

SZENT ISTVÁN UNIVERSITY
PhD SCHOOL OF MANAGEMENT AND BUSINESS ADMINISTRATION
GÖDÖLLŐ

Factors influencing the customer satisfaction of agricultural machinery

Thesis of doctoral dissertation (PhD)
Doctoral (PhD) thesis

By
BOLL ANIKÓ

GÖDÖLLŐ
2013

Name of doctoral school: Management and Business Administration PhD School

Field of science: Management and Business Administration Studies Science

Director: Prof. Dr. István Szűcs
professor
DSc (Economic Science)
Szent István University
Faculty of Economic and Social Science
Institute of Economic, Law and Methodology

Supervisor: Prof. Dr. József Lehota
professor
DSC (Economic Science)
Szent István University
Faculty of Economic and Social Science
Institute of Marketing

.....
Director's approval

.....
Supervisor's approval

TABLE OF CONTENTS

1. INTRODUCTION.....	HIBA! A KÖNYVJELZŐ NEM LÉTEZIK.
1.1. Relevance.....	Hiba! A könyvjelző nem létezik.
1.2. Objectives	Hiba! A könyvjelző nem létezik.
2. THE PRESENTATION OF THE RESEARCH, MATERIALS AND METHOD	6
2.1. Research hypothesis.....	Hiba! A könyvjelző nem létezik.
2.2. Data source	Hiba! A könyvjelző nem létezik.
2.3. Statistical methodology	11
3. RESULTS	HIBA! A KÖNYVJELZŐ NEM LÉTEZIK.
3.1. The importance of customer satisfaction accordig to literature.....	12
3.2. Presentation of machinery groups	15
3.2.1. Factors influencing the satisfaction of customers purchasing combine harvesters	15
3.2.2. Factors influencing the satisfaction of customers purchasing balers.....	19
3.2.3. Factors influencing the satisfaction of customers purchasing tractors	21
3.2.4. Results of telephone and peronal interviews	22
3.2.5. Factors influencing customer satisfaction - all machine groups.....	24
3.3. New and novel scientific results	26
4. CONCLUSIONS AND RECOMMENDATIONS.....	28
5. SUMMARY	HIBA! A KÖNYVJELZŐ NEM LÉTEZIK.
PUBLICATIONS IN THE FIELD OF THE PHD WORK.....	30

1. INTRODUCTION

1.1.Relevance

Customer satisfaction is one of today's most relevant topics. Customer satisfaction is important to varying degrees all over the world, in every company's business life. Competition is getting stronger, there is a struggle to get customers. Together with the importance of reducing costs, the role of keeping and winning over new customers is increasing. In addition to increasing the number of loyal customers, it is crucial to take customer satisfaction into consideration. Numerous companies carry out satisfaction surveys, but these are not made public. Literature has repeatedly referred to the fact that the number of domestic surveys is relatively modest. (Hofmeister-Tóth et al., 2003). However, based on the result of more empirical research, it can be stated that customer satisfaction and the interpretation and extent of customer orientation is variant in different sectors. Among services, higher education, healthcare and suppliers in chemical industries can be mentioned. To my knowledge, surveys in the area of agricultural machinery have not been published in Hungary.

One of the main policies of the Deutsche Landwirtschafts-Gesellschaft (German Agricultural Society, my former employer) agreed completely with Husti, claiming that it is necessary to create a platform for the cooperation of agricultural stakeholders: 'teaching, research, breeding, development, production, purchasing, processing and distributing organizations' (Husti, 2008, p.609). According to Husti (2008), our European closing up depends on research, technological development and appreciation of future innovation.

In addition to the above, the relevance of customer satisfaction is justified by the fact that the spreading of mass marketing caused the manufacturers and service providers to lose direct contact with customers. The number of interactions between the customers and producers-services has decreased.

Agriculture is a dominant branch of Hungary's national economies. Agricultural machinery, and consequently trade is therefore important. Success connected to them is greatly influenced by customer satisfaction.

Large number of data and analyzes can be found on Hungarian agriculture. Also, numerous research results have been published on the topic of food consumer behaviour. However, sales of agricultural investment equipment pose another set of challenges to the manufacturer.

Husti (1999) dealt with agricultural machinery service more than a decade ago. He analyzed and systematized the different service areas. Still, the amount of agricultural marketing literature dealing with agricultural machinery – especially with results of customer satisfaction in this field - is modest. Hungarian agricultural machinery has a very important role in Hungary being competitive in the European Union. However, the majority of agricultural machinery gets to farmers through importers.

In Hungary, agricultural machinery does not have a wide enough area for analysis, but the Hungarian agriculture has not reduced the need for high-quality machines. In Hungary, nearly a million landowners involved in agricultural activities are registered. Admittedly, only 56 thousand farms exceed the territory of one hectare. However, the need for agricultural machinery is still significant, regardless of the size of the farmland. Hungarian agricultural machinery is generally outdated, new machines are needed. Here is where the above mentioned two target groups meet one another. During my research I examined how German products find buyers in Hungary, and what are the factors that influence their satisfaction.

Information for agricultural machinery manufacturers about buying behaviour of people working in agriculture is little. In addition to the difficult task of the manufacturers, it is also a problem that agricultural producers are not part of the general customer base, in other words, they are not part of the consumer market, moreover, they do not belong to institutional market unequivocally either. The behaviour of agricultural customers is an important piece of information with both the correct application of marketing mix and the market success of agricultural machinery manufacturers.

Only satisfied customer will become a regular customer, who will recommend the product actively or passively in a cost effective way for the manufacturer. Customer satisfaction is the key to well established, long term business relationships.

1.2.Objectives

As my doctoral thesis objective I have set up the following aims in connection with my research:

- I. In connection with literature I have set up the following aims:
 1. To collect and shortly introduce the interpretation of customer satisfaction based on published research from Hungarian and international literature.
 2. To present the role and development of customer satisfaction in a historical overview.
 3. To present the satisfaction feeling occurred during the purchase procedure, with an emphasis on the phase after the buying.
 4. To summarise the importance of customer satisfaction in the consumer and institutional markets; its concept and relations based on literature.
 5. Another objective is to examine the impact of customer satisfaction, loyalty and fidelity on company performance.
 6. Finally to summarize the experiences of the companies on customer satisfaction measurement methods, models and pitfalls.
 7. To give a brief summary on Hungarian and German agricultural machinery production and its impact on agriculture.

- II. In connection with my own research I have set up the following aims:
 1. To conduct a questionnaire survey among Hungarian producers in connection with purchased German agricultural machinery.
 2. To examine whether customer satisfaction depends more on the service given at the time of the purchase or the quality of the product itself.
 3. To introduce the factors influencing customer satisfaction.
 4. To introduce the factors which influence customer satisfaction in the order of preference.
 5. To determine the areas which require improvement, and to suggest methods to do this.
 6. Finally, to determine areas which influence customer satisfaction less, however, going needlessly beyond expectations.

2. THE PRESENTATION OF THE RESEARCH, MATERIALS AND METHOD

2.1. Research Hypotheses

After processing the literature I have concluded that many areas have been covered by researchers around the area of customer satisfaction. Although not in agriculture, but in many industrial areas that are close to my field, most of the researches on customer satisfaction studied loyalty. More results indicated that the service associated with the product has a bigger impact on customer satisfaction. They examined relationship between the satisfaction with the quality of the product, product-related services, and satisfaction with the dealer. As it is shown above, the recruitment of new customers is important in a company's life, but keeping a regular customer is a more cost-effective method. For this, it is crucial to have the customer maximally satisfied. This effort means expenses. To highlight the importance of service does not mean the quality of the product should decrease. To compare satisfaction with quality and with service is of high importance for the thesis. The company, producing high quality machinery, giving the primary data for the dissertation does not have a base in Hungary. To sell its products, it needs representation in Hungary. Thus a survey conducted among Hungarian farmers - how satisfied they are with the dealer and the product – is fully justified. My investigations also extend to what are the factors that influence satisfaction and to what extent.

After processing literature and setting up aims I have formulated and studied the following hypotheses in my thesis:

Hypotheses:

1st Hypothesis (H1)

The customer's satisfaction with agricultural machinery works through loyalty and thus determines satisfaction with the dealer.

2nd Hypothesis (H2)

Being satisfied with the dealer has a greater role in customer satisfaction with agricultural machinery, than satisfaction with the product

3rd Hypothesis (H3)

Loyalty towards the dealer has a positive effect on loyalty toward the brand of the machinery.

4th Hypothesis (H4)

Satisfaction for the product has the greatest impact on brand loyalty.

5th Hypothesis (H5)

The overall customer satisfaction is mainly dependent on the satisfaction with the dealer, and not for the product.

6th Hypothesis (H6)

Agricultural machinery customers in the eastern part of Hungary are more satisfied than the ones in the west.

2.2.Data source

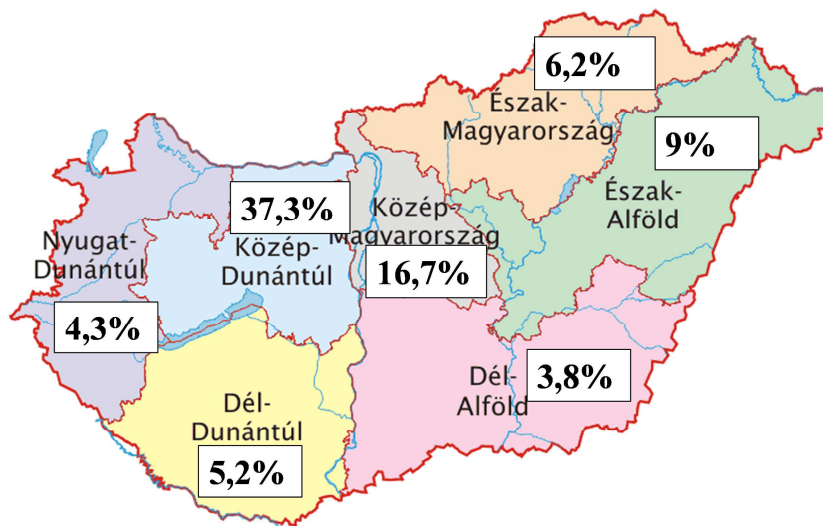
Collecting and processing of data is of key importance in every field. Every company can gain advantage by properly processing, evaluating and following strategy based on the data in the highly competitive surroundings (Sajtos and Mitev, 2007). The acquisition and correct usage of research results can mean the effectiveness of a company. Malhotra (2002) provides excellent detailed assistance to present the research process, which I intend to write down briefly. To determine the problem, most researches – preferably on a yearly basis - aim to increase profit. In addition, other kind of tasks might occur. In illustrating research problems, the iceberg principle is often used. On the decision-making level, lost sales, declining market share of dissatisfied customers can be seen. The task of the researcher is to explore the areas under water. The vast majority of the researches are done within the companies, not publicly due to the above-mentioned competition.

I have summarized secondary data used in the writing of this dissertation in the literature section. In the writing process of the dissertation I was led by personal motives. I had been working for years at the Marketing Department of the Deutsche Landwirtschafts-Gesellschaft (German Agricultural Society), where as part of my work I took part in the organization of the world's two biggest exhibitions, the Agritechnica and the EuroTier. Also, part of my job was to keep contact with theoretical and practical representatives of Central and Eastern Europe countries. This resulted in the interest for agricultural machinery, agricultural workers and their satisfaction which has become the main motive of my dissertation. I have also used primary data sources for my research. Hungarian agricultural production operators have diverse organizational and management forms. Before the fall of communism, there were mainly big-scale, state-owned farms, and later all forms of businesses appeared. Agricultural activity in Hungary can be led as an individual and as a company, too (Gáspár, 2011). I have taken great care in choosing the target groups for my survey to ensure representativeness. The study covers agricultural machinery purchased between 2003 and 2006. The survey was conducted in 2006. I have conducted further surveys in the autumn of 2012, and I have expanded the questionnaire survey with telephone and personal interviews.

I extended the survey to all of Hungary. (Figure 1) The highest percentage of questionnaires coming back was Central Transdanubia in: 37.5%, The explanation is that this is the area where machinery I have concentrated on is mainly used. The high or low percentage rate is also explained by the number of purchased machinery in certain regions. To examine these details is not the aim if my dissertation.

My research is mainly based on primary data, using the following methods:

- Postal questionnaire survey
- Traditional telephone polling
- Personal interview



Source: Own data

Figure 1: Primary data collection rate in Hungary

From the available research methods, the questionnaire form was used, sent by post. During the questioning, the targeted farmers had to give answers to closed questions. The answers were given to limited alternatives. The questionnaire was compiled by me, taking into account the needs of a German agricultural machine manufacturer, which has a Hungarian representative. The name of the company and the representative is irrelevant here. It is also irrelevant to the quality of the scientific work that the survey was conducted in 2006. This policy is supported by me using the same questions in the telephone and personal interviews in 2012. The participants at this point of the survey came from my circle of acquaintances. The applied questionnaires were used to meet the above mentioned criteria of representatively. I have also paid attention to the comparability of the two surveys.

The questionnaire aimed at Hungarian farmers, a dealer of their choice and opinion of the purchased agricultural machines. The survey aimed the whole country. Among the participants of the survey, there were various legal company forms, for example sole trader, partnership, Plc, Ltd. The survey aimed to unfold to what extent were the farmers satisfied with the service, information, training/coaching and the quality of the purchased product, etc. All of these are detailed later.

The processed questionnaires contain answers from buyers who purchased machinery between 2003 and 2006 from the following five types:

- Combine harvesters
- tractors,
- balers,
- round balers and
- foragers

These five types of machinery are the ones most frequently used in Hungarian agriculture. According to Malhotra (2004), in a group of 10 million people, examining the opinion of 1000 can be regarded as representative. According to CSO (KSH) data 2011, 433 000 different types of agricultural companies were registered. In my case, I have processed 497 questionnaires.

In autumn, 2012 for the above mentioned reasons, I have used further polling method. I have conducted personal interviews with 18 people, and telephone interviews with another 42. At this point I also used the previous questionnaire, in addition with priority points. The comparison of data was done the same way as before, but in this case I did not use only one manufacturer's products, but more producers. To ensure homogeneity, I examined only German produced machinery.

Taking into account the diversity of agricultural organizations examined, I consider the processed database representative.

Table 1: Processing customer satisfaction survey

Machine group	Returned questionnaire	Sent questionnaire	Returned questionnaire percentage ratio
<i>total</i>	<i>497</i>	<i>1061</i>	<i>47%</i>

Source: Own data

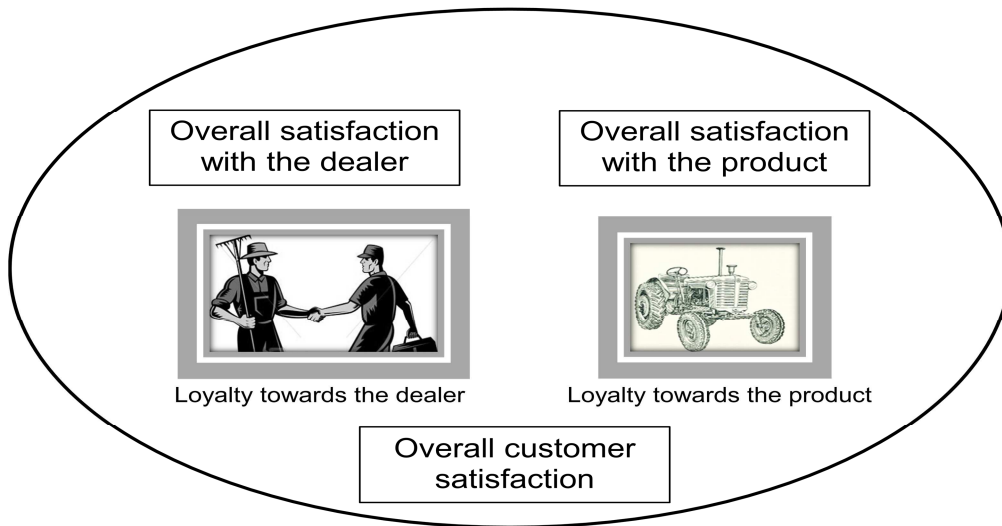
The return rate of completed questionnaires was 47%, which actually means 497 evaluable questionnaires. The questionnaires were sent to the customers by post. Out of the 497 farmers, 31% purchased combine harvesters, 8% foragers 19% balers, 21% round balers and 21% tractors.

Out of the different types of machinery, the owners of tractors and balers were the most cooperative. They returned questionnaires with a ratio of 58% and 41%. The machine groups are presented in three thematic groups: the combine harvesters and foragers, the two types of balers, and tractors. In assembling the questions one of the main aims was that the performance of the manufacturers and the performance of the dealers (or importers) could be compared. In order to do this, the questionnaires were identical to 85%, and had different, specific questions for the rest.

The questions focused on the following areas:

- Quality customer satisfaction analysis in reference to the manufacturers:
 - machine performance
 - total satisfaction
- Quality customer satisfaction analysis in reference to the dealers:
 - Design and consulting
 - transport
 - giving offers
 - customer service and garage performance
 - component supply
 - total satisfaction

During the analysis of the questionnaire I mainly examined the relation between customer satisfaction and satisfaction with the dealer, satisfaction with the product, dealer loyalty and loyalty towards the product. (Fig.2).



Source: Own data

Figure 1: Main areas of the customer satisfaction survey

For most questions in the survey, I have used the Likert scale to evaluate the answers. A statement of agreement or disagreement on a level 5 scale made it possible to grade the answers from being very satisfied to being least satisfied.

Very satisfied				Least satisfied
5	4	3	2	1
☺	☺	☹	☹	☹
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Source: Part from the questionnaire, own data

Table 3. A part of the customer satisfaction survey

The method of measuring customer satisfaction

As customer satisfaction is getting more and more important for companies, it is necessary to measure the level of satisfaction. In order to influence customer satisfaction, it has to be measured, since it can only be managed, which is measured.

Using the opinions measured by the five-level Likert scale, a satisfaction index was calculated using the following formula:

To evaluate the information collected based on the questionnaire, the following index number was developed:

Satisfaction index:

$$E_i = \frac{\sum_{j=1}^m e_j^i}{\frac{m}{\max\{[z]\}}}$$

where $i = 1, 2, \dots, n$, (n = the number of services), (1)

and $j = 1, 2, \dots, m$, (m = the number of customers answering),

E_i = the level of satisfaction in comparison with area 'i' (Satisfaction-index) [-],

e_j^i = the satisfaction value [1 – 5], on 'i' service area by 'j' customer

z = The evaluation scale used, in this case: [1 – 5].

The index described above is the reciprocal used in Takács (2004) lecture notes.

The resulting index-number was assessed as follows: since the maximum value of the satisfaction index is 1, the closer it is to 1, the better the reviews are regarding the service area.

2.3. Statistical methodology

The expectation towards the dissertation was the usage of such a methodological model, which is simple, clear and is able to numerically express the impact of service areas on customer satisfaction. The questionnaires were processed by SPSS - Statistical Package for the Social Sciences (SPSS 17.0). In the data processing, calculation of descriptive statistics, the preparation of figures MS Office Excel was of great help. In methodological questions several statistical literature were used, of which I would highlight the following: Székelyi-Barna (2008); Ketskemény (2005); Sajtos-Mitev (2007); Harnos (1993).

The results of the questionnaires were evaluated by means of mathematical-statistical methods. Relations between the strength of evidence was determined by correlation and linear regression test. Exploring the relationships between the variables, from the models I have mainly used linear regression analysis and analysis of variance (ANOVA). Multivariate methods were also applied. From these I have used the explanatory models. The linear correlation – or Pearson – coefficient (denoted by: r) value ranges between -1 and +1. The correlation coefficient value shows the strength of the relationship. A statistical analysis of the models validity criterion was determined by the 5% significance level. I point out every data diverting from this . Further data reduction methods were necessary, since I found it more suitable to group the numerous questions in the survey. I have used principal component analysis, factor analysis and multivariate linear regression models, the FORWARD model. In specific cases for the appropriate use of variables I have used Kaiser-Meyer-Olkin indicators (KMO).

3. RESULTS

3.1. The importance of customer satisfaction according to literature

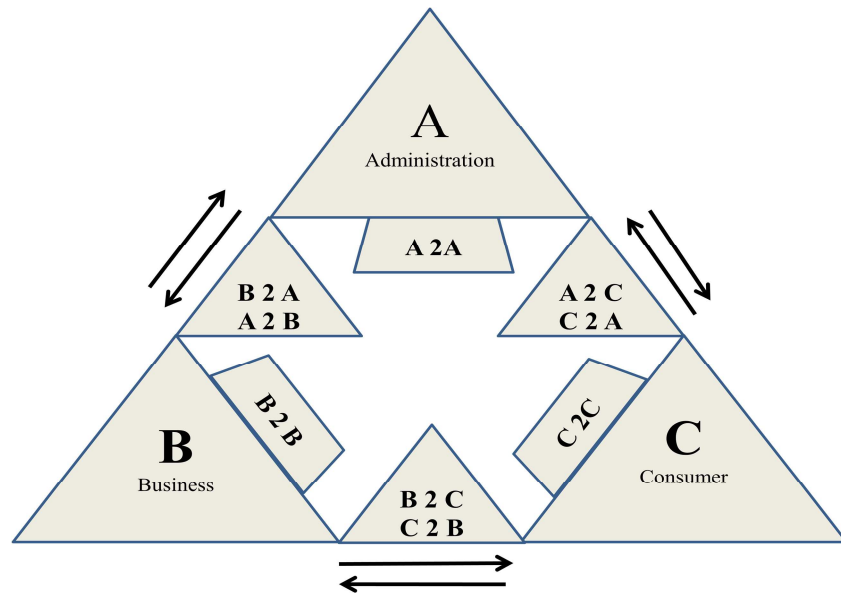
In my dissertation, secondary data has been used, which I summarized in the literature section. Being a multidisciplinary field, I have reviewed literature covering areas that influence customer satisfaction such as social, sociological and psychological publications.

Defining customer satisfaction, I have summarised definitions published in different times and languages. After that I have presented publications in different groups, based on the interpretation of customer satisfaction. These groupings are based on whether the authors found the social or psychological effects more significant. As some of these publications have been quoted and referred to in other works before, I tried to use rarely or never quoted works. I also hope that the numerous works translated by myself will also be useful by fellow researchers. My dissertation is based on broad and diverse processing of literature with a great help of my German, Russian and English knowledge. As a goal of my paper I have aimed and completed to process literature based on customer satisfaction.

The research area of customer satisfaction is interdisciplinary, and can be found in the following areas: economics, psychology and society. Research found in economics area mainly focus on the price, and psychological studies focus on what factors motivate customers (Müller-Hagedorn, 1986, p.41). In addition to this, the customer's place in society also plays a great role. Based on the above the customer's behaviour can be predicted. All this information may help us use the right marketing tools.

According to Hoffmannné (1995), for satisfied customers not only social and psychological factors can be useful, but quality management systems also appear. On the development of customer satisfaction analysis, research results on customer behaviour also play a great role. After careful study of this area it can be stated that next to cultural, social and personal factors, literature focuses mainly on psychological characteristics in analysing customer satisfaction.

On the market three types of participants are in contact with each other: the customer as the end user, the manufacturer as the producer and the authorities. These participants are either buyers or sellers. The network of contacts are shown in figure 4. The organizational buyer purchases for his own organization and not to satisfy his own needs. In case of farmers these two areas are often the same. Regarding the thesis' database it can be said that more traditional agricultural organizations have been replaced by self-employed farmers.



Source: Own data

Figure 4. Supply and demand relationships

The most common area of market research are B2C and B2B relationships, in other words consumer behaviour on individual or small-group level, and links between companies.

Organizational buyers cover three areas:

- Industrial customers,
- Resellers,
- The government (administrative units).

The difference between retail and organizational markets can be seen in Lehota's figure (Lehota, 2001), which shows the following differences from the organizational market's view. I expanded the following two tables by the relevant participants to the thesis.

Organizational market	The relevant participants of the thesis, the farmers
- Smaller number of customers	☞ Typical relevant to the size of the branch
- Greater market share of each customer	☞ Typical
- The customers are geographically concentrated	☞ Typical
- The replacement is relatively of greater value	☞ Not typical
- The complexity of the product is generally greater	☞ Not typical
- Correlation may occur at the purchases	☞ Typical
- The form of decision-making is generally in a group	☞ Not typical
- Rational purchase motives are stronger at the purchases	☞ Typical

Source: expanded based on Lehota (2001)

Table 1: comparing the organizational market and characteristics of farmers

The number of customers of the institutional market is low due to the magnitude of agricultural machinery production. The value of the transaction on the organisational market is high, since the price of the machinery is also high. Customers are concentrated geographically which is justified by agricultural land. The mutual independence between the sellers and buyers is not strong. The purchasing decisions are generally not grouped, and to make that decision generally takes longer in order to choose the right financing, also, rational buying motives dominate.

The behaviour of organizational buyers is influenced by many factors. Some of these are of economic nature, some are related to the standard of service or the image of the contractor. The impact on organizational buyers can be grouped in four categories:

- environmental factors (economic conditions, technology, competition),
- organizational factors (organizational strategy, organizational structure),
- relationships within the organization (the position and rights of the purchaser, his skills),
- individual characteristics of the purchaser (age, education, income).

On a company's successful appearance on the market, the following factors have an equal impact: market orientation, the marketing concept, external environment, demand and effect of technology. Company's market orientation is the practice of the marketing concept (Lehota, Kárpáti 2007). Research in connection with market orientation only started in the 1980's. According to Kohli-Javorsky (1993), an organization collects information on the market, processes them within the organization, distributes tasks, and reacts to the market information. Narver-Slatter (1990) expands the definition of market orientation with the action to create higher customer value. Their definition includes three behavioural components: the consumer, the competitor and the inter-functional orientation. They also include two decision criteria: long-term orientation and profit orientation. There is a race among companies for land, capital, workforce and information. In my dissertation the competition for customers is in the centre.

Even if global agricultural markets' recovery from low prices for is slow, agricultural commodity demand only knows one long-term direction. Agribusiness can only benefit from this direction, and provide innovative, high growth opportunities. All this can entail new challenges. New market opportunities are needed. New competitors appear, and in this competition the prices of agricultural products are essential for the companies.

In the past few decades Hungary's agricultural machinery market has greatly changed. Purchasing new machinery boomed with the help of state aid, then stagnated in 2009, when the government's subsidies were stopped. A comprehensive survey about the state of agricultural machinery was conducted in 2011 by Kleffman & Partner market research firm. According to their survey, there were 143 thousand tractors, 13 thousand combine harvesters and 48 thousand seed drills owned by farms. Every third farm owns a tractor, and only 4% of the farms own a combine harvester. Less than one sixth of the machines are under 5 years old, and more than half of them are more than 10 years old. According to the survey, in smaller farms (less than 30 hectares) one third of the machines were made in western counties while in bigger farms (more than 300 hectares) the number of western-made machinery reaches 85%. Since it was known that the government was stopping subsidies in 2009, in the last year even those farms decided to purchase machinery, which did not plan it originally. Experts claim that it is advisory to replace tractors in every 5-7 years, whilst combine harvesters should be replaced in every 6-10 years. The survey also included that farmers intended to purchase 10 thousand tractors and 1000 combine harvesters in the following two years. In the case of the tractors, two thirds of the planned machines were to be new, while with combine harvesters this rate were to be half. Smaller farms intended to purchase cheaper, Eastern-European machines, while at farms larger than 300 hectares the rate of second-hand machines would be 3 %, and they intended to buy them from western countries (Márfi, 2012).

According to the survey conducted by the VDMA (Verband Deutscher Maschinen und Anlagenbau e.V.) Department Landtechnik, the value of sold agricultural machinery and tractors over the world in 2009 could reach an estimated 58 billion Euros. From this, the European Union represents 3%. In the past years China and India tremendously increased production. In agricultural machinery production there are four dominant companies: John Deere (USA), Case New Holland (Olaszország), AGCO (USA) and Claas (Németország). These companies represent 40% of the world market. Obviously, there are more big companies and also many medium-sized and smaller companies on the list, which are present on the market with high quality products. There are about 135.000 employees working in approximately 4.500 agricultural machinery producing factories in western Europe. Among these, Germany is the biggest employer with 29.000 employees, emphasising harvesting techniques and tractors in the European Union. Since the cold war, the importance and technical support of Central and Eastern European market is increasing.

3.2.Presentation of machinery groups

I present the results of my research based on the following method:

- I present the questions and results of the survey in smaller groups.
- I also summarize the experienced results between the questions (correlation and significance).
- I examine the fulfilment of my hypothesis, also separately with each machine group:
 - ❖ the combine harvesters,
 - ❖ the balers,
 - ❖ the tractors.
- I present the results of the telephone and personal interviews.
- I summarize the results experienced at each machine group in a chart and evaluate the fulfilment of my hypothesis.

I define and position the factors that influenced customer satisfaction. This may contribute to the development of existing products and services, or contribute to the development of new ones and their introduction to the market. I have ranked the influencing factors by regression analysis, thereby determining the effect of individual areas on customer satisfaction.

3.2.1. Factors influencing the satisfaction of customers purchasing combine harvesters

One part of the agricultural work year is harvesting. I studied customer satisfaction with combine harvesters at this work phase. The results of the survey offer a great help at the strategic planning of businesses, especially at choosing the right marketing tool. These results can be found in my dissertation, due to the limited space I am not detailing them here. My dissertation also covers research results of products and services connected to them. In the following I present the result of hypothesis in relation to literature and proven by statistical-mathematical method.

From the data in figure 3, I have highlighted the results of variables having the stronger connection, where being satisfied with the product shows strong relation with being satisfied with the brochure. Customer satisfaction shows strong relationship at work quality with professional training.

Ranking	Question 1.	Question 2.	Correlation coefficient and significance level
	<i>The initial question: How satisfied are you with....?</i>		
1	the professional training	the quality of work	0,876**
2	the product introduction	the brochure	0,842**
3	the competence of staff	accessibility	0,773**
4	the commitment of staff	professional qualifications of staff	0,759**
5	the information received	overall performance of the trader	0,711**
6	the rapid acquisition of components	the availability of spare parts	0,749**
7	professional qualifications of staff	the received answers to questions	0,743**
8	the received answers to questions	adjusting the machine	0,741**

Source: Own data

Table 3: Relation between different questions

Data reduction method with principal component analysis was used in order to compress the large number of questions. Since it is known that not every set of variables is suitable for factor analysis, I used the Kaiser-Meyer-Olkin index (KMO) provided by SPSS program. KMO tests if partial correlations remain within the acceptable limit. Each set of variables is suitable, in which the KMO value is at least 0.5. In my case, this value was higher than 0.7 at all times.

Based on the above, I organized the product-related customer satisfaction questions in five groups. After that I examined their effect on the total satisfaction level, which means the strength of their relationship. As it can be seen in table 4, the strongest relationship is with the customer service and service performance, at the appropriate level of significance. The purchasing process is not the only important part for the farmers anymore, they also show a need for customer follow-up. Contact after purchase also verifies this.

Service areas	name	B	Std. Error	Beta	F sig.
Factor 1	Design, consulting	0,216	0,034	0,417	0,000
Factor 2	Transportation	0,039	0,049	0,067	0,042
Factor 3	Contact after purchase	0,303	0,052	0,527	0,000
Factor 4	Giving offers/purchase phase	0,116	0,046	0,212	0,012
Factor 5	Customer service/service performance	0,348	0,045	0,647	0,000

Source: Own data

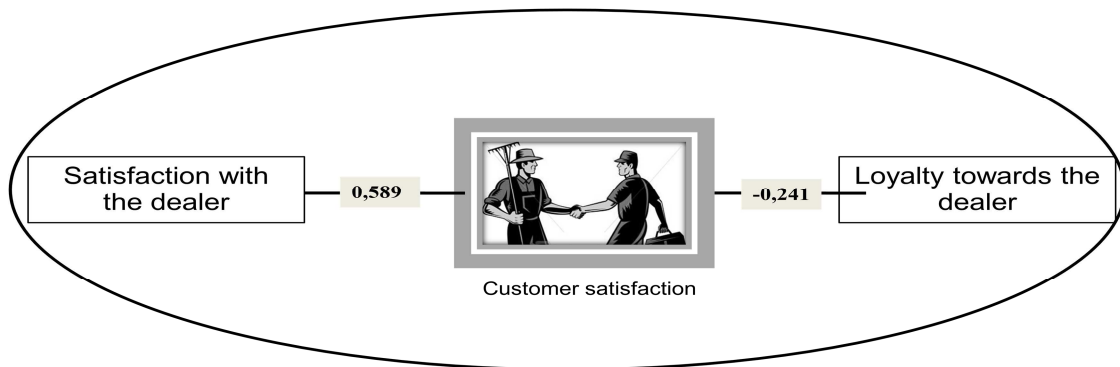
Table 4: Factor analysis, relationship between factors and customer satisfaction.

Figure 5 shows research results on how much customer satisfaction depends on satisfaction felt towards the dealer. As it is shown, there is a moderate relationship, with strong significance level and 0,591 correlation, examining results of customers purchasing combine harvesters.

I made further examinations on dealer satisfaction conditions with loyalty towards the dealer, after comparing that to customer satisfaction. I found a weak negative relationship, with a just acceptable significance level, correlation level: -0,237.

Based on these data, the first hypothesis (H1) - customer's satisfaction with agricultural machinery works through loyalty and thus determines satisfaction towards the dealer – has not been fully

proven. I set this hypothesis based on presented and published literature in the automobile industry, with the aim to examine this area in agricultural machinery production.



Source: Own data

Figure 5: Customer satisfaction through loyalty with correlation coefficient

Based on my investigations so far, this statement does not seem possible to prove.

The success of a product has key importance for a company, and in the area examined by me, it plays a decisive role in the budget, which area will be developed by the company. Consequently, the success of the product's function is important. I continued by examining which area affects customer satisfaction more, in other words, whether being satisfied with the dealer, or satisfaction with the product has a stronger relation. Being satisfied with the dealer showed stronger relation with 0,477 correlation at appropriate significance level compared to being satisfied with the product with 0,203 correlation, also at appropriate significance.

With the above, the second hypothesis (H2) - being satisfied with the dealer has a greater role in customer satisfaction, than satisfaction with the product - has been proven.

I also examined the relation with loyalty toward the brand and the dealer. I found a moderate relation with 0,538 correlation.

So, the third hypothesis (H3) - loyalty towards the dealer has a positive effect on loyalty toward the brand of the machinery - is proven.

To continue, I examined the relationship between satisfaction with the product and loyalty towards the brand. In loyalty, as I have presented with the examined literature, customer satisfaction is vital. In table 5 I present the results of factors influencing loyalty towards the brand.

Connection between loyalty towards the product and the		B	Std. Error	Beta	F sign.
-	<i>overall performance of the product</i>	-0,311	0,086	-0,296	0,000
-	dealer loyalty	0,545	0,070	0,538	0,000
-	overall performance of the dealer	-0,183	0,092	-0,180	0,049
-	overall performance of customer satisfaction	-0,211	0,095	-0,187	0,027
-	recommending the dealer for other customers	0,060	0,127	0,040	0,638
Factor 1.	design, consulting	-0,165	0,078	-0,266	0,037
Factor 2.	transportation	0,042	0,098	0,063	0,671
Factor 3.	contact after purchase	0,052	0,095	0,083	0,587
Factor 4.	giving offers/purchase phase	0,387	0,131	0,622	0,004
Factor 5.	customer service/service performance	-0,381	0,122	-0,614	0,002

Source: Own data

Table 2: Connection between loyalty towards the brand and the factors influencing it

In recommending the dealer to other customers, the significance level of factors 2 and 3 is not sufficient.

As it can be seen, I found relationship with loyalty towards the brand and factor 4 at 0.622 correlation, and loyalty towards the dealer with 0.538 correlation. In both cases the significance level was appropriate.

Hypothesis 4 (H4) states that satisfaction with the product has the greatest impact on brand loyalty. In this case, it is not proven, since I have shown -0,296 correlation level with satisfaction with the product at appropriate significance level.

The next examined hypothesis (H5) states that the overall customer satisfaction is mainly dependent on the satisfaction towards the dealer, and not for the product. Satisfaction with the dealer shows stronger connection with 0,591 correlation, at appropriate significance level, while satisfaction with the brand shows only 0,457 correlation, at appropriate significance level, too. Thus, hypothesis 5 (H5) is proven.

In hypothesis 6 (H6) I examined whether customers living in the eastern part of Hungary are more satisfied than customers from the west part of the country. This hypothesis was based on geographical differences mentioned in literature (Sági, 2006). Also, my personal experience showed that a wider choice results in higher needs, so I examined this statement based on methods in my reach. I evaluated the results in regional breakdown (table 6).

Table 3: Customer satisfaction by regions

Description	Regions							
	1	2	3	4	5	6	7	
Levels of satisfaction (based on the Likert-scale)								
5 - 😊 Very satisfied	57%	60%	77%	84%	75%	40%	50%	
4 - 😊	42%	40%	-	16%	25%	60%	50%	
3 - 😐		-	23%		-	-		
2 - 😞	-	-	-	-	-	-	-	
1 - 😡 Least satisfied	-	-	-	-	-	-	-	
Average satisfaction	4,57	4,59	4,33	4,81	4,75	4,4	4,5	4,56
1 = Northern Hungary, 2 = Northern Great Plain, 3 = Central Hungary, 4 = Southern Great Plain, 5 = Central Transdanubia, 6 = Southern Transdanubia, 7 = Western Transdanubia								

Source: Own data

Most of the highest marks (5) were given by customers living in Southern Great Plain (84%) The amount of filled in questionnaires was different in each region, farmers living in the Southern Great Plain were the most willing in completing the questionnaire.

When we exclude central Hungary, and take the average of only the eastern and western parts of the country, eastern Hungary gives the average of 4,66, and western Hungary the average of 4,55. With this result, hypothesis 6 (H6) is proven.

3.2.2. Factors influencing the satisfaction of customers purchasing balers

One of the final phases of agricultural work is harvesting, baling. I examined round and square bales in one group. The starting question in every case was: 'How satisfied are you with...'

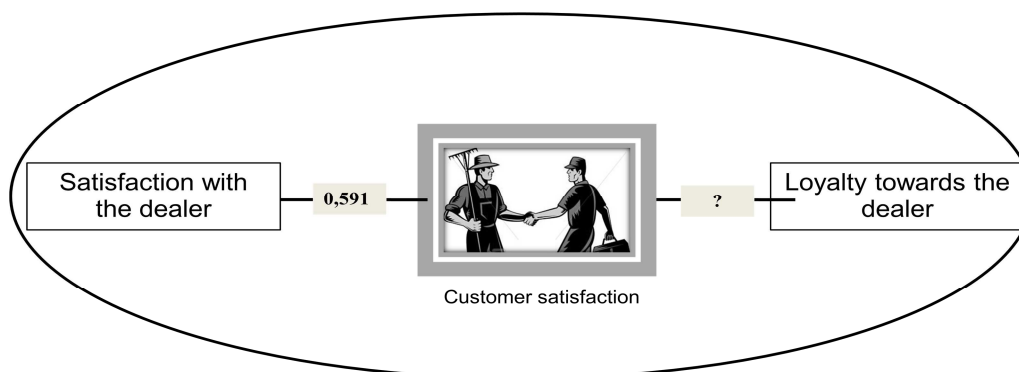
The questions of the survey were grouped in 5 factors with data reduction method (table 7). I examined their relation with customer satisfaction, and have found that every factor shows at least a moderate relation. Significance level was also appropriate. The resulting significance level <0.05 meets the requirements I set during the research. The strongest correlation was given at customer service and service performance, with 0,742 correlation, at appropriate significance level. There was a strong correlation (0,712) between customer satisfaction and the performance of customer service and service. In case of the balers, design, consulting, transport and contact after purchase showed moderate correlation with customer satisfaction. In contrast to the results with combine harvesters, every factor has a great importance here. In my opinion, further studies about the relation between the product and service can provide more specific answers. The quality of the examined balers has good references and image.

Service areas	name	B	Std. Error	Beta	F sign.
Factor 1.	Design, consulting,	0,296	0,075	0,510	0,000
Factor 2.	Transportation	0,290	0,066	0,521	0,000
Factor 3.	Contact after purchase	0,424	0,143	0,509	0,007
Factor 4.	Giving offers/purchase phase	0,395	0,055	0,712	0,000
Factor 5.	Customer service/service performance	0,425	0,055	0,742	0,000

Source: Own data

Table 4: Factor analysis, relationship between factors and customer satisfaction.

I found moderate correlation (0,591) between satisfaction with the dealer and loyalty towards the dealer at appropriate significance level. However, I found a very weak correlation (-0,050) between loyalty towards the dealer and customer satisfaction. Also, significance level was not appropriate, so it could not been used anyway (table 6).



Source: Own data

Table 6: Customer satisfaction and satisfaction with the dealer through dealer loyalty

My first hypothesis (H1) stating that customer satisfaction with agricultural machinery works through loyalty and thus determines satisfaction towards the dealer was not fully proven.

My second hypothesis (H2) says being satisfied with the dealer has a greater role in customer satisfaction toward agricultural machinery, than satisfaction with the product. Satisfaction with the dealer shows relation with 0,588 correlation at appropriate significance level, however, I cannot accept the result of satisfaction with the product due to not appropriate significance level.

In this case I consider the second hypothesis (H2) proven, because satisfaction with the dealer has a major role with moderate relationship.

Examining the relation between the dealer and loyalty towards the product I have found that with a 0,643 correlation at an appropriate significance level the third hypothesis (H3) is proven.

In table 8 I present the results of factors influencing loyalty towards the brand. At the appropriate level of significance there are only two categories worth mentioning: the overall performance of the product with a moderate 0,545 correlation, and the dealer loyalty with also a moderate 0,643 correlation.

Hypothesis 4 (H4) states that satisfaction for the product has the greatest impact on brand loyalty. In this case it is not proven, since I have shown 0,545 correlation with satisfaction with the product at appropriate significance level. In contrast, dealer loyalty showed stronger relation: 0,643 correlation, which can be accepted due to the appropriate significance level.

Connection between loyalty towards the product and the		B	Std. Error	Beta	F sign.
-	<i>overall performance of the product</i>	0,570	0,121	0,545	0,000
-	dealer loyalty	0,760	0,120	0,643	0,000
-	overall performance of the dealer	-0,205	0,186	-0,164	0,275
-	overall performance of customer satisfaction	-0,299	0,167	-0,238	0,080
-	recommending the dealer for other customers	0,528	0,210	0,321	0,015
Factor 1.	design, consulting	-0,29	0,107	-0,39	0,787
Factor 2.	transportation	-0,44	0,096	-0,60	0,650
Factor 3.	contact after purchase	0,060	0,119	0,097	0,618
Factor 4.	giving offers/purchase phase	-0,121	0,097	-0,165	0,216
Factor 5.	customer service/service performance	-0,118	0,094	-,172	0,213

Source: Own data

Table 8: Connection between loyalty towards the brand and the factors influencing it

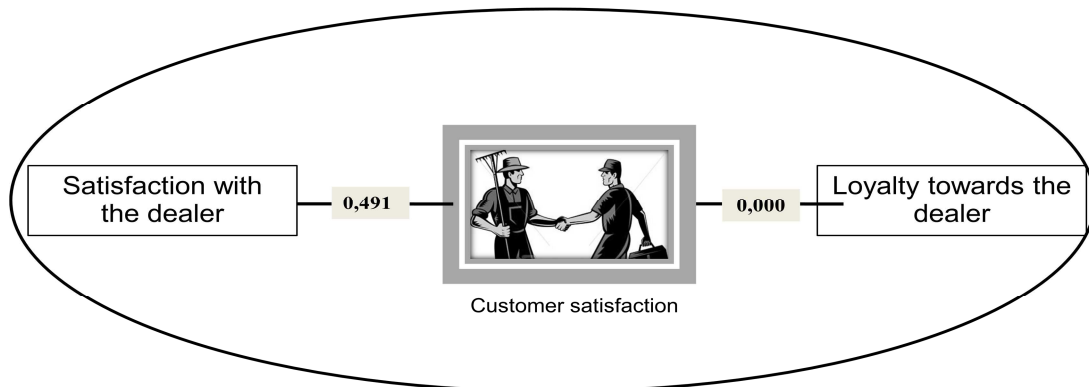
My next hypothesis (H5) states that the overall customer satisfaction is mainly dependent on the satisfaction towards the dealer, and not the product. Customer satisfaction shows a stronger relation with satisfaction with the dealer at a 0,591 correlation, appropriate significance level. While satisfaction with the product only shows 0,457 correlation, also at an appropriate significance level. Thus, hypothesis 5 (H5) is proven.

Hypothesis 6 (H6) states that agricultural machinery customers in the eastern part of Hungary are more satisfied than the ones in the west. The evaluation found that farmers living in the eastern part of Hungary are satisfied with balers with an average of 4.66, out of the maximum of 5. Farmers from the western part of Hungary gave an average of 4.87, which is above the country average: 4.81. Note, however that no results came from South Transdanubia, so their opinion is not represented in this result.

3.2.3. Factors influencing the satisfaction of customers purchasing tractors.

One of the most used agricultural machine is the tractor. In the following chapter I present the results of the questions on this machine. The significance of the machine is enhanced by the fact that the studied German agricultural equipment manufacturer does not have such a professional experience as they have in the case of combine harvesters and balers.

My first hypothesis states that customer's satisfaction with agricultural machinery works through loyalty and thus determines satisfaction with the dealer. Since satisfaction with the dealer shows moderate 0,491 correlation with appropriate significance level, but customer satisfaction does show correlation but has no an appropriate significance level, the first hypothesis has not been proven.



Source: Own data

Figure 7: The relation between customer satisfaction and satisfaction with the dealer through loyalty.

The second hypothesis (H2) seeks whether being satisfied with the dealer has a greater role in customer satisfaction toward agricultural machinery, than satisfaction with the product.

Satisfaction with the dealer shows 0,676 correlation at appropriate significance level, while the result of satisfaction with the product cannot be accepted due to not appropriate significance level.

In this case I find the second hypothesis (H2) proven, since satisfaction with the dealer has major importance with moderate correlation.

Research connected to the third hypothesis deals with connection between loyalty toward the dealer and the brand. At appropriate significance, with a correlation of 0,638, this hypothesis is also proven.

I have examined results of factors influencing loyalty towards the brand. At appropriate significance level, there are two areas worth mentioning: the moderate relation with loyalty towards the dealer with 0,491 correlation, and the also moderate relation with the overall performance of the dealer with -0,570 correlation. There was no possibility to create factors due to the low number of filled questionnaires.

Hypothesis 4 (H4) states that satisfaction with the product has the greatest impact on brand loyalty. In this case it is not proven, since I have shown -0,047 correlation with the product satisfaction at no appropriate significance level. In contrast, loyalty towards the dealer showed stronger relation of 0,491, which can be accepted due to the appropriate significance level.

Connection between loyalty with the product and the		B	Std. Error	Beta	F sign.
-	<i>overall performance of the product</i>	0,182	0,066	-0,047	0,852
-	dealer loyalty	0,500	0,306	0,491	0,014
-	overall performance of the dealer	-1,000	0,395	-0,570	0,035
-	overall performance of customer satisfaction	0,000	0,810	0,000	1,000

Source: Own data

Table 5: Connection between loyalty towards the brand and the factors influencing

The fifth hypothesis states that the overall customer satisfaction is mainly dependent on the satisfaction with the dealer, and not the product. Satisfaction with the dealer with 0,676 correlation at an appropriate significance level has proven this hypothesis.

I have examined the sixth hypothesis in this case too, but due to the low number of filled questionnaires I do not consider it to be relevant enough and cannot be evaluated to prove the hypothesis.

3.2.4. Results of telephone and personal interviews

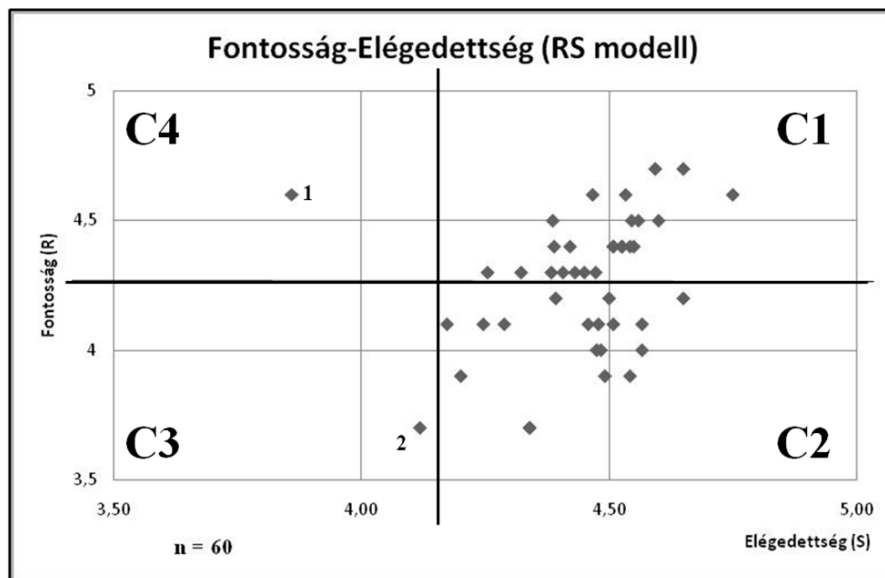
As mentioned above, satisfaction surveys conducted within companies are not made public. Nevertheless, in my case I found it important to include recent data in my research. I added questions emphasising the important issues. For this reason, using the existing questionnaire, I conducted telephone and personal interviews. I evaluated the 60 set of new answers together with the formerly received written questionnaires. I met 18 farmers personally, and interviewed another 42 by telephone. The sample – in view of the limited financial resources – is not representative.

The questions of satisfaction and relevance are summarized in Figure 8, placed in a coordinate system. The Relevance-Satisfaction model is usually presented in a two-dimensional coordinate system, where the horizontal axis shows satisfaction (S), and the vertical axis shows the relevance (R).

The origin of the graph shows the average of all the questions in points [4,2; 4,25], the extreme values of the axes represent the lowest and highest values. I have divided the RS model's graph into four quarters, where each quarter has a different meaning. I have placed the original graph of the large number of questions in the Annex of my dissertation (M17), here I am only presenting an illustrative figure (Figure 8). I present the four clusters (C1, C2, C3, C4) generated on the basis of deviating from the average in a simplified way, and show the characteristics of the groups.

Characteristics of the 4 clusters of Figure 8:

- Segment C1 includes half of the majority, characterized as above-average relevant and above-average satisfaction by the buyers.
- Segment C2 includes questions of above-average satisfaction, but under-average relevance characterised by the buyers.
- Segment C3 includes values of under-average satisfaction and relevance.
- Segment C4 includes responses, which were of under-average satisfaction, still, according to the buyers, the relevance of these is above-average.



Source: Own data

Figure 8: Relevance-satisfaction model (RS model)

I conclude that most of the questions were grouped in the C1 and C2 clusters. In case I separate the questions into thematic groups, no big differences can be seen in which questions are put predominantly in the C1 or C2 clusters. Thematic grouping is the following: services before and after the purchase – especially questions emphasising service and spare parts in the later one. Rate of questions about before the purchase in the C1 and C2 clusters: 11/7. Questions about after the purchase in C1 and C2: 16/15. However, at the detailed analysis I noticed that this rate at the service was 4/11, in other words, four questions about the service were put in the C1 cluster, indicating above the average relevance and satisfaction. These issues were: the waiting time, duration of maintenance and service, professional qualifications and sticking to the given maintenance price offer.

- ☞ Cluster C1: above the average satisfaction – above the average relevance
Vast majority of those questions can be found in this cluster which concentrate on the circumstances before the buying.
- ☞ Cluster C2: above-average satisfaction – under average relevance
In this cluster are those questions in equal proportion, which concentrate on customer service before and after the purchase.
- ☞ Cluster C3: under-average satisfaction – under-average relevance
There is only one question in this cluster, which refers to dissatisfaction about the received information, but it does not connect relevance to it.
- ☞ Cluster C4: under-average satisfaction – above average relevance
In my opinion, one of the most important issues about the duration of repaying the loan and the received information about the loan maturity.

These dimension clearly show that it is relevant for every company to set up quality management priorities. There are areas of development which are to be placed in the foreground, for many reasons. One of the possible reasons is the development of some areas in order to increase general customer satisfaction. This is not only an effective, but also a cost-effective tool. Putting some other areas in the background does not result in customer satisfaction decrease, since maintaining the present state does not create higher satisfaction, either.

3.2.5. Factors influencing customer satisfaction – all machines groups

At the confirmation of hypotheses I aimed to examine them from every possible side, with all the statistical methods available to me. In the following, I present the evaluation of all machine groups together.

In order to compress the large number of data, I used data-reduction method with principal component analysis. The Kaiser-Meyer-Olkin index (KMO) was greater than 0.7 in all cases. According to this, I grouped the product-related customer-service satisfaction questions in five factors. Then I examined their effects on customer satisfaction.

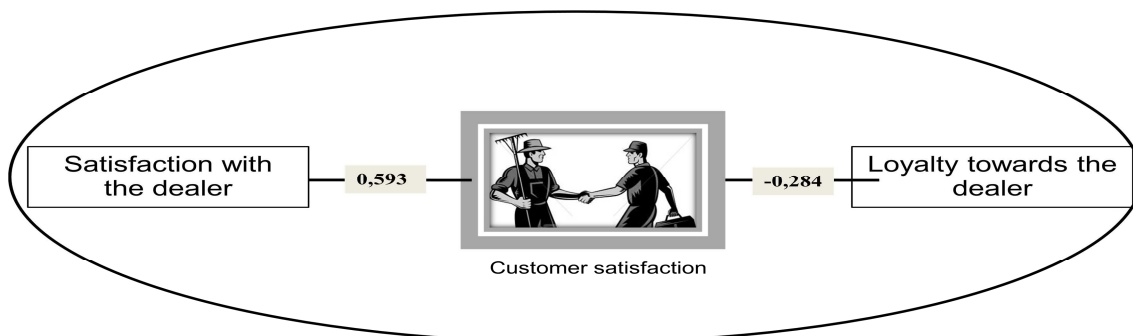
Service areas	name	m	Std. Error	Beta	F szig.
Factor 1	Design, consulting	0,264	0,034	0,505	0,000
Factor 2	Transportation	0,372	0,028	0,689	0,000
Factor 3	Contact after purchase	0,362	0,028	0,671	0,000
Factor 4	Giving offer/purchase phase	0,424	0,025	0,776	0,000
Factor 5	Customer service/service performance	0,420	0,026	0,766	0,000

Source: Own data

Table 11: Factor analysis, relationships between factors and overall customer satisfaction

Figure 9 shows how dependant is customer satisfaction on being satisfied with the dealer, as the first hypothesis (H1) suggests.

Data show moderate relation with 0,593 correlation at appropriate significance level. Thus the first hypothesis (H1) is proven



Source: Own data

Figure 9: The connection between satisfaction with the dealer, dealer loyalty and customer satisfaction

Further examining the conditions of loyalty towards the dealer and being satisfied with the dealer I found weak relation with -0,284 correlation at appropriate significance level.

Next, I examined the data of all machine groups, to find out which is the area that influences customer satisfaction more: satisfaction with the dealer or satisfaction with the product. Satisfaction with the dealer showed 0,498 correlation - thus higher relation than satisfaction with the product which showed 0,223 correlation, both at appropriate significance level

Thus, hypothesis 2 stating that loyalty towards the dealer has a positive effect on loyalty toward the brand of the machinery is proven.

I examined the connection between loyalty towards the dealer and loyalty towards the brand in agricultural machinery production. I found a moderate relation with 0,578 correlation at appropriate significance level.

Thus, hypothesis 3 (H3) which states that loyalty towards the dealer has a positive effect on loyalty toward the brand is proven.

In the following I examined the connection between satisfaction with the product and loyalty towards the brand. Hypothesis 4 (H4) states that satisfaction for the product has the greatest impact on brand loyalty. In Table 11, I present the results of factors influencing loyalty towards the brand.

Connection between loyalty towards the product and the		B	Std. Error	Beta	F sign..
-	<i>overall performance of the product</i>	-0,300	0,072	-0,277	0,000
-	dealer loyalty	0,616	0,059	0,578	0,000
-	overall performance of the dealer	0,547	0,057	0,593	0,000
-	overall performance of customer satisfaction	-0,225	0,082	-0,188	0,007
-	recommending the dealer for other customers	0,212	0,111	0,131	0,058
Factor 1	design, consulting	0,143	0,045	0,249	0,002
Factor 2	transportation	-0,042	0,050	-0,076	0,041
Factor 3	contact after purchase	0,256	0,271	0,460	0,347
Factor 4	giving offers/purchase phase	-0,151	0,267	-0,266	0,057
Factor 5	customer service/service performance	0,140	0,366	0,081	0,070

Source: Own data

Table 11: loyalty towards the brand and factors influencing it.

According to the above, my fourth hypothesis (H4) in this part is not proven.

The fifth hypothesis (H5) states that the overall customer satisfaction is mainly dependent on the satisfaction towards the dealer, and not the product. Customer satisfaction shows stronger relation with satisfaction with the dealer at 0,593 correlation, and appropriate significance level. In addition, satisfaction with the product only shows 0,455 correlation, at appropriate significance level. Thus, hypothesis 5 (H5) is proven.

Hypothesis 6 (H6) states that agricultural machinery customers in the eastern part of Hungary are more satisfied than the ones in the west. I examined this statement with the overall results of all the machine types

I have studied the results by regions, shown in Table 12. The table includes the answers to the questionnaire in 2006, about all 5 types of machines.

Description	Regions							Total average satisfaction
	1	2	3	4	5	6	7	
5 - ☺ Very satisfied	62%	72%	80%	75%	73%	63%	53%	
4 - ☺	38%	28%		25%	27%	27%	47%	
3 - ☺			20%					
2 - ☹								
1 - ☹ Least satisfied								
Average satisfaction	4,61	4,62	4,6	4,75	4,73	4,62	4,53	4,63
1 = Northern Hungary, 2 = Northern Great Plain, 3 = Central Hungary, 4 = Southern Great Plain, 5 = Central Transdanubia, 6 = Southern Transdanubia, 7 = Western Transdanubia								

Source: Own data

Table 12: Customer satisfaction by regions – all machines

Table 12 shows that farmers living on the Southern Great Plain were the most satisfied. Most maximum marks (5) were given by farmers in Central Hungary (80%). If I exclude Central Hungary, and take the average of the eastern and western parts of the country separately, eastern Hungary gives an average of 4.66, and western Hungary gives an average of 4.62. Based on this result, hypothesis 6 (H6) is proven.

3.3. New and novel scientific results

Based on my research I state the following new and novel scientific results:

1. Using three different kinds of research methods – questionnaire, telephone and interview – I determined and ranked by satisfaction index the factors influencing customer satisfaction in agricultural machinery purchase. Considering the processed secondary data I found that the results of similar surveys conducted and published in German and English speaking countries is different from those conducted in Hungary. I proved that satisfaction with the machine has little effect on loyalty towards the brand name. I also proved that although satisfaction with the dealer is important in customer satisfaction, its main importance does not come through loyalty.
2. I proved with mathematical-statistical methods that satisfaction with the dealer has a greater role than satisfaction with the product. I found weak connection between the answers about satisfaction with customers buying agricultural machinery and the quality of the products. The examined farm equipments included combine harvesters, balers and tractors. I found stronger links to services accompanying products by the dealers. The demand for product quality has not changed, only its priority, over time. Customers take high quality for granted, as standard service, and require extra service from the dealers. In a country, where the foreign-based manufacturers only keep contact with customers through importers, a proven hypothesis like the above cannot be overlooked.

3. I have shown how important service elements given by the dealers are from the customer's point of view. Various factors affecting the satisfaction level of farmers are of different importance. Each company's relevance is to establish priorities in quality management, in which the investigated areas of my dissertation can offer great help for creating a company strategy. Examining the service areas and making different groups I conclude that phone accessibility, commitment, kindness, professional service means customer satisfaction with the dealer. Results under the average generally arrived when customers were forming opinions about the circumstances of the service, like opening times, possibilities for service, or winter discount. Customers were mostly dissatisfied with the advising representative and courses held for drivers. This group was also connected to the circumstances of the service, for example dissatisfaction with the course for the drivers or the costs of the loan.

4. Satisfaction with the agricultural machinery can be considered homogenous on the basis of the studied factors, machine type and regions. I proved that there is no significant difference in customer satisfaction and factors influencing customer satisfaction in the different regions of the county. Satisfaction with the various types of machines in different regions did not show significant difference, either.

4. CONCLUSIONS AND RECOMMENDATIONS

After extensive processing of literature and on the basis of the data processed by me, I make the following conclusions:

Customer satisfaction is one of the most relevant topics of today. Competition is getting stronger and in order to survive, companies are forced to reduce costs. There is a race to win over customers, and the importance of keeping customers is increasing. Only satisfied customers will become regular and loyal customers.

In my opinion, agriculture is one of Hungary's strongest economic sectors. The unique natural and terrain conditions and climatic factors allow a high quality and quantity of products. To achieve this, and the required European level, farmers need high-quality machinery. The spread of mass marketing resulted in manufacturers and service providers losing direct contact with users. The number of interactions has decreased between customers, manufacturers and service providers.

The relevance of the topic is further enhanced by the fact that the number of published results on the field of customer satisfaction is relatively modest. Also, the number of customer satisfaction surveys in the field of agricultural machinery is also modest. Unfortunately synchronizing agricultural theory and practise does not really work, as Husti (2006) mentions it: the cooperation between agricultural stakeholders 'teaching, research, breeding, development, production, purchasing, processing and distributing organizations' is missing.

According to the press of the latest agricultural exhibition, there 160 companies dealing with the manufacturing of agricultural machinery, from these, about 75 work in Hungary. Although the thesis examined German machine producers among Hungarian users, I believe that other companies may find useful results and information in my work.

➤ **Customer satisfaction surveys are important.**

Customer satisfaction has not lost its relevance. Competition is getting stronger, there is a struggle to get more customers. The majority of the companies are forced to cut costs, but it is essential to keep customers. It is not only important to get new buyers, but also to keep the old ones. It is impossible to build a company's strategy without measuring customer satisfaction. Measuring customer satisfaction is a necessity for every company, in the long term, not even the smallest company can work without customer feedback.

➤ **The number of published customer satisfaction surveys are insignificant.**

Many companies carry out customer satisfaction surveys that can be conducted from either inside the company, or by asking an external market research company. However, even in today's advanced technology there are not enough made public. In my opinion, the fate of a company does not depend on making such a result or database public for researchers, students or other companies.

➤ **The results of surveys conducted in English and German countries are different from the results of my studied area.**

In response to the hypothesis based on the literature, I conclude the following:

Customer satisfaction through loyalty does not play a major role in being satisfied with the dealer. It is my understanding that although loyalty plays an important role, it still does not have such a big effect on satisfaction with dealers than shown in research conducted in English or German speaking countries. My proposal in this area for companies is to pay attention to conducting and analyzing customer satisfaction surveys and not to neglect taking care and developing dealer satisfaction on an appropriate level of loyalty.

- Being satisfied with the dealer has a more important role than satisfaction with the product itself. As my research results have shown, this statement is correct. My recommendation for the area is for the companies not to neglect the area, and in case cost reduction is necessary, the effects and strength of factors influencing customer satisfaction should be examined, and the decision on cost reduction should be with the help of a priority list.
 - Loyalty towards the dealer has a positive effect on loyalty for the brand. My recommendation is thus for the foreign-based agricultural machinery manufacturers, to take my research evidence into account.
 - I mentioned the importance of loyalty towards the brand many times in my dissertation. The assumption that it is mainly effected by satisfaction of the brand did not prove to be right in my case.
 - The overall satisfaction of the customers based on answering questions in a survey, depends mainly on satisfaction with the dealer.
 - My assumption that in the Eastern part of Hungary, the satisfaction level of the customers is higher than in Western Hungary needs further studies.
- Carrying out scientific and research work is of great importance in the area which is presented in my dissertation. My research is also significant due to the low number of customer satisfaction surveys in agricultural machinery, especially in Hungarian,.

Factors influencing customer satisfaction clearly show that it is relevant for every company to determine quality management priorities. The development of certain areas should be prioritised since it can increase customer satisfaction. This is an efficient and cost effective tool, which does not cause reduction in customer satisfaction by overshadowing certain areas, since maintaining the current state does not mean higher satisfaction efficiency either.

5. SUMMARY

The relevance of the research is justified by the facts that customer satisfaction is one of the most frequently discussed and applied topics, and also it is closely related to boosting Hungarian agriculture. On the one hand, we can still feel the impact of the recently ended economic crisis; therefore companies in every field are forced to use economic constraints. When it comes to reducing costs, companies primarily cut back on marketing. But how does it affect customers and their satisfaction? Today, customer satisfaction is one of the most current topics. Together with the costs, competition increases. Keeping their customers is a priority task of every company, as well as is finding additional customers.

Secondly, the relevance of the dissertation is also justified by the fact that customer satisfaction surveys of most companies, irrespectively of the product, are not made public. The number of published research results of Hungarian farmers' satisfaction is relatively modest.

An even more important reason is that agriculture, in my opinion, is still one of the most important economic sectors in Hungary, which leads to the need of high quality and adequate quantity of agricultural machinery. Numerous publications are available on the topic of Hungarian agriculture, specifically in the food branch, although research on agricultural machinery is to be found mostly in foreign languages. I have no knowledge of published research results based on the satisfaction of customers who had bought agricultural machinery. In Hungary, nearly a million landowners involved in agricultural activities are registered. Admittedly, only 56 thousand farms exceed the territory of one hectare. However, the need for agricultural machinery is still significant, regardless of the size of the farmland.

Long term demand for agricultural raw materials knows one direction. It grows together with the increase of world population, and brings steadily rising prices for raw materials. In Hungary, during the latest Agro-Mash Expo (2012) it was announced at a press conference that about 160 companies deal with producing agricultural machinery in our country. Although only 47% of these are in Hungarian ownership, agricultural machinery production is still significant. Highly competitive market trends put consumer satisfaction to the foreground.

My dissertation is based on broad and diverse processing of literature. As a goal of my paper I have aimed to process literature based on customer satisfaction. I have presented the development of customer satisfaction in chronological order. Being a multidisciplinary field, I have cumulatively evaluated literature published on the effect of areas including customer satisfaction, like social and the mostly developed and mostly published psychology.

First, I found that the numerous international translations interpreted the term "customer" in different ways. The English word "consumer" and the German "Verbraucher" primarily refer to the members of the consumer market. The words "customer" or "Kunde" appears on the organised market.

The area of customer satisfaction is interdisciplinary, I have divided the studies in three big categories: economic, psychological and social. The most common side of customer satisfaction is of course economic, since companies had profit-oriented production for a long time. The customer's behaviour can be explained rationally according to Varian (1995), since the customer will buy the product that he can afford. Also, we cannot ignore psychological and sociological areas either, when looking at areas influencing the customer's behaviour. Festinger (1978) came up first with the social psychological theory which was later used in many cases in relevant literature. The basic idea of this theory is dissonance, which means an idea that contradicts the experience or the new information, causing a sense of inner tension. If somebody buys an item, and leaves the store with a

positive feeling, then, the customer awareness generated is cognition. However, if he sees a similar, but better item in a short time, two contradictory cognitions are generated, which is called cognitive dissonance. In the 1970s the importance of service also appears. Hofmeister and Co (2003) determine four subjective factors influencing individual purchasing process: perception, belief, attitude and intention.

The most common areas of market research are B2C and B2B relationships, in other words consumer behaviour on individual or small-group level, and among companies. In my case the classification of farmers was not easy. The customer buys not to satisfy his own needs, but to meet the needs of the organisation or company. In case of farmers these two areas are often not the same.

In the dissertation, I have used secondary data, created through literature. During my research, I have used three types of descriptive research methods during primary database collection: questionnaire survey, telephone and personal interviews. In all three cases, the obtained, clear, statistical-mathematical methods to justify the conduct of representativeness were given. The five groups of machinery: combine harvesters, silo-combine harvesters, square and round bailers and tractors were analysed together. This was due to the fact that the results were hardly different thematically and statistically, and also the representativeness of the types of machines were supported by this method. The groups merged together were the round and square bailers, combine harvesters and silo-combine harvesters. The initial questionnaire was identical in most cases, in other words, during the statistical analyses only the exactly same questions were taken into account. The questions can be divided into two big groups: connected to the product and the level of satisfaction with the service given with the product. I have grouped the huge database, which I also preferred in the statistical method – not neglecting the other factors of course – were the following: satisfaction with the dealer, satisfaction with the product, loyalty towards the dealer, loyalty towards the product and all in all customer satisfaction. The five level Liker-scale was used in the analyses of the questionnaire. I have also used a satisfaction index during the analyses, the technique of calculating this index can be found in the dissertation. From the statistical methods I have used correlation, methods for establishing significance levels as well as principal component analyses, factor analyses, one-component and multi-component linear regression computation.

In the Results chapter I have presented the average of the results given to the questions relating to the different machine groups. I have presented a possible solution for increasing all-in-all customer satisfaction with an example, where the improvement of a specific field affects customer satisfaction.

In case of the dealer services a strong correlation was found with the appropriate significance level among professional skills, quality of work, product presentation and satisfaction with the product brochures, satisfaction with quick purchase and availability of components, just to mention a few.

With the different machinery groups, I have examined my hypotheses separately, and in the end I have summarised them. Based on these, I have concluded the following:

The Hungarian farmer's satisfaction towards purchased agricultural machinery through loyalty does not play such an important role in satisfaction towards the dealer, as shown in the results of international surveys. In my view, although loyalty has a very important role, it does not have such a big impact on the satisfaction level towards the dealer in Hungary, as it was shown by research done in English and German speaking countries.

Satisfaction with the dealer has a bigger significance than the satisfaction with the product itself, which is in my case, agricultural machinery. The farmers' loyalty towards dealers have a positive influence on loyalty towards the brand, also in case of agricultural machinery.

Loyalty towards the dealer has a positive influence on the loyalty towards the brand name of the agricultural machinery.

I was not able to prove that satisfaction with the product has the biggest influence on loyalty towards the brand name.

My assumption is that in the Eastern part of Hungary, the satisfaction level of the customers who had purchased agricultural machinery, is higher than in Western Hungary, and for that, I suggest further studies.

PUBLICATIONS IN THE FIELD OF THE PHD WORK

Scientific journal articles published in English

Anikó Boll (2010): Analysis of customers satisfaction of agricultural machineries from the level of producers and traders in Germany. – In Annals of the Polish Association of Agricultural and Agribusiness Economists (SERiA), Krakow – Poznan. 2010. vol. XII. No. 6; 17-20 p. ISSN 1508-3535

Anikó Boll – Franz Mühlbauer (2010): Why is customer satisfaction analysis important in city marketing? - In Annals of the Polish Association of Agricultural and Agribusiness Economists (SERiA) Krakow – Poznan. 2010. vol. XII. No. 6; 21-25 p. ISSN 1508-3535

Scientific journal articles published in Hungarian

Boll Anikó (2009): Vevőelégedettség biztosítása az önkormányzatoknál Marketing Controlling segítségével - Jelenkori Társadalmi és Gazdasági Folyamatok, IV. évfolyam 3-4. szám 2009, P. 120-125; ISSN 1788-7593

Boll Anikó (2013): A vevőelégedettség növelésének lehetőségei a mezőgazdasági gépgyártásban *Economica Szolnoki Főiskola Tudományos Közleményei*. ISSN 1585-6216 . P. 124-134

Scientific conference presentation released as publication

In English or German:

Anikó Boll (2007): Quality of the Human Resource as the Influential Faktor of the Satisfaction of Consumer, Competitiveness and European Integration International Conference Babes-Bolyai University Cluj-Napoca, Romania P. 405-410: ISSN 1453-1410

Anikó Boll (2008): Untersuchung der Kundenzufriedenheit im Bereich Agrotechnik auf Hersteller- und Händler-Ebene X. Nemzetközi Agrárökonómiai Tudományos Napok, Gyöngyös. 2008. 04.27. ISBN 978-963-87831-1-0

Anikó Boll (2010): Was hat Kundenzufriedenheits-Analyse mit Stadtmarketing zu tun? XI. Nemzetközi Agrárökonómiai Tudományos Napok, Gyöngyös. 2010. 03.25-26. P. 416-424; ISBN 978-963-87831-1-0 ,

Anikó Boll (2010): Untersuchungen des Kaufverhaltens im Bereich Agrotechnik mit besonderem Rücksicht auf Kundenzufriedenheits-Analyse XI. Nemzetközi Agrárökonómiai Tudományos Napok, Gyöngyös. 2010. 03.25-26. ISBN 978-963-87831-1-0

Anikó Boll (2010): Wirtschaftskrise = Marketingkrise? - Welche Rolle spielt Kundenzufriedenheit in der Krise? Tudományos Konferencia, Sopron, 2010. ISBN 978-963-9883-73-4, . CD kiadvány 177. CD:\docs\foreign1.pdf

In Hungarian:

Boll Anikó (2007): Vevőelégedettséget befolyásoló tényezők vizsgálata a mezőgazdasági gépjárműgyártásban. Tradíció és Innováció Nemzetközi Tudományos Konferencia, Gödöllő, 2007. ISBN 978-963-9483-85-9, CD:\Proceedings\Contributed papers\Marketing\Boll Anikó.pdf

Boll Anikó (2008): Vevőelégedettség vizsgálata a mezőgazdasági gépjárműgyártás és kereskedelem szintjén. Georgikon Napok, Keszthely, 2008. Konferencia , ISBN 978-963-9639-31-7, CD:\50 GeorgikonNapok\gn2008\GN2008\Teljes anyagok\Boll.pdf

Boll Anikó (2009): A beszerzési magatartás összetevői a mezőgazdasági gépjárműgyártásban, különleges kihatással a vevőelégedettségre. L. Georgikon Napok, Keszthely, 2009. okt. 1-2. Konferencia, ISBN 978-963-9639-34-8, Konferencia CD:/GN2009/Teljes anyagok 2009/Boll.pdf

Boll Anikó (2010): Agrobusiness gazdasági válság ellenére? LI. Georgikon Napok, Keszthely, 2010. szept. 30-okt. 1. Konferencia, Konferencia CD:/GN2010/Teljes anyagok 2010/Boll.pdf

Boll Anikó (2007): Testvérvárosi kapcsolatok jelentősége kistérségi településeknél marketing szemmel. Konferencia: Szolnok XI. Magyar és világtudomány napja 2007. nov.

Boll Anikó (2010): A vevőelégedettség jelentősége településmarketingben. Tudományos Konferencia, Sopron, 2009. CD kiadvány 177. CD:\docs\Boll_paper.pdf

Other:

Journal article:

In English or Hungarian:

Anikó Boll (2003): "Chancen ergreifen und dabei die Risiken abwägen", Agrarzeitung Ernährungsdienst, ISSN 0014-0228, p. 8-13.

Anikó Boll (2002): Ungarn erschwert seiner Agrarwirtschaft den EU-Beitritt, Agrarzeitung Ernährungsdienst, ISSN 0014-0228, p. 15-19.

Anikó Boll (2001): Ungarn – noch reichlich Hausaufgaben, DLG-Mitteilungen, ISSN 0341-0412, p. 22-24.

Anikó Boll (2001): Still a lot of homework to do, Agrifuture Autumn, ISSN 0554-5587, p. 19-25