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Bachelor Thesis
Beer consumption and consumers preferences in the
Czech Republic

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BACHELOR THESIS ASSIGNMENT

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Economics and Management

Thesis title

Beer Consumption and Consumers Preferences in the Czech Republic

Objectives of thesis

The aim of the bachelor thesis is to determine and to evaluate beer consumption and consumers preferences in the Czech Republic in the selected period.

The aim will be fulfilled based on the partial aims. Then, several hypotheses will be defined and verified. Based on the results of and empirical analysis the final conclusions will be introduced.

Methodology

The bachelor thesis will cover both theoretical and empirical part. Theoretical part will contain theoretical background of the selected topic as well as the methodological framework. Scientific literature will be used to prepare the literature overview. Based on the empirical analysis the results will be presented and some recommendations will be suggested.

To fulfill the aim of the thesis the selected methods will be employed as following:

- regression analysis (trend function) to determine the main tendencies at the beer market in the Czech Republic;
- survey based on own questionnaire to define the consumers preferences.

The proposed extent of the thesis

30-40

Keywords

Consumption, consumer, beer, trend function, questionnaire.

Recommended information sources

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Declaration

I declare that I have worked on my bachelor thesis titled “Beer consumption and consumers preferences in the Czech Republic” by myself and I have used only the sources mentioned at the end of the thesis.

In Prague

.....

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Beer consumption and consumers preferences in the Czech Republic

Summary

The main aim of this work is to analyze beer consumption in the Czech Republic and determine the factors that may influence consumer beer preferences. In the theoretical part are described the stages of the marketing research process, its tools, methods and approaches. Factors that affect consumer behavior are mentioned as well. Further, there are the beer history in the world and in the Czech Republic, the technology of brewing and the current situation in the Czech beer market. Based on the theoretical information, a questionnaire was prepared, the evaluation of which is described in the analytical part. The obtained data was formed in the contingency tables, which were analyzed using the software SAS Enterprise Guide 7.12. Thus, the predetermined hypotheses were accepted or rejected.

Key words: preference, consumption, beer, consumer, trend function, questionnaire

Spotřeba piva a spotřebitelské preference v České republice

Souhrn

Hlavním cílem této práce je analyza spotřeby piva v České Republice a určit faktory, které mohou ovlivnit preference spotřebitelů piva. V teoretické části je výzkumný proces, jeho nástroje, metody a přístupy. Jsou zmíněny také faktory ovlivňující chování spotřebitelů. Dále je v práci obsažena historie piva ve světě a v České Republice, technologie pivovarnictví a současná situace na českém pivním trhu. Na základě teoretických informací byl připraven dotazník, jehož hodnocení je popsáno v analytické části. Příručka Enterprise SAS 7.12. Předem stanovená hypotéza byla tedy přijata nebo odmítnuta.

Klíčová slova: preference, spotřeba, pivo, spotřebitel, trendová funkce, dotazník

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1 INTRODUCTION

The dynamic development of market relations, the need to act commercially successfully in conditions of uncertainty form the need of tools, reducing this uncertainty and allowing to make well-founded management decisions. Marketing research as a scientific field of knowledge provides the enterprise with valuable information that serves as the basis for making managerial decisions.

The use of marketing research in the company's activities is an essential condition for its successful functioning. In the market conditions, those firms and companies, who are better than others know consumer's needs and who produce goods that can meet these needs are the most successful. But the market is constantly changing, the needs of people under the influence of various factors are also changing, so firms must constantly monitor the market conditions to make a profit. It is through marketing research that firms can track customer changes.

Beer is one of the oldest and most popular beverages in the world. In the Czech Republic beer is an important part of culture and economy. Czech's beer consumption per capita is the highest in the world. In recent years in the Czechs there has been a huge increase in the number of minibreweries. This means that the previously conservative Czech consumer changes his preferences.

2 OBJECTIVES AND METHODOLOGY

The main objective of this thesis is to explain beer consumption in the Czech Republic.

Partial objectives are:

- overview of the Czech beer market, its trends and indicators
- identifying the possible factors that affect consumer behavior, based on consumer's theory assumptions
- designing the questionnaire
- analysis of consumer's preferences based on the survey and concluding statistical inference

To achieve the objectives of the thesis will be gathered data from secondary and primary sources and conducted quantitative research. For this purpose, will be used methods of statistical analysis, such as regression analysis, hypothesis testing and categorical data analysis.

2.1 Hypothesis testing

Statistical hypothesis is the assumption about the type of distribution and properties of a random variable that can be accepted or rejected by applying statistical methods to data sample.

Testing the statistical hypothesis is the process of deciding whether a given statistical hypothesis contradicts the observed data sample. [7]

Steps of the statistical test procedure:

1. Formulation of the null hypothesis H_0 and the alternative hypothesis H_1 .
 - H_0 : the absence of differences of parameters or distributions, $\mu=\mu_0$
 - H_1 : there is significant difference between parameters or distributions $\mu\neq\mu_0$ (two-tailed form); $\mu>\mu_0$, $\mu<\mu_0$ (one-tailed form)
2. Setting of the significance level α , on which it will be concluded that the hypothesis is valid. It is equal to the probability of type I error.
3. Selection of the proper test criterion and computation of test statistic.
4. Construction of the critical region. If test statistic falls to the critical area, H_0 is rejected. p – probability of making type I error, $p>\alpha$ – accept H_0 .
5. Interpretation of the result.

Type I error consists in rejecting the null hypothesis when in fact it is true.

Type II error consists in not rejecting the null hypothesis when alternative hypothesis is true. [7]

2.2 Categorical data analysis

“A **categorical variable** has a measurement scale consisting of a set of categories.” [1]

There are following ways of classifying categorical variables:

- Dependent or independent
- Nominal (no scale, e.g. gender, hair color) or ordinal (scale, e.g. level of education)
- Continuous (e.g. height, income) or discrete (e.g. number of neighbors)
- Qualitative or quantitative (requires coding to analyze)

The contingency table is a form of data representation about the objects of research based on grouping of two or more categories according to the principle of their compatibility. If the first variable can take **m** values, and the second variable has **n** values, then the resulting contingency table of the categories will be a matrix of size **m * n**, each cell containing the frequencies of the combinations of categories encountered.

Contingency tables can be **association** (2x2) or **classic** (3x2, 2x3, etc.) [1]

2.2.1 Test of dependency in association contingency tables

Firstly, the null hypothesis is set, claiming that there is no significant difference between variables. Secondly, should be defined significance level α . After that, it is necessary to choose test criterion, based on following conditions:

- If sample size $n > 40$ then χ^2 independence test is used
- If sample size $20 < n < 40$, then expected frequencies should be checked. If any of them is < 5 , then Fisher’s factorial test is used, otherwise χ^2 independence test is used
- If sample size $n \leq 20$, then Fisher’s factorial test is used

Table 1 Association contingency table

Var A/Var B	B1	B2	Total
A1	a	b	a+b
A2	c	d	c+d
Total	a+c	b+d	Sample size

Source: [1]

Formulas for calculating expected frequencies:

$$a_0 = \frac{(a+b)(a+c)}{n} \quad (2.1)$$

$$b_0 = \frac{(a+b)(b+d)}{n} \quad (2.2)$$

$$c_0 = \frac{(c+d)(a+c)}{n} \quad (2.3)$$

$$d_0 = \frac{(c+d)(b+d)}{n} \quad (2.4)$$

Test criterion χ^2 is calculated by following formula:

$$\chi^2 = \frac{n(ad-bc)^2}{(a+b) \cdot (a+c) \cdot (b+d) \cdot (c+d)} \quad (2.5)$$

Decision rule: $\chi^2 > \chi^2_{\alpha(1)}$ – reject null hypothesis

Procedure for implementing Fisher's factorial test:

- Find the cell with the lowest value
- Reduce this value by 1 (final value is 0), all marginal frequencies stay the same
- Calculate the of probability for each table

Probability for Fisher's factorial test is calculated by following formula:

$$p_i = \frac{(a+b)!(c+d)!(a+c)!(b+d)!}{n!a!b!c!d!} \quad (2.6)$$

Decision rule: if $\sum p_i > 0,05$, then H_0 is accepted. [1]

2.2.2 Power of dependency in association tables

To describe the power of dependency in dependent association tables is used coefficient of association:

$$V = \frac{a \cdot d - b \cdot c}{\sqrt{(a+b)(c+d)(a+c)(b+d)}}, V \in \langle -1; +1 \rangle \quad (2.7)$$

Another formula to calculate the power of dependency is:

$$|V| = \sqrt{\frac{\chi^2}{n}} \quad (2.8)$$

The bigger is the value of V, the greater is the power of dependency. [1]

2.2.3 Test of dependency in classic contingency tables

Table 2 Classic contingency table

Var A/Var B	B1	B2	...	Bj	Total
A1	n ₁₁	n ₁₂	...	n _{1j}	n _{1.}
A2	n ₂₁	n ₂₂	...	n _{2j}	n _{2.}
...
Ai	n _{i1}	n _{i2}	...	n _{ij}	n _{i.}
Total	n _{.1}	n _{.2}	...	n _{.j}	n

Source: [1]

Test criterion for classic contingency tables is χ^2 . But it requires that maximum 20% of expected frequencies can be <5 and no expected frequencies <1 . To meet this condition, some categories can be merged. Formulas for calculating expected frequencies for classic tables:

$$n_{01} = \frac{n_{.1} \cdot n_{1.}}{n} \quad (2.9)$$

$$n_{0j} = \frac{n_{.j} \cdot n_{i.}}{n} \quad (2.10)$$

Formula for calculating test criterion χ^2 :

$$\chi^2 = \sum_{i=1}^k \sum_{j=1}^m \frac{(n_{ij} - n_{oj})^2}{n_{oj}} \quad (2.11)$$

Decision rule: Reject H_0 if $\chi^2 > \chi^2_{\alpha[(r-1)(c-1)]}$, where r-number of rows, c- number of columns. [1]

2.2.4 Power of dependency in classic contingency tables

To describe the power of dependency in dependent classic tables is used Pearson's coefficient:

$$C = \sqrt{\frac{\chi^2}{n + \chi^2}} \quad (2.12)$$

Or Cramer's coefficient V, where h is minimum of (c;r):

$$V = \sqrt{\frac{\chi^2}{n(h-1)}} \quad (2.13) [1]$$

2.3 One Sample z-Test for Proportion

One Sample z-Test for Proportion is a statistical test by which can be compared proportion of the sample and population (theoretical) proportion.

The hypothesis is formulated as follows:

- Two-tailed test $H_0: \Pi = \Pi_0, H_1: \Pi \neq \Pi_0$
- One-tailed test $H_0: \Pi = \Pi_0, H_1: \Pi > \Pi_0, \Pi < \Pi_0$

Where Π is the proportion in the sample, and Π_0 is the population (theoretical) proportion.

Test criterion is calculated as follows:

$$z = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0(1-p_0)}{n}}} \quad (2.14)$$

\hat{p} - sample proportion, p_0 - population (theoretical) proportion, n - sample size.

Decision rule: $|Z| < Z_\alpha$ or $p > \alpha$ - H_0 is accepted. Z_α - critical value for the normal distribution. (Illovsky, 2013).

3 LITERATURE REVIEW

3.1. Consumer behavior theory

Consumer Behavior Theory explains how consumers spend their income to satisfy their needs. It shows how choices are influenced by different factors.

Consumer behavior in the market is quite difficult to understand and explain. A lot of reasons affect the tastes and preferences of a people when they buy a product or service.

There are following methods to predict the possible behavior of the consumer.

1. Marketing research of consumer behavior is focused on the needs and requirements of consumers. Marketing research is based on economic theory, psychology and sociology.

2. System analysis. General principles and methods of this research are based on economic theory, explain consumer behavior and demand.

In system analysis, the study of consumer behavior begins with a study of his consumer choice, the reasons for which he prefers one product to another.

Three versions of consumer choice are usually analyzed. These versions are connected, firstly, with the concept of *marginal utility*, secondly, with the *income effect* and the *substitution effect*, and thirdly, with the analysis of consumer *preferences*.

Analysis of consumer preferences in the system analysis - combining consumer preferences with budget constraints, what determines which combinations of goods consumers choose to purchase to maximize the satisfaction of their needs. Faced with the economic factor of scarcity, the consumer must make compromises. He must choose between alternative goods to have at his disposal the most desirable set of products.

To understand how a consumer behaves in a given situation, it is necessary to analyze the factors influencing his choice. [11]

3.2 Marketing research

According to American Marketing Association, "Marketing research is the function that links the consumer, customer, and public to the marketer through information - information used to identify and define marketing opportunities and problems; generate, refine, and evaluate marketing actions; monitor marketing performance; and improve understanding of marketing as a process. Marketing research specifies the information required to address

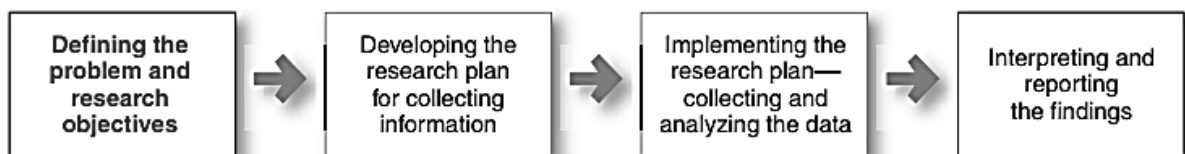
these issues, designs the method for collecting information, manages and implements the data collection process, analyzes the results, and communicates the findings and their implications.” [13]

Kotler (2012) defines marketing research as the systematic determination of the range of data required regarding the marketing situation facing the firm; its collection, analysis and reporting the results.

The function of marketing research is to establish a connection between consumers, clients and society with the marketer through the information that is used to establish and identify marketing opportunities and problems; development, improvement and evaluation of marketing activities; improve the understanding of marketing as a process. [9]

The figure 1 shows a diagram describing the process of marketing research.

Figure 1 Steps of marketing research process



Source: [8]

3.2.1 Identification of problems and formulation of research objectives

At the first stage, the marketing manager and researcher should clearly identify the problem and agree on the research objectives. The market can be investigated by hundreds of different parameters. Information gathering is too expensive, and a vague or incorrect definition of the problem leads to unproductive costs. Research objectives can be:

- Exploratory, i.e. provide the collection of some preliminary data, shed light on the problem, and possibly help to set a hypothesis.
 - Descriptive, i.e. provide the description of certain phenomena, e.g. to determine the number of people who drink non-alcoholic beer or the number of those who heard about some brand.
 - Causal, i.e. provide testing of the hypothesis about some cause-effect relationship.
- [8]

3.2.2 Develop the research plan

At the second stage, it is necessary to determine the ways of the most effective data gathering. The researcher can collect secondary or primary data or both at the same time.

Secondary data is information that already exists somewhere, being collected earlier for other purposes, e.g. editions of state institutions, internal sources of company, periodicals, books, commercial databases. Secondary data serves as a starting point for the study. The advantages of this source are cheapness and affordability.

However, secondary data may be obsolete, incomplete or unreliable. In this case, the researcher will have to spend much more time and money collecting primary data, which is more relevant and accurate.

Primary data - is information collected for the first time for a specific purpose. Most marketing researches involves the collection of primary data. This involves the development of a special plan that requires preliminary decisions regarding research methods, ways of communicating with the audience, sampling plan and research tools. [8]

3.2.2.1 Research approaches

There are three ways to collect primary data: observation, experiment, survey.

Observation is one of the most important methods of data collection. The objects of observation in marketing can be people or groups of people, enterprises, competitors, the market or its individual systems. In different situations, different types of observation are required:

- Depending on the type of situation, observations are field (conducted in natural environments) and laboratory (conducted in artificially created conditions)
- Depending on the registered objects, observation can be complete (all possible manifestations are recorded) and selective (only pre-selected parameters, phenomena and states are recorded)
- Depending on the structure, observations can be structural (systematic), when surveillance is conducted according to a certain plan, and unstructured, when only the general impression about the states and manifestations of the object is formed

- Depending on the level of awareness of the researched, observations are open (respondents know that they are under observation) and hidden (the researchers are not aware of the observation)

Ethnographic research is also type of observation method. Ethnographic research is a process of studying consumers in their natural circumstances of daily life, taking into consideration cultural characteristics. Ethnography methods came to marketing from historical science, when ethnologists, exploring the unknown tribes, detailed the actions and behavior of the natives to understand their way of thinking and actions. It is most expedient to use ethnographic research, when the available information about the target audience is minimal.

Another way to collect data is **experiment**. Experimental studies require the selection of comparable groups of subjects, the creation of different environments for these groups, control of variable components and determining the level of significance of the observed differences. The purpose of such a study is to discover the cause-effect relationships by eliminating contradictory explanations of the results of observation.

The **survey** is about halfway between observation and experiment. Observation is best suited for exploratory research, the experiment - to identify cause-effect relationships, while the survey is most convenient for conducting descriptive studies. Firms make surveys to get information about the knowledge, beliefs and preferences of people, their level of satisfaction and to measure the strength of firm's position in the eyes of the audience. [8]

3.2.2.2 Contact methods

The next step is choosing the way of communication with the interviewees: by phone, by mail, through a personal interview or online.

Interview by **phone** is the best method of prompt collection of information. During the call interviewer can clarify questions that are unclear to the interviewee. The two main drawbacks of telephone interviews are that response rate is low and the conversation should be short in time and not be too personal.

A questionnaire sent by **mail** may be the best way to get in touch with people who either do not agree to a personal interview, or their responses may be affected by the interviewer's

influence. However, the mail questionnaire requires simple, clearly formulated questions and the percentage or speed of return of this questionnaire is usually low.

Personal interview is more universal method of conducting the survey. The interviewer can not only ask more questions but also supplement the results of the conversation with his personal observations. Personal interview is the most expensive of all methods and requires more careful administrative planning and control. Personal interviews are divided into two types - individual and group.

- **Individual interviews** involve visiting people at home or at work or meeting them on the street. The interviewer must obtain their cooperation, and the conversation itself can last from several minutes to several hours.
- **A focus group interview** consists of inviting 6-10 people to several hours for a conversation with a specially prepared interviewer about a product, service, organization or some other marketing problem.

Online researches have advantages over other methods, expressed in a higher level of willingness of respondents to participate in the study and cheaper cost per interview. Online research also increases the level of involvement of participants through the inclusion of visual, audio and textual perceptions. This type of research leaves the opportunity to choose a convenient time and place of participation and can be completed at any time comfortable for the respondent.

Below are the main strengths and weaknesses of contact methods

Table 3 Strengths and weaknesses of contact methods

Measurment	Contact methods			
	Mail	Telephone	Personal	Online
Flexibility	Poor	Good	Excellent	Good
Quantity of data that can be collected	Good	Fair	Excellent	Good
Control of interview effects	Excellent	Fair	Poor	Fair
Control of sample	Fair	Excellent	Good	Excellent
Speed of data collection	Poor	Excellent	Good	Excellent
Response rate	Poor	Poor	Good	Good
Cost	Good	Fair	Poor	Excellent

Source: [8]

3.2.2.3 Sampling plan

The sample is a segment of the population designed to personify the population. A marketing researcher should develop a sampling plan that will allow the selected population to meet the challenges of the study. For this it is necessary to answer three questions:

First: who is to be interviewed? The answer to this question is not always obvious. The researcher must decide what kind of information he needs and who is most likely to have it.

Second: how many people need to be interviewed? Large samples are more reliable than small ones, but to obtain accurate answers, the researcher does not necessarily need to interview the whole market.

Third, how should the members of the sample be selected? The samples can be probability and non-probability.

Figure 2 Properties of probability and non-probability samples

Probability Sample

Simple random sample	Every member of the population has a known and equal chance of selection.
Stratified random sample	The population is divided into mutually exclusive groups (such as age groups), and random samples are drawn from each group.
Cluster (area) sample	The population is divided into mutually exclusive groups (such as blocks), and the researcher draws a sample of the groups to interview.

Nonprobability Sample

Convenience sample	The researcher selects the easiest population members from which to obtain information.
Judgment sample	The researcher uses his or her judgment to select population members who are good prospects for accurate information.
Quota sample	The researcher finds and interviews a prescribed number of people in each of several categories.

Source: [8]

3.2.2.4 Research instruments

When collecting primary data, marketing researchers have a choice of three research tools, which are questionnaires, qualitative measures and mechanical devices.

The questionnaire is the most common research tool for collecting primary data. In a broad sense, the questionnaire is a series of questions to which the respondent should provide answers. Questionnaire is a very flexible tool, because questions can be asked in

many ways. The questionnaire requires careful design, testing and elimination of the identified shortcomings before it is widely used.

The most common mistakes are posing questions that cannot be answered, which will not be answered, which do not require an answer, and the absence of questions that should necessarily receive answers. Each question needs to be checked in terms of the contribution that it makes to the achievement of the research results. Questions that are just idle interest should be omitted, as they delay the procedure and make respondents nervous.

The form of the question may affect the response. Marketing researchers identify two types of issues: *closed* and *open*. The closed question includes all possible answers, and the interviewee simply chooses one of them.

An open question gives interviewees an opportunity to respond with their own words. Open questions often give more information, because the respondents are not bounded in their answers. On the other hand, closed questions give answers, which are easier to interpret and put in tables.

The formulation of questions also requires caution. The researcher should use simple, unambiguous words that do not affect the direction of the response.

A special attention is required by the establishment of a sequence of questions. The first of them should, whenever possible, awaken interest among the respondents. Difficult or personal questions should be asked at the end of the interview.

Questions should be given in logical sequence. Questions that classify the respondents into groups are asked in the last place, because they are more personal and less interesting for the respondents.

Although the questionnaire is the most common research tool, various **mechanical devices** are used in marketing research. To measure the intensity of interest or feelings of the respondent when contacting a specific advertisement or image, *galvanometers* are used. An instrument called a *tachistoscope* displays an advertisement for an interviewed person in the interval of exposure from less than one hundredth of a second to several seconds. A special device is also used to fix eye movements, with the help of which it is determined which areas the eye falls first, how long it lingers in certain areas, etc. An electronic device

called an *audimeter* connected to a TV in the homes of the respondents, records information about all its inclusions and the channels to which it is configured.

Another instrument of research is **qualitative measures**. It involves a creative approach and competent interpretation of the results from researchers. Some techniques used in qualitative researches are:

- Word associations, e.g. what words come to respondent's mind, when he hears the brand's name
- Projective techniques, e.g. comparison of brand with some objects, animals, people
- Visualization, e.g. making collage from different images, photos or things, which will represent respondent's perception
- Laddering is the establishment of cause-effect relationships between the properties (attributes) of the product or brand and the benefits of use (consequences) and the values (values) of consumers. [8]

3.2.3 Collect the information

After development of the research project, it is necessary to collect information. Usually this is the most expensive and the most fraught phase of research. During the interviews, four major problems immediately arise. Some respondents may not be at home or at work, and the attempt to contact them will have to be repeated. Others may refuse to participate in the survey. Others can respond biased or insincere. Finally, the interviewer can be preconceived or not professional.

During the experiment researchers need to attentively monitor the compliance of the experimental and control groups with each other, do not exert influence on the participants, give instructions in a completely uniform manner and monitor compliance with all other conditions. [8]

3.2.4 Analyze the information

The next stage of marketing research is the extraction of the most important information and results from the set of data obtained. The researcher summarizes the gained data into tables. Based on these tables, indicators such as frequency distribution, mean values, measures of dispersion are derived or calculated. Then the researcher processes the obtained data using statistical techniques and decision-making models, used in the marketing information analysis system. [8]

3.2.5 Presentation of the results

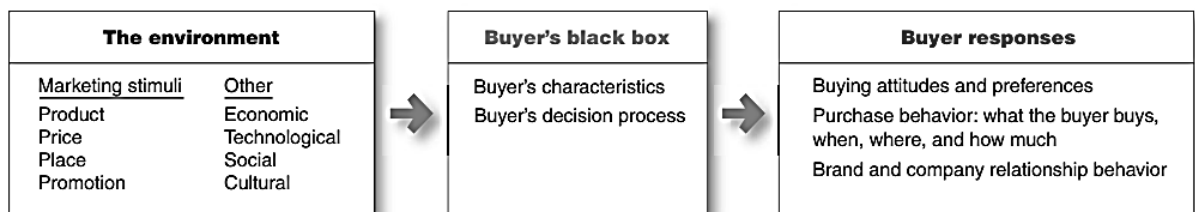
Finally, the researcher shows the of the work done to the client or management. It is necessary to present the main findings essential for the company's management to make major, vital marketing decisions. The study is useful when it helps to reduce the uncertainty faced by marketing professionals. [8]

3.3 Factors affecting consumer behavior

Consumer behavior is a general concept for the factors and processes that determine the economic actions of the consumer in the context of the acquisition and consumption of the product. Therefore, the study of consumer behavior can be the main source of market information for a marketer, since only through understanding the consumers behavior the researcher can come to a correct assessment of the prospects of the company's products and the desired directions for their development. [9]

The task of the market leader is to understand what is happening in the “black box” (Figure 3) - consumer consciousness between the arrival of stimuli and the manifestation of responses to them. The "black box" itself consists of two parts. The first is the characteristics of the buyer, or different factors, affecting consumers behavior. The second part is the process of making a purchasing decision on which the result depends. It is necessary to consider in detail the factors influencing consumer behavior.

Figure 3 Model of consumer behavior



Source: [8]

3.3.1 Cultural factors

Cultural factors include culture, subculture and belonging to the social class.

Under the culture is understood the totality of basic values, concepts, desires and behavior perceived by a member of society from the family and other public institutions.

A subculture is a group of people with a common value system based on common life experiences and situations, for example national, religious, regional groups.

The social class is a relatively orderly and stable social group whose members share common values, interests and behavior. The criteria for dividing society into classes include not only income, but also work, education and residence. Representatives of various social classes differ in style of dress, speech, organization of rest and many other characteristics. [5]

3.3.2 Social factors

Social factors include small groups, divided into membership groups, reference groups, family, social roles and status.

A membership group is a group to which certain individuals belong and which directly affects their behavior, for example, a family, co-workers, friends.

A reference group is a group by which a person performs a direct or indirect comparison when forming his relations and lines of behavior.

A social role is defined as certain activities that are expected to be carried out by an individual in relation to people around him. For example, the same person can play the roles of son, father and director. Depending on what role a person plays at a given moment, his buying behavior depends. [5]

3.3.3 Personal factors

These factors include age, stage of the family life cycle, occupation, economic status (income per family and one family member), lifestyle, personality type and self-presentation.

The life cycle of the family is the sum of the individual stages that the family has undergone since its inception (bachelors, a young family without children, the youngest child is less than 6 years old, etc.).

Self-presentation is a complex mental representation of a person about himself, about his own "I". For example, if someone thinks of himself as a creative and active person, he will look for a product that meets these characteristics. [5]

3.3.4 Psychological factors

Psychological factors include motivation, perception, assimilation, persuasion and attitude. These factors have a strong impact on consumer behavior.

Perception is the process by which an individual select, organizes and interprets information to construct a meaningful picture of the real world.

Assimilation consists in changing the behavior of individuals based on their acquired experience.

Consumer behavior is influenced by their beliefs; certain ideas about the product. Beliefs can be based on real knowledge, opinion, faith.

Attitudes are stable favorable or unfavorable assessments, feelings and inclinations to actions in relation to certain subjects and ideas. [5]

3.4 Beer

Beer is a low-alcohol beverage produced by yeast fermentation of malt wort (most often barley-based), usually with the addition of hops.

3.4.1 World history of brewing.

The history of beer began with the development of agriculture in the Neolithic Period. The first writing evidence is Sumerian Poem "Hymn of Ninkasi" (about 1800 BC). It described brewing process and basic ingredients: *bappir* (twice-baked barley bread), *munu* (a milled cereal that was malted in the process of brewing) and *titab* (a mash from malted grain, dried after cooking). Honey and wine were put in the mixture before fermentation.

The first documented use of hops in brewing belongs to monasteries. In 822 AD, Abbot Adalhard of Corbie decreed that abbeys might receive hops for making beer.

Bavarian Purity Law ("Reinheitsgebot"; literally "purity order") illustrates the role of the state in establishing the drinking customs of its inhabitants and the regulation of brewing.

This law was enacted 23 April 1516 and determined principal standards for beer production in the whole state. The Bavarian Purity Law set the price of the beverage, defined uniquely the term "beer" and limited the ingredients by barley, hops and water.

A significant advancement in brewing industry occurred in the 19th century. French scientist Louis Pasteur introduced the role of yeast in alcoholic fermentation and developed better hygiene standards. He invented the process of heating liquid products to eliminate bacteria and other microorganisms. This technique is now called pasteurization. Thus, the shelf life of beer was increased without compromising quality.

Achievements of industrial and technical revolutions in 19th and 20th centuries, e.g. bottling lines and commercial refrigerating, contributed the mass production and distribution of beer on all continents. [3]

3.4.2 Czech history of brewing

The earliest mention of brewing on the territory of the Czech Republic accounts to Břevnov Monastery in 993. During the consecration of the Břevnov Monastery, the second Czech bishop Vojtěch allegedly forbade the monks to brew beer because they devoted more to preparing and drinking beer than to their brethren.

The oldest document about the cultivation of hops was endowment act from prince Břetislav I (1034-1055). In this act he assigned to chapter in Stará Boleslav tenth of hops growing in the yards in Žatec and Mladá Boleslav.

The first document directly related to the production of beer in the Czech Republic was another endowment act of 1088, where the first Czech King Vratislav II mentioned a tenth of hops for brewing.

The first known brewery was founded in 1118 in Cernice. The competition between the Czech brewers had sharply grown, and it was easier for brewers to leave their native village and settle in a different place than continuing the struggle for the consumer. This contributed to the rapid growth of new settlements and cities. In the XII beer production was so expanded that brewing was practiced in almost every household. However, the first laws concerning beer appeared only in the XIII, when King Wenceslas II stipulated that only burghers living in royal towns within the city walls and monasteries should have the right to brew beer.

The big reform in the production of malt and beer occurred in the 18th century due to the Czech brewer František Ondřej Poupe. He proposed new equipment for making beer and malt, recommended using exclusively barley malt, ordered the dosage of hops. That was the first step in the development of the typical qualities of modern Czech beer. On the slope of his life, Poupe founded a brewing school in Brno, which became the first educational institution of this type in Europe.

19th Century - The Golden Age of Czech Brewing, when happened basic technological changes: transition to bottom fermentation, implementation of saccharometer and machine

drives, use of steam, machine cooling, establishment of promotional stations, first bottling plants. [14]

3.4.3 Technological process of brewing

Despite all the variety of raw materials used and methods of brewing beer, the modern technology of beer production includes the following stages:

Malt processing

The raw material for brewing demands preliminary processing, which consists of transformation it into brewing malt. First step is the germination of grains (most often barley), drying and cleaning from sprouts. The color of beer depends on level of drying the malt. To gain darker types of beer, malt is roasted to caramelize sugars. Secondly, the malt is milled to particles, which will yield the most economic extract.

Mashing procedure

The mash is a blend of milled malt, solid additives (if used) and water. The result is a gruel, which has a sweet taste from the dissolved malt sugars.

During the mashing procedure, there is a consistent heating with the so-called “temperature rests”. Different enzymes are activated at certain temperatures:

- 49–55 °C activates proteases, which break down the proteins
- 60 °C activates beta-glucanase enzyme, which splits beta-glucans, resulting in a better release of sugars
- 65–71 °C for converting starch into sugars, which will be used by yeasts further.

The whole procedure lasts 1-2 hours. The end of the process of saccharification is defined by iodine test. The result is wort with a fixed gravity (OG), a set ratio of fermentable and non-fermentable sugars, soluble and non-soluble proteins. Then, the wort is heated to 78 degrees to inactivate the enzymes and reduce the viscosity and transferred to filtration.

Wort Separation

The resulting wort is pumped to the filter tun, where it is divided into an unoxidized beer wort and a draff - insoluble residues of the mash, remaining in the filtration process.

Usually, filtration consists of two stages. Firstly, the wort is collected, secondly the draff is washed with hot water. Both portions are mixed in a brewing pot. Thus, the draff serves as a filter barrier.

Also, press filters are used, in which the synthetic material plays the role of the filter plate, and the filtration occurs not by gravity, but by pneumatic compression of the filter elements.

Wort boiling

The wort is boiled for 1-2 hours with the addition of hops and other required ingredients. During the boiling, the wort is saturated with the taste and flavor of hops. At the same time, protein substances coagulate and precipitate, and some undesirable aromatic components are evaporated.

Whirlpool

The wort is pumped into a vortex bath to separate insoluble remains of barley and hops. These particles, under the influence of frictional force of the liquid layers, are collected at the bottom of the hydrocyclone. After 20-30 minutes of settling, the wort is separated from the insoluble residue – “trub”.

Cooling and aeration of wort

After separation of the hot trub, the wort is cooled to a temperature of 5 to 15 ° C for bottom-fermented beer and to 15-18° C for top-fermented beers. During pumping it is cooled and aerated with oxygen, necessary for the yeast propagation.

Fermentation

At the beginning yeasts use sweet wort as a food resource. Then the amount of oxygen decreases, the reproduction of yeasts stops, and fermentation begins. In yeast cells are synthesized enzymes, that convert sugars into alcohol and carbon dioxide. At a lower temperature, this process proceeds slower, but more qualitatively.

After all the sugars processed, the yeasts settle on the bottom of the fermentation tank. The duration of fermentation and the temperature of the process depend on what kind of yeast was given and what kind of beer is produced - top or bottom fermentation. In the second case, the product obtained at this stage ("young beer") is placed in the tanks for ripening.

The purpose of ripening is to improve the organoleptic properties of the beverage, to break down diacetyl and esters.

Cylinder-conical tanks are widespread, in which the processes of basic fermentation and ripening occur continuously, in a single container.

Filtering

Then the beer is filtered from the remaining solids and yeast residues. Filtration is needed to reach colloidal and microbiological stability of the beverage. The beer must be stable so that visible changes do not happen during its shelf life.

Pasteurization

Principle of pasteurization is the inactivation or destruction of microorganisms that cause beer damage. Due to the acid reaction of beer, this process can be carried out at relatively low temperatures, since these microorganisms become incapable of making spores.

Usually pasteurization is conducted at 62° for 20 minutes.

Beer Carbonation

The next step that takes place is carbonation. Carbon dioxide contributes to perceived “fullness” or “body” of the beer, increases foaming potential, acts as a flavor enhancer and plays an important role in extending the shelf life of the product.

Packaging

Ready-made beer is bottled in kegs, glass, aluminum or plastic bottles of various volumes, aluminum or tin cans. Botte stopper can be disposable (crown plug), reusable or twisted-off. [4]

3.4.4 Beer Styles

At present, there is no single system for classifying beer in all its diversity. There are some features on which classification can be carried out:

- **Raw materials** (Barley, rye, wheat, rice, corn, etc.)
- **Color**, which depends on the amount and degree of roasting of dark malt in the original wort. There is light, dark, red, white and mixed beer.

- **Strength** (alcohol by volume, %) ranges from less than 3% to around 14%, but upper border can be increased by using different techniques, e.g. using the champagne yeasts.
- **Density** is the concentration of dry matter in the initial wort. Density is measured before the start of fermentation, it is indicated in percent or degrees of Balling (weight of extract in 100 grams of mixture).

In the US and most European countries, the main classification system of beers is classification by the method of fermentation:

- **Bottom fermentation**, in which wort is fermented at low temperature (6-15 ° C). This method has become the most common in modern brewing. Almost all beer obtained by this bottom fermentation is called a lager.
- **Top fermentation** tends to be at a relatively high temperature (15-25 ° C). Before the introduction of bottom fermentation, almost all beer was produced by this method. The most famous types of beer produced in this way are ale, porter, stout, wheat beer. [2]

3.4.5 Beer styles in Czech Republic

The great majority of beer in the Czech Republic is a bottom-fermented beer styles. The most popular styles are light and dark výčepní (literally “tap”), light lager. There also can be unfiltered versions of classic Czech styles.

Table 4 Bottom-fermented styles in the Czech Republic

Style		Strength, density
Light	Výčepní	3-4% (8-10° Plato)
	Lager	4.4 - 5% (11-12.5° Plato)
	Special	5.3 - 5.8% (13-14° Plato)
		6 - 7% (15-17° Plato)
Semi dark	Special	8 - 9% (18-21° Plato)
		3-4% (8-10° Plato)
	Lager	4.4 - 5% (11-12° Plato)
	5.3 - 6% (13-14° Plato)	
Dark	Special	6 - 7% (15-17° Plato)
		8 - 9% (18-21° Plato)
	Lager	4.4 - 5% (11-12° Plato)
	5.3 - 5.8% (13-14° Plato)	
Dark	Special	6 - 7% (15-17° Plato)
		8 - 10% (18-24° Plato)
Porter	8 - 9% (19-20° Plato)	

Source: [17]

Top-fermented styles are represented much less and are brewed by small and microbreweries. They produce following styles: Bavarian-style wheat beers, British styles, such as Bitter, Stout or Porter, Belgian styles like Witbier or strong ale. [17]

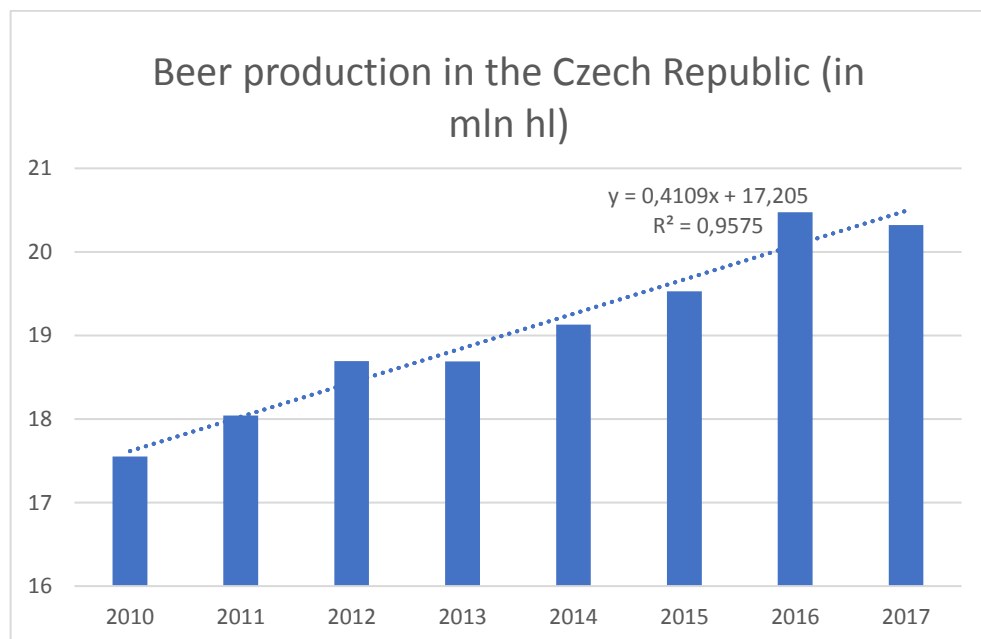
4 ANALYTICAL PART

4.1 Czech beer market overview

According to The Brewers of Europe, 2018, the Czech Republic has the highest beer consumption per capita in the world (138 l in 2017). Beer production of the Czech Republic is 7th largest in Europe, which is 20 322 000 hectoliters in 2017. Total beer consumption in 2017 was 15 518 000 hl, which means that 78% of the produced beer is consumed domestically.

The production of beer in Czech Republic has increasing trend over the last few years. The exception was 2017, when production decreased by 0,7 % due to decreasing demand in the domestic market. Regression coefficient from the trendline shows that each year production is increased by 410 900 hl. High coefficient of determination indicates high accuracy of this linear regression. Generally, increasing production trend is supported by relatively stable domestic consumption and growing exports. [24]

Figure 4 Beer production in the Czech Republic over the years



Source: [24]

There were 450 active breweries in 2017. The biggest share of the beer market in the Czech Republic occupies brewery Plzeňský Prazdroj. On the second and third places, with big gap are breweries Pivovary Staropramen and Heineken Česká republika. On the Table 5 are listed the 10 biggest breweries in the Czech Republic according to beer production.

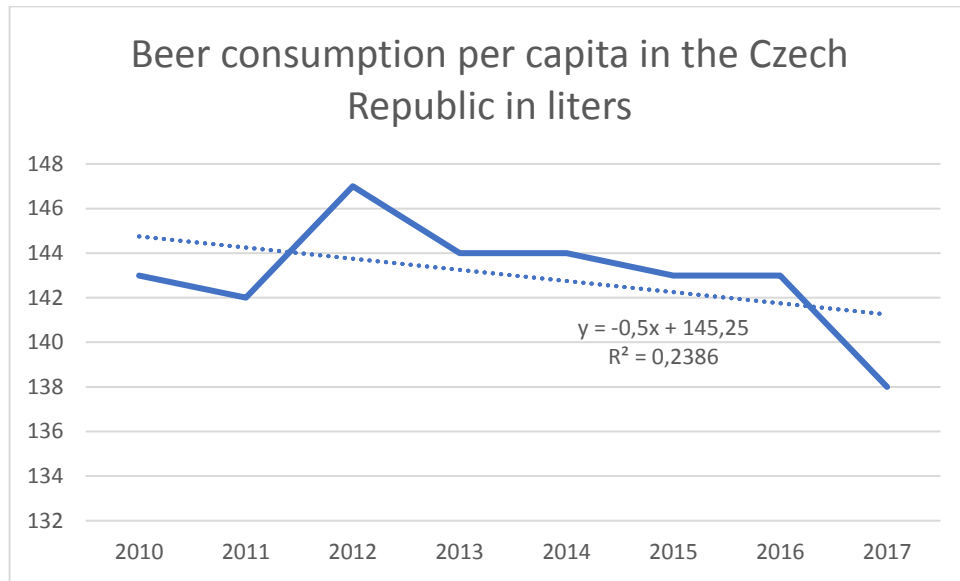
Table 5 The biggest breweries in the Czech Republic according to beer production 2014

Name of brewery	Main brands	Beer production (in 1000 hl)	Group
Plzeňský Prazdroj	Pilsner Urquell, Gambrinus, Radegast, Velkopovický kozel, Primus	10 150	SABMiller Plc
Pivovary Staropramen	Staropramen, Velvet, Ostravar, Bráník	3 100	MolsonCoors Brewing Co.
Heineken Česká republika	Zlatopramen, Krušovice, Starobrno, Březňák, Dačický, Hostan, Louny	2 300	Heineken N.V.
Budějovický Budvar	Budějovický Budvar, Pardál	1 470	národní podnik ČR
Pivovary Lobkowicz Group	Lobkowicz, Platan, Uherský Brod, Merlin, Klášter, Rychtář, Černá Hora, Ježek	894	PLG
LIF Group	Svijany, Rohozec, Primátor	802	LIF Group
PMS Přerov	Holba, Litovel, Zubr	755	PMS Přerov
Rodinný pivovar Bernard	Bernard	265	Duvel Moortgat (50%)
Pivovar Nymburk	Postřižinské pivo	163	
Pivovar Samson	Samson	156	AB InBev

Source: [18]

Contrary to the production, beer consumption per capita shows stable decreasing trend over the last few years. Regression coefficient from the trendline shows that each year beer consumption per capita is decreased by 0.5 l. However low coefficient of determination indicates low accuracy of this linear regression.

Figure 5 Beer consumption per capita in the Czech Republic over the years



Source: [24]

According to the classic microeconomic theory, decreasing consumption can be caused by decreasing income, growing inflation, growing price. But income or inflation can hardly be the cause of the decreasing demand of the beer, as the Czech Republic economics show continuous growth over the past 5 years. [20]

Table 6 GDP per capita and inflation rate in the Czech Republic 2010-2017

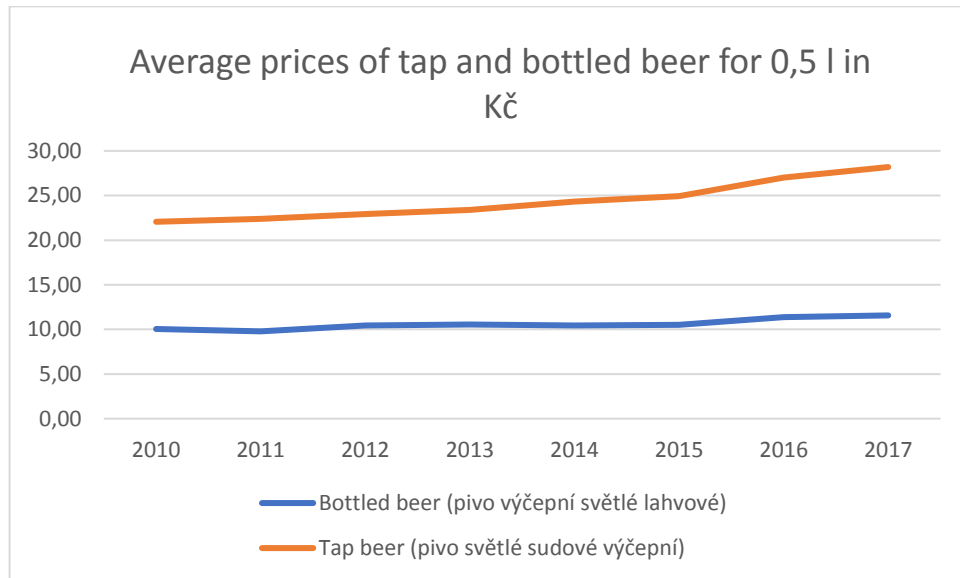
Year	GDP per capita (in US\$ PPP)	Inflation Rate
2010	27,559	1.5 %
2011	28,561	1.9 %
2012	28,803	3.3 %
2013	29,096	1.5 %
2014	30,434	0.3 %
2015	32,318	0.3 %
2016	33,529	0.7 %
2017	35,512	2.4 %

Source: [19]

Other possible factor of decreasing demand is beer price. In 2017 average price of bottled beer was 11,57 Kč, tap beer 28,19 Kč. But changing relative prices of tap and bottled beer have different trends. According to Flanders Investment & Trade, “the real price per liter

of on-trade beer has risen by 23% from 1994 to 2016; the real price of off-trade beer has fallen by 12% in the same time period”. Lower off-trade prices are caused by high competition on Czech beer market. [22]

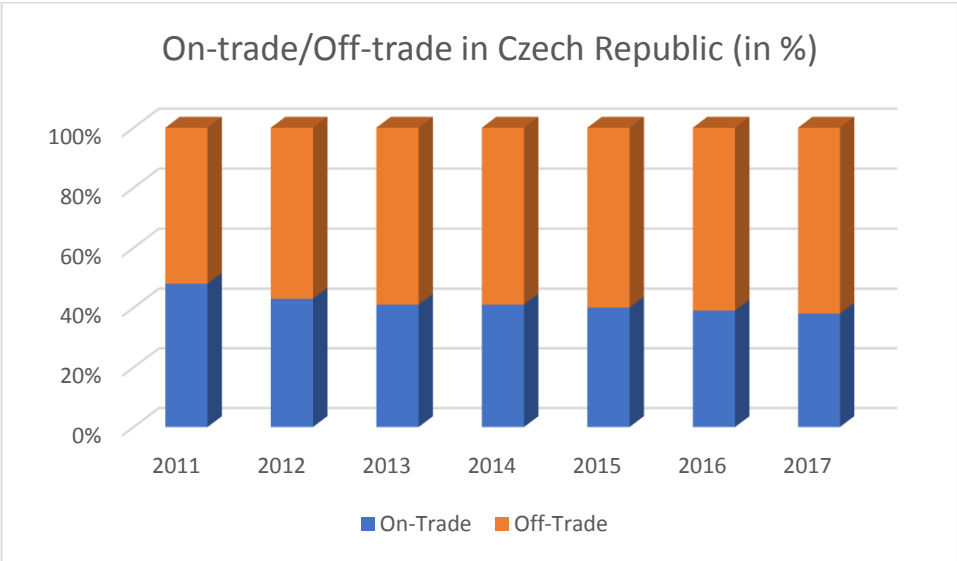
Figure 6 Average prices of tap and bottled beer in the Czech Republic over the years



Source: [21]

The distinction between on-trade and off-trade prices led to continuous growth of the off-trade sector from 48:52 in 2011 to 38:62 in 2017. František Šámal, The Chairman of the Czech Beer and Malt Association, says, that the main reasons for the decreasing of the on-trade sector are regulation and excessive bureaucracy, which complicates entrepreneurs' trade and impacts on Czech beer culture. Also, the implementation of the EET system and adoption of the anti-smoking law could have negative effect to the on-trade sector. [16]

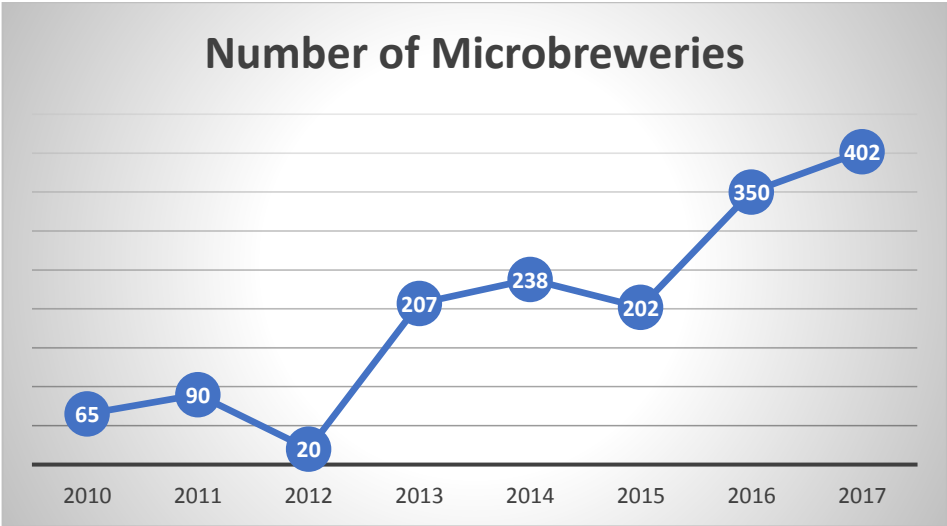
Figure 7 Shares of on-trade/off-trade sectors in the Czech Republic over the years



Source: [24]

Craft beer become very popular in the world in recent years. This trend has not bypassed the Czech Republic, where has been a huge growth of microbreweries (breweries with production up to 1000 hl) for several years. This also indicates the interest of consumers in new styles of beer, different from classic Czech styles.

Figure 8 Number of microbreweries in the Czech Republic over the years



Source: [24]

Recent study from Ipsos a Faculty of Social Studies UK shows that in the age group of 18 to 29 14 % of people drink less beer. At the same time, young people prefer to drink other beverages, such as ciders, cocktails. According to the survey, 38 percent of young people are choosing "mixed drinks" instead of beer. While in the total population it is only 24%. [23]

The study carried out by the Public Opinion Research Centre showed that 88% of males and 57% of females in the Czech Republic drink beer. Males drink around 4 liters per week, females around 1 liter. That defines gender as a factor influencing beer consumption. [15]

4.2 Evaluation of survey

Based on the Czech beer market analysis and marketing research approach, the following factors can be distinguished as affecting beer consumption in the Czech Republic: gender, age, level of income, beer price, place of drinking, level of education, occupation, season of the year, nationality, way of spending free time. To verify this assumption, questions regarding these factors were added to the survey.

According to principles, described in the theoretical part of this work, the questionnaire was designed. It is anonymous, consists of 26 closed questions. Most of them have one possible answer, several questions with multiple answers and option "other". The majority of closed questions were chosen for simplification of the passage of the survey, the reduction of respondents' answering time and faster analysis of the results. The first and second questions filtered the alcohol and beer drinkers, after that are questions about beer preferences. In the last part of the survey are personal questions, which can show the socio-demographic portrait of respondents. The preconditions to participate in survey were age over 18 years and living in the Czech Republic more than 6 months.

The questionnaire was made in English and Czech, to get higher response rate and obtain more diverse sample. The questionnaire was designed in Google Forms, distributed online via social websites, email, messengers.

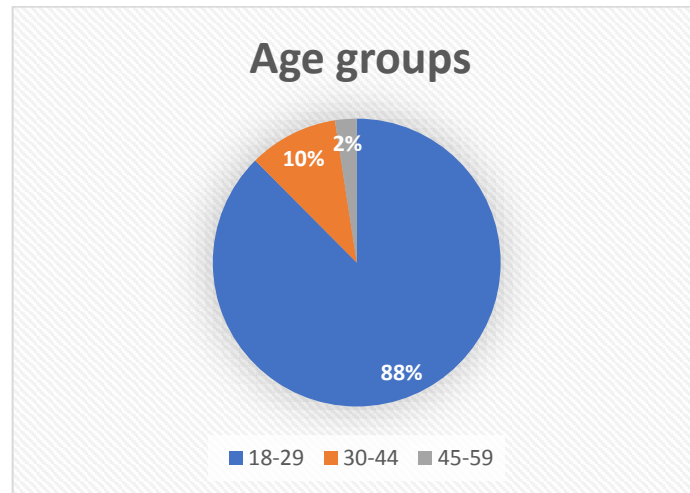
After the end of the survey, all information was placed in summary tables, and incomplete or illogical answers were deleted.

4.2.1 Evaluation of personal questions

Totally 289 people took part in the survey: 137 (47,4%) females and 152 (52,6%) males.

Most respondents (88%) are young people. This is the consequence of online distribution of the questionnaire. Also due to way of spreading of the information “word of mouth” can present some homogeneity of respondents.

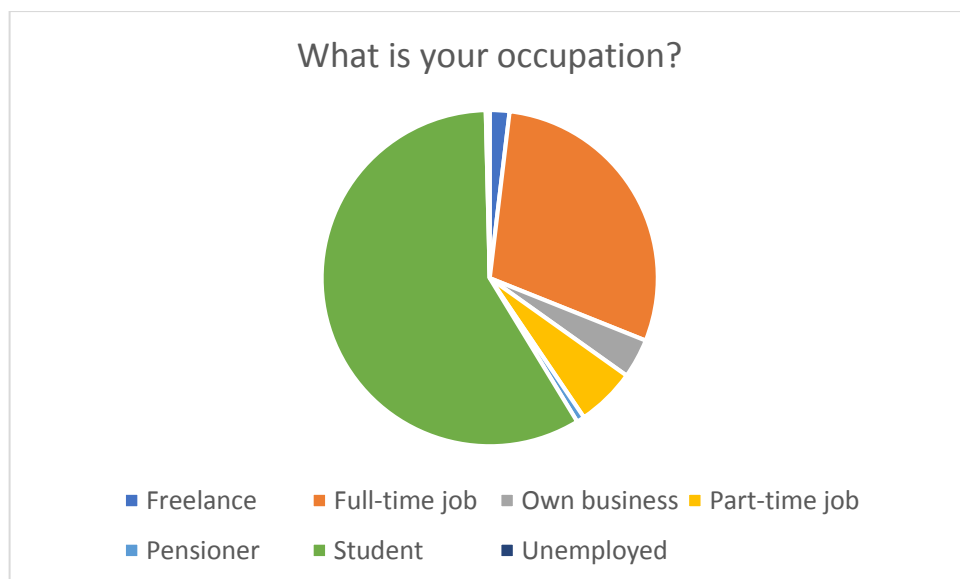
Figure 9 Age stratification of the sample



Source: Excel chart, own work

As was mentioned before, survey was published at some student groups in social media and inside author’s social circle. So, it is not surprising that most of the sample consists of students (58%). Next are full-time employees (29%).

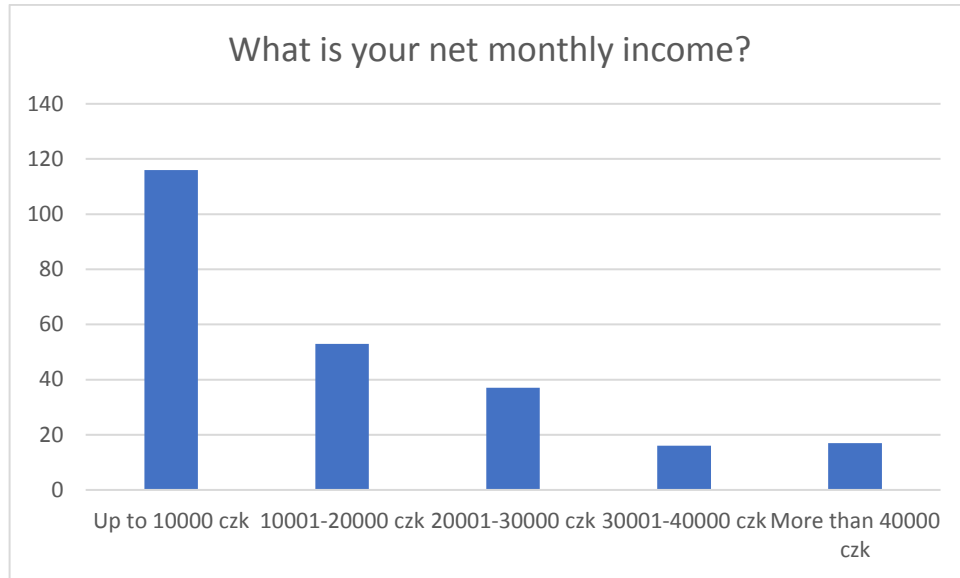
Figure 10 Occupation stratification of the sample



Source: Excel chart, own work

The next two questions also were influenced by prevailing number of students in the survey. As those who have full-time study and part-time job, most of the respondents have net monthly income up to 10000 czk (48,5%).

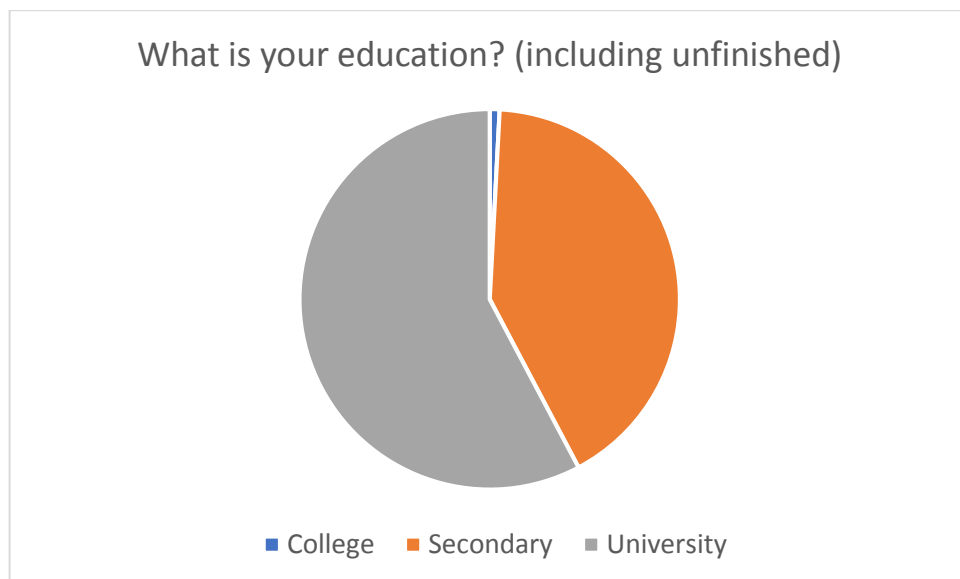
Figure 11 Net monthly income of respondents



Source: Excel chart, own work

Educational stratification is homogeneous, 58% of respondents study in university or have university degree, 41% have secondary degree. Notwithstanding this result is not good for studying the population, it can give detailed information about group of young educated people.

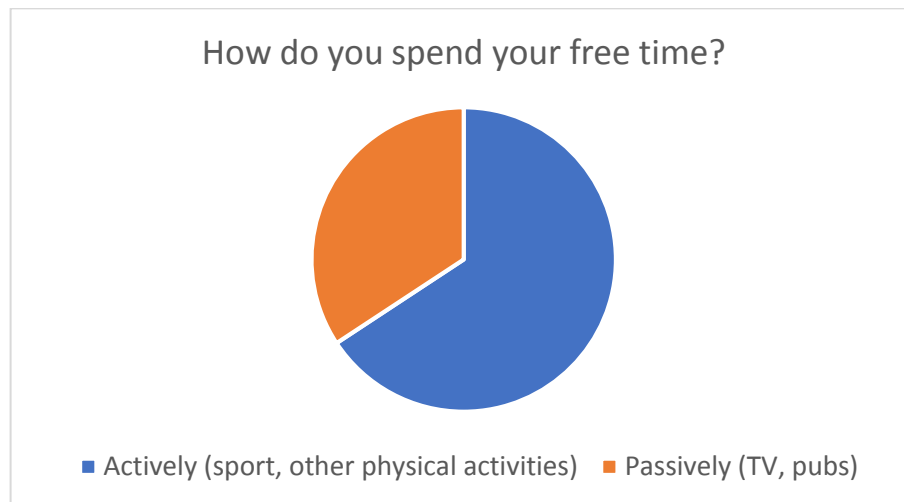
Figure 12 Levels of education of respondents



Source: Excel chart, own work

Often beer drinking is contrasted to active lifestyle. To explore this issue the question about leisure was added into the survey. Most of interviewees spend their free time actively (66%). But for the survey is important this ration only among beer drinkers. It is interesting that there is nearly the same result: 159 (66,5%) votes for active and 80 (33,5%) votes or passive lifestyle.

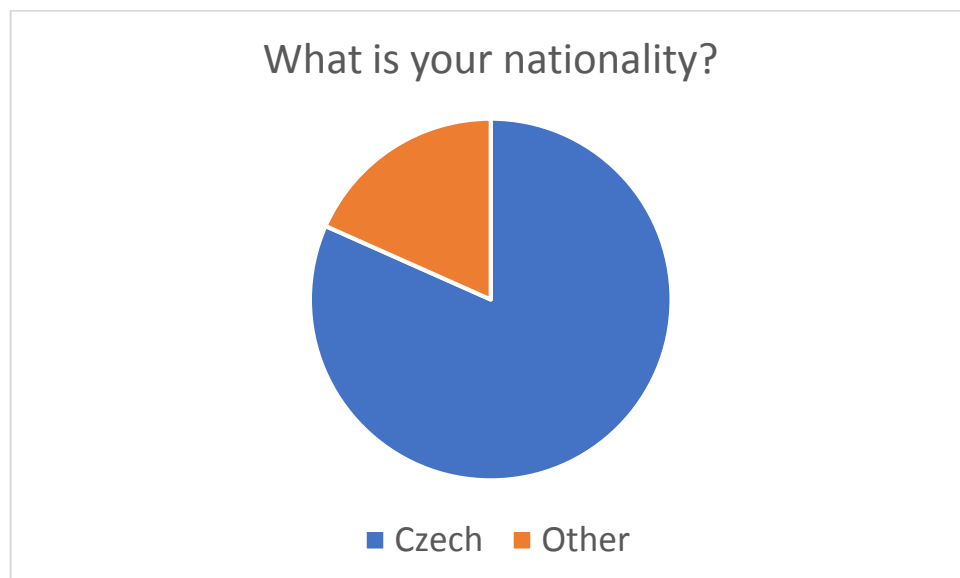
Figure 13 Respondents' way of spending free time



Source: Excel chart, own work

The survey was held in Czech and English, what contributed to much wider coverage of audience and raise interest to the questionnaire. The result was 82 % of Czech respondents.

Figure 14 Respondents' nationality



Source: Excel chart, own work

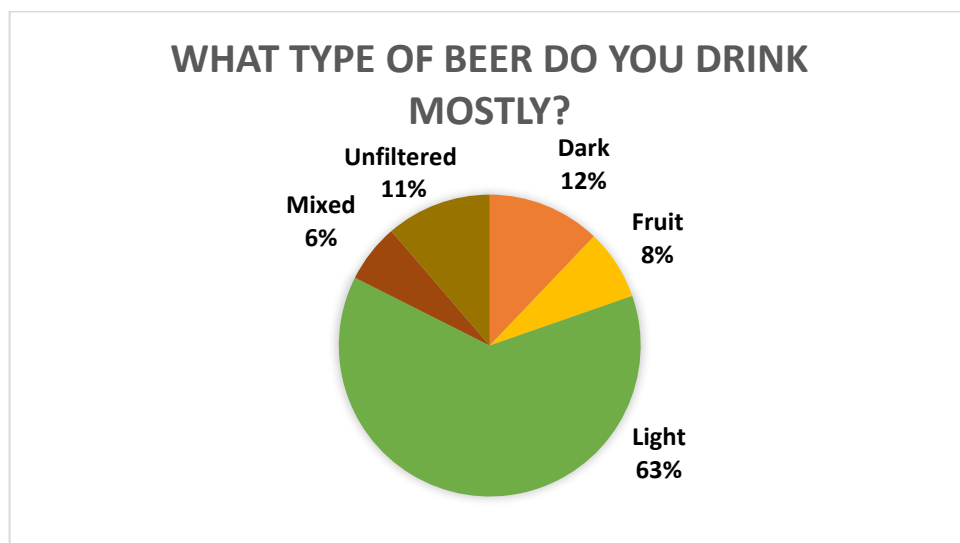
4.2.2 Evaluation of beer-related questions

The following is an overview of questions directly related to drinking beer. First of all, 18 (6,2%) respondents do not drink alcohol at all and 32 (11,1%) do not drink only beer.

In the first chapter of the analytical part were mentioned growing number of microbreweries in the Czech Republic and interest of young people in new tastes. The result of questionnaire correlates with that: 53% of interviewers like to try something new, while 47% of respondents prefer to drink the same type/brand of beer.

As it was expected, the most popular type of beer is light beer. 63% of all respondents prefer light beer to other types of beer. 39,5% of beer consumers prefer 12° beer, further are 11° beer (31,1%) and 10° beer (19,7%). Regarding the alcohol content, leads the beer of 4,1%-5% ABV. This strength of beer is preferred by 60% of respondents.

Figure 15 The distribution of popularity of beer types



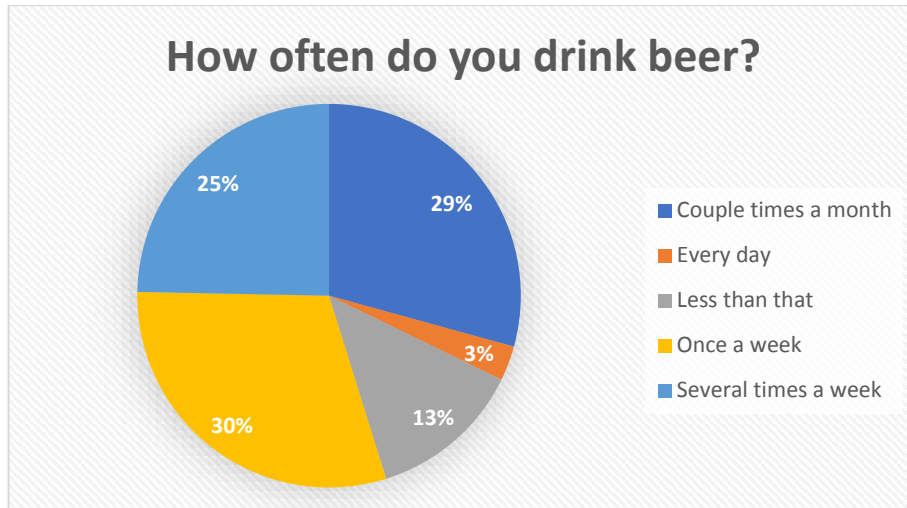
Source: Excel chart, own work

As for the frequency of beer consumption, most of respondents drink beer from several times a week to couple times a month. Most of respondents consume up to 1 l of beer weekly (49,3%).

Quantity of people, who prefer to drink beer in the summer (54,5%) is ahead of those, who drink beer regardless of the season (43,2%).

Most of respondents (66,1%) prefer to consume beer in pubs, restaurants, cafes. This differs from information about on-trade/off-trade beer consumption in the Czech Republic.

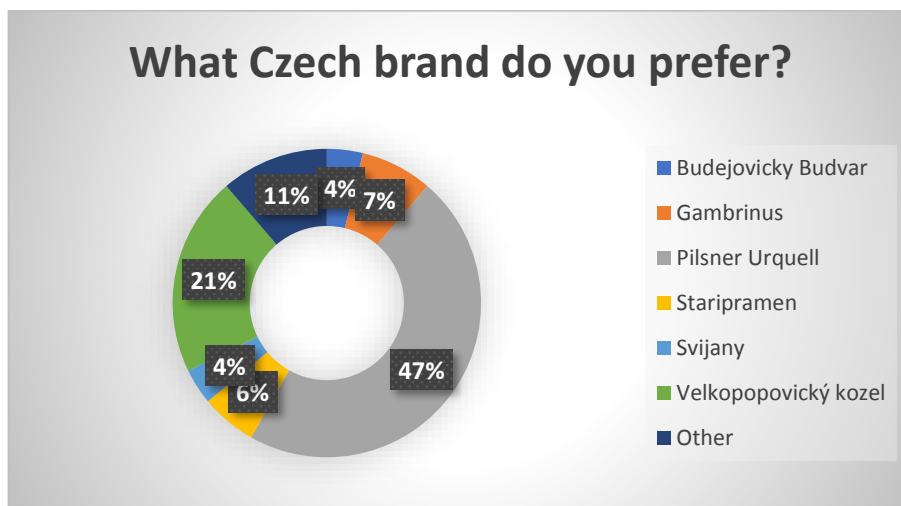
Figure 16 Frequency of beer consumption



Source: Excel chart, own work

Pilsner Urquell became the most popular Czech brand. On the 2nd and 3rd places are Velkopopovický kozel and Gambrinus. 37,2% of respondents don't drink beer of foreign brands.

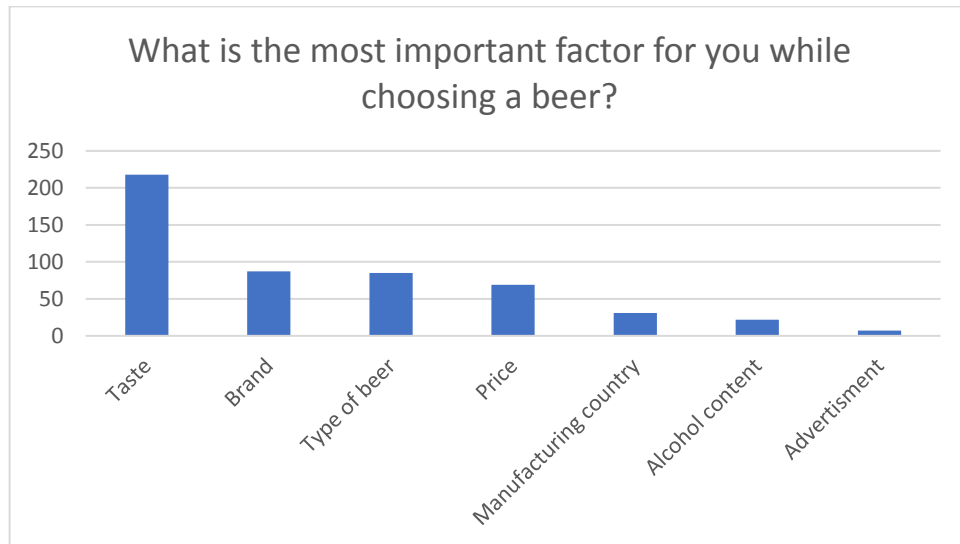
Figure 17 Preferences of Czech brands



Source: Excel chart, own work

According to survey the most important factor affecting in the choosing a beer is taste (91%). Brand (36%), type of beer (35,5%) and price (28,8%) were mentioned among the most significant factors.

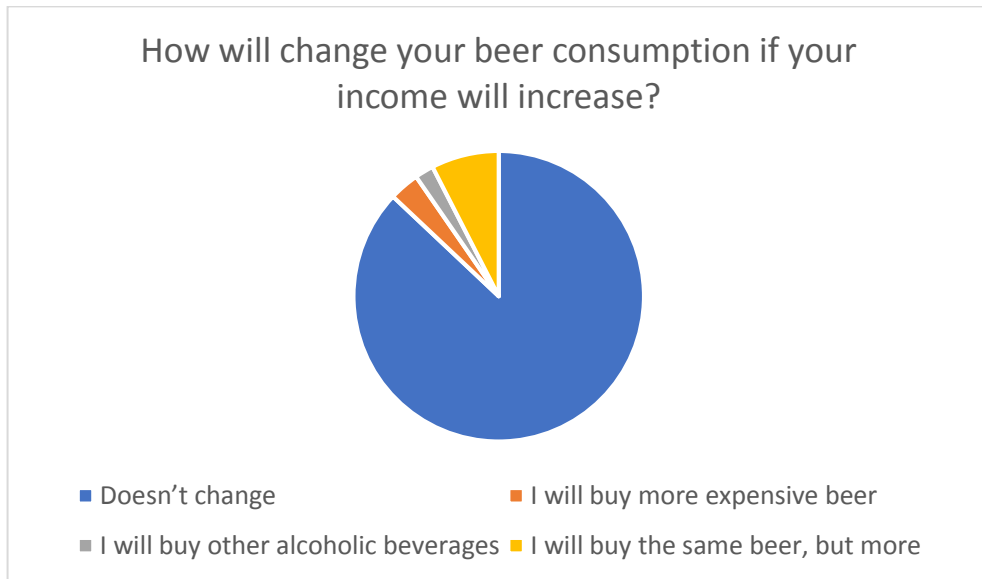
Figure 18 Factors affecting on choosing of beer



Source: Excel chart, own work

Income is considered as one of the most important factors influencing consumption. The bigger part of respondents spends on beer less than 300 czk per month. On the question “How will change your beer consumption if your income will increase?”, 87% of interviewees responded, that their consumption would not change. Thus, according to this questionnaire, beer demand can be interpreted as not elastic by income change.

Figure 19 Decisions of respondents when income will increase



Source: Excel chart, own work

The price was assumed as important factor, which can affect consumption. Almost half (44%) of respondents will reduce their beer consumption if the price will increase by 10%.

Figure 20 Decisions of respondents when the price of beer will increase



Source: Excel chart, own work

4.3 Hypothesis testing

To find out what factors can affect consumer behavior, following hypotheses will be tested:

H₀: There is no dependency between gender and beer type

H_0 : There is no dependency between gender and frequency of beer consumption

H_0 : There is no dependency between nationality and drinking of foreign brand beer

H_0 : There is no dependency between age and beer consumption in liters

H_0 : There is no dependency between age and consumption of beer

H_0 : There is no dependency between level of income and beer consumption in liters

H_0 : There is no dependency between education and consumption of beer

H_0 : There is no dependency between type of leisure and frequency of beer consumption

H_0 : There is no dependency between occupation and beer consumption

4.3.1 Analysis of dependency between gender and beer type.

H_0 : There is no dependency between gender and beer type

H_1 : There is dependency between gender and beer type

$\alpha=0,05$

Table 7 Contingency table: gender and type of beer

		Type of beer					
		Dark	Fruit	Light	Mixed	Unfiltered	Total
Gender	Female	12	17	55	6	11	101
	Expected	12.255	7.606	76.389	6.338	9.114	
Male	Frequency	17	1	95	9	16	138
	Expected	16.745	10.393	86.611	8.661	15.59	
Total	Frequency	29	18	150	15	27	239

Source: SAS output, own work

Table 8 Statistics: gender and type of beer

Statistic	DF	Value	Prob
Chi-Square	4	22.0780	0.0002
Phi Coefficient		0.3039	
Contingency Coefficient		0.2908	
Cramer's V		0.3039	

Source: SAS output, own work

For testing this hypothesis, χ^2 independency test can be used, because expected cell frequencies meet its requirements. P value is very small, $<\alpha$, so the null hypothesis is

rejected and **there is dependency between gender and beer type**. According to Cramer's V, this dependency is weak.

4.3.2 Analysis of dependency between gender and frequency of beer consumption

H_0 : There is no dependency between gender and frequency of beer consumption

H_1 : There is dependency between gender and frequency of beer consumption

$\alpha=0,05$

Table 9 Contingency table: gender and frequency of beer consumption

Table of Gender by Frequency of beer consumption								
		Frequency of beer consumption					Total	
		Every day	Several times a week	Once a week	Couple times a month	Less than that		
Gender	Female	Frequency	2	18	25	35	21	101
	Expected	2.9582	24.933	30.427	29.582	13.1		
Male	Frequency	5	41	47	35	10	138	
	Expected	4.0418	34.067	41.573	40.418	17.9		
Total	Frequency	7	59	72	70	31	239	

Source: SAS output, own work

Table 10 Statistics: Gender and frequency of beer consumption

Statistic	DF	Value	Prob
Chi-Square	4	15.5212	0.0037
Phi Coefficient		0.2548	
Contingency Coefficient		0.2469	
Cramer's V		0.2548	

Source: SAS output, own work

For testing this hypothesis, χ^2 independency test can be used, because expected cell frequencies meet its requirements. P value is $<\alpha$, so the null hypothesis is rejected and **there is dependency between gender and frequency of beer consumption**. According to Cramer's V, this dependency is weak.

4.3.3 Analysis of dependency between nationality and drinking of foreign brand beer

H_0 : There is no dependency between nationality and drinking of foreign brand beer

H_1 : There is dependency between nationality and drinking of foreign brand beer

$\alpha=0,05$

Table 11 Contingency table: nationality and drinking of foreign brand beer

		Table of Nationality by Drinking of foreign brand beer		
		Drinking of foreign brand		Total
		No	Yes	
Nationality	Frequency	80	118	198
	Expected	73.732	124.27	
Other	Frequency	9	32	41
	Expected	15.268	25.732	
Total	Frequency	89	150	239

Source: SAS output, own work

Table 12 Statistics: nationality and drinking of foreign brand

Statistic	DF	Value	Prob
Chi-Square	1	4.9487	0.0261
Phi Coefficient		0.1439	
Contingency Coefficient		0.1424	
Cramer's V		0.1439	

Source: SAS output, own work

For testing this hypothesis, χ^2 independency test can be used, because sample size is >40 . P value is $<\alpha$, so the null hypothesis is rejected and **there is dependency between nationality and drinking of foreign brand**. According to Cramer's V, this dependency is very weak.

4.3.4 Analysis of dependency between age and beer consumption in liters

H_0 : There is no dependency between age and beer consumption in liters

H_1 : There is dependency between age and beer consumption in liters

$\alpha=0,05$

Table 13 Contingency table: age and beer consumption in liters

Table of Age by Beer consumption in liters					
		Beer consumption in liters			Total
		Up to 1 l	1-3 l	3,1-5 l	
Age					
18-29	Frequency	110	64	33	207
	Expected	103.07	67.556	36.377	
30-59	Frequency	9	14	9	32
	Expected	15.933	10.444	5.6234	
Total	Frequency	119	78	42	239

Source: SAS output, own work

Table 14 Statistics: age and beer consumption in liters

Statistic	DF	Value	Prob
Chi-Square	2	7.2224	0.0270
Likelihood Ratio Chi-Square	2	7.3606	0.0252
Mantel-Haenszel Chi-Square	1	6.7017	0.0096
Phi Coefficient		0.1738	
Contingency Coefficient		0.1713	
Cramer's V		0.1738	

Source: SAS output, own work

For meeting the requirements for χ^2 independency test, categories “3,1-5 l”, “5.1-10 l” and “More than 10” were merged, categories “30-44”, “45-59” and “60+” were merged. P value is $< \alpha$, so the null hypothesis is rejected and **there is dependency between age and beer consumption in liters**. According to Cramer’s V, this dependency is very weak.

4.3.5 Analysis of dependency between age and consumption of beer

H_0 : There is no dependency between age and consumption of beer

H_1 : There is dependency between age and consumption of beer

$\alpha=0,05$

Table 15 Contingency table: age and consumption of beer

Table of Age by Beer consumer				
		Beer consumer		Total
		no	yes	
Age				
18-29	Frequency	46	207	253
	Expected	43.772	209.23	
30-59	Frequency	4	32	36
	Expected	6.2284	29.772	
Total	Frequency	50	239	289

Source: SAS output, own work

Table 16 Statistics: age and drinking of beer

Statistic	DF	Value	Prob
Chi-Square	1	1.1012	0.2940
Phi Coefficient		0.0617	
Contingency Coefficient		0.0616	
Cramer's V		0.0617	

Source: SAS output, own work

Before testing procedure categories “30-44”, “45-59” and “60+” were merged. For testing this hypothesis, χ^2 independency test can be used, because sample size is >40 . P value is $<\alpha$, so the null hypothesis is accepted and **there is no dependency between age and drinking of beer.**

4.3.6 Analysis of dependency between level of income and beer consumption in liters

H_0 : There is no dependency between level of income and beer consumption in liters

H_1 : There is dependency between level of income and beer consumption in liters

$\alpha=0,05$

Table 17 Contingency table: level of income and beer consumption in liters

		Beer consumption in liters			Total	
		Up to 1 l	1-3 l	More than 3 l		
Level of income	Up to 10000 czk	Frequency	66	39	11	116
	Expected	58	37.529	20.471		
10001-20000 czk	Frequency	20	19	14	53	
	Expected	26.5	17.147	9.3529		
20001-30000 czk	Frequency	20	10	8	38	
	Expected	18.5	11.971	6.5294		
30001-40000 czk	Frequency	7	3	6	16	
	Expected	8	5.1765	2.8235		
More than 40000 czk	Frequency	6	7	3	16	
	Expected	8	5.1765	2.8235		
Total	Frequency	119	78	42	239	

Source: SAS output, own work

Table 18 Statistics: level of income and beer consumption in liters

Statistic	DF	Value	Prob
Chi-Square	8	16.6031	0.0345
Phi Coefficient		0.2641	
Contingency Coefficient		0.2554	
Cramer's V		0.1868	

Source: SAS output, own work

For meeting the requirements for χ^2 independency test, categories “3-5 l”, “5,1-10 l” and “More than 10” were merged. P value is $<\alpha$, so the null hypothesis is rejected and **there is dependency between level of income and beer consumption in liters**. According to Cramer’s V, this dependency is very weak.

4.3.7 Analysis of dependency between education and frequency of beer consumption

H_0 : There is no dependency between education and frequency of beer consumption

H_1 : There is dependency between education and frequency of beer consumption

$\alpha=0,05$

Table 19 Contingency table: education and frequency of beer consumption

		Frequency of beer consumption					Total	
		Every day	Several times a week	Once a week	Couple times a month	Less than that		
Education	Secondary	Frequency	4	27	24	34	12	101
	Expected	2.9582	24.933	26.201	33.808	13.1		
University	Frequency	3	32	38	46	19	138	
	Expected	4.0418	34.067	35.799	46.192	17.9		
Total	Frequency	7	59	62	80	31	239	

Source: SAS output, own work

Table 20 Statistics: education and frequency of beer consumption

Statistic	DF	Value	Prob
Chi-Square	4	1.4144	0.8417
Phi Coefficient		0.0769	
Contingency Coefficient		0.0767	
Cramer's V		0.0769	

Source: SAS output, own work

For meeting the requirements for χ^2 independency test, categories “College” and “Secondary” were merged. P value is $>\alpha$, so the null hypothesis is accepted and **there is no dependency between education and frequency of beer consumption**.

4.3.8 Analysis of dependency between type of leisure and frequency of beer consumption

H_0 : There is no dependency between type of leisure and frequency of beer consumption

H_1 : There is dependency between type of leisure and frequency of beer consumption

$\alpha=0,05$

Table 21 Contingency table: type of leisure and frequency of beer consumption

		Frequency of beer consumption					Total
		Every day	Several times a week	Once a week	Couple times a month	Less than that	
Active	Frequency	3	42	50	46	18	159
	Expected	4.6569	39.251	47.9	46.569	20.623	
Passive	Frequency	4	17	22	24	13	80
	Expected	2.3431	19.749	24.1	23.431	10.377	
Total	Frequency	7	59	72	70	31	239

Source: SAS output, own work

Table 22 Statistics: type of leisure and frequency of beer consumption

Statistic	DF	Value	Prob
Chi-Square	4	3.6293	0.4585
Phi Coefficient		0.1232	
Contingency Coefficient		0.1223	
Cramer's V		0.1232	

Source: SAS output, own work

For testing this hypothesis, χ^2 independency test can be used, because expected cell frequencies meet its requirements. P value is $>\alpha$, so the null hypothesis is accepted and **there is no dependency between type of leisure and frequency of beer consumption.**

4.3.9 Analysis of dependency between occupation and beer consumption

H_0 : There is no dependency between occupation and beer consumption

H_1 : There is dependency between type occupation and beer consumption

$\alpha=0,05$

Table 23 Contingency table: occupation and beer consumption

		Beer consumer		
		no	yes	Total
Occupation	Frequency			
	Expected			
Full-time job	Frequency	8	52	60
	Expected	10.381	49.619	
Own business	Frequency	4	15	19
	Expected	3.2872	15.713	
Part-time job	Frequency	0	18	18
	Expected	3.1142	14.886	
Student	Frequency	38	154	192
	Expected	33.218	158.78	
Total	Frequency	50	239	289

Source: SAS output, own work

Although the occupation categories “Pensioner”, “Part-time job” and “Unemployed”, categories “Freelance” and “Own business” were merged due to small number of respondents, the requirements for conducting χ^2 independency test were not met, 25% of expected frequencies are <5. Hypothesis cannot be tested.

4.3.10 Evaluation of the representativity of the sample

To assess the plausibility of the sample, it’s possible to compare the proportion of the sample with the population proportion from the research carried out by the Public Opinion Research Centre.

According to their research, 57% females and 88% males in the Czech Republic drink beer.

H₀: There is no difference between the sample proportion of females drinking beer and the theoretical proportion of females drinking beer.

H₁: There is difference between the sample proportion of females drinking beer and the theoretical proportion of females drinking beer

$\alpha=0,05$.

Table 24 Proportions of female respondents

Beer consumer	Female	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Yes		101	73.72	101	73.72
No		36	26.28	137	100.00

Source: SAS output, own work

Table 25 Statistics for female proportion

Test of H0: Proportion = 0.57	
ASE under H0	0.0423
Z	3.9536
One-sided Pr > Z	<.0001
Two-sided Pr > Z	<.0001

Source: SAS output, own work

For testing this hypothesis, one sample z-test for proportion is used. P value is $<\alpha$, so the null hypothesis is rejected. **There is difference between the sample proportion of females drinking beer and the theoretical proportion of females drinking beer.**

H₀: There is no difference between the sample proportion of males drinking beer and the theoretical proportion of males drinking beer.

H₁: There is difference between the sample proportion of males drinking beer and the theoretical proportion of males drinking beer

$\alpha=0,05$.

Table 26 Proportions of male respondents

Beer consumer	Male	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Yes		138	90.79	138	90.79
No		14	9.21	152	100.00

Source: SAS output, own work

Table 27 Statistics for male proportion

Test of H0: Proportion = 0.88	
ASE under H0	0.0264
Z	1.0583
One-sided Pr > Z	0.1450
Two-sided Pr > Z	0.2899

Source: SAS output, own work

For testing this hypothesis, one sample z-test for proportion is used. $Z < Z_{\alpha}$, p value is $>\alpha$, so the null hypothesis is accepted. **There is no difference between the sample proportion of males drinking beer and the theoretical proportion of males drinking beer.**

Thus, the sample obtained during the own research is more plausible in relation to men than women.

5 CONCLUSION

In this thesis was conducted a research, the aim of which was to study beer consumption in the Czech Republic and find factors that affect consumer preferences in beer. For this purpose, was reviewed Czech beer market, proposed some assumptions and prepared the questionnaire. The obtained data was analyzed and interpreted.

Czech beer market nowadays shows trends of decreasing consumption and increasing production. Also, there is tendency of shifting beer consumption to the off-trade sector. Another trend is interest of Czechs in craft beer, which is produced by microbreweries.

The survey consisted of 26 questions. 289 people were interviewed, 137 females and 152 males. The most popular type of beer is light beer, 12° density and 4,1-5% ABV. The most favorable places to drink beer are pub, restaurant, café. The most preferable season to drink beer is summer. Respondents defined the following factors as the most important for them: taste (91%), brand (36%), type of beer (35,5%) and price (28,8%). Significant part of respondents (44%) would decrease beer consumption if the beer price will increase by 10%.

Several hypotheses were set forward and variables were analyzed to test the dependence between them. After hypotheses testing, the following hypotheses were accepted:

- There is dependency between gender and beer type. Females more likely will drink different types of beer (fruit, dark, unfiltered), while males mainly prefer one type (light).
- There is dependency between gender and frequency of beer consumption. Generally, males drink beer more frequently than females.
- There is dependency between age and beer consumption in liters. Age group of 18-29 drink less beer than age group of 30-59.
- There is dependency between nationality and drinking of foreign brand. Czechs mainly prefer Czech beer, foreigners more often drink beer of foreign brands.
- There is dependency between level of income and beer consumption in liters. With higher income beer consumption slightly increase.

Thus, price, season, gender, age, nationality and level of income are factors, that influence consumption of beer on the Czech Republic. The trend of customers' interest in craft beer

and new tastes should be considered as well. The marketing department of brewery can implement these findings to improve their marketing strategy.

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7 APPENDIX

Questionnaire

1. Do you drink alcohol?

- Yes
- No (please go to question 20)

2. Do you drink beer?

- Yes
- No (please go to question 18)

3. What type of beer do you drink mostly?

- Light
- Black
- Mixed
- Unfiltered
- Fruit

4. Which of the following options suits you best?

- I almost always drink the same type/brand of beer
- I like to try different types/brands

5. What degree of beer do you drink mostly?

- Less than 10°
- 10°
- 11°
- 12°
- More than 12°

6. What alcohol content in beer do you prefer?

- 0-4%
- 4,1%-5%
- 5,1-6%
- More than 6%

7. How often do you drink beer?

- Every day
- Several times a week
- Once a week
- Couple times a month
- Less than that

8. On what season do you drink beer more?

- Winter
- Spring
- Summer
- Autumn
- Doesn't matter

9. Where do you drink beer the most often?

- At home
- In pubs/restaurants/cafes
- Outdoors (nature/picnic/park)
- In clubs/parties

10. What beer package do you prefer (in case of drinking outside of pub/restaurant)?

- Draught/Tap
- Bottle
- Tin can
- PET bottle

11. What Czech brand do you prefer?

- Pilsner Urquell
- Staropramen
- Budweiser Budvar
- Velkopopovický kozel
- Gambrinus
- Other:

12. Do you drink beer of foreign brand?

- Yes
- No

13. What is the most important factor for you while choosing a beer? (Several options possible)

- Taste
- Type of beer
- Price
- Brand
- Manufacturing country
- Alcohol content
- Advertisement

14. Estimate your weekly beer consumption (in liters)

- Up to 1 l

- 1-3 l
- 3,1-5 l
- 5,1-10 l
- More than 10 l

15. How much money do you spend for beer per month in average?

- Up to 100 czk
- 101-300 czk
- 301-500 czk
- 501-700 czk
- More than 700 czk

16. How will change your beer consumption if your income will increase?

- Doesn't change
- I will buy the same beer, but more
- I will buy more expensive beer
- I will buy other alcoholic beverages

17. Will you reduce beer consumption if the price will increase by 10%?

- Yes
- No

18. What another alcoholic beverage do you drink? (Several options possible)

- Wine
- Cider
- Cocktails
- Strong alcohol
- Other:

19. How much money do you spend for alcoholic beverages per month in average?

- Up to 100 czk
- 101-300 czk
- 301-500 czk
- 501-1000 czk
- 1001-2000 czk
- more than 2000 czk

20. What is your age?

- 18-29
- 30-44
- 45-60
- 60+

21. What is your gender?

- Female
- Male

22. What is your occupation?

- Student
- Full-time job
- Part-time job
- Freelance
- Own business
- Pensioner
- Unemployed

23. What is your education (including unfinished)?

- Secondary school
- College
- University

24. What is your net monthly income?

- Up to 10000 czk
- 10001-20000 czk
- 20001-30000 czk
- 30001-40000 czk
- More than 340000 czk

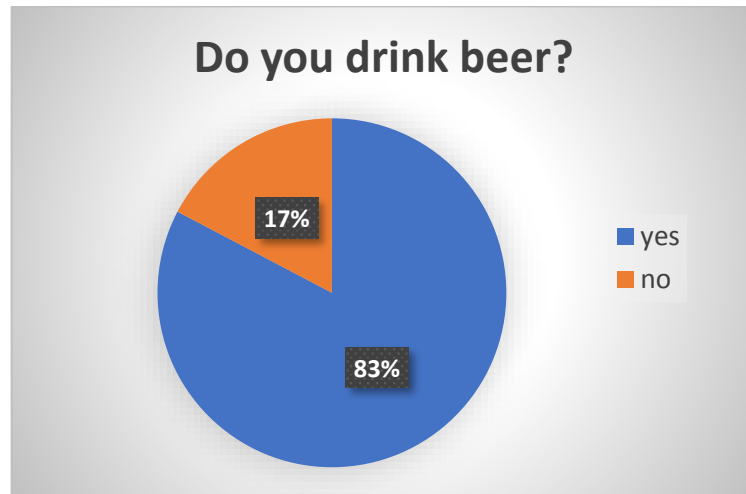
25. How do you spend your free time?

- Actively (e.g. sport, other physical activities)
- Passively (e.g. TV, pubs)

26. What is your nationality?

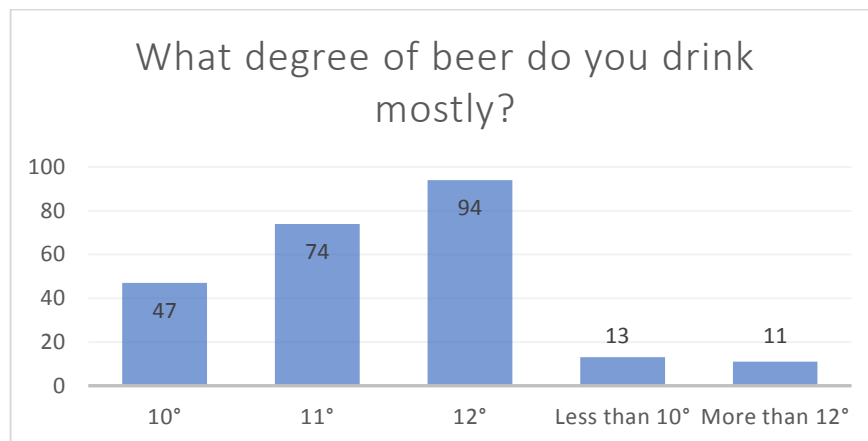
- Czech
- Other

Figure 21 Percentage of beer consumers



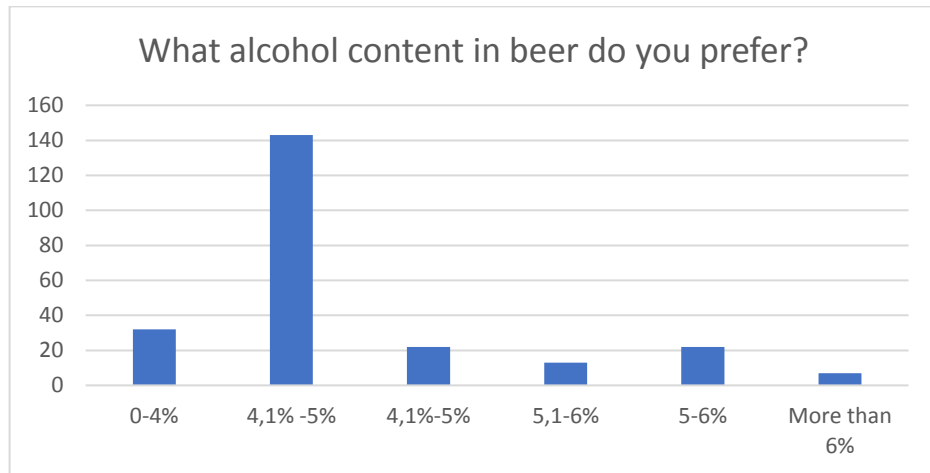
Source: Excel chart, own work

Figure 22 The distribution of popularity of beer degrees



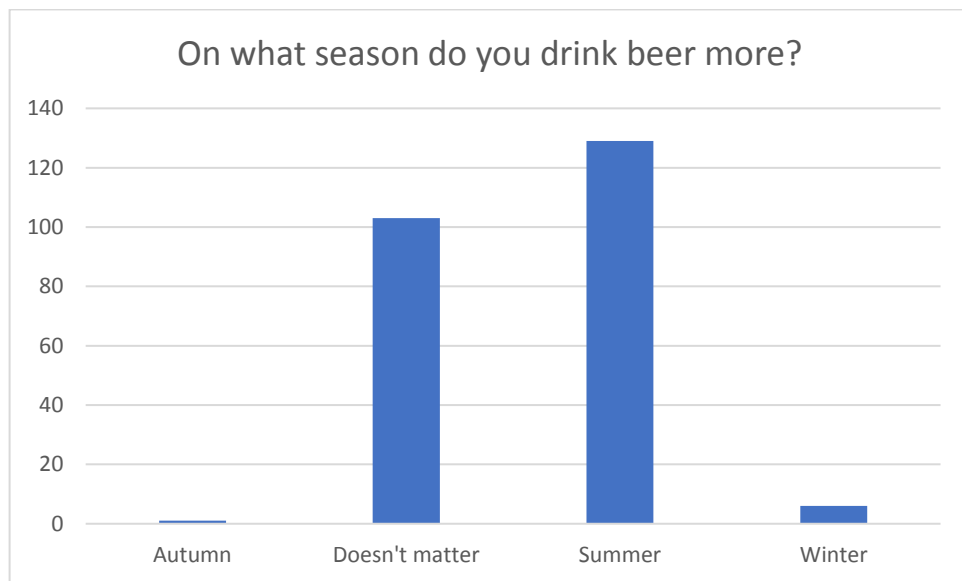
Source: Excel chart, own work

Figure 23 Distribution of beers strength preferences



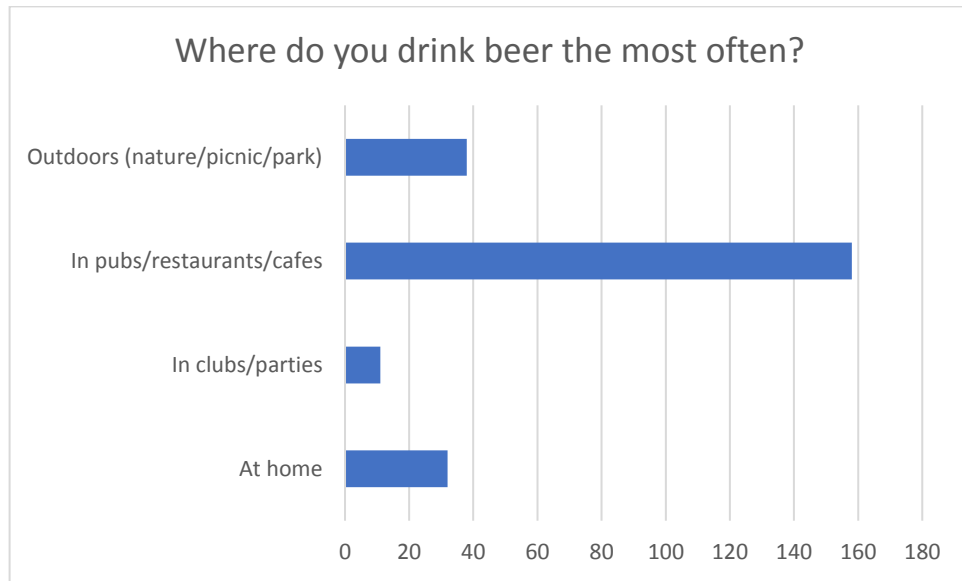
Source: Excel chart, own work

Figure 24 Seasonal beer preferences



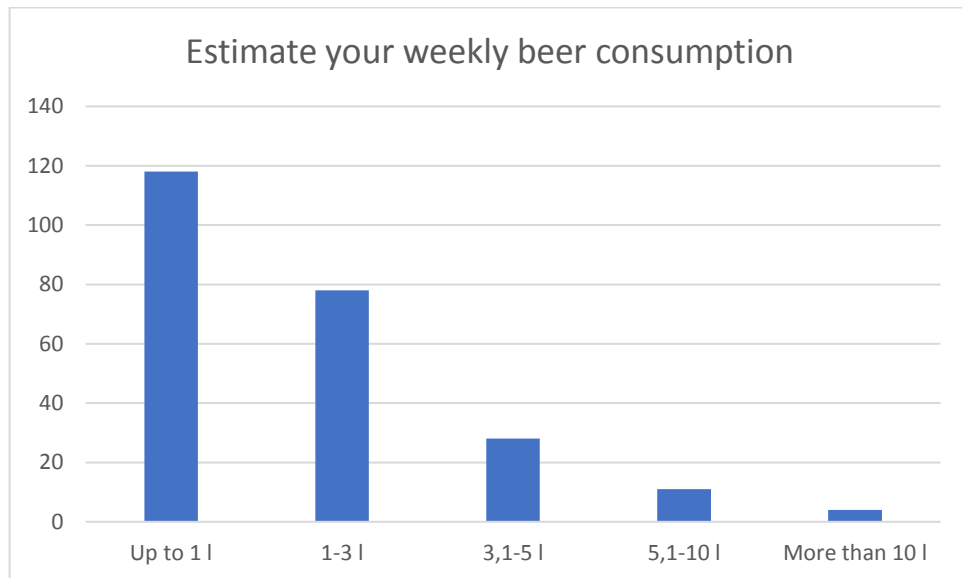
Source: Excel chart, own work

Figure 25 Preferences of places to consume beer



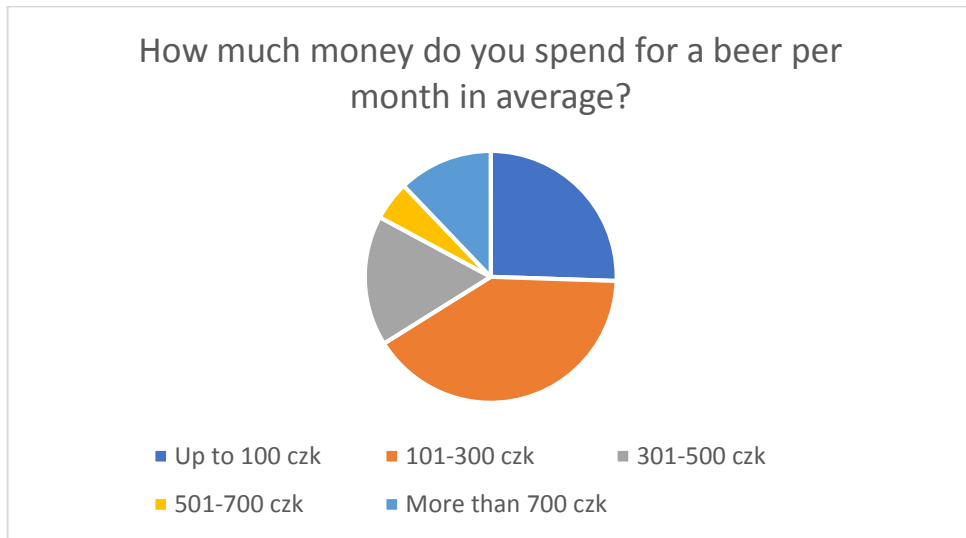
Source: Excel chart, own work

Figure 26 Respondents' weekly beer consumption



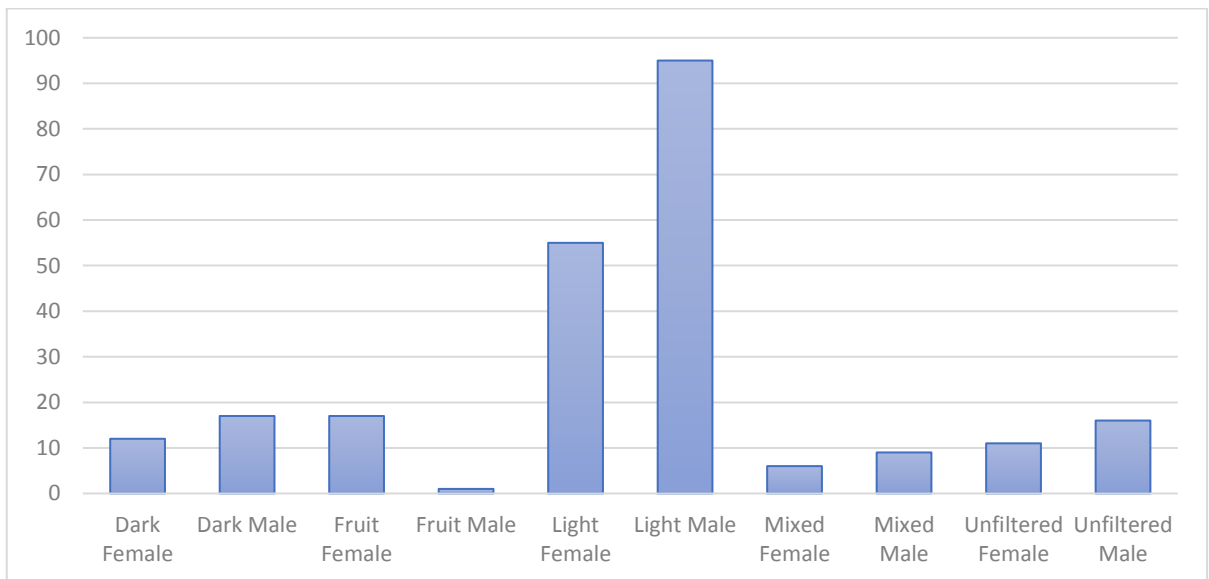
Source: Excel chart, own work

Figure 27 Money spent on beer monthly



Source: Excel chart, own work

Figure 28 Type of drinking beer and gender



Source: Excel chart, own work