GAMIFICATION OF WAREHOUSING ACTIVITIES: EXPLORING PERSPECTIVES OF WAREHOUSE MANAGERS IN THE UK

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Introduction

Today's warehouses experience a continuous competition which has soared pressure on warehouse management to improve efficiency and productivity (Richards, 2011). Due to continuous developments of new trends warehousing and distribution operations should adapt to the emerging trends and growing needs of the customers for error free and world-class service (Frazelle, 2002). According to Keller and Keller (2014), the warehouse is as good as its personnel and warehouse managers need to consider factors increasing employees' motivation. Recently gamification has emerged as a way to re-design work processes and improve employees' engagement (Korn and Schmidt, 2015).

Following this introduction, the authors' literature review provides an overview of the warehousing challenges and motivational techniques used to encourage productivity. Then gamification benefits, challenges and applications are discussed. Afterwards the rational of the current study is explained and the authors' specific objectives are set out. Next, the methodology employed by the authors is described. Then authors discuss the key messages from the research highlighting some of the main limitations and contributions of the paper.

Literature review
Warehousing

Warehouses are considered a key part of the supply chain (Gu et al., 2007) and operations within warehouses are concerned with the flow of materials, these are: receiving, put-away, storage, order picking, and dispatching/shipping. Among these activities, order picking is the most labour-intensive and costly process at approximately 60% of total labour activities (Drury et al., 1988; Gamberini et al., 2012) and constitutes approximately 55% of the total operating expenses (Roodbergen, 2001; Frazelle, 2002; Richards, 2011). Warehouse managers are under constant pressure to minimise cost and time, reduce spoilage and increase efficiency (Frazelle, 2002), consider environmental impact (McKinnon et al., 2015; Fichtinger et al., 2015; Ries et al., 2017; Konur et al., 2017), manage warehouse space and layout (Vrysagotis and Kontis, 2011; Cheung et al., 2009; Zupan et al., 2017), meet customer expectations (Madurapperuma et al., 2018), and efficiently manage warehouse personnel (Keller and Keller, 2014; Kim et al., 2018).

According to Keller and Keller (2014), the warehouse is as good as its personnel and warehouse managers need to consider factors affecting employees' motivation: achievement, recognition, growth, payment, feedback, rewards, and empowerment (Emmett, 2005; Tella et al., 2007; Kamalian et al., 2010; Manzoor, 2011; Capobianco, 2014). Increased motivation can increase performance and more recently gamification emerged as a new way to improve worker's morale and engagement.

Gamification

Gamification can be defined as "the presence or addition of game-like characteristics in anything that has not been traditionally considered a game" (Harris and O'Gorman, 2014). "Use of game design elements in a non-game context" (Deterding et al., 2011) improves productivity and performance by way of provoking basic human desires (Burke, 2014; de-Marcos et al., 2014; Hamari, 2013; Papastergiou, 2009).

Typical elements of a gamified activity include (Dale, 2014; Korn and Schmidt, 2015; Kapp, 2012; Zichermann and Cunningham, 2011; Cardador et al., 2017):

- Points – distributed to players for high-value achievements or behaviours
- Achievements – provide satisfaction for high-value user behaviour
- Levels – highlight the level of engagement of each player and reinforce them for new challenges
- Missions – are sets of behaviours which enable players to get specific rewards
- Contests – specific rewards for players who finish effectively and quickly
- Leader board – increase competition by posting the rankings
- Notifications – encourage players towards the desired action

Gamification of business activities has positive impact on employees by improved engagement, increased morale, faster learning and skills development, increased productivity, competition, and performance tracking (Narayanan, 2014; Dale, 2014; Marczewski, 2013; Burke, 2014). By providing levels, badges or other types of rewards and gaming elements companies can actuate the employee's interest and engage them on a personal level (Warnlof, 2014).

There are also number of challenges facing gamification. Firstly, implementing gamification is a complicated business process, which requires significant planning, and consumes time and resources for a proper implementation (Harris and O'Gorman, 2014). Furthermore, the fact that individual players vary, challenges designers to understand that variability (Robson et al., 2015). For example, a part of players can be more interested in the social aspect of the gamified experience in order to learn more and interact with others, while another part of players may be more competitive and thinking more about personal growth and achievement. People differ from each other so designers should consider possible behaviour before developing the mechanics of the gamified process (Werbach and Hunter, 2015). Next, studies indicate that the result of gamification may not keep players motivated for a long time (Farzan et al., 2008; Hamari, 2013) which requires to constantly changing the mechanism of the gamified experience to keep players motivated. Lastly, creating a competitive environment to increase engagement and motivation has some ethical implications as bluffing and cheating can emerge (Jiang, 2011; Eyal, 2014).

While gamification was successfully implemented at office-based type of jobs at Freshdesk (Robson et al., 2016), DevHub (Kuo, 2015; Dale, 2014), Microsoft (Narayanan, 2014; Smith et al., 2015) and Deloitte (Dale, 2014; Meister, 2013) there appears to be no attempts or reports on implementing gamification within the warehousing context. Warehouse consultants Manhattan Associates state that "we are still in the early stages of seeing gamification elements [embedded] in labour management systems, but it holds great promise as a tool to help revolutionize the warehouse workforce" (Schnorbach, 2015). As such, this indicates a gap within the body of knowledge, which this work aims to, at least partially, fill.

Development of research objectives

To gain some insights on gamification of warehousing activities, the authors conducted interviews with warehouse managers working in the UK. This approach adopts the lesson of Geertz (1973, p.5) who stated that "if you want to understand what a science is, you should look in the first instance not at its theories or its findings ...you should look at what the practitioners do". Based on the above the specific objectives of this research study are:

1. Explore perspectives of warehouse managers on gamification of warehousing activities, with the research questions focus on its applicability (RQ1), potential benefits (RQ2) and obstacles (RQ3).
2. To compare practitioner perspectives with the body of academic knowledge;

Methodology
Data collection
The interview sample comprised of eight managers, eight warehouse managers and one head of logistics. Seeking insight into research questions from practitioners with knowledge and experience relevant to the study mirrors the approach used by Lummus et al. (2001) and justifies a relatively low number of participants (García-Álvarez de Perea, et al., 2019). Table 1 presents some of the interviewees' characteristics.

Code	Position	Years of experience	Goods/services orientation	Company presence
WM1	Warehouse Manager	4 years	Warehouse solutions	UK
HL1	Head of Logistics	10 years	Consumer goods	Global
WM2	Warehouse Manager	13 years	Consumer goods	Global
WM3	Warehouse and Logistics Manager	24 years	Grocery stores	UK
WM4	Warehouse and Logistics Manager	13 years	Manufacturing and production solutions	UK
WM5	Warehouse Manager	12 years	Logistics services	Global
WM6	Warehouse Manager	27 years	Consumer goods	Global
WM7	Warehouse Manager	13 years	Furniture	UK

Table 1: Interviewees' characteristics

This sample of companies handles a wide variety of product groups thus enabling the authors to generate a breadth of perspectives. Individual respondents were in senior positions with responsibilities for warehouse management. Each person was sent an indication of topics that will be discussed to consider for their upcoming interview. The research then involved carrying out focussed (i.e. semi-structured) interviews with each respondent. Interviews were recorded and transcribed.

Data analysis
Regarding interview transcript analysis, Easterby-Smith et al. (2008) describe two approaches: content analysis and grounded analysis. The overall approach in this study involved a combination of both methods, thus integrating their strengths and mitigating their shortcomings. The transcript analysis employed by the authors (as shown in Figure 1) involved four main stages in distilling the raw transcript data into information that was analysed based on comparing and contrasting the main issues set out by respondents.
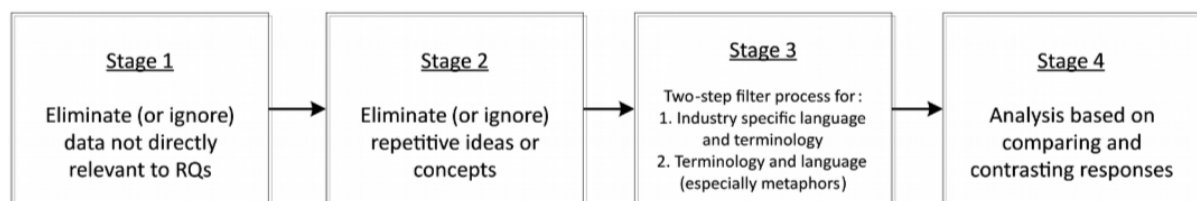

Figure 1: Transcript Analysis Process

Discussion of results
RQ1: Applicability of gamification in warehousing
Majority of warehouse managers support a view that order-picking is the most labour-intensive and costly activity (HL1, WM2, WM3, WM4, WM6 and WM7), which corroborates with academic literature (Frazelle, 2002; Coyle et al., 2002; Tompkins et al., 2010; Richards, 2011; Van Den Berg, 2012; Gamberini et al., 2012). However, WM1 pointed out that quality control is the most labour-intensive and costly activity in his business, as a bad quality product can lead to dissatisfied customers and

negative reviews disseminated online. Furthermore, for WM5 it is the training of the employees that is most costly and labour intensive due to high forklift and crane training costs and additional health and safety precautions during the training sessions. The most monotonous and boring warehouse activities for personnel were order-picking (HL1, WM2, WM3, WM4 and WM5), loading of trucks (WM7), crane driving (WM6) and quality control (WM1). In these activities workers usually perform the same movements and tasks with a little variety and decline in work performance is directly linked with people's motivation (Emmett, 2005). All managers indicated that money and rewards were crucial motivational factors for their employees (Tella et al., 2007). As such, all interviewees highlighted that warehousing activities often considered mundane, would be applicable for gamification.

Gamification can increase employees' productivity, engagement and morale (Narayanan, 2014; Dale, 2014; Marczewski, 2013; Burke, 2014) and this was a perception of majority of interviewed warehouse managers (WM1, HL1, WM3, WM4 and WM5). Managers WM5 and WM7 stated that gamification may be a way to develop "a fun environment" which will boost morale of employees and create a healthy competitive environment (WM1, HL1, and WM2). Manager WM5 even speculated that having motivated and more engaged employees can increase the accuracy of any given task. However, WM6 warned that workers would not like to be ranked and identified on a leader board, as he has tried a similar tactic in the past and workers protested against it, which corroborates with findings in Robson et al (2015). While all managers agreed that gamification may be applicable to warehousing environment, they were cautious about potential benefits (RQ2) and envisaged several implementation obstacles (RQ3).

RQ2: Gamification benefits
Gamification benefits potentially achieved in business environment include increased employee productivity, increased engagement and morale, competitive environment, easier performance tracking, better feedback, skills development and employee learning (Narayanan, 2014; Dale, 2014; Marczewski, 2013; Burke, 2014). This corroborates with responses from warehouse managers, who speculated that main benefits of gamification will be in increased productivity and morale (WM1, HL1, WM3, WM4 and WM5). A fun environment to work in (WM5 and WM7) and a healthy competition between employees (WM1, HL1 and WM2) could lead to achieving these benefits. Interestingly, interviewees were much more interested in discussing potential obstacles (RQ3).

RQ3: Gamification obstacles
Gamification literature enumerates a number of challenges and obstacles such as tolerance with time, ethical implications, resources and differentiation of players (Harris and O'Gorman, 2014; Robson et al., 2015; Werbach and Hunter, 2015; Farzan et al., 2008; Hamari, 2013; Jiang, 2011; Eyal, 2014) and interviewed warehouse manager also shared these concerns.

Managers WM1, WM2 and WM7 stated that strict budget limitations will certainly be difficult to overcome. A successful gamification needs intensive planning, time and resources to be well designed and implemented (Harris and O'Gorman, 2014) and managers predicted that implementing it will not be a priority within their limited budgets.

Another obstacle mentioned by WM1, WM2 and HL1 is the tolerance of gamification with the time, which means that as employees–players fulfil their needs of satisfaction, the incentive reduces its impact and no longer motivates the staff. This view corroborates with literature indicating that gamification may not keep players motivated for a long time (Farzan et al., 2008; Hamari, 2013).

Ethics surrounding gamification are a serious challenge to its application in warehousing and managers WM1, WM2, WM3 and WM5 noted a number of ethical concerns related to employee behaviour: cheating, neglecting health and safety procedures, risk-taking, and other unethical actions to quickly get to the top of a leader board. Issues of bluffing and cheating, which may occur when gamification

is applied within a business context were highlighted by Jiang, (2011) and Eyal (2014). Additionally, WM1 mentioned that the gamification system must be fair for all employees. For instance, in order picking, pickers should have the same routes to traverse at the same level of difficulty and it is not fair if one picker picks only heavy items at the back of the warehouse and the other only picks small items on the eye level racks at the front of the warehouse.

Furthermore, manager WM3 stated that while gamification can "positively affect the social life of workers while they feel that being valued for what they offer to the warehouse" it can also have a negative effect on underperforming workers. As such, it was suggested that any gamification system should be designed in a way that takes employees wellbeing and mental health into an account (Johnson et al., 2016).

Lastly, all managers indicated that while gamification may be achievable at state-of-the-art warehouses with very good IT systems it will not be suitable for low-tech operations, which hints at a digital divide between operators in a logistics sector (Evangelista et al, 2013).

Research limitations and future work
In reflecting on the validity and reliability of this research, the four qualitative criteria recommended by Lincoln and Guba (1985) have been adopted – credibility, transferability, dependability and confirmability. The credibility criterion involves establishing that the results of qualitative research are credible from the perspective of the participants in the research. Whilst there is room for improvement in this area in the research described in this paper, this issue was addressed to some extent by inviting interviewees to comment on summaries of the research findings. The small sample used in the current research is not intended to be definitive and transferability is difficult. However, use of the focussed interview methodology enabled some potentially useful contributions to be developed inductively. The process of relating the empirical findings back to the literature helped in this regard. The next stage of the work is to empirically test these findings using a larger survey of warehouse managers with a view to implement a gamification of warehousing activities. Dependability emphasizes the need for the researcher to account for the changing context within which research occurs. In this regard, the authors fully documented the whole focused interview process, from design through to analysis and feedback. Confirmability refers to the degree to which the results could be confirmed by others. Future work should build on the findings of this research using a combined inductive/deductive approach based on methodological triangulation.

Conclusions
The first objective of the research described in this paper was to explore perspectives and gain insights on gamification of warehousing activities, with the focus on its applicability, potential benefits and obstacles. To this end, the views of warehouse managers have been solicited through a series of focussed interviews. The findings suggest that gamification is applicable in the warehousing context with potential benefits such as improved worker engagement, increased morale and productivity, enforced competition, increased accuracy, and skills development. However, there are also limitations, for instance limited resources, game tolerance with time, intense planning required, ethical implications, and ensuring fairness for all players. These findings provide some insights into the second objective of this piece of research and open up some potentially fruitful avenues for future research.

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