

DISPOSABLE KEGS AS A NEW WAY FOR DRAFT BEER EXPORT

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ABSTRACT

Exporting draft beer all over the world has two aspects: on the one hand, the prestige requires a world-wide presence of many breweries; on the other hand, worldwide export of beer is very cost-intensive. This is dependant on the high purchase costs of stainless steel kegs and also for transport of the returned empty containers. A high rate of loss (theft, looting) and many other factors are why disposable kegs promise a successful application for the export of beer. There is an increasing consumer awareness concerning the compatibility with environment for beverage containers.

This presentation will analyse the cost structure of stainless steel vs. non-returnable kegs under different aspects. Purchase, cleaning, delivery and return transport costs will be discussed as will time saving, showing the advantages for kegs of no return. According to the cost analysis, a carbon footprint for both types of containers will be considered.

Disposable packages often have a negative image. The presentation will make suggestions as to whether it is better to ship empty containers around the world or to use packages, which can be recycled.

Keywords: *transporting beer, disposable packaging, cost saving, CO₂-saving*

INTRODUCTION

In recent years, with the internationalisation of the beer market, delivery markets also changed in a significant way. Oktoberfest beer, brewed in Bavaria, is exported all over the world, Anheuser Bush sponsors the soccer world cup in Germany and wants their beer draughted in the place of the event. Enjoying imported beer is becoming more and more popular. However, difficulties are experienced in long and expensive transport of the containers to the location of the event, expensive transport back to the breweries, the high investment cost of the barrels and high theft rates, to name some of these problems.

With the analysis of various parameters, the rationale of the use of no-return-kegs is shown. The paper gives an overview of the current systems, facts and numbers about exporting beer (exemplary on the German situation) and shows financial and ecological aspects thereof.

Facts and difficulties of exporting beer in stainless steel kegs

A look at export quantities of beer from Germany show that, in the last few years, this has increased. Export to EU-countries has grown as well as export to countries all over the world (**Fig. 1**). Export in kegs equals more than 1000000 barrels from Germany across the world.

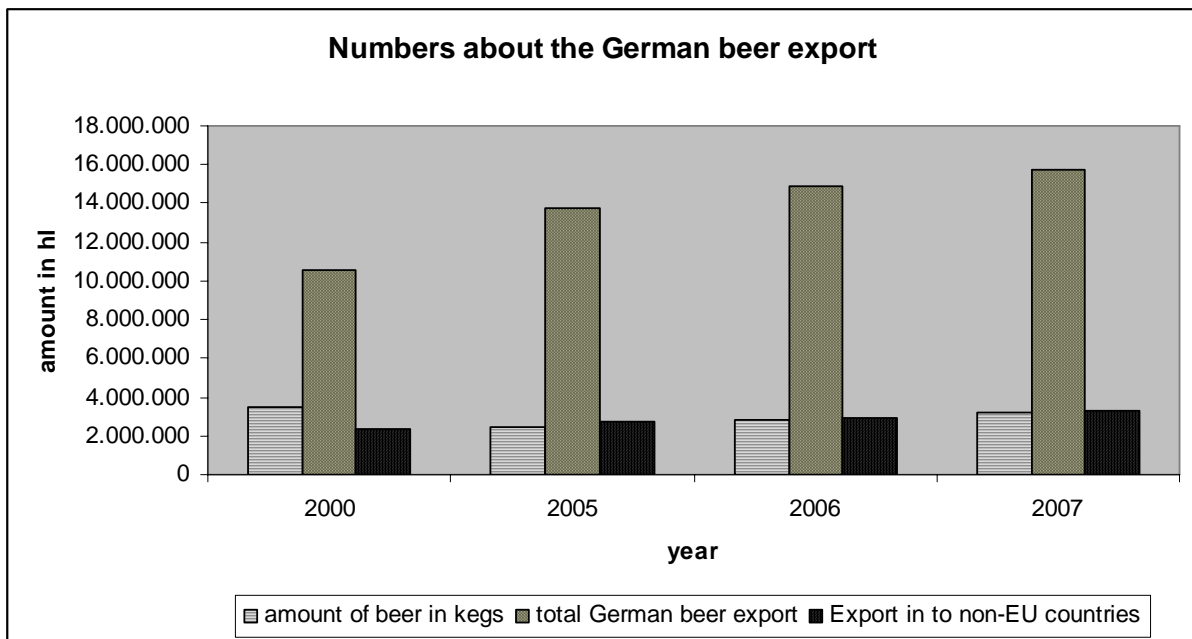


Fig. 1 Numbers of German beer export

This indicates that export for German breweries is becoming important. The situation of other beer producing countries shows similar results. Increasing export rates create many problems. In most of these cases, this means increased costs for the breweries. The following points show an overview of the most important facts.

Pilferage and non-delivery

The return flow of the empty containers differs in most cases significantly from the amount delivered. Breweries report that loss rates between 30-70% are not unusual. Important causes for the high loss are thievery and external use.

Time of circulation

Sending beer from one continent to another means unavoidably long shipping times. Additionally, the delivery intervals as well as number of distributors add to the time of delivery. Summarising all factors, a circulation time from 12 to 18 months for one keg is more the rule than the exception.

Investment costs

The purchase cost of one keg depends on the market price of raw material and stainless steel. Overall, it is very high, with the average price of 60-100€/piece, millions of fixed capital is tied-up for the companies.

Incorrect use and hygiene problems in combination with an extensive cleaning process

Returned kegs are an enormous expense to clean as they are used for own waste before being returned and long storage thus causing severe microbiological contamination. This entails a long and intensive cleaning process to prevent a re-infection of the freshly filled beverage keg. Undetected pollutants may cause customer problems.

Destroyed containers

Breweries also report a very high damage rate of the returned stainless steel kegs. The solution, until now, was to buy used or to re-condition kegs from insolvent breweries to minimise the costs of purchasing new ones. The initial cost of used and refurbished containers is about 50% less than new kegs.

Cost of the return transport

After the drafting, the emptied kegs are transported back to the brewery. A rough calculation of cost of return transport is 14,00€ per keg.

Table 1 gives a summary of the cost factors comparing disposable and returnable kegs.

TABLE I		
Cost Comparison of Stainless Steel and Disposable Kegs		
	Stainless steel keg	Disposable keg
Capital asset	Up to 150€ per keg, 60-100€ in average	Most of the systems max. 10€ per package
Cleaning costs	high	n/a
Handling and labour cost	high	low
Return transport cost	up to 14€ for the way South America to Germany	n/a
Detergents	high	n/a
Costs of maintenance	high	n/a
Loss of the barrel stock	1-10% per year	n/a

Table II shows the most important benefits and disadvantages of the two systems: returnable and disposable kegs.

TABLE II Benefits and Disadvantages	
Returnable Stainless Steel Kegs	Non-returnable Kegs
<ul style="list-style-type: none"> ▪ light insensitive ▪ tasteless ▪ non-corrosive ▪ shock-proof ▪ long-life cycle ▪ sales territory near production location (short time of circulation) ▪ high investment costs ▪ high costs for return transport ▪ costs for cleaning and repair ▪ high losses when exporting the beer 	<ul style="list-style-type: none"> ▪ low acquisition costs ▪ reduction of investment costs ▪ no return transport ▪ recyclability of the used materials ▪ increased quality of packages in regard to flavour stability re photo-resistance ▪ flexible response ▪ no empties management ▪ no risk of thievery ▪ opportunity for branding of the product ▪ oxygen permeability can be a problem ▪ negative image of disposal packaging ▪ high circulation, especially around production location, some disposable systems are too expensive

Current systems of disposable kegs and their properties

EcoKEG (~2003) (Fig. 2)

The EcoKEG of the Company EcoKeg Pty Ltd, Glen Iris Victoria, Australia, was probably the first package that was developed for the substitution of stainless steel kegs. The idea was to create a system that is able to save costs for the producers as well as simplifies the export of beer for small and large breweries. For the design, classical stainless steel kegs were archetypes to make them easier to recognize as a beer package. The One Way Keg™ is built like a regular keg but with plastic as material. A plastic ball is inserted into a plastic jacket.



Fig. 2 Construction of the EcoKEG

The EcoKeg characteristics are:

- filling volume is 30 litres
- 80% lighter than the traditional steel keg
- built with complete recyclable materials (HDPE, PET, PVC)
- compatible with most existing filling and dispensing lines
- cost price approx. 30A\$.

PETKeg (~2006) (Fig. 3)

With the PETKeg, KHS, Dortmund, Germany created a disposable package that follows the trend in the whole beverage industry. The kegs are, in principle, oversized PET-bottles that can be fitted into dispensing equipment. The fitting, that is also built in plastic, can be adapted on every established coupler system. No further bags or protection layers are used.



Fig. 3 PETKeg of KHS

The PETKeg characteristics are:

- filling volume: 20 litres
- compatible with all existing dispensing systems
- completely recyclable
- no inliner
- a keg blown up from a pre-form like a soft drink bottle with stretch blow technology
- cost price: 5.00-8.30EUR.

KeyKEG (~2005) (Fig. 4)

The KeyKeg, Lightweight Containers, Den Helder, The Netherlands, is a construction of a PET-shell with an inliner (bag-in-ball system), packaged into a carton jacket for better handling. Furthermore there is a jacket protection against damage of the beer ball. This system differs to others mainly in the construction, allowing the beer to be conveyed out of the bag with compressed air. No CO₂ is needed for the working process and the risk of unintended carbonisation of the beverage, is avoided. Therefore it is also possible to use it for wine and non-carbonated beverages.



Fig. 4 System of the KeyKeg

The KeyKeg characteristics are:

- operation is possible using compressed air because of the protective layer, which prevents an oxidation of the beverage
- the package can be used with all dispensing equipment by using a special coupler
- 20l and 30l are the standards
- 25% more shipping capacity
- fulfills all European environmental regulations.

Bag-in-Box-Beer (~2006) (Fig. 5)

Lots of juice packages, especially for catering and gastronomy, are constructed as a bag in box container. This construction was the archetype for Ankerbrauerei, Nördlingen, Germany, to construct a similar system for beer. The pressure in the beer being the main problem, a solution was to decarbonate the beer down to a CO₂-content of $\pm 1\text{g/l}$.



Fig. 5 System of the bag-in-box-beer

CLOSE

The Bag-in-Box-Beer characteristics are:

- dispense equipment is provided with carbonator to inject the CO₂ into the beer
- package cannot be used in a regular dispense system; special couplers are required
- cost price per bundle is lower than 5€
- filling volume is 25 litres
- capacity per palette is 900 litres instead of 540 litres with regular kegs
- saving potential: 15-20€/hl.

EinwegKEG (~2008)

Schäfer Container Systems, Neunkirchen, Germany, famous for producing stainless steel kegs, have now also invented a keg-of-no-return. In opposition to other systems, they use a metal body for the stability of the container with an inliner wherein the beer is filled. The data on this system is not currently available.

Comparison of a calculation model of CO₂-mission and transport costs

The emission of CO₂ becomes more economically important globally and the use of disposable kegs must be thoroughly investigated. This Institute has developed an analysis in this regard.

A further important factor is the cost saving. The Institute has developed a calculation model on costs of exporting beer.

A look at the whole process of filling and exporting beer in kegs shows that there are several big CO₂-emitters and cost drivers. **Table III** gives an overview of the factors.

TABLE III	
Influences on the CO₂-emission	
Returnable stainless steel kegs	Non-returnable kegs
<ul style="list-style-type: none">▪ Transport back to the brewery▪ Cleaning and disinfection▪ Higher weight causes higher emissions	<ul style="list-style-type: none">▪ Creating a new keg for every cycle▪ Recycling the material for next use

After a research of available information the first key data could be calculated. **Table IV** shows important numbers.

As an example, the route Munich to Pretoria was calculated for one palette with an amount of 6hl beer. The savings of CO₂ and costs are shown in **Table V**.





TABLE IV CO ₂ -key datas		
CO ₂ -Source	Amount of CO ₂	Costs
	50g CO ₂ per tonne and kilometer	D 0,24€/t and km EU 0,74€/t and km Non-EU 0,40€/t and km
	26,5g CO ₂ per tonne and kilometer	0,10 €/t and km
	15g CO ₂ per tonne and kilometer	0,05 €/t and km
	540g CO ₂ per tonne and kilometer	2,50 €/t and km
Cleaning of a returned keg (example datas from KHS)	<i>To be advised later</i>	<i>To be advised later</i>
Production of new one-way-kegs	<i>To be advised later</i>	<i>To be advised later</i>

TABLE V Exemplary Calculation of CO ₂ and Cost-savings				
	CO ₂ -Emission		Costs	
Creation of the keg	To be advised later		To be advised later	
Cleaning process of the kegs	To be advised later		n/a	
Munich – Pretoria	Full stainless steel kegs		Full disposable kegs	
Truck	49,1 kg	302,00 €		
Ship	155 kg	516,50 €		
Pretoria – Munich	Empty stainless steel kegs		Empty disposable kegs	
Truck	11,1 kg	68,20 €	CO ₂ -amount of recycling	
Ship	35 kg	116,50 €	To be advised later	

Problems with disposable kegs

Disposable kegs are a new and innovative way of filling and transporting beer. All current products have been developed and introduced in recent years and show good approaches. Further development is necessary.

Legal regulations for disposable kegs

Legal regulations for disposable kegs are given in the DIN 6647-4 (Means of packaging - Cylindrical beverage containers - Part 4: Disposal pack with allowable operating pressure up to 3 bar, nominal volume up to 60 litres). The standard norm defines the most important facts for producing one-way-kegs. But a look at the market of disposable kegs shows that the norm is not applicable for all available systems.

The most important requirements, after the common requests on hygiene and compatibility of materials, are consistency of volume and form, recyclability and the pressure the keg must resist. It also advises on the testing procedure on disposable kegs.

Summary and experiences

This Institute gathered data on various experiments with disposable kegs. One system was tested very intensively. With storage simulation tests, the kegs were exposed to severe conditions that could be encountered during exporting beer worldwide. Taste, microbiological tests, carbonation and oxygen tests showed that disposable kegs are a sound alternative option for beer exporting companies to keep the quality of the beverage and save a lot of money.

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