Glass beer bottle reuse in Bulgaria

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ABSTRACT

A way to minimize the growing amount of waste is through reuse of packaging. Reuse of glass beer bottles is popular and widely used approach by brewers around the world. In Bulgaria, however, the reuse percentage of glass beer bottles is relatively low – less than 25%. This study aims to investigate the role of the beer brewers for increase of glass beer bottles' reuse in Bulgaria. Different methods are used to collect relevant data. Ecological modernisation theory is used as a tool to discuss the findings of this study. When theory is compared to the current situation with the glass beer bottles, differences are revealed. In conclusion recommendation for increase in glass bottle reuse are giv-

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Introduction

This study has been carried out individually in at the 4th semester of the Master Program Environmental Management and Sustainability Science at Aalborg University. The study has been conducted in Bulgaria between February and May 2016.

The subject of this research was suggested by Margarita Georgieva, an ecology expert in Ecology department from Stara Zagora Municipality, Bulgaria. I have been on a three month internship at the Ecology department in Stara Zagora Municipality in the 3rd semester of this Master Program.

In the last decades increase in the world's population results in higher need for food and therefore increase in generation of packaging waste like bottles and boxes (Gómez, et al., 2009). The packaging material could have a significant impact on the environment (Meneses, et al., 2012) (Del Borghi, et al., 2014). Moreover the choice of packaging material could lead to impact on the whole beverage value chain (Simon, et al., 2016). Waste management could become a challenge in fast growing cities (Gómez, et al., 2009). Reuse of packaging should be considered before any other waste treatment, placed under 'reuse' in the waste hierarchy pyramid (Babader, et al., 2016) (WRAP, 2011). Although reuse is the easiest way to reduce waste, it has not been a common focus in studies (Babader, et al., 2016).

One of the packaging, glass, could be easily reused due to its qualities (Brewers Association, 2014) (INFORM, 2012) (FEVE, n.d.) A common way in Western Europe (Denmark, Sweden, Germany) to reuse glass bottle packaging is through deposit system on beverage plastic, cans and glass bottles including water, beer, siders, non-alcoholic drinks (Zero Waste Europe, 2010). That is not the case in other countries such as Bulgaria. The current bottle deposit system in Bulgaria includes return of some glass beer bottles, which remains relatively low in comparison to the share of beer bottle packaging – around 85% of the glass beer bottles are reusable and only 25% of the packaging is glass, where the leader is PET packaging with 60% share (Union of Brewers in Bulgaria, 2014). This research focuses on beer glass bottle packaging in Bulgaria. The general research question of this study is:

What is the role of the beer brewers for increase in reuse of glass beer bottles in Bulgaria?

Glass beer bottle reuse in Bulgaria

Abstract

A way to minimize the growing amount of waste is through reuse of packaging. Reuse of glass beer bottles is popular and widely used approach by brewers around the world. In Bulgaria, however, the reuse percentage of glass beer bottles is relatively low – less than 25%. This study aims to investigate the role of the beer brewers for increase of glass beer bottles' reuse in Bulgaria. Different methods are used to collect relevant data. Ecological modernisation theory is used as a tool to discuss the findings of this study. When theory is compared to the current situation with the glass beer bottles, differences are revealed. In conclusion recommendation for increase in glass bottle reuse are given.

Keywords: reuse, glass beer bottle, ecological modernisation theory, breweries

1. Introduction

In the latest decades the high level of anthropogenic activity has resulted in increased impact of our society to the environment. As consequences are depletion of natural non-renewable resources and increased generation of waste. (Kørnov, et al., 2007) Through the years different programs in the US have been created with the aim to improve the waste management and decrease the waste headed to landfills (Campbell, et al., 2016).

Likewise, The European Union presents common principles, definitions in the area of waste management and aims for its Member States. With the inclusion of the waste hierarchy (**Figure 1.**), where waste prevention is placed on top, there are clear rules for the different waste actions and tools for handling the waste. (Eurpean Commision, 2008)

Figure 1. Waste hierarchy. *Source: European Commission*

As indicated by the European Organization for Packaging and the Environment (EUROPEN), packaging waste '*has a direct impact on the environment*' (EUROPEN, 2011). Among the different waste handling processes reuse should be considered before any other waste treatment (Babader, et al., 2016). A widely used packaging material is the glass (Campbell, et al., 2016), which is commonly used in the brewery industry in Europe, where more than half of the beer (51%) is sold in glass bottles (Berkhout, et al., 2013).

In this article there are five main sections. There is a brief methodology section and a theory text. This is followed by a description of the glass bottle reuse and analysis of the findings. Finally, a discussion is followed by a conclusion and recommendations.

1.1. Literature review

The literature review presents number of studies which are about packaging in general. They present the environmental benefits of packaging and on the other hand the economic benefits of the packaging material. Different studies (Mata & Costa, 2001) (Ramos, et al., 2015) (Hekkert, 2004) indicate the number of advantages of returnable (reusable) packaging for the environment. The reuse of packaging could minimize the cost for recycling and waste disposal (Dubiel, 1996). In spite of the fact that for manufacturing a returnable product it

would be thicker and cost more than the price for non-returnable product, the returnable product would be used again and again, which could lead to overall reduction of consumption of new manufacturing materials (Jurapan, et al., 2003). For example, Mata and Costa (2001), using LCA method indicated that when the reuse of returnable glass bottles is 50 % or more the impact on global warming, human toxicity, energy and material consumption is smaller after they are reused in comparison to non-returnable glass bottles (Mata & Costa, 2001). Another study on LCA of glass beer bottles shows a carbon footprint of 0,006 $kgCO_{2e}$ per glass bottle in Western Europe, which is lower in comparison to a can (0,122 $kgCO_{2e}$) and a PET bottle (0,152 $kgCO_{2e}$) (Owens-Illinois, 2010).

A study made by Babader et al (2016) in UK investigates the reuse behaviour and how to improve it according to the variables: awareness, values and motivation. The results show that factors like knowledge, social norms, communication and availability of returnable packaging could influence and increase the level of reuse among society. (Babader, et al., 2016)

A way to minimize the beverage packaging impact on the environment is through common use of same shape and colour glass bottles. A research by Ko et all (2012) focuses on the possibility of standardization of glass bottles of two competing breweries and the advantages of this process for both of them. Results present different benefits, for example, easier bottle collection for reuse, cost reduction and decrease in the inventory holding costs. (Ko, et al., 2012) Moreover, higher reuse percentage of used glass bottles could lead to other benefits such as reduction in the CO_2 emissions (Hekkert, et al., 2000).

Reuse and recycling of beverage packaging (glass, cans and PET bottles) through deposit systems is a common practice in European countries like Germany, Sweden, Denmark and Estonia (Ministry of Environment and Water, 2012) (Zero Waste Europe, 2010). This is another way to enrich the waste management practices and reuse some packages and recycle others. In Bulgaria there is no common deposit systems for bottles. The existing deposit system could be described as poor, where only certain glass beer bottles are returned for reuse to breweries. There is not a specific legislation about reuse of glass bottles or the deposit system. A research made by the Bulgarian Ministry of Environment and Water (2012) explores the possibilities of Bulgaria in establishing such deposit system for return of beverage packages, similar to the existing deposit systems in the western countries. The results of the research indicate number of difficulties towards the deposit system introduction – initial investment, changes in the legislation and negative impact on small and medium businesses. The authors conclude their negative support in establishment of the deposit systems in the coming years. (Ministry of Environment and Water, 2012)

As it was shown in the literature review there are different ways to look at the problem. The system of glass bottles packaging is complex and the research of this study will focus on brewery industry in Bulgaria. This study will investigate what the beer brewers' role is for increase in reuse of glass beer bottles in Bulgaria.

2. Methodology

In the present research different methods have been used to acquire qualitative data: literature review, observations, interviews and informal discussions with representative from the Bulgarian Ministry of Environment and Water.

In the first part of the research a literature review has been carried out to obtain data on the existing state of the art about packaging and reuse of glass beer bottles. The literature review is used as point of departure for the present study, which gives different opportunities to look at the glass beer bottles.

Observations have been a useful method, which gave a possibility to visualise the issues in the last stages of the glass bottle life cycle. Three different supermarket chains were visited to see what the system with the glass beer bottles is.

In the second part of the research interviews with environmental managers in three breweries in Bulgaria have been conducted. It was in order to collect data on breweries' environmental performance, their position on glass bottle reuse and their opinion about the existing deposit system, which includes some type glass beer bottles. A contact was made with the three leading breweries in the country (Zagorka AD, Kamenitza AD and Carlsberg Bulgaria) and interviews with their environmental managers were performed. Due to different reasons, it resulted in one live interview, one phone interview and one written interview.

During the research an unstructured interview with waste management expert from the Bulgarian Ministry of Environment and Water was performed. The aim of it was to understand the position of the Ministry towards the existing deposit system in Bulgaria.

3. Ecological modernisation theory

In the last decades, ecological modernisation concept is used '*to describe a technology-based and innovation-oriented approach to environmental policy*' (Jänicke, 2008). Ecological modernisation should lead to development in the existing technology, where environmentally friendly solutions are chosen and implemented to remove the end-of-pipe solutions (Jänicke, 2008). In the basis of the ecological modernisation theory lies the interaction between 'the institutions of modern technology, (market) economy and the state intervention' (Mol, 1997). Through the years different authors have contributed to the development of the ecological modernisation theory (Zimmerman, et al., 1990) (Jänicke, 1993) (Huber, 1985) (Hajer, 1995) (Mol, 1997) (Mol & Spaargaren, 2000) (Jänicke, 2008). In case of possible conflicts between economy and environment the government has the responsibility of making these two parts fit and work together (Murphy, 2000).

In this research ecological modernisation theory will be used to discuss the current situation of the returnable packaging and their possible increase in Bulgaria. The discussion will link the role of the state and non-state actors through reflection of the theory and taking into account the empirical data collection.

According to ecological modernisation theory the role of the state is important and through creating different instruments (e.g. through legislation, market regulation) it could have influence on the market development. This could result in economic growth and environmental protection. Likewise, the businesses should search for innovative approaches so they could improve on their environmental performances. (Murphy, 2000) The theory argues that the non-state actors should have more engagement in administrative and legislative processes (Mol, 2010).

4. Background

4.1. Glass qualities

Glass is made from natural sustainable materials such as sand, soda ash, limestone and cullet. Glass is well known material and it is used by people since 2500 BCE (American Chemical Society, 2014). Its stability, transparency and the quality to survive over warm or cold temperature makes the glass material suitable for packaging industry. Glass is a 100% recyclable material and could be recycled endlessly without loss in quality, which is unique compared to other types of packaging. In the concept of sustainable development this feature creates a closed loop. Moreover qualities of the new recycled

material are as high as the original material. Glass is used for the production of colourless and colour bottles and jars to be packaging for beer, wine, water or food. (Glass Packagng Institute, 2016) (Verallia, 2010-2016) (FEVE, n.d.) Due to its qualities the glass is a material suitable to fit in the circular economy cycle (European Commission, 2016).

4.2. Glass beer bottle life cycle

In addition to the above presented facts, glass beer bottles are chosen in this research to explore the possibilities in improving the existing deposit system of glass beer bottles in Bulgaria. In Bulgaria for 2013 60% of the sold beer was in plastic PET bottles, 25% was in glass bottles, in cans – 10% and 5% for draft beer (Union of Brewers in Bulgaria, 2014). Glass is not a leader as packaging material in Bulgaria but has an outstanding qualities, which could lead to different benefits and sustainable development.

Raw materials are extracted and delivered to the manufacturer. Then glass beer bottles are produced by a glass manufacturing companies. After production the glass bottles are sold to different breweries. These breweries fill the bottles with beer and distribute them to supermarkets. Afterwards, consumers buy and empty the glass beer bottles. (Glass Packaging Institute, 2010) There are different options for the glass bottles, where the most desirable and sustainable option is to keep the bottles out of the waste stream (**Figure 2**).

One option is the bottle to be returned at the brewery and reused. Another option is the bottle to be returned at the brewery and then send to be recycled due to damages or scratches. A third option is the bottles to be send for recycling after use in separate waste collection (Dr. Albrecht, et al., 2011).

Reuse and recycle are different waste treatment processes. Reuse of a glass beer bottle for example is when the bottle is collected and washed and then used in the same shape and form for another refill. On the other hand, recycling of a glass beer bottle is when the bottle is treated in such a way that it is melted and brand new bottle is manufactured, which could have different shape and form from the original glass beer bottle. (Hekkert, 2004)

When it comes to glass bottles the non-reusable (one way) packaging is accepted as most unfavourable packaging for the environment (Cleary, 2013) (Huang & Ma, 2004). Refilling and sending the bottles again on the market (bottle reuse) is considered a sustainable way, which saves resources, energy and CO2 emissions in comparison to recycling or landfill disposal. Due to its qualities glass has a closed loop cycle, where the glass bottles could be reused or recycled (because of damages or not covering the quality requirements) (Glass Packaging Institute, 2010) (INFORM, 2012) (FEVE, n.d.)

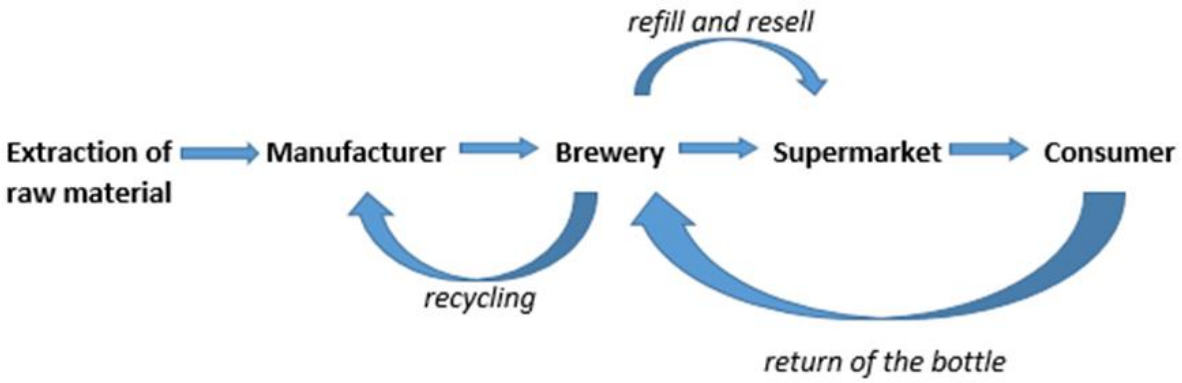

Figure 2. Glass beer bottle life cycle.

The reuse could prolong the glass bottle lifetime and later the glass bottle could be recycled, where it would be used for the manufacturing of a new glass bottle (European Commission, 2015) (FEVE, n.d.). The reuse of glass bottles could have ecological, economic and social advantages (Dr. Albrecht, et al., 2011).

Sources from US and Europe show different information about the amount of reuse of the glass bottles. A glass bottle could be refilled around 15 times (INFORM, 2012)and Other sources state that a glass bottle could be refilled 20 to 30 times (O-I, n.d.). According to Breweries of Europe 24,5% of the beer sold is in refillable glass in Europe. (Donoghue, et al., 2012) (Teotonio, 2013).

4.3. Legislation in Bulgaria

This section contains brief information relevant to reuse of glass beer bottles. The existing legislation connected to the reuse of packaging is the Ordinance on packages and waste from packages (Ministry of Environment and Water, 2012). The Ordinance states 'people, who release on the market packed goods, can organise individually or together with other producers and distributors deposit or other systems for reuse of packaging' (Ministry of Environment and Water, 2012). It is called extended producer responsibility (Ministry of Environment and Water, 2012). There is as well a National Waste Management Plan from 2014-2020, a strategy document, which contains targets to be reached before 2020 (Ministry of Environment and Water, 2014). Some of these targets are decrease of the landfilled biodegradable waste with 35% and reaching 50% reuse and recycling of paper, cardboard, plastic, metal and glass (Ministry of Environment and Water, 2012).

4.4. Background in Bulgaria

A deposit system for return of beverage packages, like PET or glass bottles, is not present in Bulgaria. Due to the existing legislation in Bulgaria there are present systems for volunteer return of the beverage packaging to the producer. They are mainly focused on the refillable glass beer bottles, where the glass beer bottles are return to the brewery for another refill. These volunteer systems are created within the industry sector and they are not covered by specific legislation. (Munistry of Environment and Water, 2012) **Figure 3** shows the change in the packaging material and the 'switch' from mainly glass bottle packaging to PET bottles between 2006 and 2010.

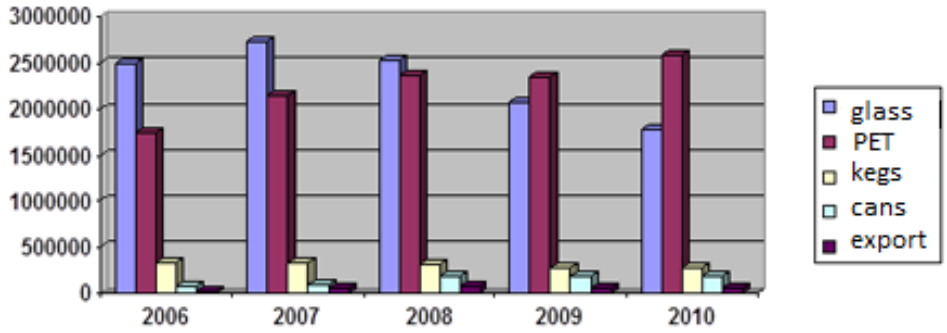

Figure 3. Beer produced (hectolitres) and beer packaging in Bulgaria (Union of Brewers in Bulgaria, 2010). Personal translation of the figure, the original is in Bulgarian language.

According to data from the Union of Brewers in Bulgaria (**Figure 4.**) the packaging share of PET bottles is the highest with 60%, followed by the glass packaging with 25% in 2013. The data could be accepted as reflection of the people's affordability, behaviour and attitude towards the beer itself and the packaging. (Krainova, 2014) Both **Figure 3** and **4** clearly show the drastic change in the packaging material and the consumer change from glass bottle to PET bottle. Breweries are driven depending on the

market share of certain packaging (Dimchev, 2016).

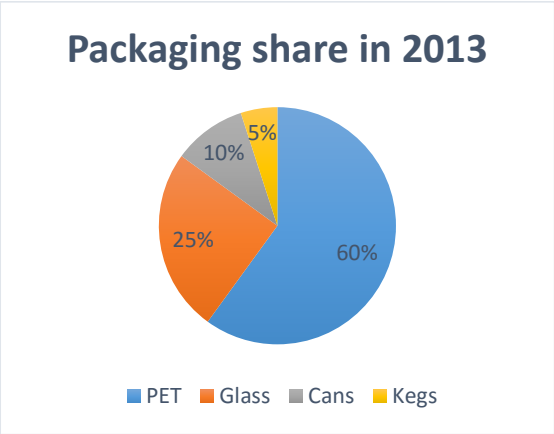

Figure 4. Packaging share based on data from Union of Brewers in Bulgaria (Krainova, 2014)

5. Analysis of the interviews

Apart from the literature review and the extensive document research to be able to answer completely the research question, there were prepared and conducted interviews with environmental managers from leading breweries in Bulgaria. Two of the breweries – Zagorka AD and Kamenitza AD are local brands of international and well-known companies: Heineken and Molson Coors (Zagorka, 2013) (Kamenitza, 2015). The third brewery is Carlsberg Bulgaria, which is part of Carlsberg Group (Carlsberg Bulgaria, n.d.). Each of the international breweries has environmental policy with specific goals to their environmental footprint (Carlsberg Group, 2016) (Heineken, 2016) (Molson Coors, 2016).

The main purpose of the interviews was to discuss the returnable glass bottles with people, who have that knowledge and who work in breweries with clear aims towards the environment in their environmental policy. In the beginning of each interview the environmental managers were asked to describe the brewery's environmental policy. Each of the breweries stated that they follow the state legislation and the environmental policy set by the 'mother' company. The manager from Kamenitza AD commented that the brewery takes as an aim the targets which are stricter when the company policy and the legal legislation are compared (Karailieva, 2016). The breweries continuously work on improving their environmental performance e.g. have different ISO certifications and for Zagorka AD the current focus is on '*building a waste water treatment plant*' (Dimchev, 2016) at the brewery in Stara Zagora.

The three breweries have a high percentage of reusable glass bottles in comparison to disposable glass bottles – 85% for Zagorka, 88% for Carlsberg and 90% for Kamenitza (Dimchev, 2016) (Borisov, 2016) (Peteva, 2016). Even though these percentages are high they remain relatively low in comparison to the total share of glass bottles in the pool of different packaging (see **Figure 4**). However, a glass bottle is reused around 20 times (Dimchev, 2016).

When asked whether they have campaigns to influence the consumer decision on which packaging to choose, the interviewees answered different. Two of them said that they do not have such campaigns (Borisov, 2016) (Karailieva, 2016) and the third interviewee mentioned they use commercials and *'mainly this year commercials are focused on glass bottles'* (Dimchev, 2016). The environmental manager from Kamenitza AD claimed that *'the market strategy is the one to be followed'* and *'social status is taken into account'* (Karailieva, 2016).

Then the interviewed persons were asked to share their opinion on the existing deposit system, which includes only some beer bottle types. Here the representative from Carlsberg summarised that *'the deposit is good way of stimulation and it is working'* (Borisov, 2016). One of the interviewee stated that '*there is a logic for working into direction where there is a deposit system for all types' bottles*'(Karailieva, 2016). In addition was the interviewee's reason '*that will contribute to higher engagement for consumers'* (Karailieva, 2016).

In the end, the interviewees were asked to point what should be changed so the deposit system becomes similar to the one in the western countries, where different packaging (glass, PET, cans) is returned. The environmental managers stated different factors, which could be seen as a driving force to do that change and there could be a cooperation between the stakeholders. These driving forces could be divided in three groups: social, economic and legislative (Borisov, 2016) (Karailieva, 2016) (Dimchev, 2016):

- social: family environment in early childhood, the schools, change in the way of thinking, industry groups, nongovernmental organisations;
- economic: the different distributors and supermarkets should also be involved;
- legislative: change in the legislation with higher taxes on non-returnable bottle packaging, involvement of the regional environmental agencies and the Ministry of Environment and Water;

The Social factor is accepted as important, because *'children fast understand and fast remember'* (Dimchev, 2016). Economic factor is needed, because it includes different businesses and the producers could have a key role. The legislation was seen as another driving force, because *'it is the only factor everybody have to be in line with'* (Borisov, 2016) and in that way the state could be accepted as a leader.

The analysis of the conducted interviews gives a better understanding of the current environmental performance of leading breweries in Bulgaria. Different factors were revealed by the interviewees, which could be beneficial and useful if the current system is to be improved and changed.

The conducted interviews present the breweries position on returnable packaging. In order to have better overview of the different actors' position, an informal discussion took place with environmental expert from the Ministry of Environment and Water. According to the expert the existing legislation '*gives possibility'* for the producers to choose which type of packaging to be non-returnable and which to be returned by the consumers (Peneva, 2016). Different reasons, were presented to support the current position of the state, not to change the existing system to a new one with return of all types of bottle packaging. Among the reasons were: the good performance of the existing waste management system; the geographical position and the high percentage of people living in small cities or villages; the financial investment in introducing a new system (Peneva, 2016). These reasons summarize the conclusions of a study conducted on behalf of the Ministry in 2011 (Ministry of Environment and Water, 2012).

6. Discussion

Looking at ecological modernisation theory with a normative approach and comparing it to the current situation of glass beer bottle, there could be found a contrast. Firstly, the Bulgarian legislation gives the responsibility to breweries (extensive producer responsibility) to decide how to handle their packaging waste and the reuse of packaging (Ministry of Environment and Water, 2012). Then the main strategy document (National Plan 2014-2020) does not contain specific aims towards increase of glass bottle reuse (Ministry of Environment and Water, 2014). However, achieving a certain level of environmental performance through implementation of sustainable practices is based on the 'mother' company's influence and the environmental strategy followed by the brewery. Another sign of existing 'non harsh' legislation is the fact that one of the breweries takes into account the stricter aim when compared the state legislation and the environmental policy of the mother company. Implementing the theory should weaken the

state authority and emerge in decentralisation and flexibility (Mol & Sonnenfeld, 2000) (Jänicke, 1993).

According to the ecological modernisation theory the role of the state is vital and should appear in different levels (Mol, 1997) (Jänicke, 2008) (Bailey, et al., 2010). There are different options for the state to increase glass bottle reuse. In his work Winsemius (1986) as cited by Smink (2002, pp. 69-70) shares that by using economic instruments which interfere with the market (influence the price tag), the state could make a change in the existing glass reuse. For example, an option could be the state to use the deposit refund system as an economic instrument 'to shape behaviour through price signals' (Hockenstein, et al., 1997). A different economic instrument could be, for example, to set high tax for non-returnable glass bottles. However the state does not use any of these instruments. Despite these possibilities the current position of the state could not be described as 'leading'. The Bulgarian Ministry of Environment and Water still supports the conclusions of a research in 2011 on possibilities to present deposit system for all bottle types, where it is not suggested the introduction of such a system (Ministry of Environment and Water, 2012). In a contrast is the opinion supported by the interviewed environmental managers who are positive on existing deposit system and in their opinion it should not be a burden to expand the system, so more bottle types (glass and others) are returned.

The state could also play a central role not only by using economic instruments. The state could influence by changing the existing legislation. Exemplifying, if the legislation has specific targets for reuse to be reached, that could trigger the producers to include all types of glass bottles to be returned and reused. Then the producers could easily shift to returnable glass bottles in order to save finances. By these instruments there would be lighter change in the regulation, which could implement some aspects of the ecological modernisation theory.

The theory gives more responsibilities to the non-state actors, which relate to involvement in regulative and administrative functions (Mol & Sonnenfeld, 2000) (Mol, 2010). The role of non-state actors is defined as important as the role of state actors. The breweries, as a non-state actor, should be included in the reshaping of the deposit system. The goal of improving the current deposit system should be a common goal involving the different state and non-state actors (Mol, 1997).The interviewees, representing state and non-state actors, revealed some other factors – social and economic, which influence improvement of the existing deposit system.

This chapter addresses differences between ecological modernisation theory and the role of the state and non-state actors in Bulgaria. It could be concluded that the theory does not fit completely the situation in the country.

7. Conclusion and recommendations

The presented research has been conducted in Bulgaria. The research question of this study was: *What is the role of the beer brewers to increase the reuse of glass beer bottles in Bulgaria?* In order to answer this research question the study takes a point of departure with document research and literature review. The empirical data collection is done through semi structured interviews with three environmental managers from leading breweries in the country. In addition, an unstructured interview was conducted with expert from the Ministry of Environment and Water, which presents the state position on the existing deposit system. Ecological modernisation theory was used to discuss the findings of the interviews. According to the ecological modernisation theory the role of the state is important (Mol & Spaargaren, 1993) and the interviewees could see the state as the initiator for improvement. Using the theory's

normative approach the state could influence the market by the means of economic instruments such as taxes or deposit system for all bottles (Hockenstein, et al., 1997). The role of the non-state actors is important, because they should have more legislative and administrative power (Mol & Sonnenfeld, 2000) (Mol, 2010). However, it was found that the role of the state and non-state actors within the brewery industry in Bulgaria does not correspond ecological modernisation theory. Number of factors were revealed, which could lead to change in the reuse. These factors could be arranged in three categories: social, economic and legislative. Among the factors were: family environment in early childhood; role of the schools; involvement of the distributors and supermarkets; change in the legislation and involvement of the regional environmental agencies (Borisov, 2016) (Dimchev, 2016) (Karailieva, 2016). Changing the system to one where all bottles (glass, PET and cans) are returned was commented positively by the environmental managers. On the other hand the expert from the Ministry of Environment and Water stated the negative position of the state where different arguments were noted: the good performance of the existing waste management system; the financial investment in introducing a new system (Peneva, 2016).

Considering the findings of this study, several actions could be recommended to the state as well as to the brewers.

The position of the Ministry of Environment and Water in supporting the results from a study on their behalf from five years ago (Ministry of Environment and Water, 2012) could not be accepted as reliable. It is suggested to the state to have clear targets on reuse of beer glass bottles written in the legislation. By this the brewers could make changes to reach these targets. Another recommendation for the state is to use different economic instruments, which could lead to improvement of the existing deposit system such as higher taxes on non-returnable glass bottles or deposit systems for different bottle packaging. The social factors should be taken into consideration as well.

It is recommended to the brewers to take the example of their 'mother' companies and place more reusable glass bottle types on the market. Following that experience could lead to improvement of the current situation on glass bottles. Another recommendation could be to demand for support and cooperation from the state in introducing deposit system for the different bottle packaging.

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Addendum

1. Methodology

1.1. Interviews

In the second part of the research semi structured interviews were conducted in order to be able fully to answer the research question. This method gave more thorough understanding of the researched topic (Silverman, 2005). Doing interviews gave an opportunity to see the researched topic from different point of view. Environmental managers from leading breweries were selected, because they could have the knowledge and experience to answer the author's questions and they were suitable. **Table 1.** shows more information about each interviewee. In earlier stage of the research there was an unofficial meeting with one of the environmental managers. The interviews were with different length - the live interview took 15 min and the phone interview took 25 min. The interview with expert from Waste Management Department from the Ministry of Environment and Water was unstructured and explorative. It took about 15 min.

Table 1. Interviewees' table.

Name of environmental manager	**Company**	**Email address**	**Phone**	**Date**	**Interview type**
Kolio Dimchev	Zagorka AD	koljo.dimchev@heineken.com	00359 898 776 759	04/05/2016	live
Radka Karailieva	Kamenitza AD	radka.karailieva@molsoncoors.com	00359 898 774 177	04/05/2016	phone
Borislav Borisov	Carlsberg Bulgaria	Borislav.Borisov@carlsberg.bg		05/05/2016	written
Petya Peneva	Ministry of Environment and Water	petyadim@moew.government.bg	00359 2 940 66 32	28/04/2016	phone

2. Questions to environmental managers (live and phone interview)

1. What is your company's environmental policy? Should it comply with the environmental policy of your 'mother' company?
2. How will you evaluate the policy?
3. How your company looks at the reuse of glass beer bottles?
    - How many times do you reuse a glass bottle?
    - What is the share of non-returnable/returnable glass bottles in your company?
4. Do you have a policy/strategy to increase reuse of glass bottles?
5. Do you have campaigns to influence the consumers?
6. What do you do to influence consumer behaviour?
7. What do you think about the existing deposit system in Bulgaria, which is only on some glass beer bottles?
8. What should be changed so it expands and for example becomes a system where you return all the bottles? = like in Germany, Denmark, Sweden. Who should be responsible for this change?

3. Questions to environmental managers (written interview).

1. What is your company's environmental policy? Please, briefly explain it.
2. How your company looks at the reuse of glass beer bottles?
3. How many times do you reuse a glass bottle?
4. What is the share of non-returnable/returnable glass bottles in your company?
5. Do you have campaigns to influence the consumers, whether to choose a glass bottle of beer or a PET bottle of beer?

- Quality of the beer
- Social status
- Price/amount ratio
- Environmental friendly packaging
- Other (please note it) ……

6. What do you do to influence consumer behaviour?
7. What should be changed so it expands and for example becomes a system where you return all the bottles? Who should be responsible for this change?

- The law
- The consumers'
- The economy in Bulgaria
- Other (please note it) ……..

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