification can be caused by the `novelty effect`, and that it is temporal (Kovisto and Hamari, 2011). Therefore, the omnipresence of gamification can speed up this process, removing the initial excitement. In other words, gamification can provide temporal positive impact, but without meaningful workplace design, interactions and experiences at the core of the organization, longer term satisfaction and productivity will be diminished.

Besides, research has revealed that users who perform systematically worse that their `winning` counterparts, eventually will perform even worse performing because of complete demotivation due to inability to become competitive (Buser, 2014). This example shows that gamification can have negative effects on the worst performing and the least motivated.

The criticism toward gamification is summarized in the Table 1 with key controversial topics from popular media and available research. Each value creation topic has a corresponding value destruction theme, and overall gamification impact depends on the gamified system design choices.

Table 1. Enterprise gamification benefits and risks (Adopted from Raftopoulos, 2014).

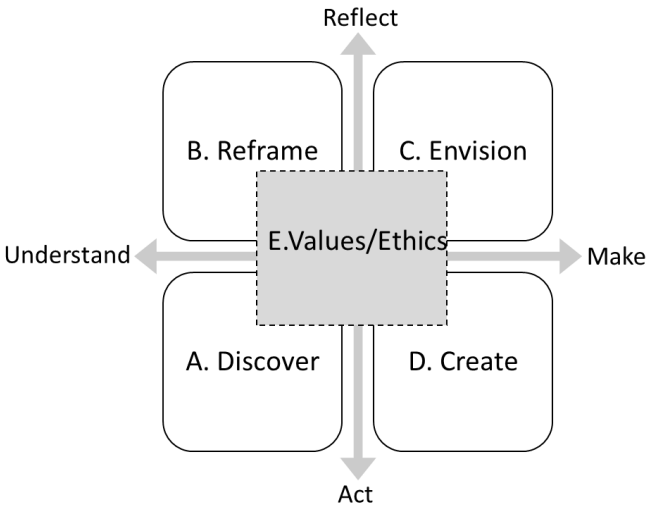
Value Creation Benefits	Value Destruction Risks
Engage and motivate employees	Coercive participation
Performance data analysis	Leaky container problem
Improve learning and collaboration	Technological whip
Shape behavior and performance	Homogenization of the workforce
Improve employee productivity	Loss of human agency
Workplace and process transformation	Illusion of change
Make work more fun	Shallow and inauthentic

To conclude with the criticism, it is necessary to highlight that enterprise gamification can destroy rather than create value if there is a lack of awareness or misinformation among managers or designers, a misuse of the technology, or an inability to effectively navigate a trade-off between short-term gains and long-term benefits, which requires a more considered and methodological approach. Therefore a sustainable enterprise gamification design framework is required in order to serve as a strategic management tool for stakeholders involved in the process of the design of the gamified system. The next section of the working paper is devoted to the theoretical foundations and practical tools to develop a sustainable enterprise gamified system.

Sustainable gamification design framework and game design thinking

Responsible applications of enterprise gamification need to be treated like any other strategic management tool when implemented in enterprise settings (Reeves and Read 2009; Werbach and Hunter 2012). As a constructive transformation of the gamification design, values-conscious design framework to ensure a more human-based and ethical approach was proposed by Raftopoulos (2014).

Figure 2. Sustainable gamification design model (Source: Raftopoulos, 2014)



This model outlines a four-step design framework that incorporates the phases of (1) Discover, (2) Reframe, (3) Envision and (4) Create, which is a structure that is not uncommon in design and design-thinking disciplines. In addition to this, the two axes of Understand/Make and Reflect/Act frame the nature of the activities that will be performed by gamification designers and stakeholders in each quadrant. An important and significant contribution of the model is the inclusion of a fifth element, (5) Values and Ethics frame, the purpose of which is to manage the potentially negative impacts of the 'value-destroying' elements of gamification. This framework is illustrated in Figure 2.

Sustainable gamification design model by Raftopoulos provides the guideline of how to design sustainable enterprise gamified system, however the model implementation involves

some degree of flexibility as gamification design is partly an art-from that requires creative thinking. Taking in mind the abovementioned framework, in the following section we describe the concrete steps of the enterprise gamified system design process.

Gamification design process could be considered as one particular application of the design thinking concept. The concept of 'design thinking' became a portal for the whole design area to contribute to innovation, and design thinking enabled innovation to supersede strategic management as a way to deal with a complex reality. Design as a strategic tool was first mentioned in 1984 (Kotler & Rath, 1984), but it was not until another 20 years later that there was any sustained discussion (cf., Fraser, 2007; Junginger, 2007; Martin, 2007a) with wicked problems (Camillus, 2008) and design thinking (Brown, 2009; Holloway, 2009).

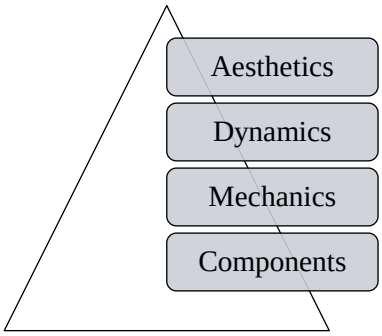
For the purposes of this paper, we have chosen a design thinking approach proposed by the design company IDEO (www.ideo.com). IDEO`s practical experience made it trustworthy, and its co-operation with Stanford University provided academic credentials, therefore this framework became a common starting point for design thinking application in the enterprises. IDEO claims that "Design thinking is a human-centered approach to innovation that draws from the designer's toolkit to integrate the needs of people, the possibilities of technology, and the requirements for business success."[1]

Therefore, taking in mind design thinking approach, the following gamification design framework has been chosen (Werbach and Hunter, 2012):

1. Define business objectives
2. Delineate target behaviors
3. Describe your players
4. Devise activity loops
5. Don`t forget the fun
6. Deploy the appropriate tools

In order to split game design process into step-by-step elements design, the game elements pyramid framework will be used (Werbach and Hunter, 2012). For the purpose of designing sustainable corporate gamified system part of another popular theoretical framework, called Mechanics-Dynamics-Aesthetics (MDA), will be used (see modified version of MDA on figure 3). MDA is developed by Robin Hunicke, Marc LeBlanc and Robert Zubek in 2001. Mechanics are the formal rules of the game that define how the game is prepared, what actions the players can take, the victory conditions, the rule enforcement mechanisms, etc. Dynamics describe how the rules act in motion, responding to player input and working in concert with other rules. Aesthetics describe the player's experience of the game; their enjoyment, frustration, discovery, fellowship, etc.

Figure 3. Gamification design framework



[1] http://www.ideo.com/about/

The Dynamics-Mechanics-Components pyramid framework provides a series of options while developing the structure of the game in a gamified system as well as provides a comprehensive picture of the game elements, from top to bottom, showing how abstract concepts are based on the basic bricks of the game components. In the next subsections the game elements are described in more details.

At the top of the game elements are game **dynamics**. These are the most abstract, conceptual elements of the game in the gamified system. Dynamics are the hidden structure of the game that has regular patterns and makes a game experience coherent. Dynamics are not the same as the rules, because it is an implicit structure providing a framing for the game. The following are the examples of the dynamics of the game:

- Constraints (restrictions put on the player)
- Emotions (sense of accomplishment, joy)
- Narrative (explicit – storyline of the game, or implicit, creating the sense of flow for the gamer)
- Progression (the notion of the player journey – idea of opportunity for the player move from the one place to another, explicit-levels, or implicit)
- Relationships (between players in the gamified system)

Mechanics are the elements of the game that move the game forward, to get players of the game to move from one state of the game to another. The following are examples of the mechanisms of the game: challenges, chance, competition, cooperation, feedback, resource acquisition (possibility to get resources), rewards, transactions (with other players or characters in the game), turns, win states.

Components are the most basic elements of the game, specific instantiations of mechanics and dynamics: achievements, avatars, badges (specific visual representations of achievements or other game dynamics), boss fights (difficult tasks to move to the next level), collections (assembling certain pieces), combat, content unlocking (getting an access to the content), gifting (altruism, giving to others), leaderboards (listing players on the order of their score), levels, points, quests (specific tasks within the structure of the game), social graph (seeing friends who are also players of the game), teams, virtual goods (virtual things for which players have a willingness to pay either with virtual currency or with a real money).

The PBL (points, badges, leaderboards) triad is one of the most popular elements of the gamified design because it may serve a variety of functions. Many corporate gamified systems for employees and customers use PBL as a useful element. Therefore the PBL will probably inbuilt in our treatment gamified system as well.

Points are implemented to keep score, to determine win states, connect to rewards, provide feedback, display the progress, to serve as a standardized unit in the game mechanics, and to provide the data for the game designer.

Badges are visual representations of achievements, besides badges are stylish and flexible instruments serving any purposes game design might have. Badges also function as signals of importance, credentials, status symbols, and can support collections mechanism.

Leaderboards are ranking mechanisms which provide feedback on competition. Frequently leaderboards are used not in absolute scale but relative to the friends of the individual (personalized leaderboards) encouraging to compete with the members of the individual`s social graph. However, there is a criticism toward leaderboards because they are too focused on the zero-sum competitiveness and may actually diminish motivation.

It is important to highlight that the game elements are important part of the game, but more important is how they are linked together creating engaging user experience.

Motivation to engage in the enterprise gamified system

An important step in the design of the corporate gamified system is to analyze potential users and identify the most powerful motivating factors for them. On the one hand, demographic data is a useful source of the information about users. On the other hand, psychographic data could provide game designer with the detailed psychological portrait of the potential user and her inner needs. This insight is valuable at the stage of the creation of the game dynamics (the general idea, sketch of the game).

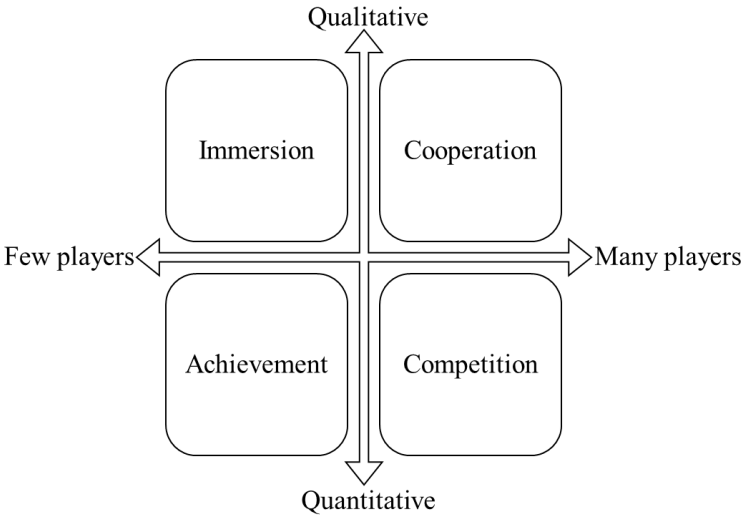
The procedure of potential players` analysis depends on whether the game is oriented towards the external audience (customers, potential and actual clients, corporate partners, specific social groups) or towards employees. For the former case, the marketing analytics data may actually serve as a starting point of the research. In the latter situation it is necessary to determine the types of employees at whom this enterprise gamified system is targeted. One of the research interests is to identify what underlying factors motivate the users in their daily work and innovative undertakings.

However, the most important task for the designer of the enterprise gamified system is to find out what motivates employees to engage in the developed gamification system. The challenge is that there is no universal template aligning all possible gamification applications with the users` portraits and underlying motivation. Game designer should determine employees` motivation in an iterative process, continually collecting and analyzing feedback from users and adjusting the game elements to this new information.

As a useful tool in this iterative process, a methodology of determining the users` engagement motivation has been proposed and tested in the literature. Quite commonly, Bartle`s players typology (Bartle, 1996) serves as a starting point. Richard Bartle came up with this model while studying one specific multiplayer online game, but his typology, frequently extended or reconfigured, is frequently used in a variety of game contexts. However, as some scholars, including Bartle himself, think that this typology would not work for other types of the game except Multi-User Dungeon (MUD). Clearly, this typology cannot be used as a guiding framework for categorizing players of the corporate gamified system, but it can serve as a valuable starting point of the research on motivational factors.

Some scholars have already rethought Bartle`s players types adjusting it for various context. For instance, Jon Radoff considers evolution of the players` motivation with the time (Radoff, 2011). Figure 4 represents the scheme of the Evolutionary Gameplay Motivations:

Figure 4. Evolutionary gameplay motivations



The Evolutionary Gameplay Motivations framework considers four layers of the game

motivating behaviors: achievement, cooperation, competition, and immersion. Immersion starts with the storytelling and provides long-term engagement of the users in the experience of play.

Another researcher of game design, Nicholas Yee, also argues for developing "motivation facets" instead of categorizing players basing on their behavior. Based on the survey of 6700 players of several MMORPG, and taking as a starting point the Bartle`s player types, he identified five distinct motivational facets (Yee, 2002): relationship, immersion, grief, achievement, leadership.

These results as well as the methodology used by the author are valuable for the purpose of our research, because of the lack of any empirical testing of identifying players` types in Russia. We will use the methodological approach to test what motivational factors are most likely to explain the users` engagement in the enterprise gamified system in Russia.

To conclude this section, there is stream of research on the aligning gamification mechanics with the personality types of the employees in the corporate environment. For example, Charles Butler develops a methodology of pairing personality types (based on the Myers-Briggs Type Indicator) with the gamification techniques (Butler, 2014). However, there is lack of research on motivational factors behind the users` engagement in enterprise gamified systems. Therefore, our research may fill this gap by using the abovementioned methodology.

Field experiment approach

Our research aims to provide organizations with methodological support in fostering their innovation capacity. We assume that there is no one-fit-all solution; therefore, it is important to develop a managerial tool that could help organizations to match offered methodology with their needs and limitations. This is a two-step tool: the first step consists of assessment and investigation of the current state and needs; the second step includes empirical test of the designed approach.

The results of data source analysis introduced in previous chapters together with defined innovation model (Figure 1) allow us to formulate the following main hypotheses:

H1. Innovative Work Behaviour positively influences Innovation Capacity of a firm.

H2. Employees' Engagement positively affects Innovative Work Behaviour.

H3. Employees' Engagement is positively influenced by Perceived Organizational Support.

H4. Sustainable enterprise gamified system positively influences Perceived Organizational Support.

As our research goal relates to the understanding the complex interaction processes that are embedded in time, we choose a field experiment approach as it fits well to it. We propose to follow the field-experimental methodology developed by Harrison and List (2004), Levitt and List (2009), and List and Rasul (2010).

Field experiment offers important advantages for empirical studies. First, it provides with a unique source of empirical evidence. Second, field experiment allows addressing the economic question immediately, without waiting for a natural event, and finally natural experiment offers economists to improve connection from economic theory and empirical evidence to the real world, as the research is deep in contextual understanding of real issues and institutions (List, 2014).

Figure 5. A field experiment bridge (Source: List, 2014).

Controlled Data			Naturally-Occurring Data	
Lab	AFE	FFE	NFE	NE, PSM, IV, STR

- Lab: Lab experiment
- AFE: Artifectual field experiment
- FFE: Framed field experiment
- NFE: Natural field experiment
- NE: Natural experiment
- PSM: Propensity score estimation
- IV: Instrument variables estimation
- STR: Structural modeling

List argues that traditional approach to empirical studies has to be changed. Figure 5 represents some of the popular empirical models that scholars use to analyze natural occurring data. On the left side of the axes, there is the laboratory experiment, the oldest type of experiment. In 2002 Vernon Smith gained the Nobel Prize for his pioneer works on the laboratory approach. Since that time, thousands of laboratory studies have been published in economic journals. The laboratory experiments supposes that researcher recruits subject to a common location where the experiment takes place and all the variables are investigated within controlled environment (Margretts, 2011). The distinctive feature of the controlled data condition is the absence of counterfactual, as the researcher stays out of the process. Experiments in contrary provide a convincing method of creating the counterfactual because they directly construct a control group via randomization (List, 2014). Randomization is a key instrument of experiment as it creates variation in treatment among participants, acting as an instrumental variable. Moreover, because of this effect randomization allows to make causal statements, moving beyond correlation.

The "artificial" experiment (AFE) differs from the laboratory one by using "nonstandard" subjects. Unlike in laboratory experiment, where subjects are usually students, in "artificial" experiment they subjects are real people from the market. Speaking of other features, this experiment is the same as the laboratory experiment. Next type of experiments is framed field experiment, which differs from AFE by framing the field context in the commodity, task, information etc. Finally, natural field experiment (NFE) occurs in the environment where the subjects naturally undertake tasks and they do not know that they participate in the experiment.

We would like to stress some advantages of natural field experiment. First, this approach combines the most attractive elements of the experimental method: randomizing and realism (List, 2014). Also it tackles the selection problem which is not often discussed within other types of experiment (List, 2011). These advantages allow us to make the conclusion that experimental approach provides internal validity in contrast to observational or field research (Margretts, 2011).

However, the risk of the natural field experiment is that the researcher has little control over factors influencing the subjects. Furthermore, the applicability of field experiment for a company is limited by availability of obtaining theoretical sampling (Patton, 2002). Thus, purposive sampling should provide reasonable randomization with consistent number of treatment groups and sufficient control group, ideally with a number of over 150 branches or teams. Moreover, company should apply diverse HCM sets based on employees' role in the company's strategy, as it often happens in multinational companies. We need to randomize the sample in order to diminish regression-to-the-mean effect, and omitted variable bias. Therefore, the treatment and control groups should be balanced in number and key characteristics.

Following the selected methodology, observation of working processes should happen in a controlled work environment and workers should not be aware of being part of a field experiment. It leads to a necessity of embodiment of novel approach leading to expected treatment effect into existing processes. Therefore, it is beneficial if the company already has corporate social network (CSN) that covers all the branches. CSN in this case will be the main instrument of delivering gamification to employees. The gamification design should be applied only for treatment groups; in other branches (teams) nothing should be changed.

Planned time for the experiment is four months, for this time, we assume that it is possible to observe how gamification affects the mismatch between formal supportive environment and real supportive environment. Thus, gamification appears as a moderator in innovation process as it is shown in our theoretical model on figure 1.

Recent research based on a case study of Russian telecommunication company (Gibbs et al., 2015) showed that enterprise social media implementation increases cross-boundary communication across hierarchical and geographical boundaries. However, link between increasing engagement achieved by social media (most likely a platform for our gamified system) and innovation capacity remained unproven. Still, we use the research by Gibbs (2015) as a guideline in terms of timeline associated with enterprise gamified system introduction.

In order to implement Difference in Difference estimator, it is necessary that all observable variables (POS, EE, IWB, Innovation capacity) should be measured in all branches before and after the treatment. For research purposes, existing in company metrics could be applied, and new tools could be used only for missing estimations. In measuring POS, EE, IWB we propose to rely on employees' perception. Following other research, we consider that caution about possible misleading interpretations of results due to common method bias is not relevant, as employees have more information about their work routines (Janssen, 2000), own innovative intentions and outcomes (Shalley et al, 2009). Evaluation of Innovation Capacity will be provided by the project champion. The role of project champion is to provide support in collecting data and organizing access to needed resources. Such champion could be a member of Quality management, R&D, marketing, production, IT or HR department, based on initial goals for increasing innovation capacity.

For *POS* measurement we propose to use a standard 36-item Survey of Perceived Organizational Support (Eisen-berger, Huntington, Hutchison, and Sowa, 1986). This scale is empirically tested and approved by many researchers in the fields of psychology and management, as it has various advantages including unidimensionality and high internal reliability (Rhoades and Eisenberger, 2002).

The state of *employee engagement* was first defined by Kahn (1990) as "the simultaneous employment and expression of a person's 'preferred self' in task behaviors that promote connections to work and to others, personal presence (physical, cognitive, and emotional) and active, full performances" (p. 700). Currently, there are several perspectives from which to frame employee engagement as well as operationalize what engagement might be (Albrecht, 2010; Harter et al., 2002; Maslach et al., 2001; Saks, 2006; Shuck, 2011; Valentin, 2014). Furthermore, recent research has called for increasing empirical exploration of Kahn's (1990) multidimensional framework especially when examining variables related to the dimensions of well-being (Cole, Walter, Bedeian, & O'Boyle, 2011; Rich et al., 2010; Shuck et al., 2011). In response to this call we advise to use the 18-item Job Engagement Scale (JES; Rich et al., 2010). The JES is a three-factor scale (cognitive, emotional, and physical engagement) with separate scales for each factor.

The seminal measure of *IWB* was developed by Scott and Bruce (1994). They developed a one dimensional six-item scale covering idea generation, coalition building and idea realization, but they did not attempt to empirically separate these dimensions. Since then, others operationalized IWB with similar, one dimensional measures with limited items (e.g.,

Bunce & West, 1995; Spreitzer, 1995; Basu & Green, 1997; Scott & Bruce, 1998). However, there is a stream of theory suggesting that IWB may in fact be multidimensional (Janssen, 2000; Kleysen and Street, 2001; Krause, 2004; Dorenbosch, van Engen and Verhagen, 2005). Adopting the latter approach, we propose to apply a scale developed by Jeroen de Jong and Deanne den Hartog in 2010 for measuring IWB, as it is applicable in different contexts, especially when innovative efforts are needed from all employees. We also advise to add to this scale a measurement of employees` creativity as psychological capability to generate and exploit new knowledge. In case of absence of the established corporate tool for measuring employees` creativity, we propose to utilize Consensual Assessment Technique (Amabile, 1982). The reasons behind this choice are the following: CAT has been well validated; it is used widely in creativity research; CAT measures actual creative performance instead of skills or traits that are hypothesized to be part of creative thinking or performance.

For *Innovation Capacity* in case of absence of own metrics we advise to use Key Performance Indicators offered by Hansen and Birkinshaw (2007), e.g. number of high-quality ideas generated within the unit; percentage of all ideas generated that end up being selected and funded. Numerical approach to data leads to more objective results. There is a possibility of subjective estimation of the ideas. The possible solution is expert's assessment by developed algorithm.

Control variables. We consider work experience, age, gender, level of position and job function as control variables.

Several drawbacks might occur during the experiment:

•Negative treatment effect because of unexpected direction of the gamification effect. In order to deal with it we advise to continuously track activity of employees in CSN (e.g., on weekly basis).

• Spillover effects within the network, as the innovative ideas can be transferred from one branch to another without traced gamification effect. To control for this, we propose to include open question to the final survey about influence of employees from other branches on IWB.

Conclusion

The ultimate goal of our research was to create a methodological tool for the companies, which would adjust fostering innovation strategies to their peculiarities and specific circumstances. To reach this goal, we defined the following tasks: (1) to specify the model of innovation; (2) to offer a practical solution of aligning enterprise gamified system to the needs and peculiarities of an organization; (3) to explore a method of field experiment for testing the suitability of a specified theoretical model and selected enterprise gamified system design.

Based on thorough literature review we developed the Innovation model (Figure 1). Furthermore, we found two ways of increasing innovation capacity with the employees' support (IWB).

The first solution is by ensuring excellence in innovation specific skills and applying techniques for generating and exploration of creative ideas. This solution is oriented on a long-term outcome and might not be observable within the short time. That is why we developed second solution oriented on a short-term outcome and implemented through the field experiment approach. We propose to gamify employees' working experience focusing their attention on innovation. It will improve perceived organizational support and thus the employees` engagement.

Gamification can create seductive experiences (Khaslavsky and Shedroff 1999), be persuasive (Llagostera 2012), and fun (Mollick and Rothbard 2014), and therefore produce improved levels and quality of staff engagement with enterprise systems for at least a short peri-

od of time. However, used inappropriately, gamification can backfire and destroy value. Therefore, we will use theoretically based approach to the gamified system design. Firstly, the enterprise gamified system design will be based on the sustainable gamification framework providing us with a strategic management perspective. Secondly, we adopt two game elements frameworks, namely Mechanics-Dynamics-Aesthetics (MDA) and the game elements pyramid (Werbach and Hunter, 2012) to serve as a canvas during gamification design process. Thirdly, we will use methodology proposed by Yee (2002) to identify which internal factors actually motivate employees to engage in the developed gamified system.

At the macro level, there is an implicit social design of workplaces, and all technological development in terms of systems and software design reinforces this meta social design, reproduce rather that change status quo (Llagostera, 2012; Raftopoulos, 2014). These are pre-existing social constructs and most gamification applications work within these boundaries conflicting with the notion that games can change the way we construct the real world (McGonigal, 2011). Therefore, existing limitations and opportunities determined by HCM approach are discovered and highlighted.

Furthermore, the process of enterprise gamified system design is described and justified by the available research. Employing the proposed approach we anticipate minimization of potential risks associated with the enterprise gamification implementation.

Field experiment approach will help to insure that designed sustainable enterprise gamified system suites company's peculiarities and restrictions and leads to increase of innovation capacity.

This working paper is a first step in a longtime research process requiring empirical investigation. Besides, as for the further possible research directions, we think of the following:

- Studies of field experiments related to innovation capacity, bringing new perspective on innovation management within a short-term time frame;
- Aligning gamification mechanics with the personality types of the employees in the corporate environment and existing HCM limitations and opportunities;
- Research of opportunities Corporate Social Networks bring to corporate competitive advantage through rising level of innovation.

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