

## **FUN AND GAME THEORY AS MOTIVATION IN WASTE SORTING PROCESS AT AN INDIVIDUAL LEVEL**

**Ieva Kolosova**<sup>1</sup>, Mg.sc.env.

<sup>1</sup>Liepaja University (Latvia)

**Abstract.** One of the key aspects in the development of a sustainable waste system is respect towards the principles of a circular economy. Despite its complexity, the essential and crucial role in the waste management process is that of an individual. Residents of Latvia face several challenges in the recycling process – lack of infrastructure, knowledge and individual motivation to sort the waste for the common good. European Union has set ambitious goals in regard to waste reduction. If the situation in Latvia does not rapidly improve, it will not achieve these goals. This paper proposes the game theory and a positive been conducted encouragement approach to help improve the situation. A literature review of established theories has and results in a proposal of an informal approach – fun theory. The final section offers a brief overview of four different research studies about waste recycling and individual motivation toward it. A range of theories and motivational aspects related to the problem have been considered and theoretical grounds laid for further and practical research, namely, a unified collection of information in a format of a household waste themed game that could be tested by employing a sample of a Latvian population.

**Keywords:** waste management, green education, motivation for social causes, game theory.

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### **Introduction**

Due to the global increase of consumerist lifestyle, individuals tend to spend more resources on achieving a better lifestyle by buying more goods, which results in simultaneously producing more waste (Reusswig, Lotze-Campen & Gerlinger 2013). Even the remaining global poverty is not an obstacle for an increasing amount of waste generated by individuals and societies. Waste management is an important public health and wellbeing requirement regulated by the law in each country. Regardless of the country, proper implementation of the waste legislation will speed up the transition to a circular economy.

Every individual has a crucial role in waste management and their involvement in policy development and implementation to ensure compliance with waste legislation. Despite the legislative framework and complexity of waste management process, the daily sorting and collection depends on individual's understanding, education, resources and motivation to comply with local recycling guidelines. This is a crucial element that is often overlooked, however it has to be emphasized that daily domestic waste sorting on individual level is an essential link in the chain of waste management that changes the whole system. For example: is the empty milk carton dried before it is put in the paper recycling bin? If not, will this carton impact the contents of the paper recycling bin and their suitability for further recycling?

This paper will examine what kind of motivation impacts individuals' choices to act in certain ways and whether it would be possible to trigger the natural instinct of curiosity to learn and explore. In other words, whether game theory (academically recognized) or fun theory (globally practiced for social issues but not fully academically explored) could be applied as a tool for educating and encouraging more inhabitants of Latvia to practice a complex issue such as waste sorting. To conclude, the final chapter briefly examines four existing research studies evaluating what triggers inhabitants of Latvia to recycle.

**Problem** - waste sorting in Latvia requires extra knowledge and effort due to the unclear system complicating the recycling process. Waste management process is not developing at the level and speed required by the EU legislation and may result in sanctions from the EU Commission. Not enough direct efforts have been dedicated to one-to-one teaching of Latvian residents besides public informative campaigns.

**Purpose** - develop an interactive, educational game with unified information about waste collection and recycling system in order to motivate and educate Latvian residents about improving domestic waste sorting.

**Objective of the study** – to promote a unified information package in a format of an attractive game about the waste collection system in Latvia to simplify the waste management system for the population and to ensure the return of resources with higher added value to the economy.

**The object of the research** - household waste management system and individual motivation towards it.

**Subject of research** - unified collection of information in a format of a household waste game.

### **1. Individual's motivation regarding daily waste management**

Over the last two decades the municipal waste management in Europe and Latvia has evolved from disposal methods to a greater focus on waste prevention and recycling. The idea is to improve sorting and aim towards more circular economy, this being the key to extracting more value from resources while reducing the pressures on the environment. Despite the efforts and while progress has been made, household waste is still very inefficiently managed (European Environmental Agency, 2015). This matter is a complex issue that consists of many players: starting from the national law, infrastructure, municipality price policy, available information, and ending with individual level, such as: available space at home for waste sorting, understanding the process and motivation to do it. In this paper it has been assumed that external obstacles (such as state law and available infrastructure) can be changed in the long term by top-down players and require an outside force from above, i.e., national law or regulations. Therefore, this paper focuses on the individual level: is there a way to motivate and educate a regular person by simple means, based on common sense and naturally aroused interest?

When considering human motivation from a physiological perspective, it has been defined as an internal process, which in its essence leads to a persistent goal-directed behaviour (Reeve, 2015). This idea explores why humans, or animals for that matter, engage in certain behaviours and execute particular actions (Kazdin, 2000). It has been assumed that motivation has also been equated with the driving force to provide purpose or direction to human behaviours, which operate at a conscious and subconscious level. Furthermore, a lack of motivation can give rise to a lack of driving power required to complete a certain task and simultaneously – the drive of motivation will lead a way towards completing the chosen activity. The logical question arises: what are the factors that drive the motivation? Psychologists have identified two fundamentally different types of motivation that appear within an individual – intrinsic and extrinsic motivation (Tranquillo and Stecker, 2016). The distinction between these two approaches lies in the notion that intrinsic motivation comes from within the individual, for example, when a person experiences interest, curiosity, satisfaction, enjoyment, self-expression, and similar emotions. Differences are mostly considered for work environment, but do not exclude daily situations. The opposite - extrinsic motivation - is observed when the purpose of an activity is to obtain values such as money, prestige, promotion or further prospects. Furthermore, the theory states that a person is extrinsically motivated if they engage in an activity to avoid negative consequences.

To sum it up, in the context of motivation, the solution in waste sorting process at an individual level can be targeted at extrinsic motivation values, but the best results will be achieved if the proposed solution (game/curiosity approach) considers the intrinsic level of motivation, because then it might give better and more lasting results. The realm of a person's motivation who enjoys his/her doing and sees it as internally rewarding, for example, by providing them an opportunity to explore, learn and actualize their potential, is deemed to be intrinsically motivated. This approach goes hand in hand with the objective of the study –

to find a naturally flowing behavioural trigger that might motivate an individual to learn more about waste management and recycling, and to engage in a process.

## **2. Game theory for solving social dilemmas**

Solving a social dilemma is a topic that can be broadly applied, but at the same time has barely been studied, mostly due to its complexity (Komorita & Parks, 2019). The question asked by psychologists who study the discipline is the same that any law maker would ask: "How can we encourage people to be more cooperative?". Before looking into answers that the game or fun theories can provide, it is necessary to emphasize that most of the conflicts in social dilemmas arise from individuals' motivation to maximize personal interest versus the motive to maximize collective interests. To apply this notion to waste sorting process, a question can be posed this way: "Is my effort to rinse the glass juice bottle worth the trouble and will the environment really get cleaner because of my action?" Considering that rinsing the bottle requires resources such as individual effort, water that an individual will have to pay for, space for separating the waste, and time to deliver it to the right location; is there enough feedback and collective information provided to confirm that the prepared waste will be recycled further and not end up in common landfill? In terms of waste sorting process, the latter can be translated into the individual's dilemma – personal motivation towards versus societal motivation and environmental interests.

Although complex social issues such as waste management are most commonly solved by means of law regulation, this paper experiments with a research question: is it possible to apply softer and more enjoyable methods, such as game and fun theories? Game theory has been applied and explained in several disciplines and in its essence, it is a decision-making theory focussed on interactive decisions, examining a process when and if choices of two or more participants affect the result. "Strategic reasoning amounts to deciding how to act to achieve a desired objective, taking into account how others will act and the fact that they will also reason strategically." (Colman and Krockow, 2017). The basic elements of the proposed approach are players (decision makers – in our case: law makers, waste collectors and most importantly – common individuals), strategies (alternatives among which each player chooses – and here the variations are many) and payoffs (numerical representations of the players' preferences among the possible outcomes of the game – including personal gains, satisfactions and furthermore – monetary savings or spending). A side branch of this theory is behaviour game theory – explaining "how people actually make strategic decisions by incorporating social utility, limited iterated reasoning, and learning" (Golman, 2020). The idea deserves a closer look if fairness in goal-oriented games comes from intuitive or rather calculated responses and actions. Many members of society tend to incur costs to uphold norms of fairness, from promoting efficiency or equity to punishing those who violate these obligations – especially in the context of this paper – waste management. This more "negative" or rather concerned direction of the theory offers many case studies and theories like the theory of blame games (Hinterleitner, 2020). However, the focus of this study is to find a positive and encouraging approach, considering the challenges involved, such as "untested assumptions about the nature of fun, its desirability and usefulness to work environment" (Owler, Morrison & Pleseter, 2015). An extensive survey of 20 European countries measured well-being and productivity (by life satisfaction and the total factor of productivity) and found that happiness and satisfaction generate significant productivity gains. As explained by DiMaria, Peroni & Sarracino (2019), the outcome emphasizes the result of a positive correlation between assumptions: if the interests and desires have been met, the benefit will be not only at individual level but will increase the overall economic performance and therefore general productivity will increase. This notion might sound like common sense, but this global truth has often been overlooked in everyday working environment.

From this chapter it is possible to conclude that personal preferences and motivation for productivity are important, nevertheless elements such as gamification, fun and pleasure should not be overlooked.

### **3. Exploring theory of fun**

In 2010 one of the giants of the automobile industry "Volkswagen" hired the top creative marketing and advertising company "DDB" to create a campaign. The brief stated that it must be innovative, new and the campaign would need to generate interest around Blue Motion Technologies, a series of cars and innovations that help reduce environmental impact without compromising on performance or the joy of driving. Three campaign promotion clips were created as part of the campaign with social engagement – simple human behaviour patterns were chosen – people being reluctant to use a staircase if there are electric elevator stairs; framing the action of placing bottles in the right recycling spot as a game; making a waste bin more attractive to use by equipping it with a funny sound etc.

The principle that the agency stipulate is that the easiest way to change people's behaviour for the better is to make the process fun. The agency also came up with a name not only for this campaign but also the principle and decided to call it the Fun theory. As stated in the introduction, it does not have a strong academic background, rather a combination and experience of understanding human behavioural patterns.

The results of the campaign are out of scope of this article, but in the current context it provides something significantly important – a trend to focus, explore and experiment with the ideas proposed in this theory. The Fun Theory social media page has almost 100 000 followers and their three video clips have more than two million views. Social media channels "Youtube" and "Facebook" contain many videos, ideas, articles and posts about taking this approach and people all over the globe have explored the essence of the idea to create their campaigns and actions. Academic research with statistics or evaluations has not yet been undertaken on this subject, however hundreds of ideas and examples have been shown in social media platforms such as "Pinterest", "YouTube" and "Facebook".

The elements of playfulness, games and game design principles are not new to the education system. There are many case studies of children and students, confirming that the role of gamification and playfulness is the key drive for education and learning process that develops essential skills and helps in general to develop creativity and learning abilities (Felicia & Engelfeld-Nielsens, 2007). Furthermore, examples of adults creating their own ideas with this approach indicates that the theory of fun and games is not only applicable to children, but also adults. Worldwide case studies and research has shown that design of the board game or any game elements with real-life elements, establishes an environment for creative problem solving ground and are successful (Chen, Tsai, Liu, Chang, 2021). Therefore, it is necessary to consider existing case studies and lessons that can be carried along.

### **4. Evidence from around the world – existing models motivating individuals to sort waste**

The past decade has given rise not only to worldwide consumption but also to several worldwide initiatives towards advocating against and fighting environmental pollution. The most well-known from 2015 are the Sustainable Development Goals with 17 initiatives. Even though the initiatives were supposed to integrate on all levels, it can still be considered a top-down approach and it is not strictly the focus of this paper. Nevertheless, it is clear that green education programs and initiatives communicate, promote, activate and internalize the environmental citizenship through resource recycling intention in this way contributing towards the ultimate goal – a greener world.

Interaction, games and similar activities have been associated with spare time, leisure and a playful way of spending time. In other words, something not serious, although they have also been used in educational tasks. It has been emphasized that games stimulate both sides of the brain – logical (cognitive) and creative (affective dimensions) (BISITE Digital Innovation Hub, 2018). Several children education systems, for example, Montessori approach, base their development ground only on the element of game and joy. It has been applied for more than 100 years and remains among top education and development systems. Therefore, the drive and dynamics that game approach provides, makes otherwise uninteresting tasks attractive. Occasionally small initiatives might show a great pattern. For example, four years ago in a small city of Finland (Kuopio) a collaboration between regional waste company, University of Savonia and a student group set up an event called 3R Game Jam. Idea for this initiative was to come up with several ways how to motivate citizens (adults) to take interest in recycling. The gamification approach was applied and a game called "Fox the Recycler" was selected for further testing. During the test period it showed a significant increase of users – around 235 monthly and 50 daily. After the testing period, the recycling ration of biodegradable waste increased from 76% to 97% (Santti, Happonen & Auvinen, 2020). The pilot version clearly showed an example that gamification-based approach can be efficient and affect user behaviour and habits. From this experiment it can be concluded that game approach can be applied not only for its original purposes, but also social practices such as recycling, green environment, and habit development.

In a city of Spain (Zaragoza), a creative way to increase the recycling ratio for its inhabitants was developed using a digital approach – QR codes - and incentives. In line with the gamification approach, local residents were encouraged to use a QR code-based system to recycle their waste and use appropriate bins. While tracking each user's profile (including basic biometric data like age, gender, area), daily recycling habits were calculated. Residents were encouraged with benefits – users who managed to obtain a certain waste reduction goal, received a discount on their monthly waste bill. Since this pilot study made successful results, resident participation increased by 32.2% and the amount of waste recycled increased by 17.2% in comparison to the data received before the start of the pilot study. It is important to emphasize that this case study managed to engage the middle-aged population (age 43-56) who were previously passive. The city council also communicated that the increase of overall waste recycling increased by 18% from before (BISITE Digital Innovation Hub, 2018).

As indicated previously, there can be two types of motivation for social aspects – to focus on penalty or incentives. The latter case study indicates that higher level of commitment has been shown from citizens when they been given an opportunity to gain some benefit (monetary) than to receive a penalty instead (that has been the case for this study). In terms of further research, it would be interesting to offer a possibility to either receive a benefit or neutral approach (meaning no penalty or no difference) in order to evaluate if a positive affection and proposal motivates individuals to pursue recycling and increase their activity. This kind of study can be initiated in any small municipality and results are simple to track, provided that the authorities have the required motivation and goals. If the research framework exists and the study shows that it does, similar case studies can be conducted, waste can be reduced and recycling increased.

As shown in the previous case study, the success was due to the game element, although it is important to emphasize that the right infrastructure was in place. A case study from Sweden and Bulgaria was conducted where the research team aimed to see if the state recycling programs affect the participation intensity for waste separation at home. The recycling and waste separation behaviours of 111 university participants from Kalmar, Sweden and 112 students from Plovdiv, Bulgaria were studied using the Theory of Planned Behaviour framework. The result was as anticipated as the tendency shows in the previous case

studies – if there is lack of proper infrastructure, despite the good intentions of the participants, the results still show a negative impact. Namely, unfavourable conditions for recycling demotivate and prevent individuals from recycling. The case study clearly showed - if the participants were satisfied with provided conditions for recycling, their attitude and therefore recycling increased (Stoeva & Alriksson, 2017). From circular economy perspective this indicates that no matter how high the micro level motivation level, the provided macro level (state legislation, green incentives – specifically waste infrastructure) is the essential component for recycling. This tendency - availability of infrastructure for waste separation - is essential globally. In the specific context of recycling, considerable empirical theories and reviews (Nixon and Saphores, 2009) point to factors, such as facilities available for recycling, costs of alternative waste disposal and the role of self-image and social pressures.

To conclude the chapter – the overview of cases shows that all case studies with an interactive element, right infrastructure and management have shown in number the success of the projects. Despite the rare evidence, it is possible to conclude that the field of gamification and theory of fun has potential and enough motivation triggers for sorting waste. At the same time, it can be admitted that circular economy (in this case waste management) can take place in nano and micro level, if the higher levels are provided: available infrastructure, monetary incentives, clear objectives and tangible goods, for example, monetary refund for waste bills. Further practical studies need to be conducted.

### **Conclusions:**

- 1) Literature review in this paper has shown that individual's motivation is the most successful if it is intrinsic. However, in waste sorting process it means that the best outcomes will depend on infrastructure and legislation.
- 2) Game and gamification theories have a variety of possibilities in terms of application and can be successfully explored in different social issues, including green education and waste recycling.
- 3) Most of the case studies associated with game and gamification theories have been tested on children education or universities, however the field is open. Literature review has shown successful evidence where digital application with game elements brings great results and success in waste management.
- 4) Even though Fun theory is not an academic discipline, it has a potential to be combined with research and directly triggers emotions and inner motivation to explore, experiment and solve social dilemmas and issues.
- 5) Studies reviewed in this paper have shown that waste sorting process can be successful if applied with elements of game, infrastructure, monitoring and enough effort to conduct the product and research in an organized way.
- 6) This paper has shown encouraging evidence based on literature to continue to explore fun and game theory and to develop a further study. Next steps will be modelling a structure for Latvia, where both theories will be applied as motivation tools for domestic individuals of Latvia in waste sorting process.

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