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Contents

Applied Studies in Agribusiness and Commerce – APSTRACT
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SCIENTIFIC PAPER

A STUDY ON CONSUMER HABITS IN THE DIETARY SUPPLEMENTS MARKET

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Abstract: *There has been a continuous increase in the proportion of consumers using dietary supplements worldwide. Evidence based on former surveys suggests that in Hungary more than half of the population buy at least one type of dietary supplement (hereinafter DS). By using secondary research, the authors of the present paper examine the demographic factors determining the consumption of DS on a global scale. Consumption of DS increases with age and is more frequent among women. Consumers with higher qualifications and income tend to buy products containing vitamins and minerals to a greater degree. In the vast majority of cases the purchase and consumption of DS is based on consumers' personal preferences and decisions, rather than on their physicians' advice. It has been found that a high percentage of DS consumers probably do not even need any extra nutrient intake. In our primary research (N=1000) the specific attitudes to and characteristics of DS consumption among Hungarian adults are analysed on the basis of on a nationally representative survey. First, we identify the most important reasons which encourage consumers to buy DS. Consumer awareness concerning DS with a particular vitamin and mineral content and of other sources is examined, and we also assess the consumption of the product which is the most popular. The current paper attempts to identify the outlets Hungarian consumers typically buy DS from, and also what resources they use to keep themselves informed about these products. Consumers who admittedly reported (regular) consumption of a certain kind of DS product 6 months prior to the survey are further examined in relation to certain additional issues. The results of our survey provide an accurate picture of the DS consumption habits of the Hungarian population.*

Keywords: *consumption of dietary supplements, dietary supplement preferences*
(JEL Code: I12, M31)

INTRODUCTION

The importance of maintaining a healthy lifestyle increasingly motivates consumers to use DS to supplement their traditional diet in order to support their physical and mental wellbeing. 68% of U.S. adults consume DS products (COUNCIL FOR RESPONSIBLE NUTRITION, 2015) the commercial value of which amounted to 38.8 billion US dollars in 2015. (NUTRITION BUSINESS JOURNAL, 2016). The global phenomenon of the prevalence of DS consumption in both developed and developing countries has been perceptible in Hungary, too. Relying on secondary research the present study aims to explore the special characteristics of DS preferences and consumption according to demographic and lifestyle criteria. At the same time, in our primary research the characteristic features of DS consumption of Hungarians have been analysed, involving the results of a nationally representative survey we conducted with the participation of 1000 people in 2018.

There is considerable variation in the interpretation of the term DS. In the U.S. the regulatory framework for DS is provided by the DSHEA (Dietary Supplement Health and Education Act). As it is defined there, DS products are as those which:

- are supplementary ingredients of the diet;
- are not intended to substitute for a traditional diet;

- cannot be sold as traditional food;
- intended to be taken by mouth in capsule, pill, tablet or liquid form;
- are not classified as homeopathic products and topical applications (BROWN, 2017).

According to the American Food and Drug Administration (FDA), dietary supplements are all products (other than tobacco) that are designed to supplement the diet and contain one or more dietary ingredients from the following list: vitamins, minerals, amino-acids, herbs or other botanicals and their concentrates, constituents and combinations. (AKILEN, et al., 2014, FDA, 2015).

In Hungary the Regulation on DS products - 37/2004 (IV. 26.) ESZCSM (Ministry of Health, Social and Family Affairs) - is in accordance with the European Union directives concerning DS. According to this regulation, DS products are types of food which contain - nutritionally or physiologically important - nutrients, separately or in combination. They are intended to supplement a traditional diet and they differ from traditional food in terms of their appearance. (LUGASI, 2014).

Numerous types of DS are available in the market in various forms and external appearance, but the present study is limited to a discussion of the consumption of vitamins and minerals only. According to a survey conducted by EUROMONITOR in 2017, Hungarians tend to pay more attention to health preservation in order to avoid major health problems. Although fortified / functional food and drinks play a significant role in the market, the majority of Hungarian consumers have more confidence in the efficacy of pills (in particular vitamins and minerals) (EUROMONITOR, 2017). According to a survey by the Nutrition Business Journal, which recorded sales in the DS industry, DS products containing vitamins and minerals accounted for 43% of the total purchases in 2015 (JOHNSON, 2015). Globally, vitamin consumption is typically higher than that of other DS products. Based on a survey carried out by STATISTA (2018), the following products proved the most popular among U.S. adults in 2017. (Table 1)

Table 1. Vitamins and minerals most frequently consumed in the USA

Product	Use (%)
Multivitamin	73
Vitamin D	37
Vitamin C	32
Calcium	32
Vitamin B / complex	24

Source: Authors' own construction, based on Statista (2018)

As has been confirmed by several previous studies DS consumption increases with age, and the level of consumption is much higher among women (BAILEY et al. 2011, 2013; RADIMER et al. 2004; DICKINSON&MACKAY, 2014; ROVIRA et al. 2013). Surveys conducted by NHANES (National Health and Nutrition Examination Surveys) over the past 20 years have proved that DS consumption is more widespread among those with higher qualifications than among people of lower socio-economic status. (DICKINSON & MACKAY, 2014).

By identifying nutritional factors it has also been established that a high percentage of DS consumers do not even need any extra nutrient intake. This primarily applies to women who lead a healthy lifestyle (by consuming a lot of fruit and vegetables, being physically active, being non-smokers and avoiding the consumption of alcohol), and who are also of a higher socio-economic status. (VANTANPARAST et al., 2010). By examining certain factors of health behaviour in their research sample, REEDY and his colleagues (2005) found that those using DS could be characterised by higher fruit and vegetable consumption.

Findings provided by BAILEY et al., (2013) clearly show that adult Americans buy DS to preserve and ensure their health. However, in the vast majority of cases the products are not purchased upon medical advice, consequently consumers use DS voluntarily. This justifies the inverse hypothesis mentioned in numerous previous studies, according to which consumers attribute a special role to DS, with the help of which the development of bad health conditions can be avoided. (BAILEY et al., 2013). WILLIS and STAFFORD (2016) revealed a significant relationship between DS consumption and health awareness. Based on their findings it can be stated that the more health conscious people consider themselves to be, the more likely they are to use one or several types of DS. In their survey DICKINSON and her colleagues (2014) concluded that people consuming DS on a regular basis were more likely to make an effort to follow a balanced diet, to go to health screenings and to do physical exercise, than non-users.

MATERIALS AND METHODS

The consumer behaviour of Hungarian adults concerning DS use has been looked at in a questionnaire-based survey involving 1000 people on a nationally representative sample. The examination of DS consumption constitutes only a part of our questionnaire. The present paper does not cover further elements involved in our complete working material.

A market research consultancy was commissioned to conduct the survey, and data were collected by interviewers who were prepared on the topic in advance, on a nationally representative sample between 1 June 2018 and 30 June 2018. The distribution of major background variables is demonstrated in Table 2.

Table 2: Sample distribution according to major background variables

Types of variables	Sample distribution	
	Number of people	%
Total number of respondents		
Total	1000	100

Gender		
Male	480	48.0
Female	520	52.0
Age		
18-29	230	23.0
30-39	145	14.5
40-49	201	20.1
50-59	183	18.3
above 60	241	24.1
Highest level of education		
Primary, maximum 8 grades	104	10.4
Vocational high school, technical school	339	33.9
High school diploma	396	39.6
College degree	161	16.1
Marital status		
Married	423	42.3
Living with a partner	202	20.2
Widow / widower	75	7.5
Single	185	18.5
Divorced	109	10.9
Separated from spouse	6	0.6
Legal situation, employment, main activity		
Active blue-collar worker	393	39.3
Active white-collar worker	261	26.1
On maternity leave	29	2.9
Retired	225	22.5
Pupil, student	37	3.7
Housewife	8	0.8
Unemployed	27	2.7
Other inactive employed	16	1.6
Other dependant	4	0.4
Monthly household income		
Affluent income with savings	40	4.0
Moderate income with little savings	286	28.6
Low income, with no savings	526	52.6
Hardly sufficient	80	8.0
Regularly facing problems of immediate survival	22	2.2
Does not know / Does not answer	46	4.6
Subjective health awareness		
Not health conscious at all	68	6.8
Mostly not health conscious	170	17.0
Partly health conscious	393	39.3
Mostly health conscious	298	29.8
Highly health conscious	32	3.2
Does not know / Does not answer	39	3.9
Region		
Central Hungary	298	29.8
Central Transdanubia	109	10.9
Western Transdanubia	100	10.0
Southern Transdanubia	94	9.4
Northern Hungary	119	11.9
Northern Great Plain	148	14.8
Southern Great Plain	132	13.2

Source: Authors' own construction, 2020

In order to avoid misinterpretation of questions, the term DS was sufficiently clarified at the beginning of the set of questions relating to the purchase and consumption of DS.

The following aspects were covered:

1. Has the respondent used any kind of DS over the past 6 months? If the answer was negative, the second question was to be ignored.
2. What are the three most important reasons for purchasing DS? In our analysis the first of these three answers are examined in relation to the background variables.
3. The respondents were asked to indicate their level of agreement with statements concerning DS and food consumed, on a five-point scale (1=strongly disagree, 5=strongly agree).
4. Has the respondent been advised by a physician to use specific vitamins, minerals or other DS products over the past year?
5. Questions concerning the awareness and consumption of vitamins, minerals and DS from other sources. (33 items in total). In our analysis the five most frequently mentioned items have been examined.
6. Are there DS products the respondent consumes on a regular basis, at least 3-4 times a week? In the case of a positive answer, the respondent was asked to specify the products.
7. The place of purchase.
8. How and from where do consumers get their information when deciding to buy DSs?
9. Background variables.

During data assessment, besides using descriptive statistical methods, significance tests were also performed, relying on

cross tabulation analysis to characterise the differences between segments. Data analysis was performed using SPSS 20.

RESULTS AND DISCUSSION

37.4% of all respondents (N=1000) reported consumption of some kind of DS during the 6 months prior to the survey. Consumption was found to be more frequent among women (59.7%) than men (40.3%) ($p<0.01$). No significant correlation can be shown among different age groups; however, the highest consumption rate (42.3%) can be observed in the 40-49 age group. Consumption increases proportionally with higher qualifications ($p<0.01$). More than half of those with a college degree (52.2%) of all respondents reported consumption of some kind of DS over the previous 6 months. Nevertheless, it is interesting to note that if we focus on only these 374 respondents who admit to using DS, those with a high school diploma (44.6%) appear to be overrepresented. No significant correlation with DS consumption can be detected according to marital status and the number of children under 18 years of age in the household. On examining employment and main activities ($p<0.01$), nearly half (49.0%) of active white-collar workers have been found to have used such products during the 6 months before the survey. Considering income, there is no significant correlation; however, it is obvious that with higher income levels consumption tends to become more frequent. Subjective health awareness has proved to be a strong factor when examining these issues. ($p<0.01$).

In the samples DS consumption increases proportionally and dynamically with the degree of health awareness. In the 6 months period before the survey 65.6% of respondents who considered themselves very health conscious reported consumption of some kind of DS. In terms of consumption, regional differences can also be observed ($p<0.01$). The differences between regions are demonstrated in Table 3.

Table 3: Regional differences in DS consumption (N=1000)

Region	Rate of consumption (%)
Central Hungary	52.7
Southern Transdanubia	43.6
Western Transdanubia	41.0
Northern Great Plain	31.8
Northern Hungary	25.2
Central Transdanubia	24.8
Southern Great Plain	23.5

Source: Authors' own construction, 2020

DS consumption is the highest in the Central Hungarian region, while it is the least typical in the Southern Great Plain.

We were also interested to know what might prompt people to people buy DS products. The motivating factors mentioned first by respondents are shown in Table 4.

Table 4: Factors motivating people to buy DS (N=374)

Statement	Number	%
Food products do not contain adequate amounts of nutrients, so it is necessary to supplement them.	167	44.7
I consider my health important, and DS products provide an obvious solution for maintaining it.	153	40.9
It helps recover health after illnesses.	106	28.3
We are surrounded by several harmful environmental factors, so there is a need to compensate for the impacts associated with them, and DS products play a significant role in this process.	97	25.9
I use them to prevent joint and cartilage disorders.	62	16.6
It helps overcome stress and reduce its consequences.	60	16.0
I do sport regularly and it helps improve my performance	53	14.2
Almost everybody uses some kind of DS nowadays, that is why I do, too.	40	10.7-
It helps prevent cardiovascular disorders.	38	10.2
Other	21	5.6
Does not know / does not answer	2	0.5

Source: Authors' own construction, 2020

44.7% of respondents are of the opinion that food products do not contain nutrients in sufficient quantities, therefore supplementation is necessary. It is a widely held belief (40.9%) that consumption of DS may help maintain overall health. The third most frequent response among the above factors suggests that consumers deem that the use of DS may speed up recovery after illness. Other responses include strengthening of the immune system and the importance of DS consumption during pregnancy and lactation. On closer examination, significant correlations has been found in terms of gender ($p<0.01$), education ($p<0.01$) and subjective health awareness ($p<0.01$).

Men tend to use DS mostly in order to improve their sports performance (22.5%) and reduce stress (17.2%). Women, on the other hand, buy DS products because they believe these help maintain overall health and wellness (37.2%) and restore health after illnesses (9.9%). Women also typically hold the view that such products can help them fill nutrient gaps in the diet (17.5%) and that DS can counteract the harmful effects of negative environmental factors (6.7%).

Purchasing DS to improve their sports performance was found to be the most typical among respondents with a college degree (19.0%). The main reasons given by those with vocational or technical schooling for using DS were stress reduction (17.0%), regaining health after illnesses (14%), and a peer effect – "I use DS because almost everybody does"- (7%).

Respondents with a high school diploma were found to use DS products for maintaining good health (34.9%), for filling nutrient gaps in the diet (16.3%), and for compensating for the impacts of negative environmental factors (6.6%).

Respondents considering themselves mostly health conscious use DS for maintaining good health (43.4%) and for filling nutrient gaps in the diet (17.2%). Those who claim to be partly health conscious are more likely to use DS for the improvement of their sports performance (20.0%) and for reducing stress (17.0%).

Respondents were then asked to rate different statements by indicating their level of agreement or disagreement with them on a scale from 1 to 5, where 1 stood for strong disagreement, while 5 meant strong agreement. The findings are illustrated in Table 5.

Table 5: Statements relating to DS products and traditional food (N=1000)

Statement	Mean	Standard deviation	Relative deviation, %
DS consumption is indispensable for maintaining adequate overall health.	2.46	1.501	61.016
The amount of vitamins, minerals and other nutrients in my diet is sufficient for the preservation of my health.	3.09	1.456	47.119
I am fully aware of what kind of vitamin-, mineral-, plant-based and other DS products are necessary for me.	2.99	1.366	45.685

Source: Authors' own construction, 2018

Relative deviation appears to be particularly high for all the statements, consequently mean values do not provide exact results, and responses seem heterogeneous. Based on correlation analysis with background variables, several conclusions can be drawn. In terms of gender, women ($p<0.01$) are typically are more likely to feel that DS consumption is indispensable for maintaining adequate overall health. Female respondents ($p\leq0.05$) are also more likely to consider themselves aware of what kind of vitamins, minerals and other DS products are necessary for them. Regarding education, those with a college degree ($p<0.01$) rank first in stating that DS consumption is important in maintaining good health. Graduate respondents ($p<0.01$) claim to know what DS products are necessary for them, therefore they can be considered to be the most conscious group in this respect. Respondents with secondary vocational or technical education ($p\leq0.05$) state that the food they consume contains nutrients in sufficient amounts to preserve their health. In terms of employment and main activities it can be concluded that the awareness in the fields above among graduates is most obvious among white-collar workers. Awareness likewise tends to increase with income. The higher income the respondents have, the more they claim to know what kind of vitamins and minerals they need ($p<0.01$). The same tendency can be observed in connection with health-consciousness ($p<0.01$). It has also been proved that the higher the respondents' subjective health-consciousness, the more consumers tend to believe DS consumption to be indispensable for maintaining adequate overall health ($p<0.01$).

Respondents were also asked whether their physicians had recommended that they take particular vitamins, minerals or other DS products during the previous year. 16.8% of the whole sample gave a positive answer to this question. One third of the respondents (32.9%) reporting the use of certain types of DS six months prior to the survey did so on medical advice. Consequently, the majority of consumers purchase and use these kinds of products because they themselves choose to.

Following this, different DS products were listed to the participants in the survey. First, they were asked to mark the products they knew and then the ones they had already used. The list contained 33 items including vitamin and mineral products and products of plant or animal origin. The 5 best-known products and their consumption rates are shown in Table 6.

Table 6: The 5 best-known DS products and their consumption rate (N=1000)

Product	Is known by (%)	Has been used by (%)
Vitamin C	96.5	67.6
Multivitamin	92.7	47.8
Vitamin D	88.1	16.6
Magnesium	85.8	40.4
Calcium	83.6	39.8

Source: Authors' own construction, 2020

Vitamin C has been found to be the best-known and most frequently used product, followed by multivitamin products. Despite the fact that the majority of consumers know about Vitamin D products, only 16.6% of respondents reported use. This confirms the findings published by the National Institute of Pharmacy and Nutrition, according to which Vitamin D consumption is critically low in our country.

We have also assessed whether there is a DS product (or products) which respondents use on a regular basis, at least 3-4 times weekly. 32.9% of the whole sample responded positively to this question. 77.3% of those who admitted consumption of some kind of DS during the previous six months were found to be using them at the time of the survey, as well.

We also examined what kind of products were being used by respondents in the survey period in the whole sample and then we narrowed the scope down only to those reporting use during the six months prior to the survey. The products in question appeared with the same frequency in both cases. Based on this it can be concluded that the products consumed most in the survey period were Vitamin C, Multivitamin and Magnesium.

It was also our objective to examine where Hungarian consumers typically buy DS products from. The results can be seen in Table 7.

Table 7: Place of purchase of DS products (N=1000)

Place of purchase	Number	%
Nowhere (does not buy)	459	45.9
Pharmacy	296	29.6
Organic shop	70	7.0
Drugstore	58	5.8
Other	33	3.3
Hypermarket–supermarket	56	5.6
Webshop	28	2.8

Source: Authors' own construction, 2020

Those who purchase DS products primarily buy them in pharmacies. Organic shops and drugstores come second and third, respectively. In the category 'Other', MLM businesses were predominantly mentioned.

Finally we surveyed where consumers get information from before buying DS products. The results are shown in Table 8.

Table 8: Sources of information used before purchasing DS products (N=1000)

Source	Number	%
Nowhere	513	51.3
Friends, family members	220	22.0
Pharmacist	152	15.2
GP	125	12.5
Internet lifestyle portals	45	4.5
Other	38	3.8
Coach/personal trainer	32	3.2
Lifestyle magazine	23	2.3
Dietitian	12	1.2
Workout partner	7	0.7

Source: Authors' own construction, 2020

Evidence suggests that consumers are typically unlikely to collect information from any source about DS products before purchasing them. However, if they do so, they mostly consult friends and family members. The first professionally reliable source, the pharmacist, only comes second in their ranking. It can therefore be concluded that credibility is primarily based on trust, and less importance is attached to the recommendations of professional organizations and experts.

CONCLUSIONS

In the present survey the DS consumption habits of Hungarians were examined on a nationally representative sample. The results have been found to be in line with those of numerous previous international studies on DS consumption in terms of demographic segmentation and lifestyle factors. Based on the information collected, it can be concluded that the prevalence of use increases with a higher educational level and higher income. DS use tends to be more frequent in women. A connection has been documented between subjective health- consciousness and DS consumption. The examination of lifestyle factors, such as obesity, overall health or physical activity is beyond the scope of the present study. However, by conducting further investigations we can gain a better insight into this area, something which would be highly desirable in the near future. Consumers claim that food products are short of nutrients, and consequently they need to be supplemented, and this has proved to be the major factor stimulating purchases. It needs to be stressed that consumers tend not to collect information before purchasing these products and that the products are not used on medical advice in most cases. The phenomenon of 'self-medication', often also cited by producers, can be observed in the consumer market. Even when consumers rely on certain sources for orientation, information is primarily gained from sources other than professionally reliable organizations or experts.

These anomalies may result in a predisposition towards different misconceptions, for example that DS products can be applied for the treatment of certain diseases. This issue would have to be addressed both by producers and professional organisations and experts in the field.

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SCIENTIFIC PAPER

KRISHNA CONSCIOUSNESS IN EUROPE: THE WAY FARMING COMMUNITIES BECAME THE FOCAL POINTS OF MARKETING

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Abstract: *Krishna Consciousness is regarded as one of the most successful new religious movements in terms of marketing in the Western World. The aim of this research was to identify and analyze the marketing strategy the members of the Krishna-conscious community apply in Europe via content analyses, field research observations and in-depth interviews. The marketing mix of services marketing (7P) are often suggested to be applied by religious communities as well, however, this concept has boundaries due to the principles of the religions, which may not be altered for the sake of marketing. The research has shown that in Europe Krishna-conscious communities have overcome this problem by shifting the product from religion to a complex touristic product, which is realized in the form of farming communities, which have become an important rural tourist attraction in some countries. As the comparison of the websites of the different institutions has shown that rural and farming communities are the ones, which focus mainly on attracting people, who are not familiar with Krishna Consciousness yet, while the websites of the other institutions communicate mostly with devotees or people already interested in the religion or its certain aspect (cuisine, education), rural and farming communities were the institutions chosen to be analyzed more closely. The marketers of these tourist attractions are therefore free to make certain modifications in the marketing mix, as its focus is a tourist attraction, not the religion itself; while the transmission of knowledge about the religion happens in the touristic attractions only. Seven European farming communities of six different countries have participated in the research so far, which may be extended to further communities and continents on the future for a more thorough analysis.*

Keywords: *marketing; religious marketing; farming communities; Krishna Consciousness*
(JEL code: *M31*)

INTRODUCTION

Marketing religions has been a subject of debate for decades. According to the researches many people think that churches doing marketing or any form of economic activities undermines the credibility and the sacredness of a religious community (ATTAWAY et al., 1997; MCDANIEL, 1986; MCGRAW et al., 2011). However, in the middle of the 20th century more and more researchers have started to discuss religious markets, where religious communities compete with each other for followers, just like for-profit companies do on the product and service markets. The literature analyzed suggests that most of the researchers agree on the existence of a religious market, where religious groups are the suppliers, while members and potential worshippers are the customers, who interact with each other on the so-called religious marketplace (CORREA et al., 2017; HAGEVI, 2017; IANNACCONE, 2012). There is also a consensus on the fact that religious markets have gone through significant changes in the past approximately fifty years, thanks to the changes in consumer needs and emergence of new religious movements, which boosted the religious market in most parts of the world – however, about whether these changes take a positive or negative effect on religious life and the reputation of churches, the opinions vary (CROCKETT, 2016; EINSTEIN, 2008; WALRATH, 2017).

However, practices show that most of the religious communities have started to apply at least a limited set of

marketing tools, which urges the development of a model suitable for studying religious marketing. CULLITON (1958) was one of the first ones to study religious marketing using the marketing mix of 4Ps, where the product is not only the salvation and afterlife happiness offered by religions, but also a guidance to life including a set of standards of what is right or wrong. Price in this case may be identified as the rules, which devotees of a religion are required to follow and in most cases the secular pleasures they need to forgo of, while place either as the institutions, where people meet the religion (a church for example), or the place religion takes in the life of people. CULLITON (1958) also enhanced that the elements of the marketing mix – especially in the case of religions – are inseparable and interrelated, since every aspect aims to sell the product (CULLITON, 1958). ABELA (2014) classified religions in the category of social marketing, meaning those forms of marketing activities, where the focus is not on selling a product or service, but on spreading certain ideas, beliefs or worldviews among the public (ABELA, 2014). FINE (1992) also included religions in his book of Marketing the Public Sector, and proposed an expanded marketing model of the 7P's of social marketing, changing three of the original 7Ps: 'people', 'process' and 'physical evidence' are replaced by 'producer', 'purchaser' and 'probing'. The social marketing approach focuses on the intangible part of religion by including the human side of both parties: producer and purchaser. This model raises the attention to the importance of the churches offering religious services and the nature of people potentially receiving it; however, probing or market research is less applicable to religions than the 7P of service marketing. Another weakness of the social marketing approach is the lack of the focus on physical evidences, which play important role in characterizing religions (e.g. design of churches and sacred items) (FINE, 2009).

Some researchers took a different approach and focused especially on the resemblance of religions to services, services provided by religious organizations; and different product categories as the material and tangible realizations of the services and the religion. They have found that religions do have some common features with services in many aspects, such as being intangible, not measurable, perishable and pretty heterogeneous as well; and if we consider religious services themselves, then we can clearly see that applicability of the services marketing models (HASHIM and HAMZAH, 2014; IYER et al., 2014; SHAW and THOMSON, 2013).

The greatest limitation of the models above however, is that most of their elements, such as product, price or physical evidence are predetermined by the principles of the religion, therefore they may not be altered for the sake of marketing. This implies that marketers of religious groups need to think in different dimensions and alter their marketing tools to be able to reach potential followers successfully. The aim of this paper is to show via the example of the Krishna-conscious communities in Europe how special religions are from marketing perspective; and to introduce the marketing model applied by devotees of Krishna Consciousness in the European countries.

RESEARCH METHODOLOGY

Research methodology is the process through which researchers want to conduct their research. It displays the way through which these researchers formulate their research problem and objective, plan to careful, systematic collect and analysis required data and present their result obtained during the study period. It helps to find solutions to a question or recognize a particular phenomenon correctly by going beyond personal experience, thought, feelings and opinion (Johnston 2010).

Accordingly, this study was carried out in capital cities of six districts (Rathnapura, Colombo, Gampaha, Kandy, Kurunegala, and Galle) of Sri Lanka. The main cities of these districts were selected purposively for the study due to their potential for the presence of organic markets and organic consumers. Four super markets were randomly selected from each city, and the target group was obtained from 25 customers came out from the super market after buying goods. Questionnaires were filled from the customers who were willing to participate in the survey. Data collection was done at 24 super markets (04 super markets from each city), and the sample size was 600 customers (100 from each city). Data were collected in two stages: First, via an online survey for the pilot study (Study one) using ten consumers in September 2016, and then, a consumer survey using the pre-tested questionnaire (Study two) in the selected six cities from November 2016 to May 2018. In the questionnaire, consumers were asked information related to socio-economic characteristics, awareness level related to organic food, information related to the present situation of buying organic food, WTP for organic food, and challenges in purchasing organic food. In data analysis, socio-economic characteristics, the level of awareness, information related to present situation of buying organic food, WTP for organic food, and challenges in purchasing organic food were analyzed using descriptive statistics (frequency analysis, percentages), while factors affecting consumers' WTP premium price was measured using binary logistic regression analysis. Data analysis was conducted using the SPSS software version 21. Table 1 presents the variables applied in binary logistics regression.

MATERIALS AND METHODS

During the secondary research the evolution of religious marketing and the theories on religious markets and the market decisions taken were analyzed, then the theory was examined on a living religious marketing example of Krishna Consciousness. In the primary data collection phase a set of qualitative and quantitative methods were applied to get a thorough overview of the research area. This study introduces the qualitative research phase and the identification of the marketing model of Krishna-conscious communities in Europe.

The qualitative research was initiated by a content analysis of the online presence of Krishna Consciousness in the European countries, the first goal of which was to identify in

which countries of Europe is the religion present and what its most important forms of appearance are. The content analysis was initiated on the central websites of Krishna Consciousness, which contained a thorough list of all the Krishna-conscious institutions in the world – and in Europe The website analysis has shown that the institutions of Krishna Consciousness in every country may be categorized into four different types, which were temples or centers, farming or rural communicate, educational centers and restaurants (ISKCON, 2019, ISKCON Desire Tree, 2019). In the next step the online presence (websites and social media sites) of these institutions were analyzed from marketing perspective. First of all the target audiences of the different platforms were identified, then the main question of the analysis was how much and in which forms the different institutions contribute to promoting the religion to people outside the religious community. This was important to help filtering those tools and institutions, which focus mainly on intra-religious communication and find the ones, which take active part in promotion among the wider public. As the comparison of the websites of the different institutions has shown that rural and farming communities are the ones, which focus mainly on attracting people, who are not familiar with Krishna Consciousness yet, while the websites of the other institutions communicate mostly with devotees or people already interested in the religion or its certain aspect (cuisine, education), rural and farming communities were the institutions chosen to be analyzed more closely.

Currently there are eighteen farming communities registered in Europe; nine of them have responded to the initial enquiry and all have agreed to participate in the further research. Two of the farming communities had population below ten, and since the marketing activities in their countries were not significantly more active than in the ones without rural communities, they were dropped from the sample.

The second phase of the content analysis focused on the website and social media contents of the seven communities participating in the research. This phase was also initiated with the evaluation of the focus on the different target audiences and marketing the religion. The analysis aimed to identify in what proportion how the farming communities focus on the people not acquainted with the religion yet and categorizing the types of information the rural communities communicate to the public. Following this, the main focus was on how the rural communities seek to attract people towards Krishna Consciousness and whether there are any similarities or differences in the practices of the rural communities of the different countries. This meant identifying the bundles of products and services and the overall experiences the farming communities offer to those arriving for a visit; with special focus on the different courses, festivals and any kind of events.

The content analysis was followed by field research observations in the farming communities examined in order to clarify and confirm the findings of the content analysis. This meant a personal visit of 1-2 days in each community at a pre-arranged time. Some communities provided a person responsible for guiding the visit, while in other cases the observations were carried out without any guidance. The observations were unstructured and took place between June 2017 and July 2019. Since Krisna Völgy in Hungary is the community of the largest population and most diverse set of portfolio and marketing activities in Europe, this entity was set as a benchmark for studying other villages.

During the field research the main goal was to observe and identify the most important characteristics, which make the countries with farming communities stand out in Europe and to find similarities or differences in their activities compared to the countries without rural entities. The communities were analyzed along the marketing mix of services marketing (7P), aiming to identify the similarities and differences in marketing services and religions, while also highlighting the most important shortcomings of the model in the case of religious communities. Each element of the 7Ps were analyzed and evaluated separately, then the rural communities were compared in order to find the patterns in the practices of Krishna-conscious farming communities. Since – as the literature analyzed suggested – many of the elements of the marketing mix are bound by the fundamentals of the religion, special emphasis was put on how the devotees of Krishna Consciousness overcome these problems, how the different elements of the marketing mix are altered to serve the purpose better. The work was initiated by the analysis of the product itself and the elements of the marketing mix, which were subject to the most modification – price, place and promotion -, then followed by those of minor changes (people, processes, physical evidences). Notes were taken of each rural community and their most important characteristics, including facilities and programs offered and marketing tools applied and the data collected through observation were summarized in a database.

Following the content analysis and the data collection of the field research observations, the molecular model – created by SHOSTACK (1977) and applied by SRINIVASAN (2012) – was used to evaluate and summarize the most important characteristics of each country. Shostack and Srinivasan created the molecular model to analyze the offers created by service providers in details by visualizing the good and service elements of certain offers, which may own both tangible and intangible characteristics. The molecular model is applicable to visualize and analyze complex service offers, which – besides the core service - may contain a set of tangible and intangible elements. Molecular models usually mark tangible and intangible parts by different colors or lines in order to show clearly, whether a certain service offer is more based on tangible or intangible elements. This research applies an altered molecular model (based on the original work of Shostack) in order to distinguish and visualize the different elements of appearances of Krishna Consciousness in certain countries, regardless of tangibility. The aim of the modified molecular model is to identify those institutions and activities, which contribute to spreading the knowledge about the religion in a certain country. In these molecular models the core product is not a service, but always the religion marked in grey color, while the institutions operated by the religion in the country and other activities – just like the tangible and

intangible elements of the original molecular model – are grouped around them. The model does not interpret the weight of the different institutions and activities, therefore the sizes of the circles do not carry any meaning, they solely serve the purpose of better separability. Since they are the focal point of the research, farming and rural communities are marked with grey color and bold circles; and their offers and activities are grouped around them. This analysis of the institutions and activities shows the fields on which the different countries are the most active; and the visualization makes comparisons and finding patterns easier. After creating the molecular model for each country separately, the aggregated model of Krishna-conscious communities of Europe was created (SHOSTACK, 1977; SRINIVASAN, 2012).

In order to confirm and clarify the results of the observations and to receive more detailed information on the operation of the communities, in-depth interviews were carried out at each location. The interviews closely followed the observations, as both happened during the same visit, therefore the observations did not have such a huge influence on the original draft of the interviews, however, in all cases necessary modifications and additions were included. The only exception was Krisna Völgy in Hungary, where multiple visits were possible due to its geographical proximity, which further strengthened the benchmark role of this community. In this case it was possible to separate the time of the observations and the in-depth interviews, therefore the experiences in Krisna Völgy supported the formation of the draft of the interview as well. The interview questions discussed were structured around six main areas: general information, self-sufficiency and production, external relations, marketing activities, future plans and vision.

Twenty three interviews were carried out in the seven communities, focusing on respondents, who are involved in the fields of marketing, tourism or guest management. In the case of larger entities these roles were usually clearly separated, while it was characteristic of the smaller ones to have these combined, or not to have a person dedicated to these areas at all. In these cases the respondents were chosen based on having been a member of the community long enough to have an overview of the operations.

RESULTS AND DISCUSSION

After carefully analyzing the methods devotees use to promote the religion, it became clear that some things have not changed in the past decades: the traditional way of promoting Krishna Consciousness has always been talking to people on the streets and selling books, ever since the appearance of the religion in the Western World in the 1960's (KAMARÁS, 1998; WUAKU, 2012). These methods are still visible nowadays, and they could be found in all the countries examined. However, marketing and technology have developed a lot in the past fifty years, and people devoted to Krishna consciously apply numerous new methods in order to fulfill the most important goal set by their spiritual leaders: to spread the teachings of Krishna.

The content analysis of the central websites of the religion had shown that we can distinguish different types of institutions, which are responsible for the majority of the marketing activities related to Krishna Consciousness in Europe. The most comprehensive information on the communities of Europe was provided by the official website of the International Society for Krishna Consciousness (ISKCON) and ISKCON Desire Tree, the official multimedia social network of the religion, where all the institutions related to Krishna Consciousness are registered. The content analysis of the two sites has shown that the Krishna-conscious institutions all over the world – and also in Europe – may be categorized into four main types, which are

- temples or centers,
- rural or farming communities,
- educational centers,
- restaurants (ISKCON, 2019, ISKCON Desire Tree, 2019).

These labels provided the basis for the further analysis, where the presence of the religion in the European countries was examined, considering the number and variety of the Krishna-conscious institutions existing within their borders.

The institutions of largest density were the temples and centers, 178 of them may be found in various European countries, while there are only 37 restaurants, 18 farming or rural communities and just five educational institutions. The countries with the most institutions were Russia (33), Ukraine (25), the United Kingdom (24) and the Netherlands (12) and Germany (12). In all of these countries temples and centers were the most frequent forms of appearance, but there are farming and rural communities in Ukraine and Germany and restaurants in Russia. The country with the most diverse set of institutions was the United Kingdom, where besides the 16 centers and temples one rural community, two educational institutions and four restaurants may also be found.

The content analysis of the online presence of the religion in the different countries has shown that most of the national communities are using at least one online platform, most often they operate a website, or Facebook page on behalf of the Krishna-conscious society in the country. However, on the national sites they focus mainly on communicating to devotees and not to the wider public. In some countries central sources of religious communication and promotion are missing, but temples and centers usually have a website and/or a Facebook page, similarly focusing mostly on within-community communication; besides a general description they focus on community news, upcoming events and religious contents.

Restaurants put the emphasis (obviously) on vegan offers and catering, not so much on religion. Their websites and social media sites are built similarly to those of non-religion-bound restaurants, focusing on the menu, daily offers, bookings and other practical information, while religion appears only among the general information. Restaurants target their messages on those, who already follow a vegan diet – regardless of religious beliefs – therefore are to a certain extent already involved in a lifestyle similar to devotees of Krishna Consciousness.

Table 1. introduces the most important characteristics of the seven communities, which agreed to participate in the research and where the field research observations took place.

Table 1. Core information of the communities visited during the qualitative research phase

Village	Country	Founded	Population	Main profile	Facilities available
Krisna Völgy	HUN	1993	131	Tourism and organic products	Temple Restaurant Guest house Gift shop School Cowshed center Bio garden Apiary
Radhadesh	BEL	1980	120	Tourism and cuisine	Temple Restaurant Guest house Gift shop Bakery Museum Bookshop University
Bhak-tivedanta Manor	GBR	1973	105	Tourism, weddings	Temple Wedding center Guest house Gift shop Bakery School Cowshed center Botanical garden
Almwiks Gard	SWE	1981	55	Yoga retreats	Temple Temple shop Guest house Bakery Farm store
Krisnuv Dvur	CZE	1990	33	Flour and biscuit produc-tion	Temple Flour-mill Apiary Cowshed center
Sim-hachalam	GER	1980	30	Guest house	Temple Restaurant Gift shop Guest House Cowshed center
Goloka Dhama	GER	1998	30	Volun-teers	Temple Restaurant Gift shop Guest House

Source: own edition based on the field researches and interview

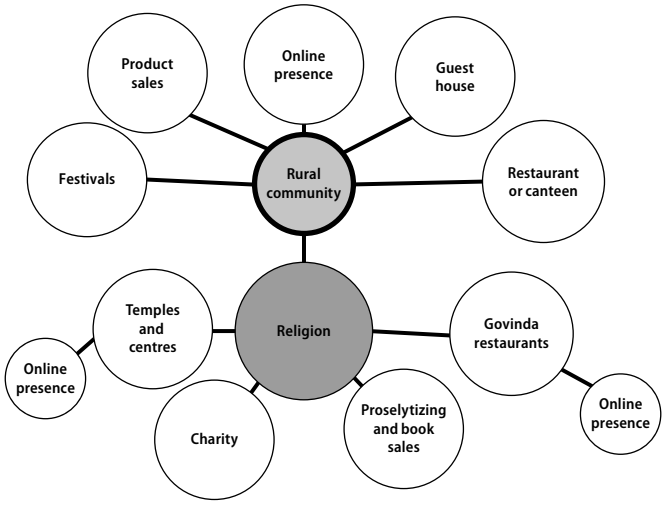
Educational centers – especially universities – are visibly focusing a little more on attracting on people from outside the Krishna-conscious population, but due to the nature of their offers they also target those, who already own at least fundamental knowledge concerning the religion or yoga, which is also connected to a certain set of beliefs. However, at the moment these institutions are present in only three European countries.

The most enhanced marketing activities targeting people not involved in Krishna Consciousness may be observed in those countries, where farming or rural communities are present. These institutions generally put a larger emphasis on attracting and involving people from outside the religious community, therefore the countries, where rural communities exist became the focal point of the further research from religious marketing perspective.

When analyzing the marketing activities of the Krishna-conscious communities in Europe, three categories could be identified, where the most important distinguishing factor was the existence of farming communities. The existence of these institutions made visible difference in the marketing activities of the religion towards the society outside Krishna Consciousness.

In the countries where no farming communities exist, Krishna-conscious communities are moderately active in terms of marketing and usually rely on the traditional forms of spreading religion, such as proselytizing and selling books on the streets. Charitable activities are also a traditional element of the activities of the community, which are present in all the countries examined; however, they are important primarily from PR perspective, their aim is not promoting the religion but fulfilling the duties set by the fundamentals of the religion. The lower section of Figure 1 shows the forms of institutions and means of promotion, which exist in most of the countries regardless of the presence of rural communities. Activities on the streets and charity are present in practically every country, which, according to the findings of the in-depth interviews they are still probably the most important form of making contact with people outside the religion; while most of the countries host at least one temple or center as well to serve those already involved. Govinda restaurants are less frequent in the countries without farming communities; and even where they exist, they focus their communication on people already following a vegetarian or vegan diet; and less on the religious aspects, which usually appear on their websites in the form of a short introduction. Some countries operate a national website or social media page, while others rely on the online platforms managed by the temples and centers, but in both cases the communication focuses mainly on existing devotees and members of the community and provide only general information for visitors outside the religion. In those locations, where farming communities exist, we may observe visibly more external communication, which is generally initiated and managed by the rural communities. On Figure 1 can see that there are a large number of additional institutions and activities, which are centered around the farming communities.

Figure 1 Molecular model of marketing Krishna Consciousness in the countries with farming communities (Own edition)



This phenomenon could be observed in the case of all farming communities participating in the research, however, even among the countries with rural communities there are significant differences in terms of the level of activity. Krisna Völgy (HUN), Radhadesh (BEL) and Bhaktivedanta Manor (GBR), which – as Table 1 shows - are the settlements of significantly larger population show enhanced marketing activities, while the activeness of Almviks Gard (SWE), Krisnuv Dvur (CZE), Simhachalam (GER) and Goloka Dhama (GER), which rural communities have approximately one third of the population than the ones mentioned above is moderate.

Farming communities of enhanced marketing activities

The farming communities of Hungary, Belgium and the United Kingdom are the largest in terms of population in whole Europe with approximately 100 inhabitants each. These entities share numerous characteristics from marketing and management perspective. Krisna Völgy, Radhadesh and Bhaktivedanta Manor are all farming communities well-prepared for visitors, offering a number of facilities, such as guest house, restaurant and one or more shops selling religious items, gifts and tokens, books and vegan treats and spices among others. These facilities enable tourists to enjoy thorough services in case of both one-day and longer, overnight stays in the farming community. Visitor parking lots are available – and suitable to host a huge number of people at a time – and signposts direct people towards the most important buildings. In all the three rural communities a reception is operated to welcome and guide the arriving guests, providing information in multiple languages In Krisna Völgy and Radhadesh guided tours are also available, where guests receive information about the history of the area, the life of the inhabitants and the essence of the religion including core values, culture, lifestyle and cuisine. The farming communities offer a wide range of programs as well: each of them organize at least one huge and numerous smaller festivals throughout the year, following the festive calendar of Krishna Consciousness. According to the interviewees these events attract hundreds of visitors each – though exact statistical data are missing in most cases –, and not only people devoted to Krishna Consciousness, but also a significant number of tourists. All the larger rural communities organize camps and workshops related to yoga, cuisine or self-development and various further topics; sometimes jointly with the Bhaktivedanta Universities of their country. In Belgium The Museum of Sacred Arts is ran by the Radhadesh community, which hosts a set of sacred paintings and artworks; Bhaktivedanta Manor of the United Kingdom nurtures ornamental gardens to support peaceful retreats, while the Hungarian rural community has put great efforts in building a sustainable bio-garden, which serves as a model farm and holds a set of educational programs on sustainability. All the three farming communities cooperate with schools on a local and national level too, supporting educational tourism concerning a set of available topics concerning sustainability.

Roughly 20-30000 visitors arrive in a year to each of the rural communities, most of them not devotees, but tourists and people interested in the religion or the Indian culture. The interviews with the management of the rural communities have confirmed that in most of the cases the main motive for visiting the farming communities is not religious, but rather cultural: people are simply driven by curiosity of something unknown, interested in Eastern cultures, vegetarian or vegan cuisine, sustainable practices, yoga or just seeking for a cultural program nearby on their holidays. Devotees have explained that opening up the gates for the public was not intentional in the beginning, but as the interest had risen, they have adapted to the demand, which resulted in increasing consciousness about tourism and the development of nowadays' facilities to be able to fulfil the needs of visitors.

The initial eventuality of tourism has turned into conscious planning and strategy in terms of guest management and marketing; nowadays all three farming communities have well-established departments for guest management, event management and marketing and communication. The aim of these units is to attract people from outside the religious community to visit the farming communities and provide them with an excellent touristic experience. The visitor departments of the rural communities cooperate with local and national tourist offices and are present in numerous tourism-related locations and sights nearby with flyers and posters. Krisna Völgy in Hungary operates a loyalty card system as well, cooperating with tourist attractions in the area, providing discounts and certain benefits for card holders, by which they aim to foster loyalty and increase the number of returning visitors.

All three rural communities put a huge emphasis on online marketing, which, according to the interviewees is one of their most powerful tools of attracting new visitors. The management of the farming communities are of the opinion that religious communities should keep up with technological progress and should utilize the possibilities provided by the internet to increase their recognition. All of them operate informative, up-to-date websites in their native language and English at least, but in some cases in other languages as

well, and their main focus is again on visitors and tourism. The three sites are built along the similar principles: they promote the farming communities as places worth visiting, offering a wide range of opportunities, while the religious aspect appears mainly in the introduction; and on a separate tab summarizing the history of the religion and its most important characteristics. Contact information, overnight stays in the quest house, restaurant and catering, festivals and other upcoming events however all received separate tabs in the menu to show potential tourists all the available opportunities for their visits. The overall impression of the websites highly resembles those of any touristic attraction, regardless of religious ties, focusing on customer experience.

The social media presence of the three entities is slightly different, however, there are numerous common features in their strategies. All three rural communities have an active Facebook page operated both in their native language and English, where they put a huge emphasis on their events and festivals, including pre-event promotion, active visual broadcast of images and videos during the whole duration and post-event follow-up. Among the three destinations Krisna Völgy is the most active in terms of events, they organize numerous workshops and camps besides the festivals as well. Apart from events, the contents of the three pages are diverse: Krisna Völgy puts the most emphasis on tourism by promoting free-time activities and introducing visitor experience, while there is a strong presence of public education in terms of social responsibility and sustainability. Bhaktivedanta Manor posts frequently of the core values of Krishna Consciousness, while Radhadesh takes the golden mean by combining the touristic and the religious aspect.

All of the rural communities are active on Instagram as well, and again, Krisna Völgy focuses more on the sights and the touristic aspects, while Radhadesh and Bhaktivedanta Manor more on the community life and the religion by posting more about the interiors of the temple and the life of devotees.

YouTube is the platform where the largest differences may be observed among the three entities examined. The channel of Krisna Völgy exists under the umbrella-channel of Krisna.hu, the national YouTube channel together with numerous other thematic channels on topics such as sustainability, cuisine of religious values. Their focus is again on tourism by offering short virtual tours and broadcasting about festivals and workshops; but the introduction of the religion appears as well in the form of videos introducing different ceremonies and traditions. Radhadesh maintains a channel only for Radhadesh Mellows, one of their main music festivals; here the focus is on the performers and broadcasting about the event. The channel contains video and audio materials of the festivals and the artists. Bhaktivedanta Manor focuses solely on religion on this platform by broadcasting religious ceremonies and speeches of their spiritual leaders happening in their temple.

Certainly, the rural communities do not only apply online marketing tools to promote the visiting opportunities, however, as the interviewees responsible for marketing have clarified, besides personal relationships with the people outside the community and targeting them through proselytizing activities on the streets, at the moment the online communication forms are the ones they can rely on the most. Fliers are available at the receptions of the three farming communities promoting certain events, courses or workshops, but they are placed only in a few tourist offices and frequently visited locations in the close proximity of the rural communities. Posters are also applied only in a geographical area with a radius of approximately 50 kilometers; and they are placed only seasonally, mainly just to promote the largest festivals of the year.

The interviewees emphasized that PR activities are also highly important in the life of all three rural communities; especially as Krishna Consciousness is a new religious movement striving for recognition and acceptance in Europe. The rural communities pay a lot of attention to the information published about them in the media; working with reporters and television crews to educate the public about the religion. An important part of the PR activities are charitable initiatives, which are usually either fostered by the national Krishna-conscious organization or carried out jointly with other churches or charity groups.

Numerous researchers have suggested the usage of the 7P, the marketing mix of services marketing to analyze the marketing activities of religious groups, while others have raised the attention to the shortcomings of the model, which do not make it entirely suitable for the purpose (CHEN, 2011; JURAVLE et al., 2016; MULYANEGARA et al., 2010;). One of the main concerns was that the majority of the elements of the marketing mix are predetermined by the fundamentals of the religion; therefore marketers of religious communities may only have freedom in the field of promotion, which is also limited due to the presence of negative attitude towards the idea of marketing religions (ANN and DEVLIN, 2000; MULYANEGARA et al., 2010; MCGRAW et al., 2011).

Analyzing the largest Krishna-conscious farming communities in Europe we can see that they have solved both challenges by transforming the product from religion to tourism. This shift has put the tourist attraction in the focal point of the marketing mix instead of religion, which is an area, where the 7Ps of service marketing are commonly applied (AMINBEIDOKHTI, 2010; MENDOZA VARGAS et al., 2019; SHEIKHI and PAZOKI, 2019). Shifting the product to the area of tourism has created larger freedom in altering the elements of the marketing mix: on the touristic level religious communities may add certain elements to create a complex touristic product, which suits the needs of the customers without harming the fundamentals of the religion and they can set the other elements of the marketing mix to reach the audience the most efficiently. As seen before, promotion has received a clearly touristic focus by cooperating with tourism offices and enhancing the visitor experience on the online platforms.

During the interviews it became clear that the most important aim of the touristic attractions is to make people acquainted with the religion, to create a place where they can get involved without preconceptions or prejudices, and all the

elements of the marketing mix – analyzed in the following - serve this purpose as well. Former locations of meeting the religion, such as temples and gathering points were less known by non-devotees, therefore did not attract new community members. Stepping on the field of tourism, Krishna-conscious communities became more visible to non-members as well.

A large shift caused by the creation of the touristic product happened in terms of price. As discussed before, price of religious products may be interpreted in non-financial terms in most cases; and in the case of Krishna Consciousness it means significant changes in lifestyle, such as forgoing of eating meat, consuming caffeine or alcohol, while taking the habit of chanting the Hare Krishna mantra, doing services for Krishna and being exposed to stereotypes by the public. These are usually perceived as a high price for joining the community, which, according to the interviewees prevents many people from getting to know the religion at all. By creating the touristic product this barrier has decreased significantly, since people take no obligations by simply visiting an attraction. 'Earlier there was a lot of skepticism and refusal; some people even refused to come inside the community.' – explained a guest manager – 'As our reputation as a tourist attraction has grown, we experience more openness and curiosity from our visitors.' This way the only non-financial cost visitors are going to face is the opportunity cost of not choosing another place to spend their free time.

On the other hand, price in financial terms has appeared by the introduction of the touristic product. In Krisna Völgy there is an overall entry fee for the grounds – with special prices for the festivals –, and in Radhadesh visitors pay for the guided tours and the entry to the museum. Visiting Bhaktivedanta Manor and the meals there are free, but guests are charged for overnight stays in all three places. In Krisna Völgy and Radhadesh there are restaurants to serve the guests, where they receive professional service from the devotees in return for their payment. All the three farming communities operate at least a small shop of gifts and religious items, in Krisna Völgy there is a store of organic products produced by the devotees, while in Bhaktivedanta Manor and Radhadesh bakeries are operated as well and the latter has a bookstore too. The products sold should naturally be paid by the customers, but often these prices are labelled as donations to the community.

'We do not operate our village to gain profit' – explained a tour guide – 'We regard the entry fees and the prices paid for our products as donations for the village and for our deities – even if our visitors don't know it. The money received is invested in our facilities, and as long as people see this and don't perceive us to become profit-oriented, there is almost no negative feedback on us asking for money for certain things.'

One respondent mentioned financials to be a sensitive topic, but generally most of the interviewees shared the opinion that as long as they do not go for profit, visitors generally accept having to pay for the services. 'We need to pay our bills too, and people accept this.' – summarized one of them briefly.

In the rural communities people living there dress according to the Indian traditions and they do services for the community, which include daily maintenance tasks, but due to the touristic product also guiding the guests or preparing food in the kitchens for them. Their actions and attitude represent the behaviors required from the devotees by the principles of the religion. Certainly, this does not only serve marketing purposes, but usually the requirements are strict on who may live and work in these locations, which makes sure of a clear image of people devoted to Krishna Consciousness.

Rituals and different processes are also determined mainly by religious requirements, however, also in this case the touristic product has made it possible – and necessary – to apply some changes. Tasks, such as welcoming guests, tour guiding or organizing mass catering became daily duties of the devotees; many of the religious rituals were opened up to the public and sacred festivities became well-promoted festivals hosting hundreds of tourists. Most of the processes have not changed in their essence, but became public, while numerous extra duties occurred to serve the needs of the tourists. Many of the managers have admitted that these practices put a lot of extra burden on the inhabitants of the rural communities; however, most of the devotees regard this – just like selling books on the streets – as part of their service to their deity.

Physical evidences, such as temple buildings and the setup of the rural communities vary by country; but the interiors usually show similar characteristics, exhibiting the traditional motives and colors of Indian Krishna-temples and hosting a statue of A. C. Bhaktivedanta Swami Prabhupada, the person who has spread the religion in the Western world. The altars of the temple rooms give home to one or more deities; and this is the central location, the heart of each temple. On the other hand there is not such uniformity in the external design of the temples and community buildings in the different countries. In Krisna Völgy the temple and the central buildings follow the Indian style of architecture, but the houses of the devotees are built along the local traditions. Radhadesh is located in a Belgian castle, while Bhaktivedanta Manor in a traditional English manor house. These adaptations were necessary for financial and practical reasons; however, some other physical elements were created clearly for the convenience of tourists. All three farming communities operate a guest house, usually with highest level of convenience than the places where the devotees live and they also operate restaurants and buffets of professional service, while devotees usually eat in their houses, or sitting on the floor in the temple room. Exhibitions, parking lots and shops are all operated for touristic purposes, to provide the best possible visitor experience.

'We do not need these facilities. We don't even need the temple to practice our religion; the main purpose of the whole settlement is to be able to be able to fulfill our duty and attract people to get to know us.' – explained a manager.

Table 2 summarizes the most important elements of the marketing mix of the three farming communities of enhanced marketing activities. In the table we can see that most of the differences are present among the first four elements of the marketing mix – product, price, place and promotion – since

these are the elements, in which the management of the rural communities have the most freedom thanks to the touristic product. The last three elements – people, processes and physical evidence – are more uniform, since there are more determined by the fundamentals of the religion.

Table 2. Marketing mix of the farming communities of enhanced marketing activities (own edition)

	Krisna Völgy (HUN)	Radhadesh (BEL)	Bhaktivedanta Manor (GBR)
Product	Complex touristic product Temple Guest house Gift shop Festivals Workshops		
	Restaurant School Cowshed center Bio garden Apiary Camps	Restaurant Bakery Museum Bookshop University Camps	Wedding center Bakery School Cowshed center Botanical garden
Promotion	Online marketing Website Facebook Instagram YouTube Fliers Posters PR activities Newspapers Television		
Price	Opportunity cost Guest house prices Prices of workshops Product prices		
	Entry fee to visit Entry fee for festivals Meal prices	Fee of the guided tour Museum entry fee Meal prices	
People	Following the principles of Krishna Consciousness Aiming to transmit the knowledge about their religion Fulfilling tourism-related duties Working for highest possible customer experience		
Processes	Rituals guided by religious principles BUT made open for the public Reception services Guest house booking Official vegan catering		
	Guided tours	Guided tours	
Physical Evidence	Additional facilities to fulfil customer needs		
	Following Indian traditions	Following Indian traditions BUT adapting to local culture	Following Indian traditions BUT adapting to local culture

Communities of moderate marketing activities

In those countries, where the rural communities are less developed – and of smaller population –, the product is decisively still religious, with certain touristic elements, which means that the touristic product is visibly less complex than in the farming communities discussed above. In Almviks Gard (SWE), Krisnuv Dvur (CZE), Simhachalam (GER) and Goloka Dhama (GER) temples are present as well and ceremonies are open to the visitors, but these rural communities are not prepared to host such a huge number of visitors as the larger ones. There are no receptions to provide guidance to the visitors, parking lots are small and only a few signposts indicate the most important buildings of the farming community. Three of the four smaller farming communities provide the opportunity for overnight stays, but their guest houses are smaller, or sometimes not even houses, but only dedicated parts of the temple building. For overnight visitors Goloka Dhama offers a set of nearby guest houses instead of staying within the community. In these rural communities there are not always separate restaurants for visitors either, but the opportunity is offered to eat together with the devotees in the canteen. In the smaller rural communities there are no official shops, but they also sell a selection of books and religious items in the temple shops, which are open upon request. Almviks Gard is the only one of the four communities, where a bakery and a farm store may also be found, but they operate only with limited opening times. All four of the farming communities organize one or more festivals throughout the year, which usually attract 100-200 visitors, but to be able to serve this many people at the same time, all of them need to use tents or cooperate with the villages nearby.

To these, smaller farming communities there are only a maximum of 2-3000 guests arriving in a year and according to the experiences of the managers a significant proportion of them are devotees, or followers of other religions originating from India. In their case the motives for visiting are decisively religious; which means that smaller rural communities do not rely so much on tourism at the moment, however the leaders of all the three entities expressed their wish to follow the path of their Hungarian, Belgian and British fellow communities. In each of the smaller farming communities examined, Krisna Völgy, Radhadesh and Bhaktivedanta Manor are regarded as role models, but these entities are missing a number of necessary assets to step on the path of progress.

'To achieve this level of development there is a need for a leader with a vision and financial resources' –explained a guest house manager – 'And to be able to serve this many people suitable infrastructure is crucial as well. We have our plans, but it takes time and money to realize them.' According to the experiences of the respondents the cooperation between the farming communities of the different countries is strong; which fosters the exchange of experiences and best practices among larger and smaller entities.

Since smaller farming communities are less able to serve a large number of visitors, their activity in terms of touristic promotion is significantly lower too. All the four smaller

farming communities operate a website too, but the one of Krisnuv Dvur is currently available in Czech language only, while the others in their native language and English too. There are differences in the structure of the websites as well: Almviks Gard puts the greatest emphasis on visitors on their website, providing detailed information on visitors' opportunities and a contact form. 'Visit' menu also appears on the websites of Simhachalam and Krisnuv Dvur (though on the latter only in Czech), but it is missing from the website of Goloka Dhama, where only a list of guest houses and directions are indicated. Festivals however are an important focal point in all four cases; and the interviews have confirmed that from touristic point of view these events are the most important attractions of the smaller rural communities currently. However, compared to the larger farming communities, on the websites of smaller rural entities the emphasis of religious information is greater.

The same is true for the social media activities for all the four smaller rural communities: on Facebook the focal points are religiously-themed posts and festivals; the only exceptions are Krisnuv Dvur, where farming – the main profile of the community – receives a role as well, and Simhachalam, where the daily life of the community is also introduced. Goloka Dhama and Krisnuv Dvur are also present on Instagram, but the German community shares only religiously-themed posts, mainly of their deities, while the account of Krisnuv Dvur has less than ten posts, focusing on religion and farming. All four of the smaller rural communities own YouTube channels, but here without exception, the main focus is on the religion: Simhachalam broadcasts some of their rituals online, while the other three communities post videos of their devotees talking about religiously related topics, playing traditional music; and less frequently also about the life within the community and festivals.

Fliers are rare in the smaller rural communities, but similarly to the larger entities, they mainly promote festivals and courses available in the farming communities. However, they are placed only in the temple buildings and sometimes in the nearest settlement, but the number of people they reach is low. Posters are placed also in the nearby settlements to promote festivals, similarly to the practices of larger farming communities.

PR activities appear in the smaller rural communities too, but in significantly smaller volume than in the case of the larger farming communities. The cooperation with media is mostly occasional and even though charity events and activities are organized, their publicity is also low.

All the interviewees of the smaller rural communities agreed that it would be early for them to cooperate with tourism agencies, as currently they are not able to cope with greater number of tourists; this implies that the creation of a place for tourists to meet the religion has not fully happened yet; and the lack of the complex touristic product influences all the elements of the marketing mix as well.

As the touristic product is limited, significant shifts in price have not happened either, which prevents the positive effects of the product shift to take place. People may buy meals or stay overnight in the guest house for a certain amount of money, items may be purchased as well, but the openness, which could be observed in the case of larger farming communities is not yet present in the smaller ones. 'Locals have started to be more open towards the community after a while, but many still perceive us as an exclusive sect, which only those may get acquainted with, who share the same principles or are ready to assimilate.' – explained one devotee fulfilling duties of managing external relations.

In Table 3 the elements of the marketing mix of the three farming communities of moderate marketing activities are summarized. In their case the differences in the first four elements are not so significant due to the touristic product not having elaborated yet; and the last three are again mostly uniform and determined by religion. Even though similar promotional tools are used as by the larger entities, the activity of their usage is significantly lower for the smaller farming communities.

Table 3. Marketing mix of the farming communities of moderate marketing activities (own edition)

	Almviks Gard (SWE)	Krisnuv Dvur (CZE)	Simhachalam (GER)	Golokha Dhama (GER)
Product	Religious product with touristic elements Temple Festivals Workshops			
	Temple shop Guest house Bakery Farm store	Flour-mill Apiary Cowshed center	Restaurant Gift shop Guest House Cowshed center	Restaurant Gift shop Guest House
Promotion	Online marketing Website Facebook Instagram YouTube Fliers Posters PR activities Newspapers Television			
Place	Peaceful places suitable for retreat An opportunity for outsiders to get an insight			
Price	Opportunity cost Guest house prices Prices of workshops Product prices			
			Meal prices	
People	Following the principles of Krishna Consciousness Aiming to transmit the knowledge about their religion Fulfilling tourism-related duties occasionally			
Processes	Rituals guided by religious principles BUT made open for the public Opportunity to join in catering			
	Guest house booking	Guest room booking	Guest house booking	
Physical Evidence	Externally – local culture Internally – Indian markings			
	Few additional facilities for guests	Few additional facilities for guests	Few additional facilities for guests	

People dress and behave according to the principles of the religion, but this marketing element remains almost unchanged; only a few inhabitants are prepared to manage guests; and for most of them this is not a part of their daily duties, just an occasional, additional task.

The same is true for the processes of handling visitors: even though opportunities are given to visit the different rituals and buildings, there are no well-established processes, such us guided tours. The only exceptions are the guest houses, as for accommodation there are clear booking processes and personnel dedicated to manage them.

Interestingly, in terms of physical evidence the religious influence is less observable in the case of smaller rural communities: in their cases the buildings generally follow the architectural patterns of the country of location, only the altars, the temple rooms and parts of the interior design follow the Indian traditions. According to the respondents this can be traced back to two important, interrelated factors: financials and the lack of tourism. As the managers of the larger farming communities have explained, many of the physical elements of the entities are created for the sake of tourism; devotees do not need them in daily life. Certainly, this means the lack of larger guest houses, shops and restaurants, but also the simplicity of decorations. Limited tourism does not make these aspects necessary, however, the lack of them also prevents the community from hosting more visitors, which in turn could improve their financial situation and provide an opportunity for investing more in the infrastructure. As mentioned before by the respondents, the way to overcome this challenge would be to have a clear vision and a set of goals within the communities – which is already present in some of them, but missing in others.

CONCLUSIONS

By comparing farming communities with enhanced and moderate marketing activities we can clearly see the benefits of shifting the product from religion to tourism. Table 4 summarizes the changes the shift from religious to touristic products has caused in terms of the elements of the marketing mix. These changes have happened thoroughly in the farming communities with enhanced marketing activities, as Table 2 has shown, while only some elements of the change have been realized in the rural communities with moderate marketing activities, as Table 3 summarizes, yet their aims include the tendency to move towards more significant shifts in the future as well. The findings of these results are aggregated in Table 4 to show the generally appearing elements in the rural communities analyzed. The in-depth interviews have proved that managers of entities with moderate marketing activities see the opportunities as well and by seeing the examples of an applicable marketing mix they aim to go along the same path in the future.

The factors underlined show the religious influences that have remained in the marketing mix in the case of the touristic product as well. The table shows how the freedom of Krishna-conscious communities has increased in terms of adapting the elements of the marketing mix to reach larger audiences.

Table 4 – The changes in the marketing mix by shifting the product from religion to touristic destination (own edition)

	Religion	Touristic destination
Product	Set of beliefs, afterlife benefits	Complex cultural experience
Price	Lifestyle changes	Opportunity cost Entry/tour guiding fee Meal prices Guest house prices Prices of workshops Product prices
Place	Temples and gathering points Peaceful places suitable for retreat	Tourist attraction of high reputation The place to get acquainted with Krishna Consciousness
Promotion	Proselytizing on the streets Via the rural communities	Online marketing Tourism agencies PR
People	Behavioral patterns set by religion Aiming to transmit the knowledge about their religion	Behavioral patterns set by religion Aiming to transmit the knowledge about their religion Fulfilling tourism-implied duties Ensuring positive customer experience
Process	Rituals guided by religious principles	Rituals guided by religious principles BUT made open for the public Additional processes to fulfil customer needs
Physical evidence	Following Indian traditions	Following Indian traditions BUT adapting to local culture Additional facilities to fulfil customer needs

Table 4 shows how the marketing mix elements were altered in the farming communities, where the shift of the product from religion to tourism was completed. Price, place and promotion have changed completely, by receiving the focus of tourism rather than religion, while people, processes and physical evidences were only slightly modified, maintaining the fundamental characteristics bound to the religion, but being complemented with additional components in order to fulfil the needs of the touristic product. Keeping the traditional elements of these three factors contributes highly to the purpose of the touristic product in educating the visitors about the religion via providing a complex experience.

Since at the moment this research studied only the Krishna-conscious communities of European countries, the observations may be extended to other continents in the future as well; while and inter-religious study may show how the benefits of the altered marketing mix model may be applied by other religious communities too. In the current ongoing research the effects of the altered marketing mix model on consumer behavior are being analyzed.

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SCIENTIFIC PAPER

FARMERS' EXPERIENCE IN ADOPTION AND USAGE OF ICT SOLUTIONS FOR AGRICULTURE IN THE REPUBLIC OF NORTH MACEDONIA

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Abstract: *The adoption of new of Information and Communication Technologies (ICTs) in farming activities becoming crucial for developing countries in order to meet the challenges of rapidly growing populations, urbanization and arable agricultural land declination. Because of it, each farmers' organization or farmer has to concern their agricultural products and services more towards modernized and ICT related routine. The attempt has been made to analyze the reaction of the Macedonian farmers towards ICTs as a source of reliable and timely information about e-banking, online purchasing/selling, marketing, input and output optimization, increased revenue, remote farm management process etc. Semi-structured questionnaire was used for interviewing 132 semi-experienced and experienced farmers that use ICTs as sample for the research. The data were analyzed using appropriate statistics tool like correlation and Rank Based Quotient (RBQ). The findings showed that farmers stressed the cost of ICTs, lack of training, trust level in the government institutions, and lack of ICT infrastructure are thresholds for ICTs adoption and use in agriculture. This research contributes to understand the adoption and use of ICT, identify the constraints associated with ICT use and propose recommendations towards the improvement of ICTs for agriculture in the Republic of North Macedonia.*

Keywords: *ICT, Agriculture, the Republic of North Macedonia, Rank Based Quotient*.
(JEL code: *Q16, Q19*)

INTRODUCTION

In the era of Agriculture 4.0 revolution, farming community leaders will be the ones that will sharp correct decisions based in the profound understanding the complex trends of information and communication technologies (ICTs). Those leaders who will not do that are risking staying on the margins of future agricultural development.

The very basis of any new agricultural approach is the transfer of agricultural information and technology to enhance the productive and knowledge capacity of the farmers. These business activities are creating many environmental problems, such as deforestation, increased carbon dioxide level, greenhouse gases, polluting water bodies, damages to wildlife, etc. Such issues have created a need for more environmentally sustainable business practices (NAZ FARHEEN et al., 2020). The adoption of new ICTs (ŚLUSARCZYK, ET AL., 2020) in farming activities becoming crucial for developing countries in order to meet the challenges of rapidly growing populations, urbanization and arable agricultural land declination. This

challenge is afterward placing greater responsibilities on agricultural extension system (NESZMÉLYI and KIM, 2001) and the capacity to cope (KADLECIKOVA and KAPSDORFEROVA, 2012). Nowadays, farmers need information on inputs supply, new farming technologies and methods, real-time alerts, micro-finance opportunity, market price and demand. Such information knowledge, technology and service contribute to expanding and energizing the agriculture sector in developing countries (MUNYA, 2000). ERDEINÉ KÉSMÁRKI-GALLY et al. (2015) developed a concept of an innovative online platform method, which provides information to the farmers and increases competition among input providers.

Lack of encouragement of the local communities and social institutions make the farmers to reject the new technologies because most of the farmers are illiterate and need to be guided and encouraged properly to the effectiveness of the ICT in technology delivery to be successful (MUNYA, 2000). Even in the most advanced economies, only certain segments of the population are benefitting from ICTs (OLÁH ET AL., 2018). Many are lagging behind because of their age, limited digital literacy, and lack of access or remoteness (WEF, 2015).

In the developing countries, level of ICT usage such as Internet and smartphones is still at a low level (HAYROL et al., 2009). The latest National Human Development Report in the Republic of Macedonia shows that 60% of Macedonian households own a computers or smartphones but only 32% from the women and men are using them. Mostly, they are widely used by the youth within the households (UNDP, 2011). The internet penetration has had rapid increase in the last ten years from 1.5% in 2000 up to 51% in 2010, but only 31.8% of rural population use the Internet (RISTESKA et al., 2011).

RICHARDSON (1997) and HAYROL et al. (2009) indicated that, farmers prefer traditional ways and methods of production instead of using ICTs and relying with big confidence on the traditional mass media such as television, radio and newspapers. Majority of the farmers are elderly with poor education and could read and write mostly in their native language. Since most ICTs run in English this, represent one of the biggest obstacles on the pathway for ICT tools adoption by the farming community (EZHAR et al, 2007). MISHRA and WILLIAMS (2006) stated that, use of computers or smartphones with Internet access is highly correlated with the educational level, off-farm income and regional location of the farm. BURKE and SEWAKE (2008) state that those farmers with higher education levels are more likely to own and surf websites for their agribusiness, also support this research.

Due to the lack of research and data for similar topics, it appears that specific attempt is yet to be made for empirical evaluation of the farmers' ICT usage in the Republic of Macedonia. The research therefore seeks to proffer solution to the following questions: What is the status of ICT usage among farmers in the Republic of North Macedonia? If there are ICT usage among the farmers, what are the impacts to the productivity and farm development? What are the factors that limit farmers to the use and adoption of ICTs for agriculture extension? That will reveal some of the constraints for effective use of ICTs as tools for competitive agricultural development. The research provided solution to the users and benefited agricultural policy makers in planning and implementing policy for ICTs in agriculture.

METHODOLOGY

The study was conducted in six different NUTS III regions to analyze experience of farmers using ICT services for agricultural information. The population of the study consisted of 132 farmers that are semi-experienced and experienced in using ICTs for agriculture. To analyse the benefits perceived and constraints experienced in utilization of ICT service, quantification of data was done by first ranking the benefits perceived and constraints experienced based on the responses obtained from the respondents and then calculating the Rank Based Quotient (RBQ) (SABARATHANAM, 1988), which is as follows: Wherein,

$$R.B.Q. = \frac{\sum fi(\mathrm{n} + 1 - i)}{\mathrm{N\ x\ n}}\ X\ 100$$

fi = Number of farmers reporting a particular benefit/ constraint under ith rank;
N = Number of farmers;
n = Number of benefit/constraint identified; and
$\sum$ = it directs to sum the multiplication factor.

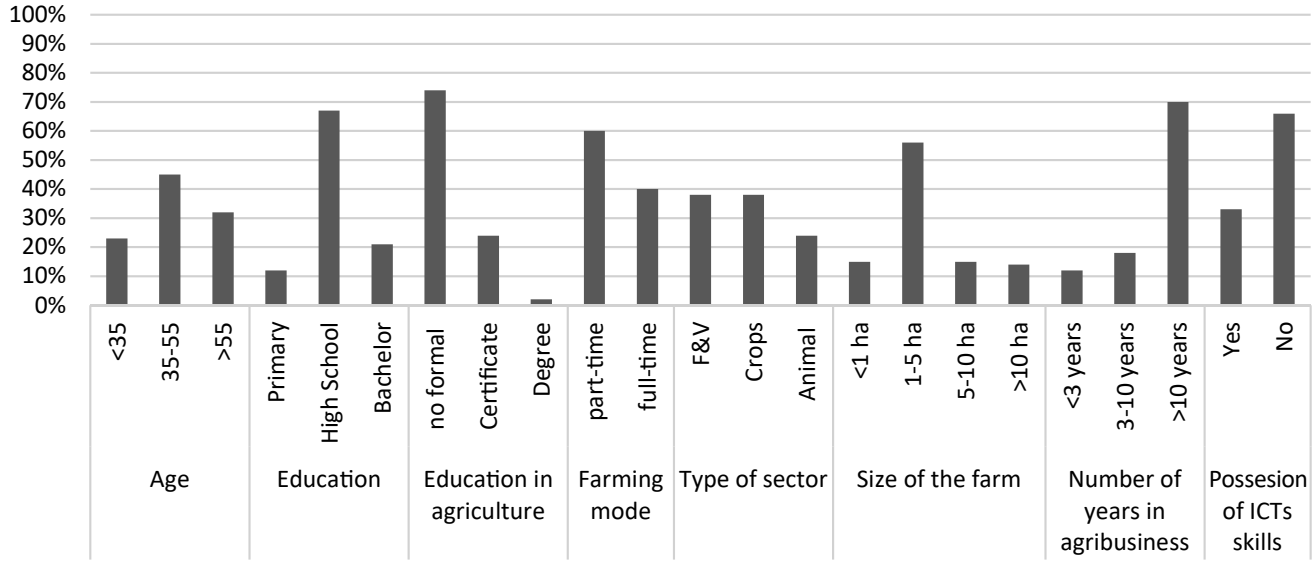
The cross tabulation was used to provide a way of analyzing and comparing the results for the socio-economic variables with the possession of ICT skills among the sample. Selected respondents were interviewed personally using well-structured questionnaire.

RESULTS AND DISCUSSION

Socio-economic characteristics of the farmers

Socio economic characteristics of surveyed farmers using ICT services in the Republic of North Macedonia were analyzed and presented in Figure 1 bellow. Most of the farmers (45%) are between 33-55 years old. The dominant educational background of the surveyed farmers is high school (67%) (Figure 1.)

Figure 1. Socio-economic characteristics among Macedonian farmers



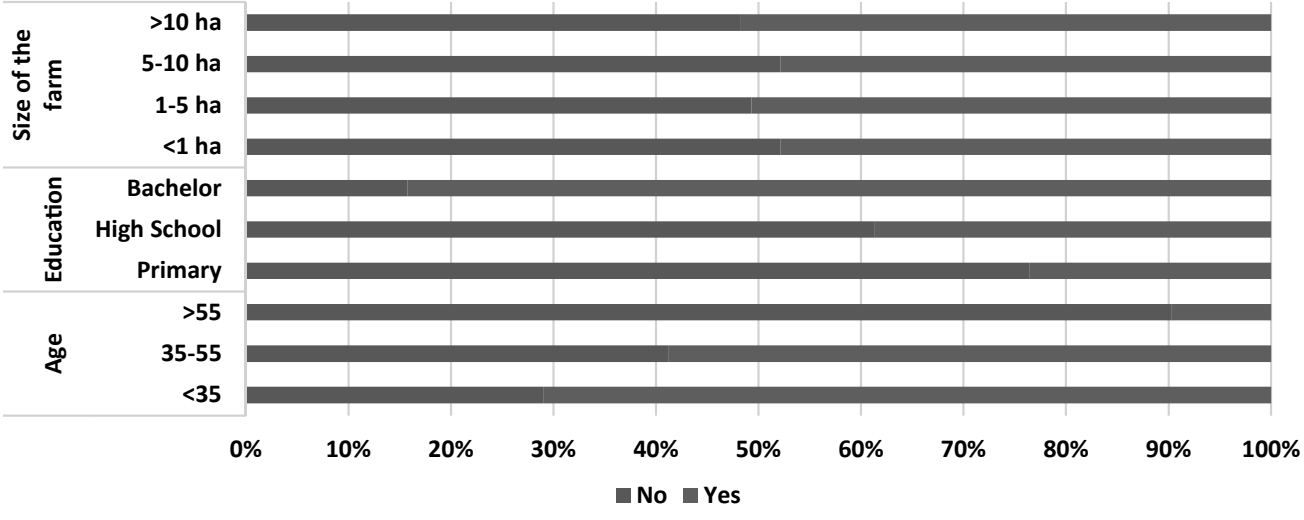
Source: Authors' own research, 2018.

The research shows that 60% of the farmers are performing agriculture activities as part-time and their farm's revenues are considered as an additional income. The dominant size of farm (56%) are farmers with average size of 1-5 hectares. The sample is consisted of mostly experienced farmers (70%) with more than 10 years' experience in agribusiness. The results also show that among the respondents using ICT services nearly 33% of surveyed farmers used the ICTs for agriculture purposes when they need to acquire information. Due to lack of education, their age stage and farming as alternative income source, most of Macedonian farmers (66%) as it was expected are not familiar or possess ICTs skills nor using them for agricultural purposes.

Factors influencing the usage of ICTs for agriculture

The analysis has indicated that younger and more educated farmers are more skillful with ICTs, whereas size of the farm in this case is not relevant. We can assume that, this situation is a result of the intensive campaigns from the government among young farmers for the future perspectives in the agriculture sector (Figure 2).

Figure 2. Socio-economic factors that influence the possession of ICTs' skills for agriculture



Source: Authors' own research, 2018.

The indication regarding the size of the farm as factor that influence the ICT skillfulness should not be taken as general conclusion, because the sample is small. In general, farmers are using internet for their farming business needs and they are aware of the benefits of this global digital network.

Purpose of using ICTs for agriculture

Overall, the usage of digital services among surveyed farmers, like e-banking and online purchasing/selling of agricultural commodities is much lower in comparison to Western Europe. The use of ICTs such as the Internet browsers to get general or governmental information is most frequent among surveyed farmers. Furthermore, government information is sourced through ICT very often (social and mass media), but rarely through the official government's websites. Due to the lack of digital and ICT infrastructure for e-banking, online purchasing and selling, Macedonian farmers do not have knowledge and perception for the functionality of such ICT tools for the purpose of their agricultural holding's economy (Figure 3.).

As a paradox, most of the government's information farmers are needed, they are getting by the social and mass media instead of the government institutions' websites. That may be as a result of trustless in the government and Agriculture Extension (AE) officers among younger and their AE's mechanisms for delivering ICTs services to the farmers.

Gained benefits of ICTs usage for agriculture

Most of the farmers (R.B.Q. 76.09) have pointed out that by using ICTs the number of customers increased (Table 1.). Using social media like Facebook for marketing and advertisement approach most of the farmers promoted their farms and farms' products.

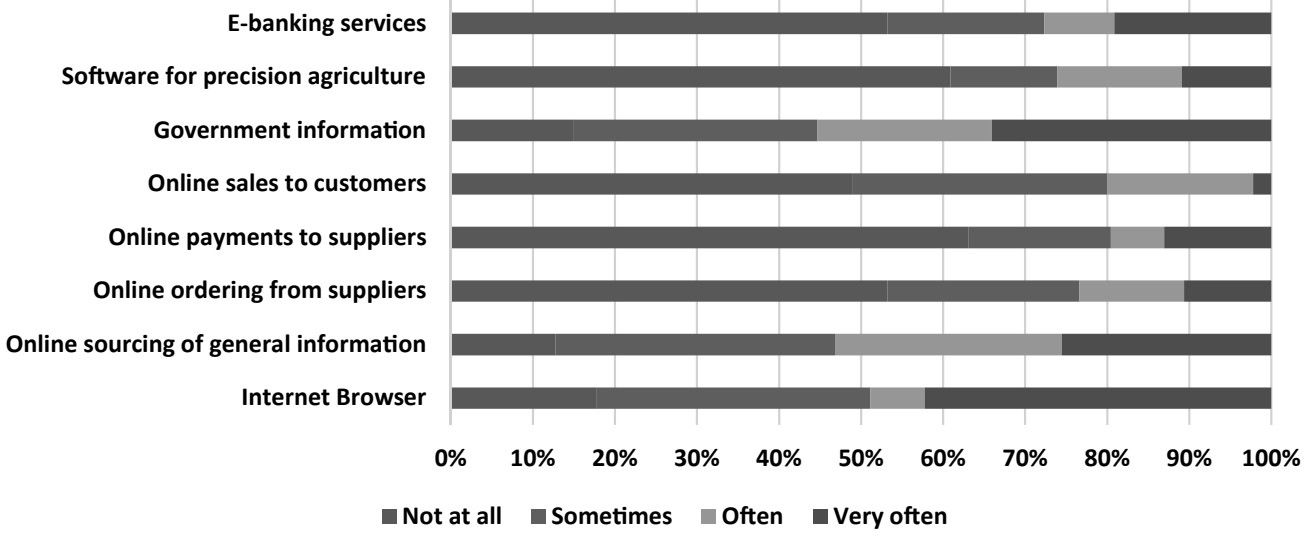
Table 1. Gained benefits through the usage of ICTs for agriculture

Gained Benefits	R.B.Q	Overall Rank
ICT improved the quality of our products and services	58.70	VI
Farm management is more efficient	69.57	IV
Increased efficiency of marketing	71.74	III
Labour force can work remotely	54.35	VII
Customer base has increased	76.09	I
Operational costs reduced	67.39	V
Increased revenue	73.91	II

Source: Authors' own research, 2018.

The next most frequently mentioned priority based on the R.B.Q value (73.91) was the increased revenue. They are achieving optimization of input/output ratio and efficient farm management ending with lower operations costs. Especially the large and medium size farms that use software tools for farm management have expressed (R.B.Q 69.57) benefits through reduced input costs, optimized production and increased revenue. Some farmers that use ICTs on their farms ranked market efficiency as third most gained benefit (R.B.Q. 71.74).

Figure 3. Purpose of using ICTs for agriculture among farmers



Source: Authors' own research, 2018.

Farmers have expressed that, thorough these technologies they are achieving better competitiveness, prompt market response, better communication and better market penetration. Operational costs as an issue is one of the biggest problem among farmers (R.B.Q. 67.39), especially among

those that are less experienced or with long experience but they still use traditional practices agricultural business. Majority of the farmers (R.B.Q. 54.35) have stated low trust for modern technology and they still believe that human have to monitor and control over the farm and entire farming process in overall. The skepticism for acceptance of modern technology and handling over it versus traditional methods of farming seems to be topic for further discussion and research among farming community in the Republic of North Macedonia.

Constraints that farmers are facing through ICTs adoption

Among the surveyed farmers, ranked as first priority constrain (R.B.Q. 83.33) is the myth that ICT tools are expensive and not available for small-scale farmers. For example, the farm management software is considered as expensive product they cannot afford. They think reduced price and grant support schemes will encourage them to invest in ICT tools on their farms.

In the Republic of North Macedonia, the government is still perceived as key stakeholders in the process of achieving wider acceptance of ICTs among farmers. Government's institutional capacity and available infrastructure for policy implementation are one of the crucial elements in the holistic approach for achieving wider acceptance of ICTs in the Macedonian agricultural sector. Farmers still have high level of trust in the governmental institutions and other public systems for agricultural support like the Agriculture Extension agency and rank their needs of authority's support as a second priority constrain based on the R.B.Q value (77.27).

Farmers' opinion is that the governments in the Republic of North Macedonia should put more emphasis on the ICT in agriculture and provide organized trainings and info-sessions, thus farmers can gain more knowledge and awareness about the benefits from using ICTs. They ranked this constrain as third, based on the R.B.Q value (68.18) (Table 2).

Table 2. Constrains facing farmers through ICTs adoption

Constrains	R.B.Q	Overall Rank
Do not know the benefits of ICT	51.52	VII
Have no skills in using ICT	59.09	VI
Price for ICT tools are expensive	83.33	I
Lack of ICT training	68.18	III
Language problem	65.15	IV
Lack of ICT infrastructure	31.82	VIII
Lack of support from the authorities	77.27	II
Lack of agricultural content through ICT	60.61	V

Source: Authors' own research, 2018

Those farmers that use ICTs have partial knowledge while operating them on the farm. Most of them need assistance to manage farm processes with ICTs. Obstacle like language problem (R.B.Q. 65.15) is ranked as fourth as a barrier that makes difficulty the process of ICTs adoption among farmers. Most of the software and applications are in English language. Taking into consideration the educational level of surveyed farmers, additional tool's translation into native language is needed. Farmers that are not using ICTs are very confident that these tools are the future and will bring benefits for their farm business, but lack of knowledge, skills and information presents an obstacle for making decision to invest in this type of technologies. In addition, such support will encourage young farmers to enter the agricultural business.

Farmers in the Republic of North Macedonia are not aware enough for the benefits of using ICTs and they have a difficulty to recognize them (R.B.Q. 51.52). Communication with farmers that are early adopters is one of the main channels for increasing awareness, but still this process is going very slow. Partly because of the poor ICT infrastructure (R.B.Q. 31.82), but mostly because of farmers' mentality and cultural behavior in the rural areas whereas globalisation and digital revolution is accepted with dose of skepticism and distrust.

CONCLUSION

Farmers yet do not have knowledge for usage of more complex ICTs used in the farming economy. The extend of usage of more complex ICTs in the farming economy are directly correlated with the size of the farm and level of education of the labour force within the farms. Young farmers play key role in the level of acceptance of ICTs among the farmers in the Republic of North Macedonia. Younger farmers with better educational background, their closeness to modern technologies and willingness to explore and experiment contributes for the higher acceptances and challenges of the ICTs in agriculture.

In farmers' opinion, the government is key stakeholders that can and have to contribute for dynamic use of ICTs in the agriculture. Development of better ICT infrastructure in the rural areas is needed. Organizing of continuous training for usage of ICTs in agriculture and translation of ICT tools into native languages are masterpieces that are missing in the Republic of North Macedonia. Through the investment in such initiatives, Macedonian farmers will increase their awareness and recognize the benefits that ICTs could bring on their farm. The expensiveness of ICTs is the matter of obstacle that farmers are addressing as a reason for poor ICTs adoption. Proven and affordable ICT tools and learning by doing are needs that farmers' adoption and usage of ICTs for agriculture will increase in the Republic of North Macedonia.

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SCIENTIFIC PAPER

STATISTICAL AND MULTI-CRITERIA DECISION MAKING ANALYSIS FOR CONSUMER ATTITUDE AND BEHAVIOR: IN CASE OF MONGOLIAN ORGANIC FOOD MARKET

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Abstract: *Nowadays, consumers have a full knowledge on products and services, and their daily consumption of healthy and environmentally friendly products has been increasing. Therefore, businesses need to implement green marketing activities, so they need to be aware of environmental issues and consumer needs while maintaining financial sustainability and competitiveness (Belz, Karstens, 2002). Examples are the rapid growth of organic food products, as consumers are concerned with their health and environmental issues in their day-to-day purchasing decisions. Over 20 years ago, in 1999, the market for organic food products sales was $ 15.2 billion, while sales in 2017 increased to $ 97 billion, indicating that the world's organic food market is growing rapidly. The organic food market is growing by $5 billion a year, and as of 2014, 172 countries have organic food farm land according to the "The World of Organic Agriculture". Since the market for organic products is a new market for Mongolia, previous surveys are relatively small. Therefore, this is aimed at conducting a study on behavioral approaches of consumers of organic food products in Ulaanbaatar. We have run statistical and multi-criteria decision making analysis based on given data of consumers. We also apply Harker's techniques for complete and incomplete evaluation matrices which are defined from consumers decision making. Numerical examples are presented.*

Keywords: *consumer behavior, statistical analysis, multi-criteria decision making*
(JEL Classification: *M30, M31, M37*)

INTRODUCTION

Consumer's knowledge about the benefits of eating organic foods is supported by consumers' ever increasing purchase. Consumers are keen to buy more traditional grown food products and are more than delighted to offer more money to buy such products. Thus, entrepreneurs and farmers are keen to focus on their organic food production by strengthening their own competitive advantages in the market while without using strong fertilizers and less chemicals. Moreover, consumer gender is another factor in buying and consuming organic foods. According to Davies et al. (1995) and Urena et al. (2008), women buy more organic foods and tend to be more positive towards organic foods than men. Davies et al. (1995) and Roitner-Schobesberger et al. (2008) assume that organic food consumers have higher income levels than others. Many studies have also shown that also the purchasing frequency is low for the younger consumers, they tend to be more willing to purchase organic foods even if they have to pay more. In other words, organic food consumers tend to be younger than the counterpart consumers (Jolly,

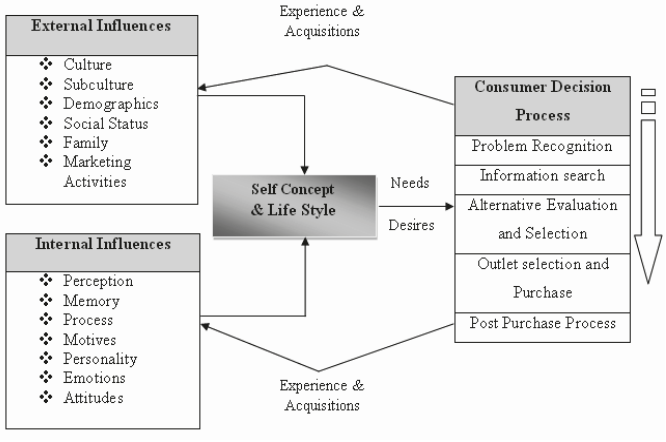
1991). But senior citizens tend to prefer organic foods as well (Durham, 2007). Based on these findings, we aim to bring the main purpose of our research from the consumer's behavioral purchasing behavior of Mongolian consumers, whether it is consistent with the results of the survey and to distinguish between Mongolian users from other countries users.

MATERIAL AND METHODS

Customer behavior

Consumer behavior is the study of a decision to purchase goods and services to meet their needs and wants. And to take steps to change their decisions (Hawkins, Mothersbaugh, 2016). According to Blakwell, Minard, and Engel (2001), the behavior of consumers is the process of finding, buying and using a product or service

Figure 1: Consumer behavior behavior main chart



Source: Mothrsbaugh and Hawkins, 2016

Organic products

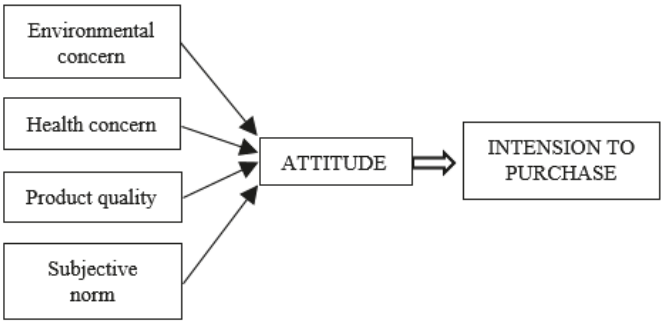
Organic produce is made without the help of chemical fertilizers or insecticides for the reason of genetic changes (Smith Spangler, 2012). Therefore, organic food is considered to be healthy because it does not contain any chemicals (Suprapto and Wijaya, 2012). Also, in many scientific articles, organic food is expressed in terms of natural, local, fresh, and impure.

In recent years, consumers' perceptions of chemical ingredients and their effects on food products have contributed to the rise in purchasing of organic foods. Basha and Mason analysts conducted a trend study on consumer nutrition in 2015 and in the study, the most common catalysts that influence organic purchasing decisions on organic consumers are:

- Environmentally friendly
- Health Benefits
- Product quality
- Social impacts are examined.

As a result of the survey, general knowledge about organic products has increased, and the purchasing trend has been increasing (Basha, Mason 2015).

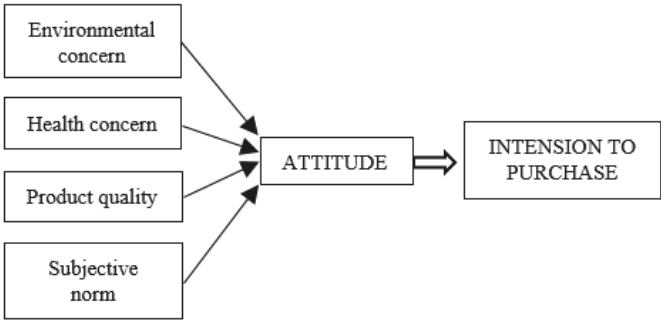
Figure 2. The approach to purchasing organic food



Source: Basha, Mason, et al. 2015

Rana and Paul (2017) believe consumers' health-promoting, quality and safety, and environmentally-friendly features are of great importance to consumers that are buying organic food products. Also, when a product has an organic produce certificate, it generates an uneven purchasing tendency for consumers. Consumers who buy non organic produce tend to have low social consciousness.

Figure 2. The approach to purchasing organic food



Source: Basha, Mason, et al. 2015

Rana and Paul assumed that consumers would be able to use regular organic food products, and to provide consumers with the right to use the right information in multiple channels and to distribute organic food products through broad channels.

Research Survey

1. Secondary data

The approach to approaching organic food is being studied by international scientists in their own prospective countries. Most scientists have learned that consumers are buying tendencies based on their time, financial status and resources when purchasing organic food products. The most important thing is that organic products are positively influenced by human health, so they choose to buy environmentally friendly products.

Table 1: Statistical studies on international organic foods

Top of research	Citation	Country context	Methods	Factors (Very important)
Effect of situation on the purchase intention and behavior	Grimmer et al. (2015)	Australia	Empirical tests, using consumers (n=772)	Price Availability Ease of purchase High perceived prior knowledge High levels of future orientation
An extension of the benefit segmentation base for the consumption of organic food	Gad Mohsen and Dacko (2013)	UK	Questionnaire (Correlation and regression)	
Factors influencing purchasing behavior of organic food	Shamsolla et al (2013)	Malaysia	Questionnaire (Descriptive Analyses, Correlation, Coefficient Analysis)	Knowledge and Education Environmental Concern Health Consciousness Demand is Price Inelastic
Demand analysis of organic milk	Government (2016)	Germany	Price-elasticity estimates on a panel data set of 20000 households.	
Purchase behavior and influence of social economic factors with reference to organic food products	Santhi et al. (2007)	India	Questionnaire (Descriptive Analysis, Chi square, ANOVA and factor analysis)	Marital status Food habits (Vegetarian) of the respondents
Determinants of regular and occasional consumers' intentions to buy organic food	Pino et al. (2012)	Italy	Survey and Structural Equation Model	Ethical commitment Food safety Availability Income Health and environmental considerations Visual attractiveness of products Quality and Safety
Determinants of purchasing behavior for organic and integrated fruits and vegetables in Slovenia	Shamsolla and Juvancic (2010)	Slovenia	Questionnaire (Ordered Profit Model)	
Quality, safety, and consumer behavior toward organic food	Lucas et al. (2008)	Germany (Berlin) Portugal (Lisbon)	Questionnaire (Chi square, ANOVA)	
Community of organic food consumers: An expiratory study	Essoussi and Zahaf (2008)	Canada	Survey: (Content analysis-verbatim transcripts of the audio-taped interviews)	Knowledge of organic content Labeling and certification Health Environmental concern Animal welfare
Attitudes and behavior toward organic products: An expiratory study	Tsakiridou et al. (2008)	Greece	Questionnaire (Descriptive statistics and non-parametric tests - Mann Whitney and Kruskal-Whallis)	

In these international articles, organic food producers have a positive impact on human health and the environment, so consumers are more likely to buy organic products. Also one of the important factors about organic food is the labeling and safety.

According to the above studies, most developed countries in the world have knowledge about organic foods and tend to buy regularly. Manufacturers and entrepreneurs are rapidly entering the market, taking their own positions within the market and increasing their profits while most importantly, the environment and the people are satisfied with the needs of the customers.

2. General information of the survey participants

According to the general data of the surveyed participants, the majority of them are men, accounting for 56.7%. In terms of age, 31.5% are 36-45 years old, 28.2% are 26-35 years old, 16.7% are from 16-25 years old, 11% are 46-55 years old, 9.8% are 56-65 years old, and lastly the lowest being 2.3% were over 66 years of age.

The most important factor for the consumers of organic foods was that there are no chemicals agents and the average value is 4.11. The deviation from the mean is 1.17.

Table 2: Factors that make consumers buy organic foods

Factors	Means	Standard Deviation	Frequency				
			1	2	3	4	5
Taste	4.06	1.12	5.20%	3.30%	18.70%	25.20%	47.50%
Price	3.87	1.22	6.90%	7.90%	17.00%	27.50%	40.70%
Smell	3.86	1.22	7.90%	5.20%	18.70%	28.50%	39.70%
Freshness	4.29	1.00	2.60%	4.30%	11.10%	24.60%	57.40%
Experience	4.01	1.14	6.20%	4.30%	14.80%	31.50%	43.30%
Ingredients	4.07	1.12	4.60%	6.90%	11.50%	30.80%	46.20%
Manufacturer's prestige	3.73	1.20	6.90%	9.20%	20.30%	30.80%	32.80%
Brand's prestige	3.72	1.18	7.20%	8.50%	18.40%	36.70%	29.20%
Advice from other people	3.43	1.29	11.10%	12.50%	23.90%	26.60%	25.90%
Sales, bonus	3.28	1.42	17.70%	11.80%	20.70%	23.60%	26.20%
To not have chemical agents	4.11	1.17	3.90%	9.80%	10.80%	22.00%	53.40%
Expiry date	4.08	1.15	5.20%	5.20%	15.40%	23.90%	50.20%
Information on label	3.98	1.18	5.60%	7.50%	15.10%	26.90%	44.90%
Size and weights	3.77	1.38	10.50%	10.50%	14.80%	20.00%	44.30%
Choice by family members	3.85	1.21	5.20%	10.20%	19.70%	23.90%	41.00%
Package	4.04	1.14	3.30%	9.20%	15.40%	23.90%	48.20%
Standard	4.03	1.18	5.20%	7.90%	13.40%	24.60%	48.90%

Table 3: Analysis of what information consumers much prefer from the label of organic foods

Information on label	Frequency		Mean	Standard deviation
	Yes	No		
Calories	57.7%	42.3%	0.57	0.49
Fat	55.4%	44.6%	0.55	0.49
Salt	49.5%	50.5%	0.49	0.5
Supplement	51.8%	48.2%	0.51	0.5
Vitamin	39.7%	60.3%	0.6	0.49
Expiry date	77.7%	22.3%	0.77	0.41
Sugar	61.0%	39.0%	0.6	0.48
Produce date	74.4%	25.6%	0.74	0.43
Manufacturer's information	47.9%	52.1%	0.47	0.5
Product warranty	50.8%	49.2%	0.5	0.5
Fiber	42.3%	57.7%	0.42	0.49

According to the results, 77.7% of the surveyed participants reported that the expiry date of organic food and the date of manufacture is the most important. while the lowest was 39.7% which represents the vitamins that are in the organic produce. 42.3% of participants considered the representation of fiber. The two parameters of vitamin and fiber also have a lower standard deviation than other variables.

3. Correlation analysis

Pearson's correlation analysis was carried out to examine the correlation between income, age, gender, family size and education in organic food consumers.

Table 4: Dependency Testing Table

		1	2	3	4	5
1	Satisfication	1				
2	Education	.169**	1			
3	Age	-.118*	-0.06	1		
4	Sex	- 0.01	.20**	0.07	1	
5	Income	.130*	.40**	-0.10	0.02	1
6	Family members	0.06	0.02	-.13*	- 0.01	- 0.06

. Correlation is significant at the 0.01 level (2-tailed)

The satisfaction after buying organic products is not dependent on education, family size, age, gender, or income. In order to confirm the hypothesis, we made a Pearson Correlation Analysis on a 95% confidence level. According to the above study, income and education is positively related to each other, however, the correlation force is very low, Pearson correlation 0.130 (revenue) is 0.169 (education). However, depending on the number of family members and sex, the difference in customer satisfaction is the value of sig (2-tailed) 0.749 (sex) sig (2-taled) 0.292 (family). While the age is associated with post-satisfaction, sig (2-tailed) indicates that the 0.39 value is expressed and the Pearson correlation -0.118 indicates that it is very negative in satisfaction.

The following hypotheses are shown in the results of the research:

H1: Purchase of organic products that are produced in Mongolia is influenced positively.
According to research findings, the influence of education level to purchase organic food is very positive.
H2: The age of the consumers has no effect on purchase of organic food products in Mongolia.
This hypothesis is also proven. The satisfaction of the younger generation from both organic food and other food is almost the same.
H3: Gender has an effect on post-purchase satisfaction of organic food produced in Mongolia.
This hypothesis is refracted, in other words gender related factors are less important.
H4: The income level positively affects purchase of organic foods produced in Mongolia.
Factual analysis shows that this hypothesis is proven, influence is quite weak.
H5: The number of family members is a factor of the purchase of organic foods produced in Mongolia.

This hypothesis confirms that the number of family members does not affect purchase amount.

4. Cluster analysis

Cluster analysis was made in order to classify the users of organic food products by their characteristics, and the Two Step Cluster method was used to do it. This method is more realistic because the software automatically calculates the quantities and creates the most likely clusters. The cluster analysis is a method of determining segments that can be based on the similarities of responses to each respondent's questionnaire, and our survey results are as follows. Initially identifying personal information or profile of the segments, and then intended to give a convenient name to each of those segments depends on what they're referring to when buying organic food.

Table 5: Clusters

	Cluster A	Cluster B	Cluster C
Personal information	26-35 years old, works in business organization, 3-4 family members, income of 1,000,101-1,300,000₮, and most of them are lives in Khan-Uul district and have higher education.	For the those who are 36-45 years old, works in business organizations, 3-4 family members, income of 320,000-500,000₮, those who live in Bayangol district, have higher education.	36-45 years old, government staffs, 2 family members, income of 500,001-700,000₮, mostly live in Songinokhairkhan district, which high school diplomas.
Things that are important to purchase	The label addresses the choice of expiry date, weight, ingredients, manufacturer's reputation, brand's reputation, taste, have important effects on family members.	Packing, expiry date, price, and freshness are more important	Price, taste, brand reputation, standard satisfaction, expiry date, weight, ingredients, discounts, have important effects of family choice.
Purchase behavior	Purchases for the sake of health 9000 plus MNT per purchase, directly use at any time, purchases weight of 200gr, and buy a plastic bag based on past experiences, which often have a significant impact of family purchases	Purchases for the sake of health, 9000 plus MNT per purchase, directly use at any time, purchases weight of 200gr, and buy a plastic bag based on past experiences, which often have a significant impact of family purchases.	Purchases for the sake of health, 9000 plus MNT per purchases, uses daily and over 1000 gr packages products for per purchases.

5. Analytical hierarchical process and Harker's method

The analytical hierarchical process (AHP) method was first developed by Saaty, (1980). This method is widely used in economics, social sciences, politics, operational research and game theory. For the excellent comprehensive survey dealing with AHP, we refer to Saaty, (1980), (1994). In this section, we recall briefly Harker's method which is an extended method of AHP to the incomplete matrix which is arising from some real problems and apply this method for some incomplete matrices from Cluster analysis in Section 2.2.4. After that approach, we obtain some complete reciprocal matrices derived from initial incomplete matrices. In some practical problems, it is impossible or difficult to have comparisons of some pairs of alternatives. It is very important to estimate incomplete comparisons data to have alternative's weights. In the Harker's method, however, weights are calculated without estimating unknown comparisons.

If (i,j) - component is missing, put the artificial value $\frac{w_i}{w_j}$ into the vacant component to construct a complete reciprocal matrix A(w). Then consider the eigensystem problem:

$$A(w)w=\lambda w \ .$$

Now we consider Harker's method briefly.

Given incomplete matrix $A=(a_{ij})$, define the corresponding derived reciprocal matrix $\tilde{A}=(a_{ij})$ as the following:

$$a_{i,j} = \begin{cases} 1+m_i, & \text{if } i = j \\ 0, & \text{if } a_{i,j} \text{ is missing} \\ a_{i,j}, & \text{otherwise} \end{cases}$$

where m_i denotes the number of missing components in the i-th row.

The Harker's algorithms can be described as follows:

Step 1. Construct a derived reciprocal matrix $\tilde{A}$ of A(x).
Step 2. Calculate the largest –eigenvalue ($\lambda_{\max}$) of $\tilde{A}$ and its associate eigenvector.
Step 3. Normalize the eigenvector into a priority weight vector.

6. Numerical Results

In this section, we consider Harker's method applications and AHP methods for some incomplete matrices which are obtained by survey of organic food consumer behavior. We divide consumers into three clusters such as Songino-Hairhan district, Bayangol district, and Han–Uul district. A total of 30 incomplete computational matrices were obtained from each cluster survey. After computing each arithmetic mean of 30 matrix computations of each cluster, two clusters arithmetic mean matrices still remain as incomplete matrices and one is derived as complete matrix.

By using Harker's method, we construct a derived reciprocal matrix A and calculate the largest eigenvalue (($\lambda_{\max}$) of $\tilde{A}$ and its associate eigenvector and normalize the eigenvector into a priority weight vector. Calculate the largest eigenvalue of and its associate eigenvector. Normalize the eigenvector into a priority weight vector. Random Index Values for n-terms had compared in Saaty, (1994). Degree of consistency is satisfactory if $\frac{CI}{RI} < 0.10$.

For example, we show that Bayangol District and Khan-Uul districts consumers data analysis respectively as the following:

Table 6: Bayangol district

	16.25	
n	15	
CI	0.08928	
CR	0.05615	Satisfactory

Table 7: Khan-Uul district

	17.09	
n	15	
CI	0.149292	
CR	0.093895	Satisfactory

Finally, we unify AHP method analysis for all districts and order some impacts as the following.

Table 8: The matrix for the importance of clusters is the mean values

	Cluster A	Cluster B	Cluster C	Sum
Price	3.1	2.4	3.8	9.3
Taste	7.8	8.9	5.5	22.2
Smell	6.1	5.2	5.8	17.1
Freshness	8.7	5.5	7.2	21.4
Experience	2.1	3	5.2	10.3
Ingredients	2.3	4.2	7.6	14.1
Brand & prestige	3.2	4.5	2.6	10.3
Advice from other people	2.4	3.8	3.56	9.76
Sales, bonus	5.35	2.17	7.45	14.97
To not have chemical agents	8.55	7.91	7.65	24.11
Expiry date	7.85	7.08	6.87	21.8
Information on label	6.42	3.86	3.1	13.38
Choice by family members	3.87	4.96	7.12	15.95
Package	4.21	2.32	7.56	14.09
Standard	4.89	6.81	4.17	15.87

Table 9: Determination potential release from normalize unit

	Cluster A	Cluster B	Cluster C	Sum
Price	0.33	0.26	0.41	1
Taste	0.35	0.40	0.25	1
Smell	0.36	0.30	0.34	1
Freshness	0.40	0.26	0.34	1
Experience	0.21	0.29	0.50	1
Ingredients	0.16	0.30	0.54	1
Brand & prestige	0.31	0.44	0.25	1
Advice from other people	0.25	0.39	0.36	1
Sales, bonus	0.36	0.14	0.50	1
To not have chemical agents	0.35	0.33	0.32	1
Expiry date	0.36	0.32	0.32	1
Information on label	0.48	0.29	0.23	1
Choice by family members	0.24	0.31	0.45	1
Package	0.30	0.16	0.54	1
Standard	0.31	0.43	0.26	1
P	0.35	0.32	0.33	1

Based on the unified analysis, we can conclude the following results. Cluster A as we named as "new generations'' - most of them 26-35 years old, and work in business organizations with family members of 3-4 and income is 1,100,101 - 1,300,000₮, with most of them living in Khan–Uul district. Their academic background of bachelor and or above. They usually care about the label and expiration date. Rather in cluster B, most of them work in business organizations and are from 36-45 years of age. Their family members include 3-4 people and their income is 320,000 - 500,000₮. Most of them live in Bayangol District, with an academic background of bachelor and or above consumers. For the Cluster C, individuals that are civil servants preferred the label, expiry date, weight, size, ingredients, manufacturer's brand's prestige and taste. Cluster C individuals age would be from 36-45 years of age. Their family members consisting of 2 and their income is 500,001 – 700,000₮. They live in Songino-Hairhan District. While their educational background is up to a high school diploma.

CONCLUSION

The study aimed to conduct research on the user behavior of organic food products across six Districts of Ulaanbaatar. Based on the result of research the following conclusions are made.

- In recent years, the consumption of organic products has been growing worldwide and the knowledge of importance and demand of organic food also increasing. According to the survey results, 94.1% of participants said that they purchase organic food products and the consumption of organic food in Ulaanbaatar is high.
- Consumers who purchase organic foods regularly consider health benefits, quality, safety and environmentally friendly issues of organic foods.
- Most of the consumers, or 86.2% of participants, purchase organic food in order to take care of their wellbeing and most of them tend to buy small packed products.
- Mongolians often buy brands that they are most familiar with. 22.6% of them purchase at supermarkets while 19% of them buy from food markets, and 81% of participants tend to buy organic food products that are produced in Mongolia. Additionally, the purchasing habit of organic products is influenced much more by family members rather than doctors or consultants.
- Quality and design of packaging is very important for Mongolian consumers to buy organic foods.
- Internationally, organic foods are mostly purchased by the consumers who are mostly highly educated, women, young, and have above average salary income.
- We apply statistical and multi-criteria decision making methods for Mongolian organic food consumers given data and analysis on decision making impacts.
- Based on the initial data sources, the five trend assumptions of Mongolian organic food consumers have been compared with secondary data sources. As a result, education level, income level and being young are positively influenced to the satisfaction of organic foods, while their marital status and gender have no effect.

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SCIENTIFIC PAPER

AN APPROACH TO THE UNDERSTANDING OF MOTIVATION PRACTICES FOR SMALL AND MEDIUM-SIZED ENTERPRISES IN THE SOUTHERN TRANSDANUBIAN REGION

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Abstract: *The singularity of human resources and the complex interests in the world of work are a constant challenge for business executives and HR colleagues. While the difference between the performance of a motivated and an unmotivated employee can be up to twice as much at almost the same cost level, the motivation strategy is typically either absent from the business life, or operates on a reactive concept based on an unconscious design. Although the mere presence of motivation and its various levels are less quantifiable in exact terms with direct tools, a performance which is much weaker than possible is measurable in the short and long term, and its negative economic results are clear. The aim of the research is to examine the motivational practices of small and medium-sized enterprises (SMEs) operating in the Southern Transdanubian Region. Involving 300 businesses we evaluated the applied wage system, the role of money among the motivational tools, the extent and causes of fluctuation, the system of employee training, the way of performance evaluation, the reasons for underperformance, the importance of motivation, the company motivation strategy and the efforts to retain the key people. The employee motivation can be increase in several forms, but the priority of needs and claims is constantly changing. Updating this motivational matrix is a real leadership challenge, but this effort can pay off multiple times. According to the results it can be stated that the motivation strategy – as a key economic issue – is not given sufficient attention in business practices.*

Keywords: *small and medium-sized enterprises, performance evaluation, motivational tools, leaders, subordinates*
(JEL code: *M12, O15*)

INTRODUCTION

Motivation is a hidden performance enhancer in the organization which is often underestimated, and its positive impact on the economic output is hardly investigated (Ryan and Deci, 2000). While the technological improvements are often unreasonably undertaken by CEOs without prior impact studies, they are not counting with the obvious fact, that it is a huge luxury in a business to abandon the loss of revenue due to "poor motivation" of the available workforce or untapped motivation opportunities (Juhász, 2005; Kőmüves, Szabó Szentgróti and Bence, 2018). The extent, to which employees spend their energy on performance enhancement over time, and under what circumstances, depends primarily on their motivation (Berke and Kőmüves, 2016). Motivating employees is an extremely various and complex task that is constantly changing due to the given economic, social and political environment (Kállay and Imreh, 2004; Póra, Kőmüves and Horváth 2017). If external motivation is constantly inadequate, even the most talented employees with a strong internal drive will perform poorly over time (Roóz and Heidrich, 2013).

There is an unprecedented attention nowadays on measuring HR at a strategic level and quantifying human capital. Most HR researches focus on how much an individual contributes to business performance, while changes in the quality of human capital are determinative (Effron, Gandossy and Goldsmith, 2004). Positions in the organization, responsibilities, gained experiences, changed privacy statuses, different goals and life situations induce internal forces, desires and needs of different intensity and composition, which interrelate and influence the significance of each aspect as a matrix. When one or more needs are met, the structure of the motivational priority changes. Continuous monitoring and updating the motivation matrix is (would be) an extremely complex task for a leader (Takács et al., 2012).

With more than 25 years of entrepreneurial history and active practice, we believe that this important topic should be studied in more depth and focus. The topic of our research is the examination of motivation strategies of human resources in enterprises of the Southern Transdanubian Region (Rechnitzer and Smahó, 2005). We assume that while some companies are – at least partially – consciously aware of the potential of motivation, others are completely or largely neglected to address this important issue. This is the reason that we looked at the attitude of SME managers to employee motivation in practice, the financial and non-financial motivational tools they use to help motivate them, and how they evaluate their own business motivation strategy and its elements.

MATERIALS AND METHODS

In this article, we have taken into account the specific facts and trends of the international and domestic HR function already identified by researches in economics and social sciences (Nawangsari and Sutawidjaya, 2019). Based on which we have tried to identify and quantify the motivational practices that are experienced in the operation of SMEs or the processes that affect them.

The empirical study of the motivation practices of SMEs in the Southern Transdanubian Region (Malhotra, 2019) was carried out with 300 business surveys and in-depth interviews with 15 business executives. The large number of questionnaires provided the necessary data for quantitative research, while the in-depth interviews provided the information needed for qualitative research. The questionnaires used were the same, also the questionnaire sampling design regarding sample size, uniformity and procedure (Mitev, 2014). We tried to avoid significant differences in the proportion of the completed questionnaires in the three counties, so the difference in the scale did not disturb the examination. Because of our good relationships in Somogy County, of course it was slightly easier to raise the willingness to respond here, but it was perceptible all along that most executives were indifferent due to overload, and even open rejection was common.

The questionnaire used consisted of eight question blocks, and we formulated a total of 51 questions that focused solely on the opinions of managers and the leadership methods they represent in the topic of employee motivation.

The questions in the questionnaire were typically closed-ended (48 closed, 3 open), with two or more answers, along pre-recorded question lines. For open-ended questions and for some closed questions, under the "other" answer option the interviewee was given the opportunity to express his or her own opinion or to respond differently from the options given. For questions where a scale had to be applied, a Likert scale ranging from 1 to 5 was used. Accordingly, alternative, selective and scale-based rating could be provided within the closed questions.

One of the very important parts of the questionnaire was the address, where we explained the purpose of the survey and justified the importance of the partnership in order to ensure an accountable response and a good cooperation. As confidential information was included in the questionnaire, anonymity had to be guaranteed, along with the voluntary participation. In the formulation of the questions, we strived for clarity and conciseness.

The question block examined the following topics: type, levels, regional standard of the pay system; the composition of the workforce, the extent and reasons of fluctuation; employee training, performance evaluation methods, reasons for underperformance; importance of motivation; key person retention; company motivation strategy; background variables.

The basic information about the company and its profile was intended to enable comparisons from these aspects.

The questionnaires were processed with a mathematical-statistical program (SPSS 16.0). Frequency distributions were used to analyze the data, mean and standard deviation were typically calculated for the scale-like questions, and data were processed using cross tables. Significance analysis was used for percentage distributions using Chi-square test, and for multivariate statistical tests analysis of variance (ANOVA) was used.

RESULTS AND DISCUSSION

The research included the study of wages of the examined enterprises, the result of which is presented in Table 1.

Application of different wage systems at the small and medium-sized enterprises in the Southern Transdanubian Region, % (N=291)

Wage systems	%
Basic salary+commission	41.2
Time wage	35.7
Individual performance-based pay	9.5
Group performance-based pay	1.7
Other	11.9

Source: own calculation

Table 1 shows that the majority of the companies investigated (41.2%) use a basic salary and a commission system. 35.7% of companies employ employees for time wages, while 11.9% choose other solutions. In the latter category, the basic salary with tip plus bonus was named. Individual performance wages appear in 9.5% of the responding firms, while group performance wages were

chosen by only 1.7% of the respondents.

The relationship between the salary system applied and the scope of activities of the company is strongly significant (p≤0.001), which shows that the highest proportion (66.7%) of the basic salary and benefits is applied jointly by the companies of trade, transport and logistics. Time wage is the most frequent in the automotive industry and its supplier partners (69.2%). It is also a high rate with 61.3% for those in the construction and real estate industries. This method is least used in finance and accounting (20.8%) and none in the media (0.0%). Half of the companies (50.0%) who work in the media sector apply individual performance wages. In the automotive, food, wood and IT sectors no respondent has chosen this wage system. Group performance wages appear in 21.4% of woodworking enterprises and in hospitality (4.0%), and are not applied anywhere outside of these two areas.

There is also a significant relationship (p≤0,001) between the number of employees in the company and the wage structure. According to this, 49.4% of companies with 2-9 employees and 35.4% of companies with 10-49 employees use the most popular basic salary and commission system.

There is also a close relationship between the organizational form of the company and the wage system applied (p≤0,001). Organizations operating in the form of limited partnership ("Bt.") employ time wages in the highest proportion (39.6%), while those operating as a general partnership ("Kkt.") apply 50-50% of time wages and basic salary plus commission. The latter appears in the highest proportion in the case of the limited liability companies ("Kft."), on the other hand public limited companies ("Rt.") choose mostly the time wage system.

The subjective perception of the wages of employees and of middle and senior executives working in SMEs is shown in Table 2.

The subjective perception of wages of SME employees from the point of view of company executives in the Southern Transdanubian Region, % (N=296)

Subjective wage categories	Subordinates, %	Middle and senior executives, %
Significantly above average	3.4	5.9
Somewhat above average	27.4	24.2
Average	57.1	54.7
Somewhat under average	10.1	10.4
Significantly under average	2.0	4.8

Source: own calculation

The highest proportion of employees' wages (57.1%) is average based on the opinion of the responding company executives. 27.4% of executives surveyed say they are giving slightly above average salaries for their employees. 10.1% of respondents believe that they give slightly below average, 3.4% give significantly above average and only 2.0% believe that they give their employees significantly below average wages. Compared to the average level, the rate of representatives of the two extreme cases is not significant. Executives and employees of companies operating in the same sector have relevant information about their rivals' wage practices and tacitly seek to keep salaries at an average level, thus avoiding self-motivating wage competition. Of course, this does not mean that there is no exception in justified cases.

The same issue was examined in relation to the salaries of middle and senior executives. According to company leaders, the highest rate of executive wages is at the average salary level (54.7%). On the other hand, 24.2% thinks middle and senior executive salaries are slightly above average. However the rate of salaries significantly above average in the examined management levels is higher than in the case of employees. Examining the organizational forms, it can be stated that 36.8% of middle and senior executives in public limited companies work for slightly higher than average income (p≤0,001).

The research also covered the development of redundancies. According to the results, 32.4% of the companies surveyed had been made redundancies in recent years, where the main reason was the drop in turnover and the lack of expected profits. Examining the activities, it can be stated that the largest number of redundancies were among those working in the fields of marketing, advertising (66.9%), wood industry (64.3%), culture, art, entertainment (60.0%) (p≤0.01). Companies with 10-49 employees had a higher rate of redundancies (45.2%) in recent years than the other companies surveyed (p≤0.01).

The research also covered which workforce groups were affected by the redundancies. The results are shown in Table 3.

Table 3. Development of redundancies by workforce group in SMEs in the Southern Transdanubian Region, % (N=294)

Workforce groups	%
Senior executives	1.7
Middle executives	3.7
Independent or subordinated experts	1.4
Sales / service network employees	7.8
Administration	10.9
Skilled labor	12.9
Trained workforce	5.8
Unskilled labor	8.5

Source: own calculation

The table shows that the highest proportion (12.9%) of redundancies was made by companies among the skilled labor. Middle and senior executives, as well as independent or subordinate experts, were the least likely to be displaced. There is a significant relationship between the size of the enterprise and which companies are firing skilled labor (p≤0.05). It can be stated that most of the skilled workers were sent by companies with 10-49 employees (23.2%) compared to the others. This may be due to the fact that while a smaller company uses everyone's working time completely that there is no spare capacity

to take over each other's work, while in a larger company capacity is harder to predict and idling is more common.

In the following, we examined the main causes of labor migration. The results are shown in Table 4.

Table 4. Reasons of labor migration from the perspective of company executives in the Southern Transdanubian Region, % (N=234)

Reasons of labor migration	%
Higher salaries elsewhere	25.6
Employees do not want to stay in a job for long	12.8
Changes in business conditions affecting the company	12.8
Family circumstances	11.1
Lack of promotion / career opportunities at the company	10.2
Bad relationship between employees	2.1
Change of owner or manager	0.8
Others	24.3

Source: own calculation

The results of the table show that the main reason for labor migration is higher salaries which are promised by competitors (25.6%). Both 12.8% and 12.8% believe that the reason for fluctuations is that employees do not want to stay in the job for a long time, and that changes in the business conditions affecting the company have led to leaving. Family circumstances are mentioned by 11.1% and for 10.2% the lack of promotion / career opportunities at the company is the main reason. Interviewees see only a little influence in the bad relationship between employees and the change of owner or manager in the migration decision, while one of the main topics of several studies and development trainings is to ensure a positive working environment. Employees' sense of job security is not only influenced by the company's stable economic and market position, but also by the constructive relationships within and between groups, which have a strong influence on employee loyalty and motivation (Arpaia et al., 2010). This is why it is surprising that the impact of changes in the status of managers / owners on employee loyalty is hardly treated as an important consideration by the responding company executives, while the importance of the topic is indisputable.

We find an interesting contradiction in the results when we consider that while 57.1% of executives rated their wages as average and 27.4% as slightly higher than average in their own company, most people cited higher pay as the main reason for labor migration. The result is significant in that the higher the number of employees in a company, the stronger the brain drain in the hope of higher salaries. While in companies with fewer than 10 employees up to 22.5% of the workforce leave for this reason, in the case of companies with 10-49 employees this proportion is 29.7%, and among those over 50 persons, 33.3% ($p \leq 0.01$). This can be partially explained by the fact that smaller work communities may develop stronger ties and loyalty with both the employer and the collective, which is more of a deterrent than the promise of slightly higher salaries (Johar et al. 2019).

Most companies (77.3%) place great emphasis on employee training and only 22.7% have not been educated or trained in the recent years. In addition to providing the training opportunities, it can be stated that, to a lesser extent, only 47.0% of the companies assess the needs of employees in the area of establishing further training. In our view, the extremely high rate (77.3%) of training is in vain if almost half of the companies do not align their employees' needs with the organizational development. Not only do they spend too much money on non-relevant knowledge, they also leave an important motivation tool unused.

Most executives surveyed (42.0%) report about the same labor productivity as in the years preceding the survey (Table 5). 33.8% of the respondents think this level is slightly higher, 14.3% think it is slightly lower than in the previous years. The ratio of much lower and much higher rates is less than 10%.

Table 5. Workers' perceptions of labor productivity in the Southern Transdanubian Region, % (N=293)

Change in labor productivity	%
Much higher	3.1
Somewhat higher	33.8
Same	42.0
Somewhat lower	14.3
Much lower	6.8

Source: own calculation

In the light of the data, two thirds of the companies have stagnating or declining productivity every year, which is a clear sign of backlog and, indirectly, lack of motivation or under-motivated workforce. Reviewing the companies' motivation strategy, or if absent, by designing, it would be the obvious way to put productivity back on the path of growth. It is primarily a matter of changing attitudes and innovative thinking, not raising costs.

The negative impact of unmotivated workforce is also reflected in our research about what business executives consider to be a significant disadvantage in the day-to-day work of employees. According to the answers, the lack of practical knowledge is the most common problem (56.6%) in the life of companies. In the second place (43.6%) – thus overtaking the lack of theoretical knowledge (39.9%) – inappropriate attitude and lack of motivation are listed. This is an excessively talkative and at the same time cautionary statement. Supplying the appropriate theoretical and practical knowledge with specific training, increasing motivation with effective leadership and HR work can be remedied with good results, however being aware of and at the same time resigning these shortcomings will not pay off.

Two thirds (75.2%) of the sampled companies evaluate (measure) employee performance. This evaluation and measurement is most often carried out (47.4%) by exam-

ining the work of employees, secondly through personal interviews (39.2%) and by tests or internal examination systems. The result that corporate executives see the main reason of under-performance at work in unmotivation (44.9%) is closely related to this issue. In the second place (22.5%) they mentioned inadequacy, in the third place laziness, followed by underperformance because of not understanding tasks. However, only 39.6% of the companies surveyed measure sales per employee.

Only 9.0% of the respondents work together with companies specializing in this topic to increase motivation. In addition, 42.0% of the respondents took steps to improve the workforce. Table 6 shows the steps of improvements.

Table 6. Steps taken to improve the workforce in the Southern Transdanubian Region, % (N=296)

Steps	%
Used more expensive labor recruitment	100.0
Offering higher income or other financial incentives	22.3
Task realignments between employees	16.6
Providing training opportunities for the less skilled	16.2
Contact with schools, colleges and universities	9.1
Recruitment of part-time employees	7.1
Lower admission requirements	0.7

Source: own calculation

100.0% of companies have already used more expensive labor recruitment tools, but only 22.3% have already offered higher income or other financial benefits as incentives, while 16.6% have realigned tasks and 16.2% provided training opportunities for the less skilled. The other steps taken to improve the workforce are so insignificant that it does not reach 10%. That is to say, that all the other studied tools that companies have done to improve the workforce have developed an insignificant rate, which unfortunately also underpins the assumption that the opportunities freely available to HR are used at a low level or even not used by the professionals who are responsible for maximizing the human resources available.

Table 7 shows the importance of corporate actions for workforce development. For this question, we asked executives to rate the workforce development areas on a Likert scale of 1-5, with 1 – not important at all, 5 – has a completely important meaning.

Table 7. Perceptions of areas of workforce development (N=287)

Development areas	Average	Std. Deviation
Improve the skills of colleagues	4.24	0.913
Increase employee motivation	4.11	1.125
Training of the workforce for the introduction of a new service or product	3.66	1.169
Training of the workforce for the introduction of a new technology	3.65	1.200
Training of the workforce in context of organizational changes	2.81	1.339

Source: own calculation

Expanding the skills of employees is the first (4.24) among the areas of employee development. This is followed by (4.11) increasing motivation, and then with an above-average result workforce training for the introduction of a new service or product (3.66) and continuing with workforce training for the introduction of new technology (3.65). Below-average value was given by executives to the importance of training for organizational changes (2.81).

77.4% of the respondents do not have any program prepared to retain key people, and only 22.6% have any planned program to retain their main workforce. These programs are typically based on direct financial motivation, but also include getting into the ownership of the company.

48.6% of the companies in the study have a motivation strategy and more than half (51.4%) of the companies do not have a consciously designed strategy that can be applied in this area. For those who have a strategy, it is a deliberately designed strategy, and in other cases it is based on the current situation. While designing the strategies, 55.3% of respondents consider the personality of the subordinates and 44.7% disregard this issue. The question arises as how conscious a motivational strategy can be when the most important aspect is an irrelevant factor. The fact that for most businesses it is not a cardinal issue or simply there is no motivational concept, justifies the idea of what they are expected to do to improve performance when they have run out of technological development or market expansion frameworks.

In the next question, we examined the role of money in regards of how much respondents agree that money is not a good motivator in a business life. The results are shown in Table 8.

Table 8. Identifying money as a non-motivating tool, % (N=293)

Level of agreement	%
Totally disagree	38.9
Rather disagree	32.1
Agree and disagree	18.8
Rather agree	7.5
Totally agree	2.7

Source: own calculation

38.9% of respondents think that money is a good way to increase motivation. If we consider the respondents who rather agree (32.1%) that money is a motivating tool, then it can be stated that for 70% of the surveyed companies money is the most important motivating tool. In the following, respondents were asked to determine the importance of financial and non-financial motivational tools in their company. Based on the answers, financial and non-financial motivational tools resulted 72.5% and 27.53% respectively. However the topic analyzes the importance of non-financial motivation tools and the right HR strategy, as well as the crucial importance of corporate leadership style, we agree with the result, with one

important condition: as long as the financial resources of the basic necessities are not satisfactorily provided to the employee, he / she will not exceed the necessary / sufficient level of performance, and in such cases, only money can really stimulate. The basic problems of everyday life cannot be forgotten by other tools of the motivation palette. If a stable financial background and a lasting sense of security are established, then money itself cannot motivate alone anymore in the long run. This is why a well-founded, diverse motivational strategy or motivational matrix is really neccessary. For example, a minimum wage employee is not motivated by a wellness weekend bonus when they cannot even manage their savings for the trip. Well-paid employees are also not moved by this opportunity because they can do it on their own in their spare time, but personalized coaching would greatly increase their self-esteem and well-being, and to feel that the personal development is important in the company. Personal life situations, age, habitus, personality components, functions within the organization, current working conditions, management attitudes and expertise, current market position and potential future opportunities of the particular company – including but not limited to – influence the co-effect of countless aspects, which is constantly changing (Szabó-Szentgróti G. et al, 2019; Csapai et al, 2018). Recognizing this and hopefully managing it professionally in the future will be a major challenge for future CEOs and HR professionals.

Table 9 shows the evolution of positive feedback and praise from management to employees.

Table 9. Positive feedback and praise for employees, % (N=293)

Level of agreement	%
Always	22.9
Often	39.9
Sometimes	30.0
Rarely	7.2

Source: own calculation

The results of Table 9 show that 39.9% of respondents often give positive feedback or praise for their employees, 30.0% occasionally, 22.9% always and only 7.2% rarely expresses their satisfaction. Entrepreneurs who give positive feedback are with the highest proportion (100.0%) among family businesses, while limited partnership ("Bt.") (39.6%) and limited liability companies ("Kft.") (38.9%) give more feedback than in other organizations forms ($p \leq 0.01$). The role of feedback is very important to encourage. if it is operated incorrectly, it may result in the formation of interpersonal conflicts (Szabó-Szentgróti and Gelencsér, 2018). It is noticeable that employees are receiving more intensive feedback in smaller, family-owned companies, though attention, good words and appreciation are available for free to all leaders, which will result in a savior consequence of a more motivated worker, performance enhancement and better economic performance.

CONSEQUENCES

Overall, the management of a company's role – as occupation, activity and responsibility – in practice is far from commensurate with its importance for the businesses we investigated. Research in the Southern Transdanubian Region shows that a wide range of business executives, partly because of the well-known economic history reasons, learn at their own expense from the often avoidable mistakes and test the processes empirically. Managing a business requires a high level of professional and material knowledge, organizational skills and psychological sensitivity. The business sector has huge hidden economic reserves, but this requires acceptance of the need for continuous tangible and intangible investment in human capital for sustainable development. In contrast, for economic reasons, business executives do not or barely sacrifice for the specific development of personal leadership competencies. They do not realize the multiple disadvantages of the "experiential journey" in business. The main problem with waiting for experience is that it is more suitable to draw the consequences of a past event than to judge the future success of a new method or technology. In the absence of relevant measurement methods, it is extremely difficult to assess the actual financial disadvantages in a company to acquire leadership and organizational development knowledge this way, but typically, the younger the business, the higher the "start-up tax".

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SCIENTIFIC PAPER

A DISAGGREGATED ANALYSIS OF MONETARY POLICY EFFECTS ON THE AGRICULTURAL SECTOR IN NIGERIA

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Abstract: *This study provides a disaggregated analysis of the effects of monetary policy shocks on the agricultural sector in Nigeria from 1981Q1 to 2016Q4. The study utilized the generalized impulse responses and the normalized generalized forecast error variance decompositions from an underlying VAR model, which are order-invariant. The four monetary policy variables used in the study are interbank call rate, monetary policy rate, broad money supply and exchange rate; while the four agricultural sub-sectors investigated are crop production, forestry, fishing and livestock. The study also controlled for the general price level and other economic activities in the overall economy. The findings indicate that the aggregate agricultural sector and its various sub-sectors consistently responded negatively to unanticipated monetary tightening in most of the forecast horizon; while the immediate impact of monetary policy shocks is transmitted to the agricultural sector through the interest rate and money demand (credit) channels. The findings further indicate that apart from these two channels, the roles of monetary policy rate and exchange rate are non-negligible in the long-run. The role of money supply channel in spreading monetary policy shocks to the agricultural sector remained muted all through. The study concludes that the monetary authority should evolve interest rate, credit, and exchange rate policies that will promote the development of the agricultural sector in Nigeria.*

Keywords: *Disaggregated, Monetary Policy; Agricultural Sector; VAR Model; Nigeria*
(JEL code: *E52; N50; C22; N57*)

INTRODUCTION

Monetary policy is one of the macroeconomic management tools used to influence outcomes in the real sectors of an economy to their desired direction. It is expected to influence the real sectors of an economy through movements in interest rates which would alter the cost of capital and investment in these sectors. In fact, the extant literature indicates that monetary policy influences the economy through an array of channels, such as interest rates, credit and/or bank lending, asset prices through exchange rates, equity and housing prices channels (Mishkin, 2007; CBN, 2014). However, the main aims of monetary policy are the promotion of price stability, sustainable output and employment.

Recent investigations into the effect of monetary policy on the economy have generally focused on the sectoral effects of monetary policy since different sectors of the economy respond differently to monetary policy shocks (Moussir and Chatri, 2017). Such investigations have important policy implications for macroeconomic management since monetary authorities can then consider the effects of their actions on the various sectors of the economy. For example, the tightening of monetary policy might be considered benign from the general perspective, whereas it can also be viewed as malignant for certain sectors of the economy. Thus, monetary policy is said to have strong distributional effects on the economy, and empirical evidence on how the various sectors react to monetary policy shocks is essential about how to stimulate growth.

Current empirical studies on the sectoral effects of monetary policy shocks in developing countries generally indicate that tight monetary policy negatively affects the agricultural sector, which is one of the key components of the real economy in Nigeria (CBN, 2014; Moussir and Chatri, 2017). Indeed, over the years, the agricultural sector has made great contributions to domestic production, employment and foreign exchange earnings in Nigeria (Oluwaseyi (2017). However, a trend analysis of its contributions to Nigeria's gross domestic product (GDP) has revealed a substantial variation and long-term decline since the early 1960s. Specifically, its contribution to GDP declined from 60% in the early 1960's to 23.11% in 2015. Its contribution to GDP further declined to 20.48% in 2016Q1. In addition, the real growth rate of the sector declined from 6.70% in 2012 to 3.72% in 2015. Its growth rate declined to 3.09% as at 2016Q1. This unsatisfactory situation has been largely attributed to unstable and often inappropriate economic policies, the relative neglect of the sector and the negative impact of oil boom (Orji, A., Ogbuabor, Anthony-Orji, and Alisigwe, 2020, Ogbuabor and Nwosu, 2017; National Bureau of Statistics, 2016). Thus, economic policies in Nigeria, such as the monetary policies of the Central Bank of Nigeria (CBN), cannot be said to be successful if they do not impact positively on the real sectors of the economy, especially the agricultural sector that employs and feeds the larger chunk of the country's population. The goal of this study is to provide a disaggregated analysis of the effects of monetary policy shocks on the agricultural sector in Nigeria[1]. Agriculture is as old as man himself as it was the first occupation of mankind. Even with the evolvement of modern civilization, it still remains an essential part of the growth and development of any extant economy (Anthony-Orji, Orji, Ogbuabor & Ezealigo, 2020; Orji, Ogbuabor, Okeke & Anthony-Orji, 2019; Orji, Ogbuabor, and Umesiobi, 2014).

This study is relevant for several reasons. One, existing studies have generally neglected the disaggregated nature of the agricultural sector in Nigeria. To address this gap, this study specifically evaluated the effects of monetary policy on the four agricultural sub-sectors in Nigeria, namely: crop production, livestock, forestry and fishing. Two, an important methodological flaw in studies that have examined the sectoral effects of monetary policy in Nigeria, such as CBN (2014) and Nwosa and Saibu (2012), is the use of vector autoregressive (VAR) framework that is not order-invariant. To address this gap, this study used the generalized impulse response and the generalized forecast error variance decomposition framework advanced by Koop, Pesaran and Potter (1996) and Pesaran and Shin (1998), which was later extended by Diebold and Yilmaz (2014). Overall, this study will assist in strengthening the formulation and implementation of monetary policy in Nigeria, particularly as it affects the agricultural sector.

1 For detailed historical account on the evolution of monetary policy in Nigeria, we refer the reader to CBN (2014). Similarly, for the historical evolution of the agricultural sector in Nigeria, we refer the reader to Oluwaseyi (2017).

AN OVERVIEW OF THE EMPIRICAL LITERATURE

In the last two decades, several studies have been conducted to ascertain the sectoral effects of monetary policy, especially in the highly industrialized economies. One of the pioneer seminal papers in this regard is Bernanke and Gertler (1995), which used a vector autoregressive (VAR) model to document the responses of GDP and its components in the U.S. to monetary policy shocks. They find that during the period January 1965 to December 1993, the different components of final expenditures responded differently to monetary policy shocks. Following this study, a plethora of other studies also focused on the U.S. economy. Raddatz and Rigobon (2003) used quarterly data for the U.S. over the period 1955:1 – 2002:3 to examine the sectoral effects of monetary policy. They extended the Bernanke and Gertler (1995) methodology by advancing an identification strategy that allows the study of both the sectoral effects of monetary policy and the role that monetary policy plays in the transmission of sectoral shocks. The results also indicate significant differences in the sectoral responses to monetary policy. Jansen, Kishan and Vacaflores (2013) studied the impact of monetary policy on net sales of publicly traded firms in various sectors of the U.S. economy and find that monetary policy has a heterogeneous effect on firms in different industries. The study observed the strongest effect on firms in retail and wholesaling, while balance sheet characteristics, particularly size, influence the impact of policy.

At this point, it is easily seen that monetary policy influences different sectors of the economy in different ways. In what follows, we explore empirical studies from other economies across the globe in order to cross check the robustness of this fact. Otero (2017) investigated the impact of monetary policy on the industrial sectors in five Latin American countries using inflation targeting, namely: Brazil, Chile, Colombia, Mexico and Peru. Among others, the results indicate that the sub-sectors producing capital goods and durable consumer goods are more sensitive to monetary policy shocks. In the UK, Ganley and Salmon (1997) examined the disaggregated impacts of monetary policy on 24 industrial sub-sectors in order to establish the speed and magnitude of the reactions of firms in those sub-sectors to an unexpected monetary policy tightening. The results indicate that the sensitivity of output to changes in monetary conditions differs noticeably across industries. This is consistent with Darby and Phillips (2007), which established from impulse responses of VARs for disaggregated UK and Scottish data that some industrial sub-sectors are more interest sensitive compared to others.

Studies in Australia also obtained similar results with the ones above, which on the whole, supports the hypothesis of differential sectoral impacts of monetary policy. Lawson and Rees (2008) examined the effects of unexpected monetary policy shocks on the Australian expenditure and production components of GDP from 1983 to 2007 using a structural vector autoregression (SVAR). The results indicate that

dwelling investment, and machinery and equipment investment are the most interest-sensitive expenditure components of activity, while construction and retail trade are the most interest-sensitive production components of activity. In an earlier study of the sectoral output impacts of monetary policy in Australia using a structural vector autoregression (SVAR) model, Crawford (2007) also found that monetary policy shocks have uneven impacts across different sectors, with the construction and manufacturing sectors showing the most sizeable and rapid responses to monetary tightening, while the mining sector is not interest rate-sensitive.

Singh and Rao (2014) and Sengupta (2014) studied the sectoral effects of monetary policy in India. Singh and Rao (2014) examined the responses of both aggregate and sectoral output to monetary policy shock using reduced form vector auto regression (VAR) model and find that the impact of a monetary policy shock at the sectoral level is heterogeneous, with some sectors like mining and quarrying, manufacturing, construction and trade, hotel, transport and communications being more responsive to monetary tightening, suggesting the need for sector-specific monetary policy in India. Sengupta (2014) also used VAR model to find that the impact of a monetary policy shock at the sectoral level is heterogeneous and that sectors like manufacturing, mining and quarrying, construction and trade are the fastest to respond, with manufacturing being the most responsive. Just as before, Sengupta (2014) concluded that the heterogeneous sectoral responses suggest the need for a more sector-specific monetary policy in India.

In Europe, Pellényi (2012) used a structural factor model to find considerable heterogeneity in the sectoral responses to monetary policy shocks in Hungary, with sectors more dependent on external finance showing greater output responses, while healthier corporate balance sheets showed weaker price responses. In South Asia, Alam and Waheed (2006) studied the responses of both aggregate and sectoral production to monetary policy shocks using a standard VAR framework and find that some sectors are more sensitive to monetary tightening. Specifically, the results indicate that manufacturing, wholesale and retail trade, and finance and insurance sectors declined more in response to interest rate shocks, while agriculture, mining and quarrying, construction, and ownership of dwellings are less sensitive to interest rate changes. Llaudes (2007) examined the differential effects of monetary tightening on the tradable and non-tradable sectors in the OECD, and find that the behavior of these two sectors varies within the countries, with the tradable sector showing greater degree of responsiveness to monetary policy shocks than the non-tradable sector. This suggests that industrial structure may be an important component for the analysis of monetary policy.

At this point, it is obvious that empirical studies have established a fact, that monetary tightening generates differential sectoral effects. Some empirical studies focusing on African economies are also consistent with this fact. Nampewo, Munyambonera and Lwanga (2013) examined the sectoral effects of monetary policy in Uganda for the period 1999 to 2011 using a recursive VAR and find that agriculture, manufacturing and service sectors respond differently to monetary tightening, with a positive shock in exchange rates resulting in the growth of agriculture and service sectors as well as decline in the manufacturing sector. This suggests the need for a stable exchange rate regime, which favors all the productive sectors of the economy. Moussir and Chatri (2017) also finds significant differences in the reactions of Moroccan sectors to monetary policy shocks, with the extraction industry, manufacturing, construction, hotels & restaurants, the financial and insurance activities being more sensitive to monetary policy shocks, while agriculture and fishing sectors appear to be insensitive to monetary policy innovations. The results further indicate that monetary policy tightening leads to a decrease of the overall GDP and price level.

In Nigeria, Nwosa and Saibu (2012) examined the transmission channels of monetary policy shocks on sectoral output growth over the period 1986Q1 – 2009Q4 using Granger Causality and unrestricted VAR model. The results indicate that interest rate channel is most effective in transmitting monetary policy to agriculture and manufacturing sectors, while exchange rate channel is most effective for transmitting monetary policy to building/construction, mining, service and wholesale/retail sectors. These results generally indicate that interest rate and exchange rate policies are important monetary policy measures for stimulating sectoral output growth in Nigeria. CBN (2014) criticized this study on two main grounds. The first is that the period covered by the study does not reflect the market orientation period of monetary policy in Nigeria. The second is that the unrestricted VAR model used in the study is sensitive to the ordering of the variables. To address these gaps, CBN (2014) used structural VAR framework and quarterly data from 1993Q1 to 2012Q4 to examine monetary policy effects on the disaggregated components of the real sector in Nigeria. The results indicate that sectoral output responded heterogeneously following contractionary monetary policy shocks, with some immediately responding negatively (services and wholesale/retail sectors), while others displayed lagged negative responses (manufacturing, building and construction, and agriculture). This is consistent with the theoretical expectation that output in each sector is expected to decline following monetary tightening. It is also consistent with the established fact that monetary policy shocks generate differential sectoral impacts. The findings of CBN (2014) further indicate that contrary to Nwosa and Saibu (2012), money supply is one of the main variables that explain the variation in sectoral output, while exchange rate does not significantly explain sectoral output changes.

Three important observations are in order at this point. The first is that the effects of monetary policy on the agricultural sector in Nigeria are yet to be investigated at a disaggregated level. It is the goal of this study to fill this gap in the literature by investigating the effects of monetary policy on the four agricultural sub-sectors in Nigeria. The second important issue here is that CBN (2014) carried out level form estimations of the underlying VAR models without

recourse to any kind of cointegration test. Obviously, the estimated models may have been misspecified when the variables are subjected to cointegration test. It is the goal of this study to cure this important methodological flaw by performing a system cointegration test. The third issue also bothers on the methodology, that is, the use of VAR system that is sensitive to the ordering of the variables. To address this issue, CBN (2014) employed structural VAR framework, and utilized the non-recursive method of imposing restrictions in structural VARs for the aggregate and sectoral output components using economic theory as the basic foundation. However, it has since been established in the literature that VAR models are atheoretical because they are not based on any economic theory; they take the view that let the data talk about themselves (Cooley and Leroy, 1985). Indeed, the modeling strategy suggested by Sims (1980) is to estimate an ('unrestricted') VAR model of a pre-specified order in variables of interest and to make use of impulse response functions to investigate the dynamic response of the system to shocks without having to rely on 'incredible' identifying restrictions, or potentially controversial restrictions from economic theory. The critical issue here is that imposing a causal ordering on the VAR based on economic theory defeats the object of this approach, and in general, no such restrictions are available or acceptable. In the absence of such restrictions, the estimated model gives few meaningful insights into the economic system that it represents. Obviously, the attempt by CBN (2014) to address the methodological gap of estimating an order-invariant impulse response functions or forecast error variance decompositions leaves more questions than answers. It is the goal of this study to address this methodological gap using the order-invariant generalized impulse responses and generalized forecast error variance decompositions following Koop, Pesaran and Porter (1996).

MATERIALSANDMETHODS

The full sample data for this study spans from 1981Q1 to 2016Q4, while the sub-sample period is from 1994Q1 to 2016Q4. The full sample period is based on available data, while the sub-sample period is used to capture the era of indirect monetary policy regime in Nigeria, following CBN (2014). The monetary policy variables used in this study include: broad money supply (M2), measured in billions of naira (MSS); nominal naira to U.S. dollar exchange rate (EXR); monetary policy rate (MPR), measured in percent (%); and interbank call rate (IBR), measured in percent (%). These policy variables are regularly used by the CBN as stabilization tools. In particular, the MPR serves as the CBN anchor rate as well as the point of reference rate for overnight interest rates in the money market. The choice of these policy variables is to ensure the comparability of our results with the extant literature such as CBN (2014) and Nwosa and Saibu (2012). The non-policy variables in this study include: consumer price index (CPI), measured in percent (%), which captures the general price level; agricultural sector real GDP component (AGR), measured in billions of naira, which accounts for economic activities in the agricultural sector; and the four sub-sectoral real GDP components under the agricultural sector, which are crop production (CPR), livestock (LVS), forestry (FRS) and fishing (FSH), all measured in billions of naira. The aim is to determine how monetary policy influences the agricultural sector as a whole and at the disaggregated (or sub-sectoral) level. The entire data were collected from the CBN Statistical database and logged before estimation.

The descriptive statistics of the variables indicate that the highest agricultural output of 12.586 trillion naira was recorded in 2009Q4, while the average value is 5 trillion naira. The statistics also indicate that among the four agricultural sub-sectors, crop production has the highest average output of 4.328 trillion naira, while forestry has the least average output of 77.84 billion naira. The statistics further show that monetary policy rate and interbank call rate witnessed the least level of variability among all the variables. We refer the reader to Table 2 in the Appendix for more details of the descriptive statistics of the variables before they were logged for estimation.

This study seeks to provide a disaggregated analysis of the effect of monetary policy shocks on the agricultural sector in Nigeria. To do this, we specify a multivariate VAR model of the form:

$$Z_t = \alpha_z + \sum_{j=1}^{p} \Phi_j Z_{t-j} + \varepsilon_t,$$

where: Z_t is a vector of both monetary policy and non-monetary policy variables; α is a vector of intercepts; ϕ_j is the coefficient matrix; p is the lag order; and the residuals $\varepsilon_{it} \sim iid(0,\sum_{\varepsilon,ii})$ Schwarz Information Criterion selected an optimal VAR lag order of one for this study (see Table 5 in the Appendix). For the aggregate agricultural output (AGR), this study estimated a six-variable VAR, which includes the four monetary policy variables and CPI. A separate seven-variable VAR was estimated for each agricultural sub-sector in order to account for the effect of monetary policy shocks on the various sub-sectors. In addition to the sub-sectoral outputs, the sub-sectoral VARs include the four monetary policy variables, CPI, and a second output variable, Y_j, for the j th agricultural sub-sector. The output variable, Y_j, is constructed as the net aggregate output $(Y_t - Y_{jt})$ that excludes that particular sub-sector when estimating the individual sectoral VAR, in line with CBN (2014). Here, Y_t is the aggregate agricultural output at time t, and Y_{jt} is the individual sub-sectoral output. All the models in this study proved to be stable (for example, see the stability test result in Table 6 of the Appendix).

The approach adopted in this study requires that after estimating the underlying VAR model, the generalized impulse responses (GIRs) and the generalized forecast error variance decompositions (GFEVDs) are then generated. The GIRs are used to trace the dynamic responses of the aggregate agricultural sector and its various sub-sectors within the VAR system to monetary tightening. For a detailed theoretical background on the GIRs, we refer the reader to Pesaran and Shin (1998). The GFEVDs are used to trace the variation in the aggregate agricultural sector and its various sub-sectors

within the VAR system that is accounted for by own shocks as well as shocks from the monetary policy variables in the system. This is with a view to establishing the main channels through which monetary policy shocks are transmitted to the agricultural sector and its various sub-sectors. Hence, following Koop, Pesaran and Potter (1996) and Pesaran and Shin (1998), this study adopts the order-invariant GFEVDs defined as:

$$GFEVD(Z_{it}; \varepsilon_{jt}, H) = d_{ij}^{gH} = \frac{\sigma_{\varepsilon,jj}^{-1} \sum_{h=0}^{H-1} (e_i' \Theta_h \Sigma_\varepsilon e_j)^2}{\sum_{h=0}^{H-1} (e_i' \Theta_h \Sigma_\varepsilon \Theta_h' e_i)}$$

where $i,j = 1, \ldots, N$; N is the number of variables in the system; $H = 1,2, \ldots$ is the forecast horizon; $e_i(e_j)$ is $N \times 1$ selection vector whose i-th element (j-th element) is unity with zeros elsewhere; Θ_h is the coefficient matrix multiplying the h-lagged shock vector in the infinite moving-average representation of the non-orthogonalized VAR; $\sum\varepsilon$ is the covariance matrix of the shock vector in the non-orthogonalized VAR; and $\sigma_{\varepsilon,jj}$ is the j-th diagonal element of $\sum_\varepsilon$ (i.e. the standard deviation of e_j). It must be stressed that the choice of GFEVDs for this study rather than the orthogonalized forecast error variance decompositions (OFEVDs) of Nwosa and Saibu (2012) and CBN (2014) is particularly based on the fact that the OFEVDs depend on the reordering of the variables in the system such that once the order of variables in the VAR is reshuffled, a different outcome results. Studies like Diebold and Yilmaz (2014), Ogbuabor et al. (2016), and Ogbuabor et al. (2018) have successfully used the GFEVDs in the study of international transmission of macroeconomic shocks and connectedness.

Diebold and Yilmaz (2014) explain that shocks are rarely orthogonal in the GFEVD environment so that sums of forecast error variance contributions are not necessarily unity, that is, row sums of the GFEVD matrix, , are not necessarily unity. This renders the interpretation of the GFEVDs complicated. Thus, to restore a percentage interpretation of the GFEVDs, this study follows Diebold and Yilmaz (2014) to define the normalized GFEVDs (NGFEVDs) given by:

$$\tilde{D}^{gH} = \left[\tilde{d}_{ij}^{g}\right] \quad \text{where } \tilde{d}_{ij}^{gH} = \frac{d_{ij}^{g}}{\sum_{j=1}^{N} d_{ij}^{g}} \quad d_{ij}^{gH} = GFEVD(Z_{it}; \varepsilon_{jt}, H)$$

By construction, $\sum_{j=1}^{N} \tilde{d}_{ij}^{gH} = 1$, so that the total sum of the generalized forecast error variance share of each variable in the VAR system is normalized to 100% across all horizons.

RESULTS AND DISCUSSION

This empirical analysis began by examining the time series properties of the data. Both the Augmented Dickey-Fuller (ADF) and Phillips-Perron unit root tests showed that majority of the series are I(1) (see Table 3 in the Appendix). The test for long-run or equilibrium relationship using the Johansen System Cointegration test also showed the existence of at least four cointegrating equations (see Table 4 in the Appendix). Therefore, the underlying model was estimated in its vector error correction form, and both the GIRs and the NGFEVDs were computed for horizons, , in order to properly capture the long run results. For the full sample (i.e. 1981Q1 to 2016Q4), the NGFEVDs of aggregate agricultural output (AGR), consumer price index (CPI) and the four agricultural sub-sectors (i.e. crop production, forestry, fishing, and livestock) are reported in Table 1. The corresponding sub-sample estimation results (i.e. 1994Q1 to 2016Q4) are reported in Table 7 (see the Appendix). The reports are shown from horizon 1 (i.e. the short-run) to horizon 24 (i.e. the long-run). Notice that the sum of each row in all the reports is 100%, in line with equation (3). In what follows, we provide a detailed discussion of these results with a view to exposing how monetary policy shocks influence agriculture and its sub-sectors in Nigeria.

To begin, let us focus on the aggregate agricultural output. Figure 1 reports the generalized impulse response, which is a means of tracing the dynamic responses of endogenous variables within the VAR system to monetary policy shocks. The aggregate agricultural output responded immediately and negatively to innovation in money supply and monetary policy rate as theoretically expected. The highest negative response was attained after a lag of 2 and 6 quarters, respectively. In both cases, the sector persistently responded negatively all through. The response to interbank call rate declined after 2 quarters, became negative after 4 quarters and persistently remained negative afterwards. The lag pattern in the response of aggregate agricultural output to a restrictive monetary policy in this study may be explained by the fact that Nigerian agriculture is dominated by small scale farmers who depend largely on crude farming methods, while the lack of capital intensity in the sector may also offer an alternative explanation. This is consistent with CBN (2014). Overall, the aggregate agricultural sector generally responded negatively to unanticipated monetary policy shock in most of the forecast horizon, which is consistent with economic theory, as outputs in the real sectors of the economy are expected to decline following monetary tightening.

The variance decomposition of agricultural output in Table 1 indicates that in the short-run (i.e. horizon 1), 94.7% of the variation in agricultural output (AGR) is explained by its own innovation while interbank call rate (IBR) accounts for 4.8%. The role of shocks from other monetary policy variables is considered negligible. Hence, we infer that interbank call rate is the main channel of transmitting monetary policy to the agricultural sector in the short-run. However, in the long-run (i.e. horizon 24), the roles of monetary policy rate (MPR) and exchange rate (EXR) become non-negligible since they contribute 11.2% and 8.45% to the total variation in agricultural output, respectively. Overall, therefore, we find that interbank call rate, monetary policy rate and exchange rate are the key channels through which monetary policy shocks are transmitted to the agricultural sector in Nigeria. These findings are qualitatively robust to the sub-sample estimation results in Table 7 (see the Appendix). The only difference is that in the sub-sample, the role of exchange rate remained unimportant throughout. These findings are consistent with Nwosa and

Saibu (2012), which also established that interest rate is the main avenue of transmitting monetary policy shocks to the agricultural sector in Nigeria. Our findings are however contrary to CBN (2014), which found that monetary policy affects the agricultural sector through the money supply channel. The inconsistency in the findings of CBN (2014) may be due to the reordering of the variables in their structural VAR model. As explained in Section 3 of this paper, our VAR system is invariant to the reordering of the variables.

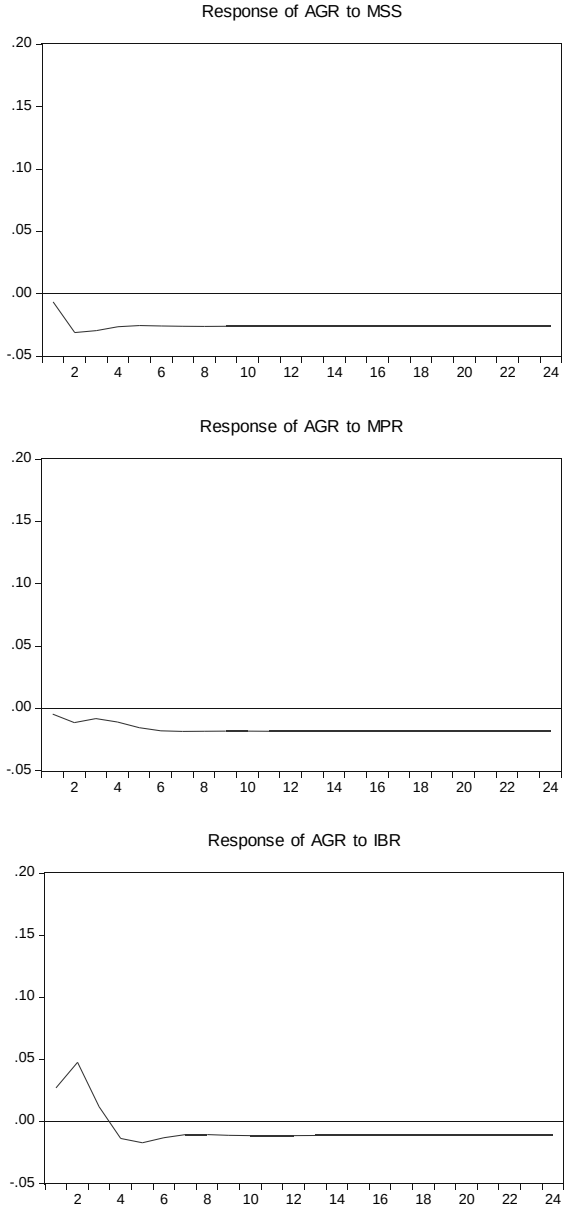
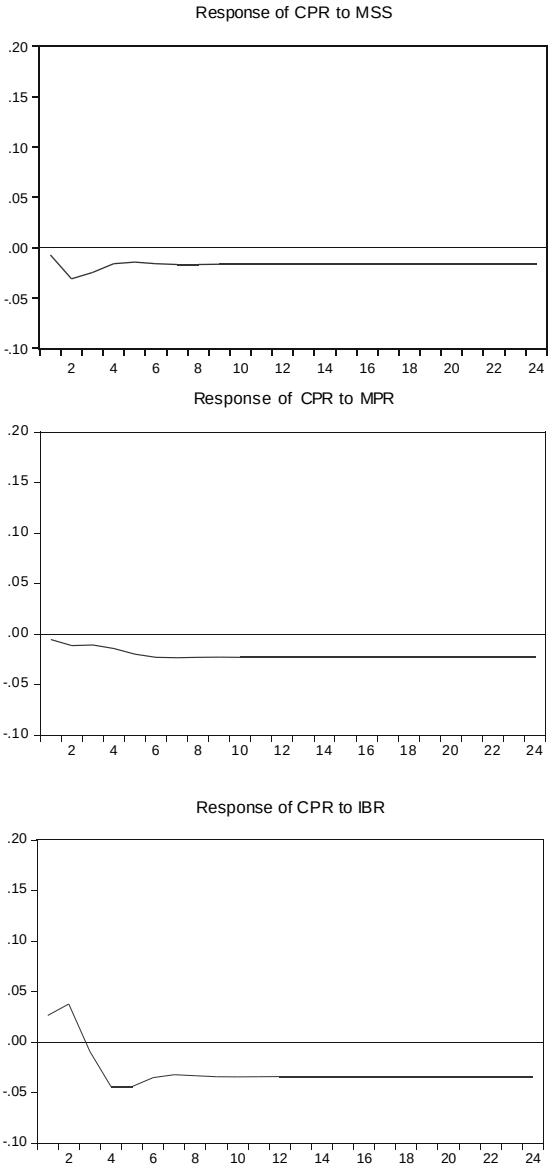


Figure 1: Generalized Impulse Response of Agricultural Sector to Monetary Policy Tightening:

Note: This figure reports for the full sample. To conserve space, we do not report the graphs for the sub-sample since they follow the same patterns. The response to innovations in exchange rate remained muted in all cases.

Figure 2: Generalized Impulse Response of Crop Production Sub-sector to Monetary Policy Tightening:



Note: This figure reports for the full sample. To conserve space, we do not report the graphs for the sub-sample, and for forestry, fishing and livestock sub-sectors, since they follow the same patterns. The response to innovations in exchange rate remained muted in all cases.

Table 1: Full Sample NGFEVD (1981Q1 – 2016Q4)

Agricultural Output

Horizon	agr	ibr	mss	mpr	exr	cpi	Total
1	94.7486	4.7702	0.0108	0.3169	0.1532	0.0004	100
4	89.6924	8.1075	0.0058	0.6838	1.2196	0.2909	100
8	82.0092	10.1113	0.0058	3.4825	3.4150	0.9761	100
12	75.3542	10.8340	0.0114	6.7373	5.5762	1.4867	100
16	71.0002	10.9575	0.0194	9.1732	7.1317	1.7180	100
20	68.7187	10.8693	0.0273	10.5825	8.0265	1.7757	100
24	67.7461	10.7560	0.0341	11.2439	8.4505	1.7695	100

Consumer Price Index

Horizon	agr	ibr	mss	mpr	exr	cpi	Total
1	0.0004	0.0594	2.2447	1.2066	0.2235	96.2653	100
4	0.0490	0.0226	2.7930	1.3660	0.1074	95.6621	100
8	0.2027	0.0281	3.5348	1.7032	0.1385	94.3928	100
12	0.2748	0.0632	4.2548	2.0650	0.2440	93.0984	100
16	0.2700	0.0897	4.9457	2.3529	0.3195	92.0221	100
20	0.2838	0.0968	5.6034	2.5195	0.3418	91.1547	100
24	0.3690	0.0959	6.2221	2.5757	0.3385	90.3988	100

Crop Production

Horizon	cpr	ibr	mss	mpr	exr	cpi	Y_j	Total
1	59.9417	2.8073	0.0137	0.2377	0.0811	0.0026	36.9159	100
4	56.0044	4.9510	0.0132	0.4610	0.6539	0.1354	37.7812	100
8	51.9284	6.3388	0.0442	2.4037	1.8858	0.5012	36.8979	100
12	48.7583	7.0212	0.0752	4.8194	3.2166	0.7903	35.3190	100
16	46.6428	7.2931	0.1004	6.7739	4.2811	0.9273	33.9815	100
20	45.4720	7.3488	0.1189	7.9971	4.9613	0.9630	33.1389	100
24	44.9354	7.3224	0.1318	8.6186	5.3206	0.9600	32.7112	100

Forestry

Horizon	frs	ibr	mss	mpr	exr	cpi	Y_j	Total
1	59.0622	2.7616	0.3967	0.3909	0.0013	0.0086	37.3785	100
4	54.0792	3.7271	0.1899	0.4779	0.1799	0.6334	40.7124	100
8	49.3537	5.0064	0.1451	2.5143	0.9734	1.7054	40.3017	100
12	46.1533	5.7362	0.1726	5.0711	2.0086	2.4527	38.4056	100
16	44.2273	6.0016	0.2299	7.0307	2.8315	2.8059	36.8731	100
20	43.2841	6.0203	0.3039	8.1073	3.2790	2.9059	36.0994	100
24	42.9270	5.9611	0.3868	8.5218	3.4332	2.9014	35.8685	100

Fishing

Horizon	fsh	ibr	mss	mpr	exr	cpi	Y_j	Total
1	74.0601	2.0723	0.7110	0.1211	0.1170	0.0024	22.9159	100
4	62.0284	4.0040	0.5343	2.1078	0.4744	0.1007	30.7504	100
8	55.1634	5.8806	0.5065	6.2497	1.3604	0.2224	30.6169	100
12	51.7076	6.8043	0.5373	10.4406	2.3497	0.2400	27.9206	100
16	49.3851	7.1708	0.5695	13.7161	3.1528	0.2226	25.7832	100
20	47.7650	7.2642	0.5892	15.8374	3.6810	0.2317	24.6317	100
24	46.7182	7.2456	0.5970	16.9953	3.9712	0.2813	24.1913	100

Livestock

Horizon	lvs	ibr	mss	mpr	exr	cpi	Y_j	Total
1	57.9037	2.9616	0.3704	0.0006	0.0180	0.0402	38.7055	100
4	48.7505	4.7336	0.1158	0.5716	0.5077	0.3386	44.9823	100
8	43.7230	6.4050	0.1290	2.6910	1.7638	0.8760	44.4122	100
12	40.8607	7.2239	0.1577	5.2612	3.1290	1.2934	42.0741	100
16	39.1345	7.4947	0.1858	7.2566	4.1299	1.4951	40.3034	100
20	38.2563	7.5048	0.2149	8.3873	4.6580	1.5479	39.4309	100
24	37.9066	7.4390	0.2461	8.8593	4.8472	1.5426	39.1591	100

In what follows, we consider the influence of monetary policy shocks on agriculture at sub-sectoral level. Let us begin with the crop production sub-sector. The generalized impulse responses of the crop production sub-sector to monetary tightening as shown in Figure 2 indicates that the sub-sector responded immediately and negatively to innovation in money supply and monetary policy rate as theoretically expected. The highest negative response was attained after a lag of 2 and 6 quarters, respectively. In fact, the sub-sector persistently responded negatively all through, just like the aggregate agricultural sector. The response to interbank call rate declined after 2 quarters, became negative after 3 quarters and persistently remained negative afterwards. Clearly, these patterns are qualitatively similar to those of the aggregate agricultural sector. Indeed, the patterns of generalized impulse responses for the sub-sample as well as those of forestry, fishing and livestock are similar to the ones reported here for crop production in the full sample (to conserve space, we do not report the graphs for these other sub-sectors). In sum, our results indicate that even at sub-sectoral level, the agricultural sector consistently responded negatively to unanticipated monetary policy shock in most of the forecast horizon, in line with economic theory.

The NGFEVD of crop production in Table 1 indicates that apart from idiosyncratic conditions, the variables which significantly explain output variability in this sub-sector in the short-run are interbank call rate (2.8%) and productive activities in other sectors of the economy (36.9%). This implies that monetary policy affects the crop production sub-sector in the short-run through the interest rate and money demand (credit) channels. This is consistent with our earlier findings for the agricultural sector as a whole. However, in the long-run and in addition to these two channels, the roles of monetary policy rate (8.6%) and exchange rate (5.3%) become non-negligible. These findings are robust to the sub-sample estimation results in Table 7, the only difference being that the role of exchange rate remained unimportant both in the short-run and long-run. Overall, we find that the interest rate and credit channel are the main avenues through which the immediate impact of monetary policy shocks are transmitted to the crop production sub-sector. Is this finding applicable to forestry, fishing and livestock sub-sectors? Let us see.

The NGFEVD of forestry sub-sector in Table 1 is qualitatively the same as that of crop production. We find that apart from own innovations, the variables which significantly explain output variability in the forestry sub-sector in the short-run are interbank call rate (2.8%) and productive activities in other sectors of the economy (37.4%). In addition to these channels, we find that the roles of monetary policy rate (8.5%) and exchange rate (3.4%) are also important in the long-run. This means that the immediate effect of monetary policy is felt in the forestry sub-sector through the interest rate and money demand channels. As before, these results are qualitatively consistent with the sub-sample estimation results in Table 7, the only difference being that the role of exchange rate remained unimportant both in the short-run and long-run. In fact, these findings are consistent with those of fishing and livestock sub-sectors, both in the full sample and the sub-sample. This means that in Nigeria, the money supply channel plays a negligible role in the propagation of monetary policy shocks to the agricultural sector.

At this point, we summarize our main findings as follows: (i) the agricultural sector responded negatively to unanticipated monetary policy shock in most of the forecast horizon in line with economic theory; (ii) the immediate impact of monetary policy shocks is transmitted to the agricultural sector through the interest rate and money demand channels; (iii) in addition to these channels, the roles of monetary policy rate and exchange rate are non-negligible in the long-run; and (iv) the money supply channel plays a negligible role in spreading monetary policy shocks to the agricultural sector in Nigeria.

Recall that we used the consumer price index to capture the general price level in this study. The estimation results in Table 1 indicate that in the short-run, the money supply channel is the main avenue through which monetary policy shocks are transmitted to the general price level. However, in the long-run, both money supply (6.2%) and monetary policy rate (2.6%) become important. The roles of interbank call rate and exchange rate remained negligible all through. However, in the sub-sample period, we find that apart from own shocks, exchange rate (11.4%) and interbank call rate (2.3%) were dominant in the short-run; but in the long-run, money supply (38.7%), economic activities in the aggregate economy (5.1%) and exchange rate (2.9%) play important roles in accounting for the variations in the general price level. These findings are consistent with the dynamics of the Nigerian economy in which deterioration in the nominal naira to U.S. dollar exchange rate usually affects the general price level swiftly while overall economic activities in the economy and money supply dynamics reflect in the general price level more gradually.

CONCLUSION

This study provides a pioneer disaggregated analysis of the effects of monetary policy shocks on the agricultural sector in Nigeria. The study utilized the generalized impulse responses and the normalized generalized forecast error variance decompositions from an underlying VAR model, which are order-invariant. The four monetary policy variables used in the study are interbank call rate, monetary policy rate, broad money supply and exchange rate; while the four agricultural sub-sectors investigated are crop production, forestry, fishing and livestock. The study also controlled for the general price level and other economic activities in the overall economy. The findings indicate that the aggregate agricultural sector and its various sub-sectors consistently responded negatively to unanticipated monetary tightening in most of the forecast horizon; and that the immediate impact of monetary policy shocks is transmitted to the agricultural sector through the interest rate and money demand channels. The findings further indicate that apart from these two channels, the roles of monetary policy rate and exchange rate are non-negligible in the long-run; while the role of money supply channel in spreading monetary policy shocks to the agricultural sector remained muted all through.

In terms of policy, the findings of this study support the creation of more credit schemes like the Agricultural Credit Guarantee Scheme Fund so that farmers can access credits at single digit interest rate. Given the significant roles of interest rate and credit channels in the short-run, this study further recommends that the CBN should evolve ways of reducing interest rate for credits to the agricultural sector and increasing credits to the real sectors (such as the agricultural sector) of the economy. In other words, the CBN should seek out ways of reversing the current apathy by deposit money banks towards lending to the productive sectors of the economy, especially the agricultural sector. In the long term, this study urges the CBN to evolve credit and exchange rate policies that will promote the development of the agricultural sector and the overall real sector of the Nigerian economy.

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Appendix

Table 2: Descriptive Statistics of the Variables

	AGR	CPR	FRS	FSH	LVS	CPI	EXR	IBR	MPR	MSS
Mean	5,000.18	4,328.05	77.84	109.25	485.05	59.97	76.59	12.78	12.97	4,259.41
Maximum	12,586.76	11,273.55	131.00	240.79	941.42	211.52	305.21	32.52	26.91	23,388.33
Minimum	2,259.79	1,711.50	30.16	39.19	216.10	0.15	0.55	1.61	4.81	12.85
Std. Dev.	2,850.94	2,638.63	23.41	51.01	172.05	50.95	71.81	5.67	4.20	6,417.50

Note: The statistics were computed using the raw data before they were logged for estimation.

Table 3: Unit Root Test Results

	ADF Tests					Phillips-Perron Tests				
	Level	5% Critical Value	1st Diff	5% Critical Value	Order of Integration	Level	5% Critical Value	1st Diff	5% Critical Value	Order of Integration
AGR	-1.9778	-3.4425	-5.1642	-3.4425	I(1)	-2.3361	-3.4416	-12.6240	-3.4418	I(1)
CPR	-1.9650	-3.4425	-5.1216	-3.4425	I(1)	-2.3743	-3.4416	-12.6483	-3.4418	I(1)
FRS	-2.5369	-3.4416	-14.6334	-3.4418	I(1)	-2.4554	-3.4416	-14.5544	-3.4418	I(1)
FSH	-1.8598	-3.4416	-10.5119	-3.4418	I(1)	-2.1099	-3.4416	-10.5004	-3.4418	I(1)
LVS	-2.1716	-3.4416	-11.3749	-3.4418	I(1)	-2.1594	-3.4416	-11.3860	-3.4418	I(1)
CPI	-4.4603	-3.4416	-	-	I(0)	-4.4603	-3.4416	-	-	I(0)
IBR	-4.7713	-3.4416	-	-	I(0)	-4.6158	-3.4416	-	-	I(0)
MPR	-2.4442	-3.4427	-5.4347	-3.4427	I(1)	-3.1088	-3.4416	-6.9898	-3.4418	I(1)
EXR	-1.3771	-3.4416	-10.4272	-3.4418	I(1)	-1.3771	-3.4416	-10.4067	-3.4418	I(1)
MSS	-1.2515	-3.4416	-12.5707	-3.4418	I(1)	-1.4813	-3.4416	-12.5741	-3.4418	I(1)

Table 4: Johansen Cointegration Test Results

Hypothesized No. of CE(s)	Trace Statistic	5% Critical Value	Prob	Max-Eigen Statistic	5% Critical Value	Prob
None *	226.5263	150.5585	0.0000	57.4311	50.5999	0.0085
At most 1 *	169.0951	117.7082	0.0000	48.3810	44.4972	0.0180
At most 2 *	120.7142	88.8038	0.0000	47.3712	38.3310	0.0036
At most 3 *	73.3430	63.8761	0.0065	32.7848	32.1183	0.0414
At most 4	40.5581	42.9153	0.0844	21.5698	25.8232	0.1652
At most 5	18.9883	25.8721	0.2815	12.8174	19.3870	0.3430
At most 6	6.1710	12.5180	0.4389	6.1710	12.5180	0.4389

Table 5: VAR Lag Order Selection for the Full Sample Six-variable Agricultural Output Model

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-639.6950	NA	0.000536	9.495515	9.624014	9.547734
1	367.5036	1910.715	3.36e-10	-4.786818	-3.887322*	-4.421286*
2	405.5081	68.74335	3.27e-10	-4.816295	-3.145802	-4.137449
3	452.7151	81.22379	2.80e-10	-4.981104	-2.539614	-3.988944
4	480.7371	45.74181	3.19e-10	-4.863781	-1.651294	-3.558308
5	535.4324	84.45600*	2.48e-10*	-5.138712*	-1.155228	-3.519925
6	563.7041	41.16029	2.88e-10	-5.025060	-0.270580	-3.092960
7	581.0798	23.76386	3.98e-10	-4.751174	0.774304	-2.505760
8	596.8724	20.20518	5.74e-10	-4.454006	1.842469	-1.895278

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Table 6: VAR Stability Test for the Full Sample Six-variable Agricultural Output Model

Root	Modulus
0.993457	0.993457
0.950850	0.950850
0.847095 - 0.101039i	0.853100
0.847095 + 0.101039i	0.853100
0.730511	0.730511
0.204351 - 0.384338i	0.435287
0.204351 + 0.384338i	0.435287
0.266467 - 0.205951i	0.336780
0.266467 + 0.205951i	0.336780
0.087763 - 0.055252i	0.103707
0.087763 + 0.055252i	0.103707
-0.073422	0.073422

No root lies outside the unit circle.
VAR satisfies the stability condition.

Table 7: Sub-Sample NGFEVD (1994Q1 – 2016Q4)

Agricultural Output

Horizon	agr	ibr	mss	mpr	exr	cpi	Total
1	92.9894	6.0370	0.0017	0.9692	0.0024	0.0002	100
4	89.2671	10.0432	0.0241	0.5280	0.1255	0.0120	100
8	85.9407	11.3460	0.0274	2.4581	0.1912	0.0366	100
12	83.0270	11.3894	0.0264	5.3056	0.2047	0.0469	100
16	81.4721	11.1004	0.0261	7.1546	0.2004	0.0465	100
20	81.0420	10.8934	0.0255	7.7915	0.1973	0.0502	100
24	81.0392	10.8160	0.0271	7.8572	0.1983	0.0623	100

Consumer Price Index

Horizon	agr	ibr	mss	mpr	exr	cpi	Total
1	0.0002	2.3094	0.8297	0.5905	11.3887	84.8814	100
4	0.1649	3.1243	6.7486	2.1044	9.0375	78.8204	100
8	0.1901	2.8929	16.5931	2.9091	6.5577	70.8571	100
12	0.2329	2.4786	25.3264	2.6836	5.0250	64.2535	100
16	0.9932	2.0498	31.8486	2.2134	4.0486	58.8463	100
20	2.7479	1.6953	36.1536	1.8272	3.3744	54.2016	100
24	5.1472	1.4517	38.7388	1.5548	2.8841	50.2234	100

Crop Production

Horizon	cpr	ibr	mss	mpr	exr	cpi	Y_j	Total
1	58.0404	3.6653	0.0011	0.6014	0.0002	0.0011	37.6905	100
4	55.3527	6.2651	0.0140	0.3449	0.0737	0.0152	37.9345	100
8	53.8814	7.0558	0.0133	1.6225	0.1106	0.0405	37.2760	100
12	52.6966	7.2057	0.0131	3.5114	0.1358	0.0516	36.3859	100
16	51.9911	7.0706	0.0131	4.6970	0.1417	0.0514	36.0351	100
20	51.7639	6.9306	0.0140	5.0239	0.1388	0.0535	36.0754	100
24	51.7390	6.8722	0.0169	4.9976	0.1366	0.0619	36.1758	100

Forestry

Horizon	frs	ibr	mss	mpr	exr	cpi	Y_j	Total
1	55.6859	2.9441	0.7445	0.9213	0.8010	0.2955	38.6078	100
4	49.9118	3.7941	0.4773	0.4904	0.5879	0.2517	44.4867	100
8	47.1520	4.9723	0.3776	1.8436	0.4606	0.2417	44.9521	100
12	45.8455	5.2271	0.3695	3.8776	0.4430	0.2601	43.9773	100
16	45.1903	5.1253	0.3879	5.2335	0.4325	0.2915	43.3390	100
20	44.9390	4.9927	0.4269	5.6659	0.4193	0.3359	43.2203	100
24	44.8450	4.9221	0.4870	5.6570	0.4092	0.3916	43.2881	100

Fishing

Horizon	fsh	ibr	mss	mpr	exr	cpi	Y_j	Total
1	65.3053	2.3214	1.2461	0.2425	1.2515	0.2428	29.3904	100
4	48.3266	4.5832	0.7242	0.7963	0.6588	0.1397	44.7712	100
8	43.4592	6.2173	0.5892	3.7927	0.4725	0.1071	45.3619	100
12	41.3407	6.5150	0.5622	7.3376	0.4462	0.1022	43.6962	100
16	40.4795	6.3359	0.5456	9.3806	0.4364	0.1071	42.7148	100
20	40.3121	6.1398	0.5436	9.7715	0.4214	0.1259	42.6858	100
24	40.3100	6.0599	0.5669	9.5543	0.4081	0.1590	42.9417	100

Livestock

Horizon	lvs	ibr	mss	mpr	exr	cpi	Y_j	Total
1	55.8494	2.8343	0.9042	0.2737	0.6432	0.1223	39.3729	100
4	47.3608	4.4612	0.3469	0.1857	0.2966	0.1039	47.2449	100
8	44.0020	6.0907	0.2642	1.3576	0.2459	0.1013	47.9384	100
12	42.7847	6.4438	0.2786	3.1232	0.2556	0.1187	46.9954	100
16	42.2959	6.3266	0.3038	4.2429	0.2526	0.1525	46.4257	100
20	42.1311	6.1812	0.3339	4.5481	0.2459	0.2010	46.3588	100
24	42.0593	6.1152	0.3749	4.5177	0.2437	0.2573	46.4319	100

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SCIENTIFIC PAPER

ATHLETE'S LIFE PATH IN THE PERSPECTIVE OF GENDER ATHLETES REPORTING OPPORTUNITIES IN THEIR SPORTS AFTER THEIR SPORT CARRIER

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Abstract: *Sport is the highlight of the male-female relationship system. We find that the concept of homogeneity is becoming more and more weakened, sport becomes unisex, which can strongly influence gender judgment in society. The "weaker sex" appearance and spread of the sport indicate that something has changed in the world, so thinking has to change also. Nowadays, there is a dual process in the field of sport: 1.) women appear in the traditionally masculine sports, and this plays an important role in the development of gender relations as mixed races arise; 2.) at the same time, men also appear in previously reserved areas for women, which they have not had opportunities so far (BÉKI, 2018). This phenomenon can be observed, though much slower in sports management. Yet in other sports roles, the gates for both sexes have not yet been opened in masculine and feminine sports. The study deals with how the status of an athlete will be transformed after sport if he/she wants to remain his or her sport in other sports roles - concentrating on coaching and judging roles – to represent his or her own sport. Particularly, we have been focusing on sports whose judgment is not socially acceptable to both sexes. The research sample is team and individual women athletes who are more than 14 years old. Research method is in-depth interview research (n = 145) and questionnaire research (n = 240). The results showed that female athletes are becoming more accepted in masculine sports, although more limited in their careers possibilities than men after an athlete's life. Their athlete's identity is strong, they want to stay in the sport on the civilian life as well.*

Keywords: *feminine-masculine sport, carrier opportunities, other sports role, dual career*
(JEL code: *J71*)

INTRODUCTION

For a long time, the only intellectual career open to women was the teacher. Women were excluded from civil rights, the military, and even university-level studies. There was only one possible way to break out, and that was to try to "become men" and adapt to the "masculine" profession. The relationship between men's position of power and the division of labor plays a major role in determining the most common inequalities. The oppressive dominance of men has persisted in modern societies, so it is the task of women to fight for equality (ANDORKA, 2006). The place (limited) appearance of women in the division of labor in men's professions less reflects the change in the situation of women, as women's career development commitment is severely limited, "suppressed" by the existence of the so-called occupational "glass ceiling" (DABASI HALÁSZ, 2011; FEKETE and SIPOSNÉ NÁDORI, 2013). The woman from the earliest period in history has been involved in the system of division of labor, mainly in the field of work around the household (PETŐ, 2017). The emergence of women in sport has made it clear that they want to "fight" with men in a new field:

challenging previous beliefs and stereotypical perceptions about the measurability of performance (BÉKI, 2017). Although we are already approaching equal participation rates for women and men in sports (olimpic.org) - this is shown by the nearly 50-50 percent participation rate at the Rio Olympics - but in sports that are not acceptable to the opposite sex (e.g. female boxing, men's swimming) there is no possibility to advance in other sports roles after elite sports. As traditional gender roles weaken or disappear, women are increasingly able to penetrate various sports. Despite the increasing help of women and sports on the American continent, for example, the IX. by 1972, U.S. law prohibits discrimination based on gender in any federally funded educational program or activity — there is still untapped territory (BÉKI and GÉCZI, 2017). The literature on the subject focuses most of the changes in the 21st century on the process that deals with women's legal capacity. Modernization has been widely accompanied by the recognition of women's legal capacity and the progressive guarantee of their equal rights. Their position in the labor market has changed, because they have broken out of the role of housewives and have started working alongside their families, moreover, they are also pursuing a career by taking on the increasingly fashionable singles. Several areas of public life, politics, and culture were opened up to them. The situation of women has also changed with the change in the division of labor. Women already appeared on the labor market (GŐSI and SALLÓI, 2017) at the time of the Industrial Revolution, although at that time they were only able to infiltrate unskilled auxiliary jobs (SOMLAI, 1997). Sports is a masculine field, especially in Hungary, where we encounter many gender conflicts. In addition, former professional athletes facing difficulties in the aftermath of the sport have to struggle to survive in other areas of life, treat them differently in other settings, and therefore face a sense of 'fall'. This is especially true for sports where society defines the accepted dominant gender associated with the sport. Sport is also a key strategic sector in Hungary (BÁCSNÉ BÁBA et al, 2019). The athlete will also appear in the job market and an employee with sports competencies can be employed more effectively. Although the competencies that appear in sports are not exactly the same, as the teamwork skills of the representatives of team sports and individual sports are different, the basic competencies related to sports are the same. These advanced competencies and the need for lifelong learning are now essential for successful career choices (RÁTHONYI-ODOR et al, 2013). Thus, it can also be applied to the athlete segment as a labor market base that new systems are being built with the spread of globalization and the knowledge-based economy, and new expectations are emerging. It needs to think, meet, and develop the market resources on an international level (FARAGÓ, KONCZOSNÉ SZOMBATHELYI 2017). Although the physiological parameters of women athletes differ from men, they appear equally in athlete performance. The mental and physical fitness and endurance of female athletes rival that of men. (SZAKÁLY et al, 2003) Two problems are raised, which are also based on personal experience and on literature. On the one hand, coping is a complex and time-consuming process, requires constant preparation to assess the gender of athletes, coaches, and sports leaders, and on the other hand, elite athletes have quite limited opportunities after completing their sporting careers, placement in their own sports or other areas.

WOMEN IN SOCIETY

"Gender relations are hierarchical at the societal level" (BELINSZKI, 2003)

The lifestyle of women in most societies was determined by family functions, while men appear mostly in social activities such as earning money, subsistence, work. Women are responsible for the care of the spouse and the upbringing of the child. The male role is manifested in the interaction with the woman (BUDA, 1998). According to an article published in the 2016 index, there were female samurai even in traditional Japan (index.hu). The topic is interesting because the knowledge of swordsmanship and fighting was masculine in this culture as well, but in a slightly different way, as protecting the family, the home was a female task that even had to be protected with a sword. In Japan, women also understood traditional swordsmanship before the advent of samurai. After these, the 17-18. in the twentieth century, women were marginalized from politics, struggle, and public life, and men saw women as tools, "parent machines". Although after World War II, Japanese women were given the same rights as men, from 1946 onwards they could vote. ABELE (2000) researched which gender role-oriented women or men are more prevalent in the labor market after graduating from university. His results showed that those with a masculine or androgynous character were more likely to get a job that matched their education, while those with a feminine or indifferent gender role orientation either did not find it at all or could only find a job well below their qualifications. As the issue of gender versus sexual difference has become widely debated, feminists have insisted that gender is not simply a matter of sexual difference but a matter of power (sexual hierarchy) "since we have looked at history from a gender perspective, we have found sexual asymmetry in every known society, inequality and male dominance "(SHOWALTER, 1989) Throughout history, as now, the issue of power has seemed most central to the relationship between men and women (PARRATT, 1989). Female historians have recognized the fact that the relationship between the sexes is much more determined by society than by nature. The strategy of studying the historical history of women and men using different systems of perspectives that have been shown to be particularly useful in bringing the world of women's history into the world of analytical social history has also been questioned in its attempt to emphasize difference rather than explain reciprocity between gender and society (KERBETH, 1988). In the study of Nancy STRUNA, Gender and Sporting Practice in Early America (1991) emphasized the diversity of women's experiences and the ever-changing nature of

gender relations. Urban women, women farmers, slaves, white servants, women in villages and at the border, all have very different opportunities to build their own forms of recreation as well as different relationships with men.

According to the legal institution of "boyhood", in the old case law, if there was no son's offspring in the family, he died early or unexpectedly, the family had the right to marry the girls so that they could inherit the family property. In a boy's family, the girls did not inherit, they received nothing but their dowry, the purpose of this rigor was to prevent the fragmentation of the family estate.

- That is, if necessary, they were able to disregard the biological gender and assert their interests in the social gender (in farrowing, the interests of the wealthy family so that wealth did not fall back on the crown.).
- The need for equality appears in education, see Blanka Teleki and her circle, who fought for the equal education of women with men (1870s).
- This was followed by the struggle for the right to vote and all the other stations of the struggle for equality.

The social and symbolic structure of gender differences has shown that the language of gender differences has provided a means of articulating power relations (VERTINSKY, 1983). Feminism has found itself confronted with the need to articulate the woman herself: "they have no past, no history, no religion of their own, lack the solidarity at work and the protection of interests that the proletariat has" (OFFEN, 2000). According to WALBY's 1996 theory, men's pay is higher than women's, even if the position is the same, and it is also typical that women are more likely to win lower-paid jobs. In other areas, men are involved in a very small proportion of domestic work, which he describes as largely a female task. It supports this theory. In Hungary, NAGY (1993) showed that there are significantly fewer female executives in terms of intellectual occupations. The results of the research clearly show that the proportion of women in senior positions has increased almost 6 times since the change of regime in 1960, but is still far behind the number of men. In addition, HADAS's (1994) research findings indicated that men fill jobs that involve power and require virtue alongside them, while women prefer those with subordination. According to a 1998 study by NEMÉNYI and TÓTH, women are the losers of the 1990 regime change. Their claim was based on an examination of the proportion of women and men in the labor market. In their view, these roles vary from society to society, but "feminism is about serving the interests and desires of men". ANDORKA (2006) came to similar results. Men perform occupations involving power, while women appear in subordinate areas that require softness. HADAS (1994) also examined music sessions. His results show that conducting is typically masculine, while women are more successful among strings, wind instruments, harpists, and singers. There is a very close connection between the division of labor and sport. As traditional gender roles weaken or disappear, women are increasingly able to penetrate various sports. Despite the increasing help of women and sports in the Americas, for example, the IX. by law, since 1972, U.S. law prohibits discrimination based on gender in any federally funded educational program or activity — there is still untapped territory (BÉKI and GÉCZI, 2017).

GENDER PERCEPTIONS IN SPORT

Many studies have been written on the topic of gender and sport in the history of the Olympics, of which about women will it present in this chapter. There are stories and reports about the marginalization of women in sports or the possibility of promotion or appearance on the ranks of the International Olympic Committee. They also provide information on the exclusion of women from sports opportunities in old and modern games. In other cases, we can read the story of the trials and tribulations of Olympic heroes and heroines. The relationship between women and the Olympic Games is a topic that can be approached from many angles. To achieve this goal, athletes and individual nations are able to cross boundaries such as the start of male competitors between women (GÁL and FARKAS, 2016), which ended with the introduction of sex testing (BÉKI, 2015). At the same time, the central role of sport should not be overlooked, which is based on gender, class/origin, and sexuality-based encirclement of power (EITZEN, 1996). Women and girls have the right to play sports and take advantage of sources of physical activity and other opportunities. (LENSKYJ, 2005). In Western countries, focusing on the theme of gender, an universal "woman" has been invented who deserves equal sports opportunities. With regard to competitive sports, for decades the emphasis has been on making more sports and sporting events viable for women, unbiased coverage, greater financial security, more support, more advanced career opportunities, better training, and others while organizing international sports competitions which peak of the Olympics remains intact (BÉKI, 2018). In his study, BODNÁR (2003) explained that the role perception of male identity in relation to sport needs to be transformed. In today's modern societies, including Hungary, the roles of women and men are merging both in the labor market and in other fields, including sports. In his doctoral dissertation, BODNÁR (2012) mostly examined coaching competencies and the acceptance of women in this field. In contrast to men's martial arts, the exercises recommended for women cannot be identified with competitive sports because it requires traits that women do not have. Sports recommended for women can be characterized as permeated with aesthetics, pleasure and body experience. It is difficult to ignore the persistent inequality between men's and women's opportunities to compete in the sport they choose (e.g., martial arts) and the ever-present stereotypes about which sports are appropriate and inappropriate for women. Metheny's theory (1965) examined the social acceptance of sports, in which she showed what is accepted and what is not for women. They divided the sports into three groups according to their characteristics. The first group included those whose pursuit was not ac-

cepted, the second those that were neutral, and the third those that were perfectly appropriate for women. He also divided the groups into subcategories with explanations. First, it does not recommend sports in which direct physical contact appears between opponents. These include handball, football, martial arts, etc. Secondly, it does not consider acceptable areas where heavy objects need to be moved or the force of the body is being used heavily. These sports include weightlifting. Thirdly, long-term continuous exercise, which is not recommended for marathon runners, cross-country skiers, etc., is not recommended. displayed. The neutral category includes sports where the weight of the object being moved is medium, does not require more effort, and sports where physical contact between opponents is prohibited, thus leaving less space among athletes (basketball). The specifically feminine category includes those where the weight of the sports equipment is light, small (javelin throw, tennis, etc.), or provides an aesthetic experience for the viewer (rhythmic gymnastics, synchronized swimming, etc.). In two other categories, he defined sports in which physical contact is impossible, as a net separates opponents (badminton, volleyball, tennis, etc.) and those that require joint mobility and flexibility (high jump, etc.). BÉKI (2018) examined which Olympic sports in Hungary could be the focus of research based on Metheny's system. Based on the answers of sports professionals, the Hungarian sports classification was outlined (Table 1). Thus, the focus of the present study was to compare the masculine and feminine sports in Table 1 with those of Metheny's previous groups.

Table 1: Judging sports (Béki, 2018)

	Value	Sports
Feminine	1-2	figure skating, rhytmic gymnastics, synchronised swimming
Masculine	4-5	wrestling, judo, boxing, weightlifting, football, ice hockey, heavy field athletics
Androgynous	3	water polo, volleyball, handball, basketball, taekwondo, canoe, kayak, marathon running, pole vault, cycling, speed skating, rowing, cross-country skiing, biathlon, track and field, table tennis, tennis, badminton, gymnastics, triathlon, swimming, fencing, sailing, surfing, diving, equestrian, sprint, field hockey, archery, shooting modern pentathlon, bobsleigh, curling, luge, snowboarding, ski jumping

ATHLETE CAREER OPPORTUNITIES

"Abuses of power are fueled by the hunger for success, the role of life-and-death coaches should be redefined, and they should rebuild their relationship with the competitors.
To do this, however, is more educated, more empathetic, and not masters from ex-champions would be needed."
(BUDAVÁRY, 2018)

The most topical and most mentioned topic is the issue of the dual career of athletes. In this topic, we can see the results of several famous researchers (FARKAS, 2012; STERBENZ et al., 2017; ANDRÁS, HAVRAN, 2017) in different sports. Interestingly, they ponder the chances of finding a job in the job market but don't specifically address the return to sports after racing. The European Union also draws up guidelines on the subject, entitled "EU Guidelines on Dual Careers of Athletes", which was published in 2012 and also does not deal with the subject separately. There are also programs in Hungary that specifically help the life paths of elite athletes. The MOB Olympic Lifestyle and EMMI Sports Stars Scholarship Program offers many opportunities, although it does not help you return to your own sport. The issue of the dual career of athletes is a well-known topic throughout Europe, but Hungary still has little good practice. The range of beneficiaries of the two support programs operating in Hungary is narrow, as it only supports athletes studying in higher education who have a chance to win medals during their studies (FARKAS et al., 2017). Several literatures deal with the aspects of pedagogy and sports similarly (GOMBOCZ 1998, RÉVÉSZ et al., 2007, GOMBOCZ and GOMBOCZ 2008, RÉVÉSZ, et al., 2013). For example, one of the key goals of starting compulsory school physical education is the contribution of sport to the development of young people (BODNÁR and PERÉNYI, 2016). The career path of a top athlete is very different from the traditional one. A person in a civilian profession spends 12-17 years at a desk and then, after completing his or her studies, enters the labor market where he or she works until retirement. In contrast, the elite athlete also begins his career at the start of elementary school. This leaves them with less time to learn. With regard to dual careers, two areas need to be mentioned, one is education, the other is entering the labor market. Both conceal ongoing conflicts (KISS, 2017). An individual's career choice is a multi-year decision-making process that is influenced by the specific labor market background, family's career orientation, parents' occupation, the highest level of education, teachers, classmates, and friends, ie the medium from which the individual comes out (RÁMHÁP, 2017). Those with higher education are more likely to enter the labor market and are in a better position (SOMLAI, 2010). Several previous researches have revealed (GfK, 2015; Deloitte, 2015) that high school and higher education students do not have a realistic career picture. They generally predict a higher level of their expected income or job prospects. Civil careers after elite sports can take different directions. Successful athletes took the barriers to complete the sport more easily than their less successful counterparts. Education also influenced their opportunities, as they were able to find more employment in the labor market, thus facing fewer employment difficulties in their later lives (MURPHY et al., 1996; WILLIAMS and RYCE, 1996). Often, elite athletes focus all their energy on achieving sports results, so in civilian

life, they often let go of their hands and step out of the vacuum (FARAGÓ et al., 2018). The importance of non-sport careers needs to be highlighted on time, in which parents, coaches, teachers, and sports associations also play an important role (FARAGÓ, 2015). "Another problem with choosing a sports career in youth is that many athletes who are considered talented in youth do not reach a level where sport provides them with a livelihood. After graduating from school, they have to enter the world of work instead of a sports career. That is why organisations and professional dealing with youth education must pay attention to maintaining the balance between sports and learning "(GŐSI and SALLÓI, 2017). GŐSI's 2018 study shows one of the possible career building of elite athletes, namely the future of his own sport in other sports roles, such as coaching sports manager or sports reporter. FARAGÓ and KONCZOSNÉ SZOMBATHELYI research (2017) examined exactly what professional plans athletes report after their sports careers. Typically, their interviewees plan to return to the sport regardless of the sport, and want to develop professionally in this area. On the one hand, the result is significant, according to which they want to continue their professional studies in sports and continue to work in sports (11.3%), the other big area was starting their own sports business (8.1%) or sports club (4.8%) want to establish.

MATERIALS AND METHODS

With the literature, we examined a specific area in this study. We were curious about the chances of a former elite athlete in Hungary, in this cultural environment, to find a job in the labor market or return to his sport. Our goal was to present the labor market, as well as refereeing and coaching opportunities in sports that society finds undesirable for men or even women. Thus, joining additional sports roles is not an easy task for a former female or male competitor. During the interviews, we tried to ensure neutral conditions for direct conversation. We chose a semi-structured format in which both closed and open questions were used. The latter allows the respondent to express his or her own opinion. In the semi-structured form of an interview, a particular problem is the focus of the questions and not just the person of the respondent (HÉRA and LIGETI 2005). We recorded the interviews personally: by sport, in case of a large number of people in groups, in case of a smaller number of people individually. In the course of our research, we used the semi-structured in-depth interview to explore the subjective opinion of elite athletes. The research examined female athletes with a questionnaire survey about their preparation for a dual career, its conscious preparations, and how much they are attached to the sport on the civilian track. We elaborated on the part of the in-depth interview questions that we asked all of our interviewees to have a chance to compare. Spontaneous questions raised during the conversations formed the other part of the interviews. Interviews with female athletes were recorded on a dictaphone with the consent of the interviewees. The interviews took place at pre-arranged times, in calm conditions, in most cases in a separate room. The duration of the interviews ranged from 20 to 60 minutes per person. Thus, female competitors in the following sports were included in the sample:

Team sports: Handball: 9 people, Volleyball: 6 people, Water polo: 12 people, Football: 21 people, Hockey: 23 people.

Individual sports: Rhythmic gymnastics: 7 people, Boxing: 15 people, Weightlifting, weightlifting: 6 people, Judo: 6 people, Wrestling: 6 people, Weightlifting: 4 people, Synchronized swimming: 3 people, Figure skating: 7 people.

In the interviews, we examined the roles of coaches and referees in terms of the experiences that elite athletes have so far with potential judges or coaches of the same sex and what opportunities they see in their own sport.
In the questionnaire research, the sample represented women who played sports or played sports in a sports association over the age of 14, the number of sample was 240 (N = 240). The questionnaires were completed at a time and in a manner agreed in advance with the sports associations, some on the online interface and some based on a personal request. The results were analyzed with SPSS statistical software. We have three hypotheses in the research.

- H1: Based on the literature, we assumed that female athletes in masculine and male athletes in feminine sports do not have the opportunity to return to other sports roles at the end of their athletic careers (coach, judge).
- H2: Furthermore, we assumed that athletes in these sports would be more accepting of coaches of the opposite sex, yet these roles were among their own career opportunities.
- H3: Based on athlete identity, female athletes want to stay in the sport during their civilian careers as well.

RESULTS

According to the results of the questionnaire, handball is not one of the men's sports in Hungary, yet it is included in the 1965 classification. Our respondents also find it all a rough sport, yet they believe that women's participation is accepted, which is explained by the effectiveness. 50 years and the results can change the perception of a women's discipline, and even a judicial career is an accepted women's career in the sport. However, none of my interviewees reported having had a female coach before. Interestingly, 2 athletes 'future plans, however, included a coaching career in handball.

"I can't imagine my coach being a woman."
A handball woman said, and later in the interview, she has a contradictory view of her own career goals:

"I want to learn more and I want to be a handball coach."

An interesting result for us is the judgment of the female profession of water polo. While water polo women, like handball players, are considered masculine, the sport itself is considered neutral despite physical contact. The women playing for the national team similarly explain this with their effectiveness, and like handball, we only meet female referees in Hungary for the time being. Although the women's field of water polo is much younger, the assessment of both in Hungary is gender-neutral, the opportunities for female competitors to return are yet to come. Among women playing water polo, a coaching career is not a tempting career option, but they are planning to continue their education without exception, or are already beyond graduating from college.

"I don't think there is a chance as a woman in water polo today as a coach." (Water polo woman)

The case of volleyball is just the opposite. It is an accepted sport for women in Metheny's system. Athlete women are pretty, which they also try to emphasize on the track with their sportswear. Both coaching and refereeing careers are open to both sexes, as in practice both genders appear in both roles. It is no wonder, then, that the respondents consider this team sport to be neutral as well, so in this case, too, their perception has changed compared to the previous 1965 classification. The coaching career choice is also planned by the female athletes, they consider it a good opportunity to stay in their sport in the field of later career choice.

"My role model is my coach and he is a woman" (Volleyball woman)

Hockey and football could not get rid of the traditionally masculine origins even after 50 years, despite the fact that women in football are successful. In both sports, it is typical that female coaches have not yet appeared on the labor market and that women athletes do not plan to represent their sport as coaches in the future. Women footballers are mostly looking for career opportunities abroad in other fields, hockey players are similarly planning their future in other professions in Hungary. However, the presence of female referees can already be observed in football, even in hockey this is not typical, but even in this field, the presence of women is not accepted. Unfortunately, also due to the youth of the women's field of hockey, it lags far behind the men's field in terms of effectiveness.

"I don't like a woman leading the match." (Soccer woman)

In individual sports, women who are preparing for a coaching career are in a better position. In athletics and martial arts, there is a tendency for clubs to employ more and more women coaches, and even a federal captain to lead a women's field (e.g. boxing). This result is outstanding because boxing is considered to be one of the roughest sports and the women's sport was also the last of the martial arts to appear at the Olympics, yet this change in attitude is already a significant achievement. Although athletes in martial arts have reported being oppressed alongside men, this developmental process is showing a positive direction. The vision of women judges can be similarly characterized, although this is also due to the fact that the international federation has made it compulsory to employ women judges in competitions where women compete. In all cases, however, the proportions tilt the scales in favor of men.

"It doesn't matter to me whether a woman or a man leads the match." (Boxing woman)

Weightlifting and boxing are considered the most masculine of all sports. Within this, they think that weightlifting is not acceptable to either gender, their bodies are distorted, unhealthy, they reject people's participation in this sport. However, women athletes do not feel this resistance. They consider their sport to be tough, but so far there is no need for further education among female athletes. Referees opportunities are similarly open to women, but as coaches, participation is not yet typical. In many cases, weightlifting women come from weightlifting, where the presence of female coaches can be observed in the field, which is interesting because the possibilities are exhausted after a change of sport.

"I've always had male coaches, and even my coach and my partner are in better harmony." (Weightlifting Woman)

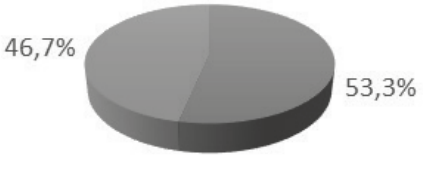
Feminine sports are in a special position. Except for figure skating, men's participation in rhythmic gymnastics and artificial swimming at the Olympic Games is not yet typical. They have already invaded this unknown area, but they are just spreading their wings. Male synchronized swimmers have been given the green light for world championships, and for the time being, the male discipline of rhythmic gymnastics is still struggling for recognition. Women's representatives of sports reject men's participation in the latter two sports. The referee, on the other hand, is open to men, yet it is not a typical career choice for athletes entering the sport. Mostly, male judges enter the profession from outside, without a sporting past. Interviews with female competitors, on the other hand, revealed that the presence of male judges is important in the sport, but not for coaches.

"A male coach is unthinkable in our sport." (Woman doing rhythmic gymnastics)

Figure skating is the only sport in the history of the Winter Olympics that was originally considered more of a men's sport, but over the years the effects of the media and various fashion waves (clothing) have helped make this sport "change genders," and now specifically include in feminine sports (ADAMS, 2011). The process was also strongly influenced by the trend that the aesthetic quality of costumes is part of the performance and is taken into account by judges when scoring. The appearance of men in sequined, glittering dresses, all combined with the graceful soft movements of the sport - while the contestants raise their female partners or lead in ice dance like a traditional dance - has lent a feminine character to the sport (BÉKI, 2018). In figure skating, both genders have the opportunity to return to the sport at the end of their racing careers, and in figure skating, they appear fully accepted in not all sports roles. Overall, it is very variable the principles by which athletes accept the gender of judges and coaches in their own sport. In some places, there are contradictions (boxing) between the very masculine nature and the acceptance of women on the coaching court, and in others the opposite (handball). There are also sports in which the appearance of men as coaches is for the time being rejected (RG) and there are somewhere women (football). There are also sports where the presence of female coaches would be accepted (water polo, wrestling) but not a typical career choice for athletes who are aging in sports. However, the referee career can be considered acceptable to both sexes in all sports.

In the questionnaire research (N=240), 63.8% of female athletes have a high school degree, while 25.8% attended university or college. 62.9% of them are still studying, 21.3% are doing mental work, 5.8% are doing physical work. 77.5% are amateur and 22.5% are professional athletes. 46.7% of them participate in individual sports, while 53.3% participate in team sports. (Figure 1)

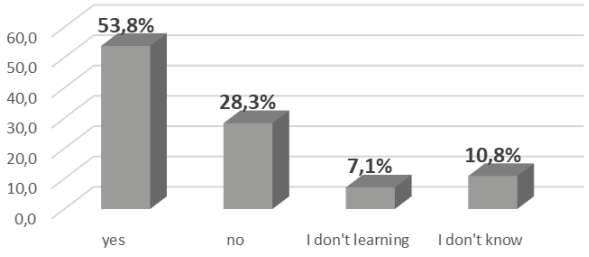
Figure 1. The distribution of the sample according to sports



Source: own editing

In the field of studies, 46.3% of female athletes study higher education, 15.8% work, and no longer study, 11.7% study professionally, and 13.8% do not plan to continue their studies. In continuing education, commitment to the sport is strongly reflected among women athletes. 53.8% are continuing their studies in sports, 10.8% are unsure. (Figure 2)

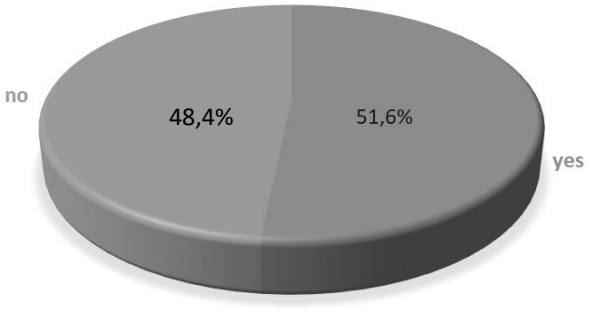
Figure 2. The distribution of the sample according to they would studying in the sports-related field.



Source: own editing

Building a dual career, helping and supporting it, is significant support for the development of an athlete's career. Athletes were asked if they had a part in it if they had come across such a program, help during their career. 51.6% of women athletes have encountered a dual career program. (Figure 3)

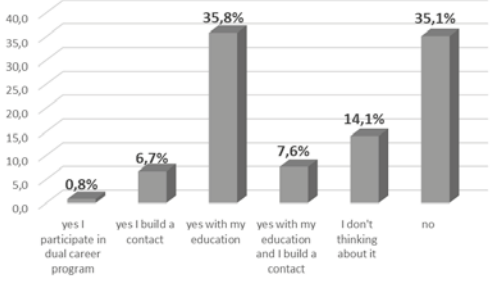
Figure 3. The distribution of the sample according to they have met an athlete dual career program.



Source: own editing

The career-building awareness of women athletes was assessed by the following question, which examines preparation for the post-career life stage of athletes. Are athlete women preparing for post-sport careers? According to the answers, 35.1% of them are not preparing for the post-sports life stage, while the remaining 64.9% are taking it into account and preparing for a civilian career, 35.8% of them are preparing for the labor market with their studies. (Figure 4)

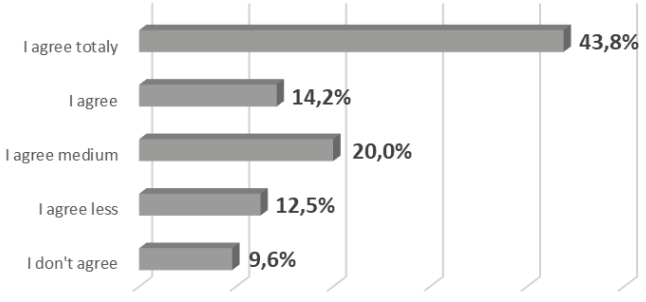
Figure 4. The distribution of the sample according to preparing for a post-competitive career.



Source: own editing

As the main topic of the research on the issue of staying in sports, 43.8% of athletes fully agree that they want to stay in sports after their athletic career. 9.6% of female athletes do not want to stay in sports, the other results indicate the degree of staying in sports. (Figure 5)

Figure 5. The distribution of the sample according to agree with: I want to stay in sports (coach, sports official, etc.).



Source: own editing

Athlete identity emerges strongly in terms of career. Female athletes want to study and work in a sport-related field. The result serves as a guideline for education and the labor market. Sports science training and job creation in sport provide perspective for female athletes in their civil careers. Athlete socialization has a strong impact on many areas of social subsystems. In our research, it has become apparent that athletes are consciously prepared, they would be prepared for the post-career life stage of athletes, but less support for dual careers appears to them. Sport offers an opportunity to learn in job creation for those who have been raised in sport.

DISCUSSION

Time spent in sports can have an impact on public perception. Just think that masculine sports that have long accommodated female participants will become more accepted year after year. An example is a process that can be observed in martial arts at the Olympics. Sports that have already joined the Olympic program as bisexuals, such as taekwondo, have been categorized as gender-neutral in my research, and female participants are not judged on the basis of stereotypes. In the case of boxing, on the other hand, where women are the last in the grip, after all, martial arts, spectators and sports leaders still have to get used to the presence and competition of female competitors. Of course, the same principle is true in the field of women's sports, as no one questions the participation of men in figure skating (although it is a fact that it is a so-called "non-changing" sport), but the presence of male athletes is still unusual and not yet at the Olympic Games. Athletes 'perceptions seem to be similarly important, as later on, their own experiences will determine how they view women's and men's disciplines in different sports. While the presence of male coaches is accepted in addition to the female major of a masculine sport, it is currently inconceivable for a female coach to appear at the head of a male major in the same sport. Even at the club level, one such phenomenon may occur in individual sports, but at a higher level it is ruled out for the time being. Thus, in this area, women are left with inferiority and future changes will show change if it materializes. The results show that even in today's sports, former athletes, especially in coaching roles, run into a glass ceiling when it comes to advancing. In our view, sports are moving in the direction of becoming bisexual or neutral. However, it is undeniable that gender stereotypes about sports can influence the changing trends of sports, including career opportunities, for some time to come. Hypotheses proved to be true in some sports and false in others. The assumption that female athletes in male and male athletes do not have the opportunity to return to other sports roles (coach, referee) in football and hockey at the end of their athletic careers has been clearly confirmed. In individual sports, however, he leaned in all cases. Although coaching careers have been pushed back more than the judiciary, for the time being, there is still a steady improving trend. Female athletes have a strong athlete identity. Sport plays a central role in their careers, and they envision their studies and civic careers in the sport if they are given the opportunity to do so. Sports science studies are not gender-specific, but their position in the labor market is influenced by their gender.

The interview research also revealed that athletes are more accepting of coaches of the opposite sex in masculine sports, while men do not appear as coaches in feminine sports, but referee careers have long been open to them. Their own career opportunities, however, include coaching roles despite the rejection of female coaches in men's sports. An exception to this is boxing, where the recognition of the female federal captain is becoming more and more accepted, so the opportunities for club coaches are also increasing.

The topic will be closed with the lines of Ágota Budaváry, namely, in whose opinion the coaching training is waiting to be solved. It needed excellent professionals to educate an excellent athlete and you will be able to get involved in gender issues. In other words, Hungary must pay attention to the voice of women in sports, coaching, and in all areas where the members of the "weaker sex" have not been able to or are no longer trying to enter. In Hungary, this takes place at a very low volume. With us, everything turns out to be delayed, people, but especially women, simply do not dare to talk openly about it. In contrast, at the opening of the Cannes Film Festival, one of the speeches began with "Mesdames, Mesdames, Mesdames et Messieurs..." and went on to say that Harvey Weinstein will have no playing field here. That is, they constantly remember that yes, women need to be protected and stand up for their rights. And Hungary seems to have forgotten about the blatant abuses perpetrated by our excellence, which is already a great oeuvre, whether in theater or sports. Their victims received very little attention. "
(BUDAVÁRY, 2018)

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SCIENTIFIC PAPER

MARKET POWER ANALYSIS IN MONGOLIAN WHEAT INDUSTRY

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Abstract: *Mongolia has been in transition from a planned economy to a market economy for more than 20 years. In many sectors of the economy, it is necessary to define which market mechanisms exist. Grain occupies important economic sector in Mongolian economy. The current state of the wheat market has been studied based on NEIO research methods. In this study, the data for years from 2000 to 2017 and from 2007 to 2017 about wheat and wheat seed sector were taken through 6 indicators. We estimated the supply and demand functions for wheat and wheat seed. Using these functions, we defined market behavior, cost function, price elasticities, and market equilibrium. The capacity setting for product prices of wheat producers is weak, and this market is likely free-style competition.*

Keywords: *NEIO, wheat, market power, market equilibrium, market distortion*

INTRODUCTION

Wheat is considered as one of the strategically important products in Mongolia. Due to cumulative impact of recent favorable weather conditions (except 2015 and 2017), state policy support, including "Atar[1] III" campaign, diligence and efforts of producers has shown a tendency of recovery and development since 2008 in wheat production. Regardless of certain progresses in the cereals sector, there has still existed numerous pressing issues in state policy, technology, economy and management. During the time period from the beginning, there has been considerable disputes on wheat prices, which rises to become focus discussion every autumn. Wheat prices are fixed in accordance with tripartite agreement between flour producers, grain growers and the government. Consequently, grain-growers receive 50.000 to 100.000 tugrugs (MNT) subsidies from the government. Researches and analysis of such price fixing practices is essential. To solve this dispute accordingly, we have to conduct a comprehensive and detailed research on wheat market characteristics, state policy and weather factor impacts.[1]

Weather conditions

Irrigation system is not practical in Mongolia. Therefore, wheat production is largely dependent on climate conditions every year.

In 2015, Government of Russian Federation passed a resolution to determine borders for crop zones throughout country territories. According to this decision, weather conditions will be defined through Hydrothermal Coefficient (HC), utilizing precipitations, temperatures in May-August, and August-September. By virtue of geographical location, we

[1] reclaim virgin land

can employ this method in Mongolia to its adaptable extent. Central zone weather conditions are defined in accordance with 2000-2017 weather parameters. The HC will be defined as follows:

Vegetation period HC: HC=(∑Pv-viii)/(0.1∑ Tv-viii)

Harvesting period HC: MHC=(∑Pviii-ix)/(0.1∑Tviii-ix)

[1]reclaim virgin land

Table 1.The Central Region Meteorological Conditions

HC	Weather Condition	Probability
1.6<	Over moisture	0.0%
1.6-1.3	Moisture	12.5%
1.3-1	insufficient moisture	43.8%
1-0.7	Drought	37.5%
0.7-0.4	severe drought	6.2%
<0.4	Dry	0.0%

Table 1 shows that climate condition of Mongolian land with a significant risk to farming. The yield function of wheat per hectare was determined using the relevant data for 2007-2018.

Table 2. The wheat yield function

	Intercept	HC	HCF	GP_{2008}	t	R2
Coefficients	0.429	1.975	-0.972	0.175	-0.018	
t stat	1.183	3.462	-2.222	0.676	-0.589	0.733

Whereas, the variables GP2008 and t are the indicators of the government's 2008 year agricultural development policy and technical progress, respectively. Favorable weather conditions during wheat growing period and government policy support have had a significant positive impact on wheat yields. However, this relationship shows that unfavorable weather conditions during harvesting and the backwardness of agricultural technology negatively affect the growth of wheat yields. As a result of these factors, the average yield per hectare of wheat is likely to be 1.59 tons / ha.

Method of Investigation

Wheat market mechanism is created during last 20 years. Effectiveness of policy regulations depends on compliance with specific market parameters. Production and market related research was made on the basis of New Empirical Industrial Organization (NEIO) method. Based on the works of researchers Bresnahan,T.F. (1981,1982), Appelbaum,E. (1982), O'Donnell,C.J. et al (2004), and Schroeter,J.R. (1988), we used the following model for this study.

Demand function

$$Q = a_0 + a_1P + a_2Y + a_3PS + a_4S + \varepsilon \quad (1)$$

Where: Q is quantity of product, P–product price

S–price of substitutes, Y–consumer's income.

Demand function represent consumer's market conditions.

Marginal cost function

$$MC = b_0 + b_1Q + b_2M + b_3N + \eta \quad (2)$$

Whereas: MC–marginal costs, Q–quantity of product, M–price of relevant production factors, N–macroeconomic or weather conditions factors.

Supply function represents producers' market conditions.

Using the demand function, determined the marginal revenue function as follows:

$$MR = P + Q\frac{\partial P}{\partial Q} = P + \frac{Q}{a_1 + a_3S} \quad (3)$$

Marginal revenue as perceived by farm, stating market power, will be as follows:

$$PMR = \lambda(P + \frac{Q}{a_1 + a_3S}) + (1 - \lambda)P = P + \lambda\frac{Q}{a_1 + a_3S},\ 0 \leq \quad (4)$$

Using PMR=MC equality conditions we will derive supply function.

Supply function

$$P = \lambda\,(-Q_1) + b_0 + b_1Q + b_2M + b_3N + \gamma,\ Q_1 = \frac{Q}{a_1 + a_3S} \quad (5)$$

Whereas, λ in (4) is measure, expressing degree of market power. In case of free competition λ=0 and λ=1 in the case monopoly market. In a case of oligopoly market λ ≈0.5, and in a case of monopolistic competition this measure will be 0 <λ< 0.5. Using the cost function, we will similarly determine degree of monopsony market power.

Empirical models and estimation results

This study is a sector-level research rather than a farm level one.

Food wheat market

Data

In this study, the data of the wheat sector is taken under 6 indicators with covering period from 2000 to 2017.

The wheat market study was carried out using the methodology described above.

The data indicators: Pwheat, Qwheat–wheat price, quantity, Pwrimport–imported wheat price, Rexchrate–MNT to dollars real rate of exchange, HC–hydro thermal coefficient, VAcrop-crop sector value added. T-Time trend, Dummy–policy impact accordingly. The price was expressed at 2010 constant prices.

Table 3. Wheat demand model

Demand	C	Pwheat	Pimport	PwhPimp	Vacrop	Dummy	T
Qwheat	1016.1990	-2.6984	-2.3669	0.0098	-0.0004	438.8854	-30.4320
t	3.2601	-2.9372	-2.6711	3.2697	-0.7429	5.9160	-3.4401
	R2	0.872	Akaike crit	11.344	DW	2.891	

Wheat demand is price Inelastic (Ed= -0.901)

Table 4. Wheat Supply model

	Qwheat	Q1	rexchrate	Vacrop	HTK	Dummy	T
Pwheat	0.5071	0.0163	0.0803	0.0013	-126.7378	-140.9505	10.4516
t	2.1609	0.6824	6.8023	4.1373	-1.9305	-1.7252	1.7427
	R2	0.620	Akaike crit	`	DW	2.095	

Statistical inference of estimated demand and supply functions are quite significant.

Degree of market power (λ=0.016) is perfect competitive.

Wheat supply is price elastic (Es=2.922)

Determined the marginal and average cost functions by using the estimated supply function.

Table 5. Marginal cost function

	Qwheat	Q1	rexchrate	Vacrop	HTK	Dummy	T
Pwheat	0.5071	0.0163	0.0803	0.0013	-126.7378	-140.9505	10.4516
t	2.1609	0.6824	6.8023	4.1373	-1.9305	-1.7252	1.7427
	R2	0.620	Akaike crit	10.930	DW	2.095	

Table 6. Average cost function

	Qwheat	Q1	rexchrate	Vacrop	HTK	Dummy	T
Pwheat	0.2536	0.0163	0.0803	0.0013	-126.7378	-140.9505	10.4516
t	2.1609	0.6824	6.8023	4.1373	-1.9305	-1.7252	1.7427
	R2	0.620	Akaike crit	10.930	DW	2.095	

Wheat market equilibrium is determined using the estimated demand and supply functions. Wheat market equilibrium is different each year. Equilibrium prices are determined on comparative constant (at 2010) and annual nominal prices.

Table 7. Wheat market equilibrium

	Q	Pconst	Pnominal
2007	94.7	309.1	208.2
2008	381.3	502.9	411.5
2009	407.6	467.4	389.4
2010	462.7	357.4	357.4
2011	487.2	311.6	358.7
2012	447.5	239.8	311.4
2013	320.9	287.3	383.9
2014	412.7	425.4	610.7
2015	268.9	397.3	580.2
2016	410.8	382.9	571.6
2017	247.8	402.2	648.5

Measuring the market distortion

In a free market, the prices of individual commodities are set by the laws of supply and demand. When the price of a commodity does not seem to follow the laws of supply and demand, it is sometimes referred to as a cost distortion, price distortion or market distortions.

Market distortion is an economic scenario that occurs when there is an intervention in a given market by a governing body. Market distortions create market failures. Market distortions are often a byproduct of government policies that aim to protect and raise the general well-being of all market participants. Almost all types of taxes and subsidies, but specially excise or ad valorem taxes or subsidies, can cause a market distortion. In addition, asymmetric information, uncertainty among market participants, or any policy or action that restricts information critical to the market can cause a market distortion. In the case of distorted market conditions, the social or economic price of goods will be determined as follows:

$$P^{social}=W^{s}P^{m}/(1-s)+W^{d}P^{m}(1+t) \quad (6)$$

$$W^{s}=\frac{\varepsilon^{s}}{(\varepsilon^{s}-\varepsilon^{d}\frac{Q^{d}}{Q^{s}})},\ W^{d}=-\frac{\varepsilon^{d}\frac{Q^{d}}{Q^{s}}}{(\varepsilon^{s}-\varepsilon^{d}\frac{Q^{d}}{Q^{s}})} \quad (7)$$

Where, Pm=market price, s=subsidy, t=tax, Ws, Wd=supply and demand weights.

The following table shows the 2010 and 2017 years wheat social prices.

Table 8. Wheat social price

e_d=	-0.734		e_s=	2.922	t=				
D:	q=1150.802-2.6984p		S:		q=-234.998+1.972p				0.1749
2010	$P_{constgnt}$	$P_{nominal}$			p_1=	P_d	P_s		
p=	285.8	285.8	q=	460.2	335.8	300.09	346.4		
p_1=	335.8	335.8	qd=	244.7	qs=	427.2			
Psocial=	340.6	340.6	wd=	0.126	ws=	0.874		1	
					t=	0.05	s=	0.0824	
2017	$P_{constant}$	$P_{nominal}$			p_1=	P_d	P_s		
p=	376.2	606.4	q=	158.6	407.2	395.0	410.0		
p_1=	407.2	656.4	qd=	52.0	qs=	568.0			
Psocial=	409.7	660.4	wd=	0.022	ws=	0.978		1	

As noted here, the distorted wheat price as p1 and p is wheat market price.

Wheat prices because of market distortion is increased by 17,5% in 2010 and 8.2% in 2017.

Demand and supply prices for wheat are changing due to taxes and subsidies, but the social price of wheat is between these two prices. For example, the condition Pd < Psocial <Ps is satisfied. Taxes and subsidies have had a large effect on supply prices and a small effect on demand prices.

The social price of wheat at 2010 constant prices would be 340.6 in 2010 and 409.7 thousand MNT in 2017.

Wheat seed market

Plant seed policy, management and financing play crucial role for the restoration of the crop sector. Seeds are the primary basis for human sustenance. Improving crops and providing producers with high-quality seeds and plant material of breeding varieties is necessary to improve the quality of crop production and solve increasingly serious environmental problems.

The state is paying great attention to improving the quality and supply of seed plants and improving the seed farming system, but there is no proper outcome. Farmers and companies are uncontrolled cultivation of different varieties, because seed and varieties policy was not functional since the 1990s. The Crop Production Supporting Fund (CPSF) is responsible for providing farmers with seeds and inputs. However, the fund has provided only about 15% of the expected seed. The remaining portion of the seed is provided with farmers own produced and imported seeds.

Data

The wheat seed market study was carried out using the methodology described above.

Wheat seed indicators are: Pwheat, Qwheat–wheat seed price, seed quantity, Pwrimport–imported wheat price, Vcrop-agriculture sector wage income, time trend T–innovation influence, Dummy–policy impact factor.

Wheat seed demand and supply model

Results of empirical model

Table 9. Demand model

	Intercept	P	Pimp	P*Pimp	Vacrop	Dummy	R square	Fsign
Qd=	10193.937	-22.6138	-34.3820	0.0516	0.0601	3256.2340		
Tstat	0.6780	-0.8605	-0.9284	0.7537	2.6070	1.7210	0.7719	0.1035

Price elasticity of Demand: Ed= -0.353

Table 10. Supply model

	Intercept	Q1	Q	T	R square	Fsign
P=	703.3565	0.0103	0.0095	-37.7435		
Tstat	14.9164	1.1601	1.9543	-7.1211	0.9029	0.0006

Wheat seed supply is high price elastic (Es=8.686). Degree of seed market power (λ =0.01) is also perfect competitive.

Table 11. Seed marginal cost function

	Intercept	Q	T	R square	Fsign
MC=	703.3565	0.0095	-37.7435		
Tstat	14.9164	1.9543	-7.1211	0.9029	0.0006

Table 12. Seed marginal cost function

	Intercept	Q	T	R square	Fsign
AC=	703.3565	0.005	-37.7435		
Tstat	14.9164	1.9543	-7.1211	0.9029	0.0006

Statistical significance of these models are good enough. Using these functions, the seed market equilibrium was determined. Market equilibrium varies annually due to internal and external factors. Statistical significance of these models are good enough.

Using these functions, the seed market equilibrium was determined. Market equilibrium varies annually due to internal and external factors.

Table 13. Wheat seed market equilibrium

	Q^1	Pconst	Pnom
2007	7139.2	780.7	525.9
2008	11092.0	736.5	602.6
2009	12628.0	782.9	652.3
2010	6722.6	660.6	660.6
2011	3808.9	595.5	685.5
2012	2307.9	539.6	700.6
2013	2548.9	497.1	664.2
2014	6089.5	545.5	783.1
2015	6473.3	467.8	683.2
2016	10918.2	492.6	735.4
2017	9036.9	426.1	687.0

Q^1 :Crop Production Supporting Fund Seed's Supply

The market equilibrium price was determined at constant prices in 2010 and each year current prices.

For instance, the current price of wheat seed is 525.9 - 783.1 thousand MNT and at 2010 constant prices is 426.1- 780.7 thousand MNT.

The annual average consumption of wheat in Mongolia is 320-330 thousand tons. Average annual wheat seed required is approximately 50 thousand tons. The average renewal wheat seed per year is about 10 thousand tons. This study demonstrates that only 59.2% of the demand for this seed renewal is met. Wheat seed demand directly related to total wheat production.

RESULTS AND DISCUSSION

The research on wheat and wheat seed markets was carried out using the NEIO method.

Using estimated demand and supply models defined market structure, market equilibrium, demand and supply price elasticities. A free competition mechanism is functioning for food and seed wheat market (λ=0.016 and λ=0.0103). The price elasticity of demand for food and seed wheat is low, while the price elasticity of supply is high.

The reason for this is the backwardness of wheat production technology.

In a free market, the prices of individual commodities are set by the laws of supply and demand.

Market distortion is an economic scenario that occurs when there is an intervention in a given market by a government policy.

The impact of taxes and subsidies on the market equilibrium was determined in 2010 and 2017.

Wheat prices, because of market distortion, is increased by 17.5% in 2010 and 8.2% in 2017 relatively. Taxes and subsidies have had a large effect on supply prices and a small effect on demand prices.

The profitability of wheat depends on seed quality, technology and production efficiency.

Average annual wheat seed consumption in Mongolia is around 50 thousand tons. Seeds need to be renewed every

4-5 years. Therefore, the elite and reproductive annual seed demand is about 10 thousand tons.
IPAS produces 350-400 tons of elite seeds per year. Therefore, seed multiplication centers should be established in the central, western and eastern regions of agriculture.

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SCIENTIFIC PAPER

RESOURCE USE EFFICIENCY AMONG RICE FARMERS AROUND FRAGILE ECOSYSTEMS: EVIDENCE FROM KILOMBERO WETLAND, TANZANIA

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Abstract: *: Farmers have been encroaching fragile wetlands as a strategy to increase their rice production thus threatening wetlands' existence and capacity to other critical ecosystem services. This calls for efficient production to strike the balance between food rice production and wetlands' sustainable existence. The current study sought to provide assess rice farmers' technical efficiency of resource use by detecting the determinants of rice yield and further identify the determinants of technical efficiency of the resources used by rice farmers in Kilombero wetland. A cross-sectional survey of 145 randomly sampled farmers aided in achieving the study objective. A stochastic frontier analysis (SFA) model was used to analyze data. The mean technical efficiency among farmers was at 60.54% level. The positive determinants of rice yield were land and fertilizers while labor influenced it negatively. Age, education, farming experience, group membership, and credit access reduced inefficiency while the distance to the extension agent and off-farm income increased farmers' inefficiency. The study concludes that there is a possibility of expanding rice production without threatening the wetland's existence. It recommends that government and other stakeholders to ensure that rice farmers are up-to-date with optimal use of fertilizers in rice production since it will assist in improving rice yield while the rate of expansion of rice lands in the wetlands will lower. Policy implementers ought to establish initiatives that inspire rice farmers to capitalize on farmer groups and join education programs to take full advantage of their potential efficiency and might participate in community development activities.*

Keywords: *Efficiency, Degradation, Stochastic Frontier Analysis, Wetlands, Fragile ecosystems*
(JEL code: *Q15*)

INTRODUCTION

The second most important staple food crop cultivated in the United Republic of Tanzania is rice (Oryza sativa L.), grown in both Zanzibar and the mainland (Gebeyehu, Kangile, & Mwakatobe, 2019). Regardless of the increased expansion of the cultivated land under rice, farmers' productivity remains as low as under 2.0 t ha-1 while they have the potential to produce over 5.6 t ha-1 (Sekiya et al., 2013). Low-yielding rice varieties, poor dissemination of technology, and the effects of climate change on the natural environment among other factors have contributed to low rice productivity in Tanzania (Rugumamu, 2014). As part of the intervention strategy, the government in collaboration with other stakeholders introduced NERICA (Oryza glaberrima), which is one of the yield-enhancing varieties (Africa Rice Center (WARDA), 2008). Nevertheless, the introduction of high-yielding varieties to farmers has not improved rice productivity (Styger, 2012). The annual production of rice is about 1.8 million MT while the consumption is approximately 1.9 million MT (USDA, 2017).

Around the Kilombero wetland, the International Rice

Research Centre (IRRI) and Kilombero Agricultural Training and Research Institute (KATRIN) introduced pest and disease resistance as well as high-yielding varieties such as TXD 88, TXD 305 and Nerica (Styger, 2012). Kilombero Plantation Limited (KPL) in partnership with United States Agency for International Development (USAID) provides inputs to many farmers within the wetland. The Tanzanian government is also expanding rice production within the Kilombero wetland through the Southern Agricultural Growth Corridor of Tanzania (SAGCOT) initiative by establishing 16 irrigation schemes for the next over ten years (Smith, 2016).

Farmers have been encroaching fragile wetlands as a strategy to increase their rice production. The encroachment is a threat to wetlands' existence and capacity to provide other critical ecosystem services despite the success in the increase in output production. The threat in the wetland's ecosystem involves draining water in the wetlands to make arable land from extreme marshes. Leachates, including pesticides and chemical fertilizers, do also affect the wetland fragile ecosystem thus negatively disturbing the stability of the natural fauna and flora. All the interference from agriculture ends up paralyzing soil formation and hydrology, which take place in the wetlands (Turyahabwe et al., 2013).

Unregulated farming activities around the wetlands, if not addressed with speed, will diminish the wetlands and risk the natural habitation of fauna and flora that thrive in marshy ecosystems. The distorted future of the wetlands looms due to loss of vegetation, groundwater reduction, changes in water regimes, and reduced floods (Baldock et al., 2000; Raburu, Okeyo-Owuor, & Kwena, 2012). Since wetlands will remain a crucial contributor to food security, there is thus a call to improve the efficiency of rice production among farmers around the wetlands to strike a balance between wetland sustainability and food production. Sustainability of the wetlands will result from reduced pressure on wetlands resources due to the increased farmers' productive efficiency as they will not require to expand more land to increase their productive capacity.

Wetlands are known to provide several other critical ecosystem services apart from agricultural production. Such services include the provisioning, supporting, cultural, and regulating services (International Water Management Institute, 2014; Wood, Dixon, & Mccartney, 2013). Out of all the functions that wetlands play, agriculture emerges as the most important contributor to wetland degradation as some rice producers have permanently transformed the fragile natural ecosystems to unstable land-use regimes. One avenue to control the negative externalities of agriculture on wetlands is the encouragement of farming practices that do not exacerbate wetlands' degradation through efficient production. It is, therefore, crucial to ensure that rice farming is done under the highest technical efficiency (TE).

Technical efficiency denotes the capability of a farm to convert resources (inputs) into outputs (Toma et al., 2015; Kansiime, van Asten, & Sneyers, 2018). It depicts the performance in the process of transforming inputs into outputs. It presents the optimality of the conversion process in the event there is no wastage of resources as inputs are converted into outputs. Two forms of efficiency exist namely input-oriented and output-oriented. The input-oriented TE allows farmers to achieve a given output using minimal quantities of inputs at a given technology while the output-oriented TE allows farmers to achieve maximum output using the available quantities of inputs (Hong et al., 2019). Farmers normally strive to achieve output-oriented efficiency due to scarcity of resources. At the farm's technical efficiency frontier, there is absolutely no wastage of resources in the process of production. Farmers rarely produce at the frontier due to unprecedented weather vagaries, pests, and diseases among other random shocks. A measurement of farmers' TE assists in the detection of the production factors that need to be targeted for increased crop productivity while separating farmers' inefficiency from managerial weaknesses.

Efficient production also reduces the magnitude in which agriculture degrades wetlands as the factors of production are used optimally and farmers do not necessarily need to expand their plots into wetlands (Pretty & Bharucha, 2014). Rice production in Kilombero wetland among other wetlands must be produced efficiently to curb further anthropogenic damage of the wetland. An efficient production will guarantee the minimization of unsustainable agricultural intensification from improper usage of inputs, which mainly causes soil degradation (Willy, Muyanga, & Jayne, 2019). In the long run, efficient production will ensure that wetlands will continue to sustainably offer other critical ecosystem services along with the provision of resources for food production.

Many studies have directed their focus on the threats faced by wetlands due to anthropogenic activities (Gardner et al., 2015; Halima et al., 2009; McCartney et al., 2010; Schuyt, 2005; Turyahabwe et al., 2013). Urbanization, population pressure, and weather changes amid other aspects have accelerated the anthropogenic damages (FAO & IWMI, 2017). Despite all the dynamics surrounding the wetlands, the ecosystems have heightened pressure from different competing uses, which calls for efficient production to sustain their capacity to function naturally (Kyalo & Heckelei, 2018). However, a dearth of scientific studies exists regarding the efficiency of rice production around the Kilombero wetlands, which may form a basis for future wetland sustainability. The dearth exists despite the crucial contribution of wetlands to food security while degradation from agricultural practices continues to threaten the fragile ecosystems' continued existence. This called for a need to carry out a study that would assess rice farmers' technical efficiency of resource use by detecting the determinants of rice yield among the inputs used in output production. There is further need to identify the determinants of technical efficiency of the resources used. We, therefore, carried out a cross-sectional research to address the aforementioned objectives.

MATERIALS AND METHODS

The study area, data types, and sampling procedures

Kilombero wetland is a river floodplain of a valley close to Ifakara in Tanzania stretching over a distance of 250 Km and a width of approximately 65 Km along the banks of the Kilombero River, in the South-central parts of Tanzania. The valley and the marginal hills around it cover approximately 11,600 Km2. This wetland experiences a sub-humid climate and receives a mean of around 1418 mm of rainfall and 240C of temperature annually (Kato, 2007). Rice, maize, green grams, bananas, and beans are the major crops produced in this wetland. The sampling of the study site was purposive because the Kilombero wetland is a focus floodplain for the Tanzanian government due to its current capacity of sustaining rice production all-year-round (Mombo et al., 2011). The Tanzanian government has a rice production expansion plan through the Kilombero cluster of the Southern Agricultural Growth Corridor of Tanzania (SAGCOT) by establishing 16 irrigation schemes for the next over 10 years (CDM Smith, 2016).

The sampling involved a two-stage method because the wetland is a well defined Ramsar site. First, administrative officers and knowledgeable villagers assisted in listing all the villages located around the wetlands. Secondly, in order to ensure a reasonable representation of households across the entire wetland, villages were randomly sampled. A total of 8 villages were sampled from the list generated around the wetland. A sampling frame was then developed from sampled villages and each village, proportional to its size, contributed to the drawing of a random sample of households giving a sample of 145 rice farmers, which had been obtained using the Kothari, (2004) formula.

Analytical framework

Measurement of technical efficiency

Technical efficiency is mainly measured using two methods namely stochastic frontier analysis (SFA) (Aigner et al., 1977) and data envelopment analysis (DEA) (Charnes et al., 1978). The SFA method is a parametric approach while the DEA is a deterministic method that uses linear programming. The latter method assumes that all shortfalls from maximal production output are attributable to the inefficiency of farmers. The DEA has the advantage of being able to incorporate many inputs and outputs in the analysis of efficiency. However, it suffers grave shortcomings due to sensitivity to outliers and computational complexities. The method also overestimates technical efficiency measures due to the failure to account for measurement errors. The current study, therefore, utilized the SFA model as it distinguishes the random variations as a result of statistical noise and inefficiency effects. The SFA model allows for hypotheses testing with regard to the structure of production as well as the level of inefficiency, which is a crucial practice that is not done through DEA (Coelli et al., 2005).

Diagnostic tests

A statistical test was done on the ordinary least squares (OLS) and SFA model to establish the appropriate model for the study analysis. The test was done by testing a null hypothesis (H_0: $\gamma=0$), which implies the non-stochastic nature of the inefficiencies (Ui). A true null reduces SFA to a conventional function (OLS) due to a lack of inefficiency effects. The test uses lambda (λ), obtained in equation 1 estimation through the generalized likelihood-ratio method (Battese & Broca, 1997).

$$\lambda = -2[\ln\{L(H_0)\} - \ln\{L(H_1)\}] \quad (1)$$

where L (H0) and {L (H1) denote the null and alternative hypotheses respectively. By failing to reject the null hypothesis (H_0: $\gamma=0$), lambda (λ) assumes a mixed χ^2 distribution. Subsequently, an SFA model fails the test as the best analytical method because the error term usually assumes both random effects (V_i) and inefficiency effects (U_i). In such a scenario, OLS remains adequate over SFA and the opposite is right.

Stochastic frontier analysis (SFA)

Cobb-Douglas (CD) and translog stochastic frontier analyses are the most used common model specifications. Both models were tested for the specification tests of multicollinearity and heteroscedasticity. Multicollinearity was detected using the variance inflation factor (VIF) test such that $VIF_i=1/(1-R_i^2)$, where R_i^2 represents an R^2 in an artificial OLS that treats i^{th} explanatory variable as a "dependent" variable (Otieno, Hubbard, & Ruto, 2012). As a general principle, a value of VIF larger than ten (10) exhibits a problem in data due to multicollinearity (Gujarati, 2004). Secondly, the null hypothesis that assumes homoscedasticity ($Var\varepsilon=E[\varepsilon-E(\varepsilon)]=\delta^2$) in data was assessed using B*reusch-Pagan / Cook-Weisberg* tests. The translog model model was disqualified due to high multicollinearity (see Table 4).

The Cobb-Douglas function of the SFA model by Battese and Coelli (1995) is given as

$$Y_i=\exp(x_{mi,}\beta_{i,}+\varepsilon_i) \quad (2)$$

where i =1,2,...,m and $\varepsilon_i=V_i-U_i$, Y_i represents the i^{th} farm yield, x_i is inputs vector for the ith farm and β_i are the unknown parameters. The notation ε_i represents error term composed of random error (V_i) that denotes the environmental influence, whose mean and variance $N(0; \sigma_U^2)$ is zero. The notation V_i is attributed to factors that are beyond farmers' control and errors during model estimation. The term U_i is a random non-negative($U_i \geq 0$) half-normally distributed $N(0; \sigma_U^2)$ variable that is associated with farm factors and impedes the achievement of maximum production output.

Two types of stochastic frontier analysis approaches exist, namely one-step and two-step methods. Huang and Liu (1994) proposed a one-step SFA estimation to produce unbiased coefficients of inefficiency determinants compared to a two-step approach by Pitt and Lee (1981). Huang and Liu (1994) assumes U_i as truncated-normally distributed and combines production function with the inefficiency model. However, Frohloff, (2007) asserts that under such an assumption, the estimates reflect gross efficiency, which is not completely adjusted for the influence of exogenous variables. The half-normal distribution of U_i assumption solves the shortcoming of the truncated-normal assumption. The half-normal assumption allows the SFA model to include the exogenous variables in the production function, thus obtaining net efficiency (Coelli, Perelman, & Romano, 1999). The two-step approach suffers from a contradiction that the inefficiency term (U_i) distribution makes different assumptions in both stages. In step one, the the stochastic frontier is estimated by model based on an assumption of half-normal distribution. In the second step, the inefficiency effects assume truncated-normal distribution to allow an estimation of the influence of exogeneous variables on (U_i) in a Tobit model. The inconsistency in the inefficiency distribution assumptions results to biased estimated in the second stage. Also, the first step assumes that inefficiency effects (U_i) have an independent and identical distribution (iid) but then regress the exogenous variables against the inefficiency indices.

The current study utilized a one-step estimation where U_i assumes a half-normal distribution and depends on exogenous factors Z_i where (Z_i=Z_{1i},...,Z_{mi}). The inefficiency effects model is presented

as U_i=Z_i δ+W_i (3)

where Z_i represents the exogenous factors that influence the i^{th} farm TE, δ represents the parameters to be estimated, and W_i represents th residual efficiency presented as the random error. The truncation of U_i is at zero with a constant variance σ_U^2 and mode Z_i' δ changing over the farms. A log-likelihood function that assumes U_i and V_i being independently distributed of each other is presented by

$$lnY_i|\beta,\lambda,\sigma^2) = mln\frac{\sqrt{2}}{\sqrt{\pi}} + mln\sigma^{-1} + \sum_{i=1}^{m} \ln[1 - F(\varepsilon_i\lambda\sigma^{-1})] - \frac{1}{2\sigma^2}\sum_{i=1}^{m}\varepsilon_i^2 \quad (4)$$

where the term ε_i can be obtained by Y_i-x_i β while F represents the distribution assumption, which is the conditional distribution function (cdf). The equation (4) MLE gives the values of parameters β,λ,σ. The TE of the i^{th} farm is thus expressed in terms of the quotient of the observed production output (Y_i) and the highest predicted output (frontier output) (Y_i^*) (Furesi, Madau, & Pulina, 2013). It is expressed in equation 5.

$$TE_i = \frac{Y_i}{Y_i^*} = \frac{Exp\,(\beta_0 + \sum_m \beta_m\, lnx_{mi} + V_i - U_i)}{Exp\,(\beta_0 + \sum_m \beta_m\, lnx_{mi} \quad V_i} = Exp(-U_i) \quad (5)$$

Technical inefficiency is then 1- TE_i and TE prediction requires that U_i should be estimated.

Equation 6 shows the estimation of the conditional expected value of U_i that best predicts U_i given ε_i.

$$E(U|\varepsilon) = \sigma_*\left[\frac{f(\varepsilon\lambda/\sigma)}{1 - F(\varepsilon\lambda/\sigma)} - \left(\frac{\varepsilon\lambda}{\sigma}\right)\right] \quad (6)$$

From equation 6, λ=σ_U/σ_V, $\varepsilon\lambda$=$-U_*/\sigma_*$, and f is the normal density function (Jondrow et al., 207 1982). The notations σ_* and U_* are unobservable thus they are replaced by their respective estimates 208 giving technical efficiency as

$$TE_i = E[(exp(-U_i|\varepsilon_i] = \left\{\frac{1 - \Phi[\sigma_* - (U_i^*/\sigma_*)]}{1 - \Phi(-U_i^*/\sigma_*)}\right\} exp\left(-U_i^* + \frac{1}{2}{\sigma_*}^2\right) \quad (7)$$

where Φ represents the cumulative density function (Battese & Coelli, 1988).

Model specification

Table 1: Description of the one-step SFA model variables

Variable	Description	Measurement
Dependent		
Y_i	Output per hectare (in model 1)	Kg ha-1
U_i	Technical inefficiency (in model 2)	Index (0-1)
Independent		
	Model 1	
X1	Plot size under rice	Ha
X2	Family and hired labor using adult equivalent	Man-days ha-1
X3	Seeds	Kg ha-1
X4	Basal fertilizer	Kg ha-1
X5	Topdressing fertilizer	Kg ha-1
X6	Pesticides	Litre ha-1
X7	Herbicides	Litre ha-1
	Model 2	
Z_1	Household head gender	Male=1, Female=0
Z_2	Household head age	Years
Z_3	Education of the household head	Years
Z_4	Household size	Number of persons
Z_5	Rice farming experience	Years
Z_6	Distance to the nearest extension service provider	Kilometres
Z_7	Access to agricultural credit	Yes=1, No=0
Z_8	If a household head belonged to an organized group	Yes=1, No=0
Z_9	Annual off-farm income	EURO
Z_10	Product market access	Kilometres

The stochastic frontier analysis model of the production function in equation 2 was specified as

$$ln\,Y_i = \beta_0 + \sum_{m=1}^{7} \beta_m lnX_{mi} + v_i - u_i \quad (8)$$

where ln = natural logarithm, β_0 β_{mi} = parameters to be estimated, i=ith farm, m = mth input, Y^i = farm yield, X_i = the production factors (see Table 1), u_i = the error term's component of inefficiency, and v_i represents the random error term.

The one-step SFA inefficiency model specification of equation 3 was given by

$$U_i = \delta_0 + \sum_{m=1}^{10} \delta_m Z_{mi} + W \quad (9)$$

where U_i represents technical inefficiency, δ_m=unknown parameters, and Z_{mi}=determinants of inefficiency (see Table 1).

RESULTS AND DISCUSSION

Descriptive statistics

Table 2 shows the household head's mean age of approximately 53 years and a farming experience of about 23 years. The farming experience shows that a rice producer within the Kilombero wetlands had begun to make independent farming decisions on rice farming at an approximate age of 20 years. The schooling years in formal education was about 13 years which matches the secondary school education. A household had approximately 5 persons and hectares of farmland each. A household head had an average of EUR 125. Lastly, distances to the nearest extension service provider and the product markets were about 11 and 10 Km respectively.

Table 2: Selected continuous and categorical variables from the study

Variable	Mean (N=145)	Std. Dev	Min	Max
Age	53.57	12.01	26	79
Household size	5.01	1.82	1	10
Education	12.97	4.3	0	18
Experience	22.76	11.08	3	50
Distance to extension provider	10.74	6.73	1	28
Distance to the market	10.19	5.92	1	28
Off-farm income	125.1	61.92	0	200
Farm size in hectares	5.25	5.38	0.5	30
	Freq (N=145)		Percent (%)	
Gender				
Female	23		15.9	
Male	122		84.1	
Group membership				
No	46		31.7	
Yes	99		68.3	
Credit access				
No	52		35.9	
Yes	93		64.1	

Source: Survey data

The majority (84.1) of the household heads were male. Many of the household heads belonged to groups (68.3%) and accessed agricultural credits (64.1%) in cash and kind (such include seeds, pesticides, and fertilizers among others).

Table 3 shows the descriptive results for inputs used and yield attained in rice production in Kilombero wetland.

Table 3: Inputs use and yield among rice farmers

Variable	Mean (N=145)	Std. Dev	Min	Max
Seeds	61.27	28.84	9.38	185.25
Basal fertilizers	76.36	95.49	0.25	625
Topdressing fertilizers	85.22	115.61	0.25	234.86
Labor	53.05	46.81	0.49	275.9
Pesticides	3.25	3.28	0.12	24.7
Herbicides	2.3	1.33	0.12	7.41
Area under rice	1.69	1.9	0.2	16
Yield	1054.13	605.77	55.58	4322.5

Source: Survey data

Seeds quantity was about 61 kg ha-1 among the wetland rice farmers and the rate concurs with the recommended seed rate of 60-80 kg ha-1 in Tanzania (Global Yield Gap, 2013; United Republic of Tanzania, 2007; Wilson & Lewis, 2015). Additionally, the basal fertilizers quantities were lower according to the recommended rates of 123.5 - 130 kg ha-1 in Tanzania (IRRI, 2012; United Republic of Tanzania, 2007). Similarly, the topdressing fertilizers quantities were also lower in comparison with the endorsed rate of 87- 260 kg ha-1 (Africa Rice Center (WARDA), 2008). The number of person-days (53) used in the wetland rice production was smaller compared with the findings of Oumarou & Huiqiu, (2016) and Kadiri et al., (2014) in South-western Niger and Niger Delta of Nigeria respectively, where the respective number of man-days used in rice production averaged at 162 and 180 person-days ha-1. Mechanization of rice production in Kilombero wetland, especially during the planting period, might have contributed to the reduced labor as about 65% of the rice farmers used tractors for land preparation. Moreover, rice yield was lower than the national mean of about 1.5 t ha-1 (Ngailo et al., 2016; Wilson & Lewis, 2015).

Empirical model

Validation tests

Estimation of equation 1 gave the calculated statistics (□2 = 46.004) that was more than the critical value (□2(1) = 2.706) thus the study rejected (H0: □=0). SFA was thus proven as the appropriate model for the assessment of efficiency and its determinants. The □2 tests were guided by the critical values in Kodde and Palm (1986). Following the test for appropriateness of SFA over OLS, a test for multicollinearity and heteroscedasticity on Cobb-Douglas and translog specifications of the SFA model was done. Table 4 presents the aforementioned results.

Table 4: Tests of multicollinearity and heteroscedasticity in the one-step translog and Cobb-Douglas specifications

Model	Specification violation	Test type	Test results	Conclusion
Translog	Multicollinearity Heteroscedasticity	Mean VIF Breusch-Pagan / Cook-Weisberg	190.13 2.29	High multicollinearity Homoscedastic
Cobb-Douglas	Multicollinearity Heteroscedasticity	Mean VIF Breusch-Pagan / Cook-Weisberg	1.79 0.19	No multicollinearity Homoscedastic

Individual and mean VIF values in the Cobb-Douglas specification were all less than 10. The translog model revealed large values of individual and mean VIFs with the mean value being 190.13. As a general principle, a value of VIF larger than ten (10) exhibits a problem in data due to multicollinearity (Gujarati, 2004). The $\chi 2$ values from the Breusch-Pagan / Cook-Weisberg tests in both specifications were insignificant ($p>0.05$).

One-step SFA estimation

Table 5: One-step SFA results for the production and inefficiency functions

Variable	Coefficient	Std. Error	z	P-value
Model 1 (Production function)				
Land	0.384***	0.023	16.88	0.000
Seeds	-0.002	0.042	-0.05	0.961
Basal fertilizer	0.171***	0.024	6.94	0.000
Topdressing fertilizer	0.068***	0.017	3.90	0.000
Labor	-0.052**	0.024	-2.09	0.037
Pesticides	0.001	0.012	0.08	0.936
Herbicides	-0.019	0.019	-1.01	0.314
_cons	6.875***	0.215	31.96	0.000
Log likelihood	-8.114***			
Wald chi2(8)	468.51***			
Prob > Chi^2	0.000			
LR test of $\sigma_\mu=0$: $Chibar^2(01)$	282.385***			
Prob > =$chibar^2$	0.000			
Gamma (γ)	0.9616***	0.0172		
TE	0.6054	0.2636		
Model 2 (Technical inefficiency model)				
Age	-0.042***	0.015	-2.76	0.006
Gender	-0.124	0.392	-0.32	0.752
Household size	-0.065	0.08	-0.81	0.419
Education	-0.125*	0.064	-1.94	0.052
Farming experience	-0.142***	0.021	-6.71	0.000
Group membership	-0.598*	0.325	-2.96	0.066
Credit access	-0.973***	0.329	-2.96	0.003
Extension access	0.066***	0.025	2.71	0.007
Market access	-0.013	0.029	-0.44	0.658
Off-farm income	0.012***	0.004	2.63	0.008
_cons	4.411***	1.336	3.30	0.001
sigma_v (σ_v)	0.095**	0.014		

Notes titles *** p<0.01, ** p<0.05, * p<0.1
Gamma (γ), the variance ratio is derived from {σμ2/(σμ2+σv2)} or {σμ2/σ2}

The estimation of maximum likelihood in the overall model in equations 8 and 9 reveals that the had a log-likelihood value of -8.114 and the Wald Chi^2 was 468.51, which was strongly significant ($p<0.01$) at 1% level. The significance of Wald Chi^2 displays the precision of model specification demonstrating the joint capability of the explanatory variables in explaining the variations in rice yield.

Inefficiencies in the model were proved by the value of γ, which infers that 96.16% of the disparities in rice yield originated from technical inefficiency. The value of γ also supports the null hypothesis (H_0: $\gamma=0$) rejection that assumes an absence of inefficiencies in the SFA model, which reduces it to OLS. The Likelihood-ratio test had a value of 282.385, which verified the presence of rice production technical inefficiency in East African wetlands since it was significantly different from zero ($p=0.000$).

Production factors influencing rice yield

The findings from Table 5 show that land was a strong positive determinant of rice yield within the Kilombero wetland ($p<0.01$). These findings coincide with those reported by Kadiri et al., (2014) in Nigeria's Niger Delta region for paddy rice farming and Islam & Kalita, (2016) in the West Garo district of Meghalaya state (India) for wetland rice cultivation. The findings indicate that Kilombero wetland is underused, which means that rice farmers have room to expand their output as they have only utilized 32% of the total farm sizes. It also suggests that initiatives such as the SAGCOT project's Kilombero cluster will implement the expansion of rice production in Kilombero wetland sustainably because the wetland is not overused. The sustainability of wetlands requires reduced drainage from the expansion of agricultural lands into the wetland while operating on the highest production frontier (Kyalo & Heckelei, 2018).

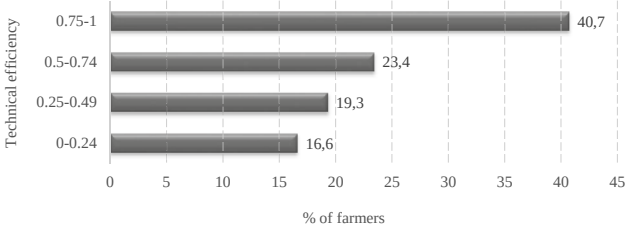
Both planting and topdressing fertilizers were strongly influencing rice yield and were underused ($p<0.01$). These revelations concurred with the findings of Kadiri et al. (2014) and Oumarou & Huiqiu, (2016) for rice production in Niger Delta and South-western Niger regions of Nigeria respectively. There is therefore room to attain maximum rice productivity by increasing both planting and topdressing fertilizers. This is because 1% increase in planting and topdressing fertilizers will increase rice yield by 0.17% and 0.07% respectively. Addressing the use of fertilizers to the optimal levels can be a strategy for increasing rice yield on smaller wetland farms while reducing the threat of wetland existence due to rampant encroachment.

Labor was a significant negative determinant of yield ($p<0.05$). Such findings coincide with those of (Yang, Mugera, & Zhang, 2016). The current results show overuse of manpower was allocated than required in making and maintaining of canals as well as engaging in rice production activities. Extra manpower can be used in off-farm activities to boost farmers capability to purchase inputs that will improve the yields. An increase in efficiency means that extra manpower may be allocated elsewhere off the rice production enterprise for a diversity of livelihood.

Distribution of efficiency scores among rice farmers

Fig 1 shows that the majority (40.7%) of rice farmers had efficiency scores ranging from 75-100% levels. The mean, highest, and lowest scores were 60.54%, 96.59%, and 3.13% respectively. The mean efficiency was close to 62.6% and 61% obtained by Kadiri et al. (2014) and Onyenweaku & Ohajianya (2005) for rice producers in Niger Delta and the Ebonyi state of Nigeria respectively. A rice farmer with at the mean efficiency (60.54%) would reduce inputs proportionally up to 37.29% as given by [(1-(60.54/96.59)) x 100], to operate on the wetland's best frontier of 96.59% TE.

Figure 1: Efficiency distribution among rice farmers by percentage



Less than half of the sampled farmers had TE below 50% perhaps due to the availability of water that cushions them from the risks that emanate from water scarcity. They also have room to improve their efficiency especially if they address the issues related to the usage of other production and non-production factors.

Determinants of efficiency among rice farmers

Age reduced technical inefficiency significantly ($p<0.01$) by 4.2%. This is this infers that older rice farmers in the wetland were more efficient compared to their younger counterparts. As farmers grow older, they advance their agricultural skills and can make decisive farming verdicts regarding efficient inputs use (Dessale, 2019; Mengui, Oh, & Lee, 2019). The accumulated skills and knowledge combined physical capability which gives older farmers the advantage of accepting new technologies over their younger counterparts. Additionally, farming experience ($p<0.01$) and formal education ($p<0.1$) in the Kilombero wetland had a significantly negative influence on inefficiency. More educated farmers are thus efficient as they may have gained the ability to utilize the available agricultural information and technologies (Ahmed, Haji, & Geta, 2013; Thabethe & Mungatana, 2014; Dessale, 2019). Regarding farming experience, an extra year expended on rice production gave farmers in the wetland a prospect to significantly raise their efficiency by 14.2%. Oumarou and Huiqiu (2016) elucidated that farmers with several years of planting a certain crop can forecast precisely when to plant, the suitable cropping materials, and types and amounts of production inputs. They may also be knowledgeable about various wetland conservation activities.

Credit access ($p<0.01$) and belonging to organized groups ($p<0.1$) and negatively influenced inefficiency among rice farmers in Kilombero wetland. Ahmed and Melesse (2018) explained that group membership especially in cooperatives positively determined participation of farmers in off-farm activities which eventually influence efficiency positively. Wetland rice farmers in farmer associations or groups can access linkage to product markets, agricultural training, and input credits among others. This improves their productivity due to the proper and efficient allocation of resources. Group membership may also increase farmers' chances of engaging in collective action on wetland conservation activities. Regarding credit access, Ahmed et al. (2015) and Haile (2015) also found credit access being a positive determinant of efficiency. Sibiko (2012) explained that agricultural credit increases the farmer's capacity to afford yield-improving inputs, for instance, improved seeds, fertilizers, and labor-saving inputs such as herbicides.

Long distances to the extension service provider and off-farm income positively influenced technical inefficiency ($p<0.01$). Longer distances negatively influence efficiency especially when rice farms are in areas where feeder roads are impenetrable and thus it becomes hard for the extension officers to make a considerable number of official visits to farms. The findings of off-farm income concur with those by Tolga et al. (2009) for rice production in Turkey but contradict those by Malinga et al. (2015) and Wakili & Isa (2015) who found off-farm income to influence efficiency positively. Islam et al. (2012) explained off-farm income rises the farmers' likelihood of adopting new technologies such as improved seeds faster than their counterparts are. However, in the current study we borrow the explanation of Tolga et al., (2009) that as people earn higher off-farm income, they are likely to spend less time in agriculture as they venture into non-agricultural and less risky enterprises.

CONCLUSIONS AND POLICY IMPLICATIONS

The land was the key factor that influenced rice yield which is underused, and as such, expansion of rice production in Kilombero wetland is possible without threatening the wetlands' existence considering other production inputs. This is because the general farm sizes in Kilombero wetland were less than 50% utilized. This as well buttresses the sustainability in the expansion of rice production particularly in the Tanzanian government's schemes like the Southern Agricultural Growth Corridor of Tanzania (SAGCOT) program that will see the expansion of rice production within the Kilombero wetland. Farmers that are formally educated and were members of organized groups had prospects of maximizing their efficiency. Longer distances to the nearest extension service providers were detrimental to farmers' efficiency. Off-farm income caused rice producers to concentrate less on the enterprise.

The study recommends that government and other stakeholders to ensure that rice farmers are up-to-date with optimal use of fertilizers in rice production since it will assist in

improving rice yield as the rate of expansion of rice lands in the wetlands lowers. Action must, therefore, be taken to guarantee the accessibility of extension services among rice farmers. The extension officers should encourage farmers with high off-farm income to capitalize on their capacity to afford yield-enhancing inputs to create a stable rice enterprise. The government policies should encourage rice farmers, irrespective of their age to enroll in technical and vocational courses related to gain a formal education. Formal education will guarantee an increase in farmers' technical efficiency as they will be able to understand different aspects of rice production due to smooth interactions with extension officers. Policy implementers ought to establish programs that inspire rice farmers to exploit farmer groups to take full advantage of their potential efficiency and might participate in community development activities.

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SCIENTIFIC PAPER

SUPPLY CHAIN MANAGEMENT PRACTICES FOR SMEs

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Abstract: *: In today's globalized business environment small and medium sized enterprises (SMEs) face many challenges. In order of their survival SMEs need to produce more, at a lower cost, in less time, and with a few defects. They form the most significant group of manufacturing firms and give supports to large companies in many supply chains. In addition, SMEs contribute greatly to entrepreneurship, gross domestic product (GDP) and employment. Despite the fact that micro, small and medium sized enterprises have very important role in business networks, they still have many problems with using supply chain management (SCM) practices. In this research my purpose was to find the best SCM practices as a strategic method to improve SMEs' performance. First, I give information in general about SCM and the SMEs, then highlight main characteristics of small firms compared to large ones and the reasons why it is essential and efficient to use SCM practices. The article is based on secondary data, using several analysis, surveys, books, journals and my personal experiences collected in this sector. I conclude the research by summarizing my recommendations in connection with SCM practices, the opportunities and barriers.*

Keywords: *SMEs, supply chain management - SCM, competitiveness, efficiency, business*
(JEL code: *M11*)

INTRODUCTION

Small and medium sized enterprises (SMEs) have important role in contributing to economic development and employment generation in emerging and developing countries. Nowadays, the SME sector can be characterized by three essential factors, like dynamism, innovation and flexibility (KOH et. al. 2007). Micro, small and medium-sized companies play a central role in the Hungarian economy, too. They are a major source of entrepreneurial skills, innovation and employment. They have difficulties usually in the early start-up phase in obtaining capital or credit. On the other hand, their restricted resources reduce access to new technologies and innovation (SZIRA, 2014). According to my experiences the importance of small companies is indisputable as they have essential role in job creation, production and especially in local services. Small firms are usually powerful founded on original idea, fast-growing ones. On the one hand SMEs are founded in large-scale, but on the other hand they usually disappear rapidly as they are in many cases for self-employed. SMEs comprise about 80 per cent of enterprises in most emerging countries, and as a result they make a large contribution to entrepreneurship, gross domestic product and employment. Several researchers confirmed that small firms have remarkable impacts on supply chain performance

as they operate as suppliers, producers, distributors and customers. Other researchers stated that SMEs usually act as the first and second tier suppliers in the larger companies' supply chain. Therefore, their essential role is obvious in contributing to employment and economic growth, so small and medium sized companies form the most significant group of manufacturing firms (BAYMOUT, 2015). Additionally, in spite of the fact that small organizations now have important role in global business environment, they still face supply chain inefficiency. In this article my main aim is to find out how supply chain management (SCM) may contribute to the success of SMEs, what parts of supply chain management take part mostly in the operations of small enterprises. To achieve my main purpose I needed to set up sub-objectives:

- summarizing the concept of supply chain management,
- collecting the most important characteristics of SMEs compared to large companies,
- gathering the enablers, barriers to successful supply chain implementation and their effects on SMEs.

My research is based on literature review and personal experiences on supply chain management practices.

In these days business environment and global marketplace are characterized by competitiveness where the survival and increase of SMEs is not easy. Customers have more demands to get high quality products at a lower price, better services, wider product range and quick distribution (CHOW et. al. 2008; KETCHEN et. al. 2008). In my opinion all the above mentioned characteristics determine the day-to-day operations of small ones that cause many difficulties and challenges for them. Additionally, many changes in business models create many problems for businesses to survive. Lower production cost, delivery of ever-increasing customer value, flexibility with superior service and the impact of information technology are creating problems for organizations to survive (CHANDRA and KUMAR 2000). The above mentioned challenges make cross-boundary relationships between business partners inevitable. As a result of these emerging situations many companies have identified the fact that nowadays individual firms are pushed into the backgrounds and creating supply chain networks is the base of their success (LI et. al. 2005; KOH et. al. 2007; CHOW et. al. 2008). Thus companies can no longer effectively compete in isolation of their suppliers and other partners in the supply chain (LUMMUS and VOKURKA 1999). It has become essential to look for partnerships and useful information links with trading entities, so it is advisable to stop the traditional boundaries of firms. SCM proved to be one of the most effective tools to achieve competitive advantage (LI et. al. 2005; KETCHEN et. al. 2008). As I see small companies compared to large ones manage fewer resources, operate fewer processes and activities, and produce less on a narrower palette. All these characteristics allow the small ones a flat organizational structure thus communication and decision-making can be faster and more efficient. Small businesses are characterized by close and informal working relationships, operation is less formalized, employees' work satisfaction is higher, family atmosphere is more typical. These characteristics make possible the SMEs a kind of flexibility. Corporate innovation processes are supported by this flexibility and as a result of this many new valuable ideas are created in small businesses useful for big ones, too. In summary the cooperation and interdependence of small ones and large companies should be obvious.

Supply chain management is a network consisting of every participant included directly or indirectly in the chain. The network involves manufacturer, supplier, retailer and customer. The whole system includes production and delivery of products or services to final customers both in upstream and downstream parts (MENTZER et. al. 2001) over physical delivery, information flow and budget (STOCK and BOYER 2009). According to Mentzer and other authors one of the purposes of SCM is to develop the long-term performance of individual companies and thus the supply chain as a whole (MENTZER et. al. 2001). According to another assumption supply chain management is a comprehensive approach to demand, sourcing, procurement, production and logistics process management (CHOW et. al. 2008). As THOO et. al. (2012) define: supply chain management is going through a kind of revolution (MELNYK et al. 2009) and developing rapidly; new SCM concepts include differences in strategies, increase in value, development regarding operational efficiency, cost reduction (BIDGOLI, 2010), SC union and working together, operational greatness and potential supply chains (CHOW et. al. 2008). The concept of supply chain management has grown fast. To reach the best level of performance needed focusing on supplier (LUMMUS and VOKURKA, 1999) and customer (LAGROSEN, 2005). European small and medium sized companies realized that through collaborative relationships they can acquire many benefits of integrated supply chain (MUDAMBI et. al. 2004; MEEHAN and MUIR 2008). Integrated supply chain can drive to outstanding modifications in the operation of businesses, in their processes, improves services in quality, reduces cost and results efficiency (APO, 2002). However, many Hungarian SMEs understand the essence of SCM but micro and small companies still lack of practicing effective SCM concepts. It has many reasons like weak supplier network, absence of knowledge on SCM and lack of exact management duties. It is obvious that Hungarian SMEs, especially micro and small-sized businesses will have more difficulties with the implementation of supply chain management than big companies. It can be observed during the process of managing and responding to the expanded system of markets, technologies and suppliers.

Small and medium sized enterprises have strengths and weakness as well. Small businesses can be characterized by the followings: they are flexible, can make decisions quickly, and cooperate with employees. Their weak points are the followings: they do not have enough technical superiority, infrastructural facility and financial resource (DANGAYACH and DESHMUKH 2001). There are three

important factors between small and big companies they differ from each other: uncertainty, innovation and evolution. The advantages of SMEs seem to be behavioural, stressing qualitative differentiation and innovation (O'GORMAN, 2001). Compared to large firms SMEs are characterized by having only a few products, a few customers and low volume. They lack experiences and learning capacity, they are bounded rational, have higher capital and transaction costs, have a reactive nature, technologically focused with weak marketing skills, have limited resources and high strategic reliance on CEO perceptions of market forces and generally are more vulnerable (COVIELLO and McAULEY 1999; O'GORMAN, 2001). So small firms usually do not employ SCM, they are managed by the needs of significant customers (QUAYLE, 2003), that I can confirm based on my experiences spent in the SMEs sector.

MATERIALS AND METHODS

I used literature review to collect information in connection of use of SCM practices regarding small and medium sized businesses. Many international books, journals contributed to the results of this article. One of the purposes of this paper was to explore the utility of SCM for SME sector. Important questions focusing in this article: How supply chain management can help micro, small and medium sized enterprises to enhance business performance and how the supply chain management can differ small firms compared to big companies? This paper provides a short insight to these topics that makes possible further researches.

RESULTS AND DISCUSSION

According to my first sub-objective, the idea of supply chain management regarding SMEs is an approach that supports the company to operate in a more agile and cost effective method by integrating the processes of different partners at all three levels – strategic, tactical, and operational. Even though globalization has increased pressure on a few small firms to constantly decrease their prices against their quality and services, SCM can make better the performance of SMEs and enhance their profitability by improving their ability to get supplies of the right quality, at the right time, and at the most favoured prices (BAYMOUT, 2015). As far as I know a comprehensive cooperation between small firms could help the operation and the everyday work of the individual ones.

For SMEs supply chain integration is very difficult. It refers to the integration of internal processes with the external supply chain network that can be implemented with communication, partnerships, alliances and cooperation (HANDFIELD and NICHOLS 1999). The most important elements of supply chain integration are cooperation, collaboration, information sharing, trust, partnerships, shared technology and a fundamental shift away from managing individual functional processes to managing integrated chains of processes (AKKERMANS et. al. 1999). The integration of logistic activities with other functional areas can give also competitive advantage (GUNASEKARAN and NGAI 2003). It can reduce operational costs and improve customer services (RICHARDSON, 1995). SCM has positive and negative effects on the performance of small firms. On the one hand, SCM can contribute to better quality, cost reduction, higher customer service, leverage and risk reduction benefits for SMEs. On the other hand, SCM exposes smaller companies to greater management and control hazards while diminishing its private differentiation advantages (AREND and WINSER 2004). According to the most important elements of supply chain integration, partnership is one of the most significant factor in problem solving that can improve supply chain partners' knowledge and learning experience, too. In addition, longstanding and effective partnerships between organizations require many factors, such as the ability of collaboration in terms of culture, procedures, working practices, frequent communication, and the need to keep track of technological and other developments taking place outside of the relationship. Small firms' alliance and network activity may help the SMEs overcome size and resource constraints with better innovation and lower costs and uncertainties. Regarding information sharing it is one the most critical drivers between partners to establish trust. The problem is that many partners do not want to share commercially sensitive data (BAYMOUT, 2015).

As for my second sub-objective regarding the most important characteristics of SMEs compared to large companies, in general for SME sector is very important to give the right product to the right customers at the right cost, right time, right quality and right quantity according to supply chain management concepts (BASHER, 2010). Due to another approach small businesses can differentiate their products and services with superior features, like high quality and high customer service (PORTER, 1985). There are differences in short-term strategic and long-term goals of SCM. The short-term goals include reducing cycle time and inventory thus increasing productivity, while long-term goal is to increase profits through market share and customer satisfaction (TAN, 2002). A well-functioning SCM has many advantages like lower supply chain costs, overall productivity, inventory reduction, forecast accuracy, delivery performance, fulfilment cycle time and fill rates (MOHANTY and DESHMUKH 2005). In contrary to large enterprises, SMEs can be characterized by unbalanced structure and less management levels thus all the duties and responsibilities are centred upon the leader's hands. All these characteristics make SMEs' organizational culture easier to change (GOUROVA, 2010), minimize the communication line within and across the teams (ARAGON-CORRERA et. al. 2008) and strengthen efficient and informal communications (LEVY et. al. 2001). On the other hand, according to the SMEs' organizational structure they have the advantage to initiate and implement changes easily, so the flat organizational structure of small businesses can simplify the changes of supply chain management implementation, too. Despite the fact that SMEs are facing with complexity and uncertainty, usually they

are good at making new things and growth. According to a study SMEs have more innovations (twice per employee) than have large companies (ACS and AUDRETSCH 1991). SMEs are often important partners of big companies due to their dynamism. The two mostly dependent industries are the FMCG that is called fast moving consumer goods and the automobile industry. This feature makes them possible to contribute to development in economy. Their smaller size makes them possible to be flexible in adapting new ways how they carry out their duties and finding out new solutions for it. Actually, small firms can solve the problems deriving from their size limits with using lots of creativity in their products and services through research and development (EBRAHIM et. al. 2008). Many small enterprises are ready to use new and not tested technologies that is crucial to boost dynamic efficiency within SME sector (ADB, 2009). In addition, smaller enterprises can adapt quickly to the ever-changing market conditions and they are more active in their internal operations (LAZARICA, 2009). SMEs can adjust quickly to the demand and market changes with SCM implementation. In general SMEs have fewer customers (THAKKAR et. al. 2009). Another way for smaller firms to be successful is to create closer and long lasting relationships with their customers and then make it more personal (HONG and JEONG 2006). SME sector is characterized by a few major and stronger customer (PITTAWAY and MORRISSEY 2004). Also in Hungary small firms try to develop a long-term relationship with their customers. SMEs often depend on their suppliers' relationship if they have. Small firms have problems with resources in terms of raw materials, financial, skills, knowledge and technology. So suppliers help to connect internal and external capabilities of the smaller firms. As their customer relationships are featured by close and long lasting contacts, they try to build deep suppliers relationships, too. As a result of the deep supplier relationships small firms hope they can make stronger and more stable their supply chain and reduce supply shortage risk (ELLEGAARD, 2006) and they are more prepared to satisfy changing and increasing customer needs (FAWCETT et. al. 2008). As I have already mentioned the success of SMEs significantly depend on the competency and capacity of their owner. The owner has central role within the organization, the owner can make important decisions, start developments, influence the success or the decline of their company. Small firms often operate with limited capacities also in management and personal dimensions not just in finances and information technology (ANJA et. al. 2009; DYERSON et. al. 2009). Moreover, small companies are greatly influenced by the external changes in economy, government, policy, socio-culture and technology (HASHIM, 2007). All these limits influence the possible application of supply chain management.

JITESH and DESHMUKH (2008) collected some characteristics of SMEs and the reasons to choose SCM that is introduced in Table 1.

Table 1: Characteristics of SMEs and reasons to choose SCM.

1. Flat structure	It is easier to implement and manage change. Leaders can decide independently regarding the development of supply chain metrics, ways of partnerships, performance indicators, and supply chain perspectives. The owner possesses the total authority to make decisions. There are less management levels and employee who are totally committed to the increase of business while making changes is not difficult. In case of big companies all these facts cannot be said.
2. Ability to innovate	SMEs are able to innovate and develop new products and services rapidly that reduces time and cost for the total supply chain. Small firms are usually engaged by big companies for their fundamental business characteristics. That is why SMEs use SCM as business strategy.
3. Size and flexibility	SMEs are more flexible thanks to their size and less number of managerial levels contrary to large companies. Because of this small organizations can improve the competitiveness of the total supply chain.
4. Information system and infrastructure	Nowadays many new information technologies help small businesses, too. Companies offer economical ERP solutions for SMEs in order to compete with the big organizations.
5. Low levels of organizational hierarchy	It is easy to make decisions with increased flexibility of change at any stage.
6. CEO involvement in operational decisions	The top management is committed that is inevitable regarding SCM as strategy.
7. Difference between actual demand and forecast	The use of information technology and collaboration can contribute to better information sharing, trust and transparency in the whole system.
8. Frequent changes to orders	Good relationship, understanding with customers can make planning process easier and more transparent that is one of the strength of small firms have in contrary to big ones.
9. Shorter manufacturing lead time	Shorter manufacturing lead time
10. High staff turnover	Supply chain management make working environment and culture better with simplifying business functions.
11. Customers' special demands	High degree of flexibility helps the supply chain both in effectiveness and efficiency.

Source: JITESH and DESHMUKH 2008

My third sub-objective is to gather the enablers, barriers to successful supply chain implementation and their effects on SMEs. Supply chain management can help SMEs in many ways, such as: in improving leaderships, strategy, waste reduction and procurement. SMEs can focus on collaboration. Practising SCM can contribute to the development of smaller firms in business strategy and core competence, it makes possible for the small firms to utilize their scalable competences in a cooperative network with the help of partners' assets. So supply chain management can improve the SMEs' performance in competitive market.

Taking into consideration all the facts in connection of SME sector, the smaller companies can rely on their strengths and accomplish the best from their weaknesses. Successful implementation of SCM has many critical factors, such as risk (probability of success), method (the approach adopted to balance value and risk), and visibility in the whole supply chain network. In addition, trust on supply chain partners, the involvement of the suppliers, distribution centres and other partners, required standards and skills can be the enablers of SCM. On the other hand, among barriers of SCM implementation the following factors can be mentioned: shortage in finance; high level of demand, high intensity of competition, shortage of managerial skills, absence of frameworks to build alliances among supply chain partners, IT is considered as a function and not as part of business strategy, lack of integrated information systems, and the shortage of tools to measure the effectiveness of a supply chain alliance. Moreover, SMEs have other weaknesses like their decreased capacity for using modern machineries, less scope for division of labour, higher cost per unit of output, incapacity to meet uncertainty, unutilized by-products, and poor storage and warehousing functions (THAKKAR et. al. 2008). Others identified some other barriers: lack of skilled individuals to drive supply chain development, lack of power in the supply chain, doubts, lack of interest through the supply chain to participate, lack of trust among supply chain members, lack of knowledge, geographical distance from customers and suppliers (MEEHAN and MUIR 2008). In order to adopt SCM it is essential to find the balance between strengths and weaknesses. Their ability of innovation helps them to balance the costs and time constraints (THAKKAR et. al. 2009). As smaller companies are operated and owned independently changes can be achieved easily. Their flat organizational structure and flexibility make SMEs well positioned in accepting and implementing changes. On the other hand, the norms and the attitude of the owner can have significant impacts on SCM strategy. The good and close relationships with the customers and suppliers can contribute to successful SCM concepts' implementation (MEEHAN and MUIR 2008). It is obvious that the strengths of SMEs can identify strategic challenges and opportunities of SCM in small businesses. Additionally, SCM can provide quality and leverage benefits for the SMEs. It makes possible some improvements, like better customer service, responsiveness, clarify business strategy and core competences. SCM practices can help in reducing cost, risk, product development cycle time, waste, procurement and inventory.

Referring to my main aim that how supply chain management contributes to the success of small firms I needed to examine the concept of supply chain management, to collect the most important characteristics of SMEs compared to large ones and to gather the enablers, barriers to successful supply chain implementation and their effects on SMEs. To summarize all the above mentioned factors I would highlight the fact that a small firm is not a small-sized large company. SMEs are totally different with special features. Because of their special features small businesses often get in disadvantageous situations against the big organizations. But on the other hand small firms have such kind of characteristics that make them essential for the economy and society at the same time. As I see supply chain management is a network with many participants involved in the chain. The participants can be manufacturer, supplier, retailer and customer, too. So the partners can connect to the supply chain directly and indirectly, too. As for the small businesses SCM is an approach that helps them to operate faster and more effectively by integrating the duties of separate partners at different levels. For SMEs to be part of a well-organized supply chain have positive and negative sides, too. Due to their small size and lower position SMEs usually cannot see the whole supply chain only a small part of it and thus they are referred to their chain partners. On the other SCM can give many potential advantages to small businesses. For SMEs collaboration within the supply chain may provide an opportunity to share risk that can be a good tool to improve their performance. Partnership with large, more experienced companies carry the potential for organizational learning that can stimulate the operation of small ones. Finally, in my opinion collaboration makes it easier for the members of the SMEs sector to access certain resources that are becoming more and more important today.

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SCIENTIFIC PAPER

DETERMINANTS OF JOB SATISFACTION AMONGST EMPLOYEES IN THE POULTRY SUB-SECTOR OF GHANA: A TEST OF EQUITY THEORY

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Abstract: *The study investigated the factors affecting job satisfaction amongst workers of the poultry sub-sector: a test of equity theory in the Dormaa Municipality in the Bono Region of Ghana. The multistage sampling technique was employed in collecting data from 100 poultry workers with the aid of a structured questionnaire. The logit model was employed in modeling the factors affecting job satisfaction. The empirical findings reveal that occupational level, pay, and relationships with co-workers were the statistically significant determinants of job satisfaction. Moreover, the study found that based on equity theory if poultry workers are satisfied with their pay, they would want to stay longer compared to referent others who are not satisfied. Benevolent poultry workers were dominant (52%), followed by equity sensitive (28%) and entitled (20%) poultry workers. Moving forward, the relevance of equity theory on workers in the cocoa value chain should also be investigated as cocoa remains a staple crop in Ghana.*

Keywords: *Equity Theory, Job Satisfaction, Poultry Sector, and Working Environment*
(JEL Code: Q10)

INTRODUCTION

The issue of what propels employees have called for more research in organizational behavior in the past 5 decades (Bolino and Turnley, 2008). As such, in the 1960s works on equity theory became eminent (Allen et al. 2005). However, equity could be substituted with inequity (Adams, 1963). Hence, Adams, (1963) propounded that a state of inequity exists when a person perceives that his input-outcome is not in line with the input-outcome of referent other. Besides an employee becoming satisfied with his job will depend on this input-outcome comparison. After the comparison is made the employee feels motivated to expend his time and effort in the organization if only he is equitably rewarded but if the comparison is otherwise he becomes dissatisfied with the work (Kingsley Westerman et al. 2007; Dugguh and Dennis, 2014). As a consequence, the state of inequity would culminate in high job dissatisfaction and dissonance (Kollmann et al. 2019). Accordingly, Allen and White, (2002) explained that dissatisfied workers as a result of the under-reward situations have several ways of ensuring their input-outcome is balanced. Therefore, according to Walster et al. as cited in Lapidus and Pinkerton, (1995) an employee could balance the input-outcome ratio by making alterations to his or her inputs or seek a pay increase (outcome), or comparing himself to a lower referent other to reduce sentiments of inequity, as well, the employee could resign from the organization. In consequence, it is worth noting that other current and extant works have extended equity theory into

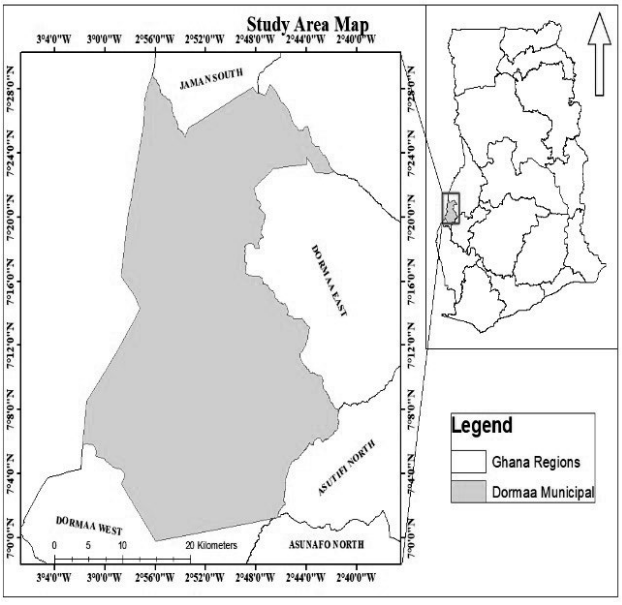
equity sensitivity (Mudrack et al. 1999; Allen et al. 2011; Oren and Littman-Ovadia, 2013) by categorizing employees into three distinct groups thus, benevolent, equity sensitive's, and entitled. Employees categorized as benevolent have the tenacity to work under conditions of low-reward whereas entitled employees demonstrate poor toleration to low-reward and would always fight for high-reward (Aggarwal and Bhargava, 2010). However, equity sensitive employees neither strive for over-reward nor tolerate under-reward, instead, they prefer a reward (outcome) commensurate to their input. Besides, worldwide several studies have been conducted on equity theory (Kingsley Westerman, 2013; Van Mourik, 2014; Lovegrove & Fairley, 2017). Despite the growing body of literature on equity theory, in Ghana and beyond no empirical study has examined the factors affecting job satisfaction amongst employees in the poultry sub-sector: a test of equity theory. This paper, therefore, seeks to address the research gap. Against this backdrop, it is indispensable to test equity theory on job satisfaction amongst workers in the poultry sub-sector, specifically Dormaa Municipality. The study highlights the relevance of equity theory on job satisfaction.

MATERIALS AND METHODS

Study area

Dormaa Municipality is situated in the western sector of the Bono and Ahafo Region. The municipality has an undulating topography that hikes beyond sea level between 180 meters and 375 meters (GSS, 2014). Since time immemorial, the area has been recognized as the leading producer of poultry products (Spent layers, broilers, and eggs) (Bannor et al. 2020). Therefore, making the economically active populace to consider the production of poultry as the main economic activity. Aside from poultry production, the cultivation of crops such as maize, vegetables, cocoa, and cashew dominates the municipality. Figure 1, show details on the area of study:

Figure 1: Map of Dormaa Municipality



Source: Author's Construct, 2020

Hypothesis for the study

According to Amissah et al. (2016), pay is a significant determinant of job satisfaction amongst employees in the hotel industry of Ghana. Likewise, in Northern Cyprus pay had a significant positive effect on job satisfaction amongst frontline workers in the hotel industry (Karatepe et al. 2003). Given the significance of pay to job satisfaction, we assume that pay could influence a poultry worker to stay or leave the organization after comparing his pay to a referent other in a similar organization. Therefore, the following hypothesis is proposed:

H_0: Based on equity theory, if poultry workers are satisfied with their pay, they would not want to stay longer compared to referent others who are not satisfied.

Ha: Based on equity theory, if poultry workers are satisfied with their pay, they would want to stay longer compared to referent others who are not satisfied.

Sampling technique and sample size

The multistage sampling procedure was adopted in this study. Firstly, Dormaa Municipal was purposively selected on the account of the predominance of poultry farmers (Mensah et al. 2020). Secondly, three communities, namely, Aboabo No.1, Kofi Asua, and Atesikrom were selected purposively as a result of the immense engagement in poultry farming. Thirdly, a list of poultry workers sourced from the Dormaa Poultry Farmers Association was used to randomly sample 100 poultry workers for the study. Purposely to give the respondent a fair chance of being included in the sample (Taherdoost, 2016). Although the sample size is relatively small it satisfies the central limit theorem. This states that a sample size ≥ 30 is appropriate for a standard normal distribution because as n (sample size) increases, the standard deviation decreases. Notably, in this case, the total population of poultry workers in the study area was not readily available and in so doing the sample size of 100 poultry workers was good for analysis. Moreover, 500 registered poultry workers were in the records of the Dormaa Poultry Farmers Association during the interview, yet currently, the poultry workers are around 700. As a result, should the approach of Yamane (1967) for determination of sample size be adopted (margin of error at 10%, roughly 83 poultry workers would represent the target population) indicating that the sample size of 100 poultry workers is suitable? Besides, a qualitative and quantitative research design was deployed in the study.

Concerning data collection, a period of two months (15th January -15th March 2020) was used. After pre-testing of the survey instrument, field assistants were trained on the effective administration of the instrument to aid reduce response errors to the barest minimum. The instrument covered socio-economic data, such as age, gender, educational level, years of experience, marital status, and off-farm job. The factors affecting job satisfaction included, pay, supervision,

job content, relationship with co-workers, promotion, and occupational level.

Logit model

This paper proposes that the decision to be satisfied with the job or otherwise is dependent on the utility that a poultry worker gets from working at the poultry farm. As a result, in the case of modeling, dichotomous variables the logit and probit models are employed (Hoetker, 2007).

The paper, presumes that the decision of a poultry worker to be satisfied with the job or not satisfied with the job is contingent on a utility index that is unobservable I*i, and depends on explanatory variables such as supervision, pay, job content, and relationship with co-workers. The index is expressed as:

$$Q^*_I = \beta x + \varepsilon_i \quad [1]$$

Where i = ith poultry worker, $\mathcal{E}$ = Error term, and β = Coefficient of the explanatory variables x = Explanatory variables.

However, the index that is unobservable is related to the genuine decision of being satisfied with the job or not being satisfied with the job by plausibly presuming that:

Zi = 1 (a poultry worker is job satisfied) if Q*i ≥ 0

Zi = 0 (a poultry worker is otherwise of the job) if Q*i ≤ 0

Thus, should a poultry worker's index utility I go beyond the level Q*, the worker would be satisfied but if it is less than Q*, that poultry worker will not be satisfied.

Making the decision operational, we presume that the probability to make a decision, thus the choice of being job satisfied (That is: Z = 1):

$$\Pr(Z_i = 1) = \Pr(Q^* \geq 0) = \Pr[(\beta x + \mathcal{E}_i) \geq 0] \quad [2]$$

$$= \Pr(\mathcal{E}_i \geq -\beta x)$$

The probability is contingent on the Zi probability distribution and in turn, depends on the error term, Ɛi probability distribution. Should the probability distribution be uniform throughout (zero) mean, then Eqn. 2 is expressed as:

$$\Pr(\mathcal{E}_i \geq -\beta x) = P(\mathcal{E}_i \leq \beta x) \quad [3]$$

Hence,

$$P_i = \Pr(Z_i = 1) = \Pr(\mathcal{E}_i \leq \beta x) \quad [4]$$

P_i is contingent on a specific probability distribution of $\mathcal{E}_i$.

The model presumes that the probability distribution of $\mathcal{E}_i$ follows the probability of the logit distribution, in our case, written as:

$$P_i = \frac{1}{1+e^{-Z_i}} \qquad \frac{P_i}{1-P_i} \quad [5]$$

Where P_i = probability of job satisfaction (That is: Z_i = 1) and

$$Q_i = \beta x + \mathcal{E}_i \quad [6]$$

The probability that Z = 0, (i.e. the worker is not satisfied with the job), is given by

$$1\text{-}P_i = \frac{1}{1+e^{Z_i}} \quad [7]$$

The probability that the worker is job satisfied against the probability that the worker is not satisfied with the job is expressed as:

$$\frac{P_i}{1-P_i} = \frac{1+e^{Z_i}}{1+e^{Z_i}} = e^{Z_i} \quad [8]$$

Where, $\frac{P_i}{1-P_i}$ = Odds ratio in favor of being satisfied with the job: the ratio of the probability that the poultry worker is job satisfied with the probability that the poultry worker is not satisfied with the job.

Natural logarithm of equation (8), specifies the logit model as:

$$L_i = In\left(\frac{P_i}{1-P_i}\right) = Z_i = \beta x + \mathcal{E}_i \quad [9]$$

The empirical model is specified as:

$$1n\left(\frac{P}{1-P}\right) = \beta o + \beta 1 Age + \beta 2 Education + \beta 3 EExperience + \beta 4 Marital\ Status + \beta 5 Occupational\ level + \beta 6 Pay + \beta 7 Supervision + \beta 8 Job\ content + \beta 9 Relationship\ with\ co\text{-}workers + \beta 10 Promotion + \mathcal{E}_i \quad [10]$$

Table 1, shows the variables used in the logistic regression analysis. 10 variables were employed in the analysis. These variables were subjected to two main sub-headings, particularly, poultry worker characteristics and farm characteristics. Job satisfaction was the dependent variable for the study. It is instructive to note that, promotion, relationship with co-workers, job content, supervision, pay, occupational level, and education was expected to positively influence job satisfaction. Nonetheless, Age, experience, and marital status were hypothesized to negatively influence job satisfaction.

Further, from Table 1, the average age for the poultry workers interviewed was 27 years. Again, the mean number of years the poultry worker had being educated is approximately 13 years, which implies that the majority of the poultry workers had gained secondary school education. The average experience of roughly 4 years was gained by the poultry workers. The mean value of 0.21 indicates that the majority of the poultry workers were not married. Besides, the occupational level for the poultry workers was low with a mean value of 0.27. The mean pay for the poultry workers was approximately Ghc 129.00 (US dollars 22.00) per month. The supervision of the poultry workers was bad (0.20). Likewise, job content was also bad, hence a mean value of 0.52. Relationships with co-workers and promotions were poor with an average value of 0.54 and 0.83 respectively.

Table 1: Description of Independent Variables Used in the Binary Logistic Regression

Variable	Description	Measurement	Expected sign	Mean	Std. Dev	Relevant literature
Dependent variable	Job satisfaction by poultry workers	1= Satisfied				
Job satisfaction		0= Otherwise		0.47	0.50	
Independent variables						
Demographic characteristics						
Age	Age of the respondent	Number	-	27.38	6.92	Bender & Heywood, (2006)
Education	Highest Educational level	Number of years in school	+	12.76	1.86	Metle, (2001)
Experience	Number of years in poultry farming	Number	-	3.74	1.32	Artz, (2010)
Marital status	Marital status of respondent	1= Married 0= Otherwise	-	0.21	0.41	Tarcan et al. (2017)
Occupational level	Highest occupational level attained	1= High 0= Low	+	0.27	0.45	Oshagbemi, (2003)
Farm characteristics						
Pay	Salary of the poultry worker	Ghana Cedis	+	128.90	30.48	Ellickson & Logsdon, (2002)
Supervision	Poultry worker level of supervision	1= Good 0= Bad	+	0.20	0.40	Rana & Agrawal, (2016)
Job content	Job content of respondent	1= Good 0= Bad	+	0.52	0.50	Rana & Agrawal, (2016)
Relationships with co-workers	Good relationships with co-workers	1= Yes 0= No	+	0.54	0.50	Čábelková et al. (2015).
Promotion	Poultry worker received a promotion	1= Yes 0= No	+	0.83	0.38	Tinuoye et al. (2016)

Source(s): Author's Construct, based on field data and literature review, 2020. NB: 1 US dollar = Ghc 5.80

RESULTS AND DISCUSSION

Table 2: Socio-Demographic Characteristics of Respondents

Variable	Frequency	Percentage (%)
Age		
10-19	7	14
20-29	31	62
30-39	8	16
40-49	3	6
50-59	1	2
Gender		
Male	43	86
Female	7	14
Educational Level		
None	7	14
Basic	15	30
Secondary	26	52
Tertiary	2	4
Years of Experience		
1-11months	16	32
1-5yrs	26	52
6-10yrs	5	10
>10yrs	3	6
Marital Status		
Single	33	66
Married	17	34
Off-Farm Job		
Yes	32	64
No	18	36

Source: Field Survey, 2020

From Table 2, The distribution of age shows that most (62%) of the poultry workers were within the age range of 20-29 years. Indicating a youthful dominance in the poultry sub-sector. Hence, the poultry workers in the study area are economically active. Accordingly, GSS, (2014) reported that individuals within the age bracket of 15-64 are active economically. Further, the result reveals that males (86%) predominate the poultry industry in the study area. Perhaps males are physically strong and active to engage in productive roles, while females are engaged in reproductive roles that attract fewer rewards unless the females are household heads. This phenomenon in the poultry sub-sector is consistent with Owusu-Sekyere, (2011) who revealed that poultry activities are carried out by males. Considering the educational level, 14% of the poultry workers had no formal education while the other workers had formal education between basic, secondary, and tertiary levels. These results could be based on the extensive use of manual or computerized bookkeeping system in the poultry industry (Amoabeng, 2011). Most of the poultry workers (52%) have experienced between 1 to 5 years with 32%, 10%, and 6% of the poultry workers having 1-11 months experience, 6-10 years of experience, and more than 10 years of experience respectively. Intrinsically, the considerable years of experience of the poultry workers in the poultry industry have a good prospect for the poultry sub-sector. From the results, 66% of the poultry workers were not married whereas 34% were married. Besides, the propensity of the unmarried poultry workers expending their pay on a household is low because they are still in their youthful age and not prepared for marriage. A total of 64% of the poultry workers affirmed that they have other jobs aside from the poultry work. These jobs included

being a mechanic, mason, and washing of clothes for some households as their secondary occupation. However, aside from the poultry work, 36% of the poultry workers indicated they have no other job.

Table 3: Logit Model Estimates of Factors Influencing Job Satisfaction

		Logit Regression	
	Coefficient	Standard Error	Marginal Effect
Poultry worker characteristics			
Age	-0.0277	(0.0329)	- 0.0069
Education	0.0983	(0.1397)	0.0244
Experience	0.3461	(0.1980)	0.0860
Marital status	0.1111	(0.6035)	0.0276
Occupational level	-1.3708**	(0.6258)	-0.3407
Farm characteristics			
Pay	-0.0293***	(0.0099)	- 0.0073
Supervision	-0.5540	(0.6339)	-0.1377
Job content	0.5455	(0.6138)	0.1356
Relationships with co-workers	1.4866**	(0.6314)	0.3695
Promotion	-0.1712	(0.7282)	-0.0426
Prob > Chi2	0.0030***		
Pseudo R2	0.1926		
Log-likelihood logit	-55.8170		
LR Chi2 (10)	26.64		

Source: Field Survey, 2020. ** 5% Significance level ***1% Significance level

From Table 3, the likelihood ratio statistic (LR) of 26.64 with 10 degree of freedom is statistically significant at 1%. Indicating that some of the factors affect job satisfaction. Consequently, age, education, experience, marital status, supervision, job content, and promotion have no statistically significant impact on job satisfaction. However, occupational level, pay, and relationships with co-workers were statistically significant factors influencing job satisfaction. In the study, the occupational level is negative and significant ($p<0.05$). This indicates that as the poultry worker increases in occupational level at the poultry farm the probability that he will be satisfied with the job is more likely to decrease by 34%. This is because, as his position at the job changes to a higher level, more tasks which are daunting, laborious, and herculean are assigned to him, however, work at the poultry farm is not easy it requires the economically active to be able to accomplish the task. In consequence, the poultry worker who has just experienced a change in occupational level becomes dissatisfied at the job. This result contradicts the study of Oshagbemi, (2003) who found a positive association between academic rank and job satisfaction. However, the result is consistent with Lee et al. (1981) that the occupational level was an important determinant of poultry worker's job satisfaction.

The pay was negative and significant ($p<1\%$). Implying that, an increase in the payment of salary to the poultry workers is likely to decrease their satisfaction at the job by 73%. This could be attributed to the fact that the salary of the poultry workers is relatively small, and if there is any pay rise it increases by a marginal amount which stifles the entrepreneurial behavior of the poultry workers and consequently translates into dissatisfaction with the job. Besides, every rational being makes rational choices, so if there is a marginal increase in pay at the workplace the motivation to work hard is observed as low vis-à-vis a substantial pay increase. The result is at odds with the empirical finding of Ellickson and Logsdon, (2002) and Chaudhry et al. (2011) who found a positive relationship between salary (pay) and job satisfaction.

Further, relationships with co-workers are positive and significant ($p<5\%$). This reveals that as relationships with co-workers increase the propensity of the poultry worker being satisfied with the job is more likely to increase by 37%. The plausible justification could be that at the job site the poultry workers could engage in a conversation with co-workers to release stress and as this continues emotional bondage is created. This bondage created proliferates job satisfaction since a sense of companion is felt between both parties. However, the results corroborate the findings of Čábelková et al. (2015) who revealed that relationship at the workplace has a positive influence on job satisfaction. Moreover, the result was in line with the empirical findings of Sowmya and Panchanatham, (2011) and Asegid et al. (2014) who revealed that the behavior of co-workers and group cohesion was a significant determinant of job satisfaction.

Hypothesis testing

Decision rule based on P-value:

If $P \leq \alpha$, reject H_0. If $P > \alpha$, fail to reject H_0. Significance level at 5%

From table 3, the P-value of pay was 0.003. Indicating that, $0.003 \leq 0.05$

Therefore, the null hypothesis is rejected in favor of the alternative, as there is sufficient evidence to indicate that the null hypothesis claim is false. Intrinsically, it is interesting to note that, based on equity theory, if poultry workers are satisfied with their pay, they would want to stay longer compared to referent others who are not satisfied.

Table 4: Reaction to Inequity after Comparing Input-Output to Referent Others

Equity sensitivity category	Frequency (No)	Percentage (%)
Benevolent	52	52
Equity sensitive	28	28
Entitled	20	20

Source: Field Survey, 2020.

Inequity results when the input-output ratio of an individual compared to the input-output ratio of others in similar working conditions are not equal. From table 4, 52% of the poultry workers indicated that they are "Content with the working environment" after sensing inequity in the organization. Moreover, 28% of the poultry workers reported that they would "Negotiate for a salary commensurate to their skills" and 20% of the poultry workers claimed they would "Negotiate for a raise in salary" or "Reduce input". Indicating that, there is dominance (52%) of benevolent poultry workers in the poultry sub-sector of the study area. At the same time, the proportion of equity sensitive poultry workers was 28% whereas 20% is entitled. The proportion classified as benevolent would always bring forth their full capacity at work regardless of pay, the entitled often strive for an increase in pay while the equity sensitive is fair and transparent poultry workers.

CONCLUSION AND RECOMMENDATION

The study examined the determinants of job satisfaction amongst employees in the poultry sub-sector of Ghana; a test of equity theory using data from 100 poultry workers. The determinants of job satisfaction were estimated using the logistic regression model. The logit model estimation reveals that job satisfaction is influenced by occupational level, pay, and relationships with co-workers. However, relationships with co-workers (1.4866) had an enormous effect. Indicating the pragmatic significance of relationships with co-workers on job satisfaction.

Also, the empirical findings revealed that the poultry sub-sector is predominated with benevolent poultry workers, followed by equity sensitive and entitled poultry workers. The preponderance of benevolent poultry workers suggests that the poultry industry can not entirely work with workers classified as equity sensitive and entitled. Based on the empirical findings of the study, owners and managers of poultry farms should consider relationships with co-workers as key to job satisfaction amongst the poultry workers. Moreover, a pay increment should be substantial to facilitate satisfaction with the job. It is further recommended that owners and managers of poultry farms should assign a few tasks to the poultry worker when there is a change in the occupational level. Adapting to this recommendation is likely to increase job satisfaction at the workplace. Notwithstanding, the impact of equity theory on workers in the cocoa value chain could also be investigated as cocoa remains a staple crop in Ghana.

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SCIENTIFIC PAPER

EMPOWERMENT OF RURAL WOMEN FARMERS AND FOOD PRODUCTION IN RATHNAPURA DISTRICT IN SRI LANKA: A HOUSEHOLD LEVEL ANALYSIS

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Abstract: *Women empowerment and gender equity are two significant aspects of the sustainable development of a country. As Sri Lanka is on the way towards sustainable development, this study was conducted to assess the situation of women farmers' empowerment and food production in Rathnapura district of the country. A sample of 300 women farmers was randomly selected for the study, from two selected Divisional Secretariat (DS) of Rathnapura district. Data was collected from a field survey using a pre-tested, self-administered questionnaire survey from April to July 2019. Empowerment was analyzed using the empowerment framework used by RAHMAN AND NAOZORE in 2007 in the study of "Women Empowerment through Participation in Aquaculture" with necessary modifications. Data analysis was conducted using descriptive statistics, correlation analysis and multiple linear regression analysis. Results revealed that majority of the women farmers were middle aged, married and had children. Furthermore, most of them had education up to secondary level. While average family size was four, average farm size was 1.25 acres. They had around 16 years of farming experience. The average monthly income of them was 25,000.00 LKR whereas 20% of it was from agriculture. The main sources of empowerment of women farmers were the Agrarian Service Center (55%) followed by village organizations/societies (30%) and microfinance institutions (26%). Furthermore, women empowerment index was 0.65. It is a moderate level of empowerment. However, there were women farmers under three categories of empowerment levels: low empowerment (4.1%), medium empowerment (58.5%) and high empowerment (36.1%). Out of the socio-economic factors; age, education, family size, land size, number of training programs participated, monthly income, experience in agriculture and number of organizations participated, education and number of training programs attended had significant and positive effect for the empowerment. Accessibility of credit facilities and agricultural extension program participation showed that there was a considerable impact on food production rather than the cultivable land size and utilization of modern farming technologies for food production. Therefore, proving of timely important agricultural education and training programs, enhance awareness level of modern farming technology utilization, better micro finance programs and agricultural credit facilities will be able to enhance the empowerment level of the women farmers of this area furthermore.*

Keywords: *Women empowerment, sustainable development, gender equity, farming activities, Sri Lanka*
(JEL Code: Q01, Q12)

INTRODUCTION

The women empowerment is a basic concept according to the Developmental Goals (DG) to the emergence of poverty alleviation programs in a particular country (IBHARHOKANRHOWA, 2016). Women empowerment is a process of enhancing the freedom of decision making within the family, access to assets and resources, social participation, freedom of mobility and spending ability (RAHMAN & NAOZORE, 2007). The potentials for agriculture accountable for the buildup of a proper avenue to unleashed the well-being of people through food production.

In Sri Lanka, more than half of the working population is constituted of women. But only about 18% share constitute as employed women from the total working age population. And also, the highest unemployment rate of women reported within the rural sector rather than the other sectors of the country. Sri Lanka is predominantly an agriculturally based country with 82% of the households still in the rural sector. Women constitute 50.7% of the Sri Lankan population are considered to be a valuable resource potential needed to be in the rural agricultural sector. Women contribution to agriculture is gradually increasing to the national economy. Most of the

Sri Lankan women are participated in agricultural sector rather than industrial sector (ANNUAL LABOR FORCE REPORTS, 2017). Measuring the empowerment status of rural women and food production is timely important to make future decisions for achieving the sustainable development related with Social, Economic and Environmental aspects. Most of the researchers are only focusing on measuring the women empowerment and diagnose the factors of behind the empowerment of women. But in this research mainly clarify about the women which engaging in farming activities how create deviation on agricultural sector through achieving the overall empowerment in the society. Rural women are highly contributed to the agricultural activities in Sri Lanka. But with most of them don't have necessary power and facilities to do the work well. In some households, men are working in cities. Women have to do household activities and also agricultural activities. If they have sufficient level of empowerment, they can contribute to rural development up to a significant level. However, it is necessary to identify the issues related to empowerment of women farmers. These are the key aspects which constitute the attention on this study. Therefore, this study was used to find out the situation of empowerment of women farmers and also what are sources of empowerment relevant to the women famers in the study area. Empowerment calculated by using five dimensions according to the literature findings relevant to the field of empowerment.

Food security and production in a global point of view

The concept of food security is a target goal of United Nations Sustainable Development which valid during the period of 2015 - 2030. Most of the developing countries have common critical issue, such as unavailability of foods for the consumption or food insecurity. According to the demonstrations of the World Food Conference, evidence that wide range of crop failures and disasters causes for food insecurity (FAO, 2018). MAXWELL AND SMITH (1996) recorded about the other factors which are responsible for food insecurity. such as,

- Shortages of agricultural production and supply.
- Problems associated with the employment and wages.
- Health and morbidity related problems.
- Market status and price fluctuations.

This observation brings in a broader thinking about food security including the accessibility to consume insufficient quantity or quality of foods within the society. Household level food security demonstrate about the availability of food structures within the households to eradicate the crises related to low level of food consumption of women and other family members (NEGIN et al., 2009). Food security is the availability of adequate amount of food and ability to access to the expected proportion of foods at right time by each and every individuals (IBHARHOKANRHOWA, 2016). The International Food Policy Research Institute (IFPRI) define food security based on the three sections, such as food production, food access and food utilization. Food security at household level refers to production of foods for their household consumption and earning additional revenue through selling of surplus to the market. But, rural women try to adapt to the latest opportunities and constraints regarding the production of foods while ensuring the adequate level of foods within their families (NEGIN et al., 2009).

Food security has been generally responsible to build up the sustainable development throughout the world. Because, United Nations already focused as a developmental goal in particular country.

Accessibility of modern farm technologies and food production

Farming is an aggregate concept which describing the entire process of crop cultivation: preparation of lands, planting, weeding, harvesting, and post-harvesting activities (IBHARHOKANRHOWA, 2016).

Women has less ability to participate in economic opportunities because they face a work related with social mission rather than the men. In most societies, women are responsible for most of the household supervision and caring and sharing of family members as well as rearing of small livestock. According to the FAO, 2015 report, Novel Sri Lankan Agriculture is suffering from several major problems. Such as,

- Low adoption of modern farming technologies
- Lower utilization of mechanization
- Higher level of cost of production and lower profitability
- Increases in post-harvest losses
- High amount of transportation cost
- Lower level of market-oriented products
- Poor level of value addition to primary agricultural products
- Low crop productivity
- Research & Development in central government
- Less priority to extension

For developing countries, more potential benefits associated with Contract Farming (BELLEMARE, 2015). Because farm scale tends to be small, farmers are consist with poor level of awareness about the agricultural activities, total agricultural production and utilization of management technologies are less efficient, and infrastructure facilities such as transportation of agricultural inputs and production, and poor flow of information within the supply chain, contracting with a large agribusiness firm may be the only way of farmers can access higher-end markets and receive beneficial returns from it (WANG et al., 2014).

Generally two types of farming technologies used,

- Local farming technology.
- Modern farming technology.

Local technologies obtain small-scale manner, conducted simple operations, lower cost and build up with indigenous materials. When considering about the modern technology, is consist with large-scale, higher operating cost, overall operational activities conducted as profit-oriented and maintaining with complex operations (IBHARHOKANRHOWA, 2016).

Extension service and food production

Rural economy basis with the Agriculture. Agricultural extension is the most prominent type of extension occurred in non-metropolitan areas (FAO, 2018). In other words, extension is a process related with an informal educational background focused toward the population in non-metropolitan areas. Extension process allows for several advices and dissemination of information to solve their existing problems. Extension aims to optimize the efficiency of the family farming activities, maintaining maximum level of food production and generally support to upgrade the standard of living and overall development of the farm family (IBHARHOKANRHOWA, 2016).

The basic objective of the extension is to build up a proper foundation for farmer's outlook by focusing their opportunities and threats. Extension is not centralized with physical and economic development of the non-metropolitan population. Agricultural extension agents, help to gain a sustainable development through disseminating knowledge with the rural people (FAO, 2018).

An improved information and knowledge flow within the agricultural sector support to improve the small-scale agricultural production and create a proper path way to optimize the production surpluses to the agricultural markets, increased rural livelihoods, optimizing quality and yield (MOJAKI & KEREGERO, 2019). Rural farmers obtain with a very few information regarding the agricultural sector, but innovative modern knowledge occurring in research institutions, universities, public offices and libraries consist with poor level of dissemination. It causes to build up the poor linkages between research, extension, not for profit and non-profit organizations, libraries etc. (LWOGA et al., 2011). Most of the developing countries are suffering from gender inequality focused under millennium development goals, cause to increase the knowledge barrier for the women farmers (QUISUMBING et al., 2014).

Access to credit facilities for food production

The demand for agricultural credit facilities are prevalent by the socio-economic factors in most of the non-metropolitan areas of developing countries (YADAV & SHARMA, 2015). Most of the low income farmers persuade to accessibility of credit facilities to minimize the financial hazards occurring with the fertilizer and agrochemicals in virtually all of the developing countries (REHMAN et al., 2015).

Research has provided a greater platform for the credit facilities to empower women in taking decisions within the household, having proper social networks, having proper access to financial and economic resources, more bargaining power with their husbands within the family and having considerable freedom of mobility. However, women still suffering from various difficulties for the accessibility of such kind of credit facilities. The major case of lower accessibility of credit facilities, the rural women has low level of literacy and dependent on their husbands for agricultural inputs (IBHARHOKANRHOWA, 2016). Agricultural credit obtains with the several credit vehicles for financing the agricultural transactions, including loans, notes, bills of exchange and bankers' acceptances etc. These types of financing methods are supported to the specific financial needs of farmers, which are determined by planting, harvesting and marketing operations. In other words, credit is regarded as a major factor for the both agricultural development and rural development (MARTIN et al., 2014). Low interest rates of credit facilities for the purchasing of agricultural productive inputs, deviations of a traditional practice (tenure farming). Therefore, to obtain a significant improvement in food production, good agricultural credit system is an essential requirement. The government policy makers are focusing to bloom the sustainable financial system for the development of the agricultural sector. It cause to build up the accessibility of credit and other financial services (including banking) to the rural farmers (WORLD BANK, 2019).

RESEARCH METHODOLOGY

This research was conducted in Rathnapura district of Sri Lanka where many agricultural activities are performed. Questionnaire Survey used as the primary data collection method. The respondents of the research were the women farmers in Rathnapura district.

Around 1200 women farmers obtained in Rathnapura district. Among them, 300 women farmers were randomly selected for the study. Two DS divisions were selected according to the base of the purposive sampling technique across the 17 DS divisions in the study area.

Pre-tested self-administrated structured questionnaire was used as the data collection instrument of the study. Descriptive statistics and regression analysis were conducted as the data analysis method using SPSS software version 23. A pilot study was undertaken with 10 copies of the questionnaire to avoid ambiguity in further data collection process.

Table 1: Measurement of selected empowerment dimensions

Empowerment Dimension	Number of indicators used	Assigned scores based on the selected responses	Possible score range
Decision making within the family	10	0 – No influence, 1– Low influence, 2– Moderate influence, 3– Full influence	0 – 30
Spending ability	10	0 – No ability, 1– Low ability, 2– Moderate ability, 3- Full ability	0 – 30
Access to resources	8	0 – No access, 1 – Low access, 2 - Moderate access, 3 – Full access	0 – 24
Freedom of mobility	7	0 – Not at all, 1 – Rarely, 2 – Occasionally, 3 – Frequently	0 – 21
Social participation	7	0 – No participation, 1 – Seldom participation, 2 – Occasionally participation, 3 – Frequent participation	0 - 21

A unit score was represented to make a comparison among the five selected measures of empowerment, by the following formula:

Formula 1: Unit empowerment score

$$\text{Unit score of empowerment} = \frac{\text{Mean score of a particular dimension}}{\text{Maximum possible score of the dimension}}$$

Formula 2: Overall empowerment

$$\text{Overall empowerment} = \frac{\text{Total empowerment}}{\text{Number of respondents}}$$

Formula 3: Empowerment Index

$$\text{Empowerment Index} = \frac{\text{Total empowerment}}{\text{Total score of dimensions}}$$

Seven variables were selected to identify the relationship of rural women's empowerment through participation in agriculture. Such as: age, education level of the respondents, family size, and size of the farm land, number of training attended, experience in agriculture, number of participated organizations of the village, number of extension services used and number of credit facilities used.

RESULTS AND DISCUSSION

Socio-demographic profile of respondents: The socio-demographic factors related with the women farmers obtain in table 2. All the respondents were women; therefore, gender variable is missing in the below data.

Table 2: Socio-demographic profile of respondents

Selected variable	No	%	Selected variable	No	%
Age			No of children		
20 – 29	14	4.7	0 child	9	3
30 – 39	45	15	1 child	56	18.7
40 – 49	93	31	2 children	133	44.3
50 – 59	81	27	3 children	85	28.3
60 – 69	54	18	4 children	27	9
70 – 79	13	4.3	5 children	5	1.7
Marital status			Level of education		
Single	8	2.7	No formal education	6	2
Married	279	93	Primary education	47	15.7
Widowed	13	4.3	Secondary education	242	80.7
Divorced	0	0	Tertiary education	5	1.7
Husbands occupation			Family size		
Farmer	125	41.7	1 member	8	2.7
Clark	22	7.3	2 members	17	5.7
Driver	41	13.7	3 members	133	44.3
Defense worker	19	6.3	4 members	89	29.7
Trader worker	55	18.3	5 members	31	10.3
Machine operator	13	4.3	6 members	15	5
Labor	25	8.3	7 members	7	2.3
Monthly income			Monthly income from Agriculture		
0 - 20000	25	8.3	0 – 20000	27	9
20001 – 40000	208	69.3	20001 – 40000	273	91
40001 - 60000	67	22.3	40001 - 60000	0	0
Husband's education			Savings (To purchasing of agricultural inputs for next cultivation)		
No formal education	8	2.7	0 - 1500	9	3
Primary education	41	13.7	1501 – 3000	13	4.3
Secondary education	247	82.3	3001 – 4500	187	62.3
Tertiary education	4	1.3	4501 - 6000	91	30.3

Source: Field survey May-June, 2019

As shown in the table 2, the average age of the respondents was 40 - 49 years indicating that they were matured adults, so they have ability of decision making when it comes to farming and other related household matters. Only 19.7% of the respondents were below 40 years. This is demonstrated from the findings as 4.7% belonged to the age group of 20-29 years. Consider as, less than 30 year's respondents are young 4.7%, in years between 30- 50 as middle age farmers 46% and more than 50 years farmers are adult farmers 49.3%. According to the findings highest value represent as adult farmers. Marital status, above table demonstrated from the findings as 2.7% belonged to the single, married category present highest value 93% among other respondents. But in questionnaire obtain other two categories. Such as separated and divorced. There was not obtain valid cases in respondent sample for these two categories.

Most of the respondents have only 2 or 3 children. No children obtain as 3%. Because of the 8 respondents were single and only 1 respondent in age 20-29 years they have not children. Respondents level of education, 80.7% of the respondents were obtain secondary education as highest category and pathetic situation behind these data, 2% of respondents were consist in no formal education category. Most of the husbands 82.3% of the respondents are obtain with secondary education, Primary education was 13.7%, and only 2.7% of husband have not formal education.

The statistics on family size revealed that 29.7% of respondents have 4 persons within the family, 10.3% was obtained as 5 persons, 44.3% consist with 3 persons, 5% occurred in 6 persons within their family. Monthly income, 91% of income obtain in Rs.20001-40000 highest income present category, Rs.0-20000 category was shows as 9%

According to the household income and expenditure report -2016 rankings,

0 -10000 income = Extreme poor,
10001- 20000 income = Poor
20001-40000 income = Lower middle income,
40001-60000 income = Upper middle income

Therefore, findings are indicated monthly income of the respondents and monthly income from agriculture obtain in lower middle-income category in the study area.

Sources of farm women empowerment: Analysis done by the using of Descriptive statistics-frequency analysis. Sources of empowerment variables are (a) Agrarian service center (b) village organizations/ Societies (c) Micro finance Institutions (d) Bank loans and loan providing institutions (f) Mass media (g) Neighboring farmers.

Table 3: An importance of the Sources for farm women empowerment

Selected Source	Type of source	No	%	Rank
Agrarian Service Center	Internal source	80	55.2	1
Micro finances Institutions	External source	44	30.3	5
Bank loans & loan providing institutions	External sources	38	26.2	6
Mass Media (TV, Radio, Newspaper)	External source	48	33.1	4
Village organizations/ societies	Internal source	75	51.7	2
Neighboring farmers	Internal sources	70	48.3	3

Source: Field survey May-June, 2019

According to the findings in the Table 3, most of the respondents are identify Agrarian Service Center activities have better support to their empowerment. Least supported organization is bank loans and loan providing institutions. Because 81.4% of women farmers are not willing to access credit facilities. But Agrarian Service Center is a better internal source and mass media is a better external source.

Table 4: Dimensions of Empowerment

Dimensions of Empowerment	Mean value of each variable respondents score	Level of Empowerment
Decision making ability within the family,	20.22	0.16
Family household expenditure Agricultural production activities Buying and selection of agricultural inputs Marketing of agricultural products Family health issues Education of children, Selecting and using family planning methods Constructing and repairing of houses Celebration of social and religious events Giving loans to others		
Spending ability	17.85	0.14
Spending money on agricultural activities, Expenditure on Medicare and health Sending money on children's education. Buying household food items Purchasing and selling of land and other assets Buying household furniture and other items Lending and borrowing money Providing financial help to others Spending money for social functions Making donations to charity		
Access to assets and resources	13.22	0.10
Access to family income and resources Access to land and farm lands Access to valuable instruments and machinery Access to a bank (e.g. having their own bank account) Access to credit facilities in institutions Ability to contact public services (health, nutrition, education etc.) Access to farm management and budgeting		
Freedom of mobility	14.75	0.11
Market place, Friends and relatives' houses outside the home village, Agrarian Service Center The neighboring houses Capital city Other districts Grama Niladhari office Religious places		
Social participation	16.67	0.13
Participation in training and education programs Participation in village organizations, meetings and arbitrations Participation in social functions such as marriage cultural programs, religious activities etc. Helping neighbors in crisis situations Working with people in emergency situations (such as natural disasters) Arbitration in the conflicts of neighbors and family Casting votes in local and national elections without outside interference.		

Source: Field survey May- June, 2019

Based on each dimensions,
Overall empowerment = 82.73
Empowerment Index = 0.65

According to the findings 58.5% of women were obtained in medium empowerment situation. Sample shows that 0% obtained in very low empowerment, 4.1% of respondents were indicated as low empowerment and 36.1% of respondents are high empowerment situation (Categories are based on the RAHMAN & NAOZORE, 2007)

Table 5: The contribution of five empowerment dimensions to overall empowerment score based on the stepwise multiple regression analysis

Model	Dimension entered	Multiple R	Coefficient of determination R2	Percentage of variation
1	Freedom of decision making within the family	0.871	0.756	75.6
2	Social participation	0.927	0.857	10.1
3	Access to resources	0.967	0.935	7.8
4	Freedom of mobility	0.985	0.970	3.5
5	Spending ability	0.99	0.99	3.0

Source: Field survey May- June, 2019

Among five dimensions, freedom of decision making within the family had been explained the highest percentage variation in the empowerment score. And also, spending ability showed the lowest percentage variation on the empowerment score.

Factors affecting women Empowerment: Analysis done by the using of Descriptive statistics and step wise multiple regressions analysis. Independent variables are age, education in years, family size, Land size, number of training attended, monthly income, experience in agriculture in years, number of participated organizations in the village, number of extension services used, number of credit facilities used dependent variable is empowerment score. Other factors which are relevant to the empowerment score, consider their relationship strong from the correlation coefficient (r) > 0.05.

Table 6: Relationship determination between the rural women's empowerment and selected predictable variables

Independent variable	Correlation coefficient (r)
Education	0.644
Size of the farmland	0.376
Experience in Agriculture	0.121
No of organizations participated	0.243
No of training attended	0.477
Age	0.307
Monthly income	0.136

Table 7: The variation of women's empowerment score to the selected predictable variables based on the stepwise multiple regression analysis.

Mode	Variable	Multiple R	Coefficient of determination R square	Percentage variation expressed
1	Education	0.734	0.620	62
2	No of training attended	0.779	0.601	60.1
3	Size of the farmland	0.793	0.536	53.6
4	Monthly income	0.799	0.628	62.8

Source: Field survey May- June, 2019

Monthly income of the respondents had been explained highest percentage variation as 62.8%, Education represent the 62% variation and number of training attended indicate as 60.1% variation. Therefore, monthly income, number of training attended, education and size of the farm land affect for the empowerment of person.

Impact of the cultivable land size and food production: Research findings were noted as 50.7% of respondents had less than 0.5-acre size of farm land and 2-acre size was the largest acreage of farm land that showed by the respondents 2.8% within the study. Cultivable land size and food production impact were assessed through the chi-square analysis. The P-value of Pearson Chi-Square value is 0.007 which is less than the significance level (0.05). And also, the relationship is moderate 68.7%, we conclude that there is an association between cultivable land sizes to the food production in the study area. Even though the farm land size increases food production may be less, the way of using agricultural inputs, farming experiences of the respondents, location of the farm land and soil structures and adequate agricultural extension services. According to the findings of the SRABONI at al., 2014 noted that household food security varies by the size of the farm land owned by the household.

Impact of utilizing modern farming technologies and food production: Most of the respondents had less than 1-acre farmland and utilization of modern farming technologies obtained as considerably very low in the study area. Therefore, hybrid seeds, hybrid seedlings, ploughing equipment and plant growth regulators were used as the modern farming technologies in the study area. Research findings showed that 53.3% of respondents utilize modern farming technologies while doing their cultivations and 46.7% of respondents were not use any kind of modern farming technique for their cultivations. Utilization of modern farming technologies and food production impact were assessed through the chi-square analysis. The P-values of Pearson Chi-Square value is 0.08 and Cramer's chi-square value 0.08 which is not less than the significance level (0.05). And also, the relationship is at lower level 38.7%, we conclude that there is not a considerable association between utilization of modern farming technologies to the food production in the study area. Based on the findings of the IBHARHOKANRHOWA, 2016; FAO, 2013 showed that utilization of modern farming technologies increases the quantity of food produced by the rural women farmers.

Impact of agricultural extension program participation and food production: Agricultural extension services are available for most of the respondents 62.1% in the study area, as only 39.9% of respondents were found to have not ever attended an agricultural training. Reasons were sought from other respondents on why they have not participated any agricultural extension training. There are four factors to justify their absence for the agricultural extension programs. Such as (a) Not registered in the any agricultural organization (b) Financial constraints (c) Not invited for any one (d) Not important to me (e) Not enough time. Among them most of the respondents 50.4% answered as not registered in any agricultural organization.

Agricultural extension program participation and food production impact were assessed through the chi-square analysis. The P-values of Pearson Chi-Square value and Cramer's V test is 0.000 which is less than the significance level (0.05). And also, the relationship is very strong (0.977), we conclude that there is an association between agricultural extension program participation and farmer education to the food production in the study area. Chi-square analysis of the relationship between Agriculture extension services accessibility and food production. But according to the ABBEAM et al., 2018; IBHARHOKANRHOWA, 2016 findings, agricultural extension services have impacted positively on food production capacity of rural women farmers.

Impact of credit accessibility and food production : Access to credit facilities was found to be low as only 18.6% respondents and many of those who did not access loan reported that they had fear of inability to repay 49%, the frustration that comes from the bank's demand for collateral 18.6%, and higher interest rate from the bank 28.3%. Most of the respondents among those who access loan facilities, reported as loan accessed before one year ago or two year ago. Because, most of the respondents find initial capital through bank loans. After that they keep savings to the purchasing of agricultural inputs to the next cultivation. And also, those access loan, 7.6% of respondents' highest category present as Rs.25000-50000. Rarely reported more than Rs.50000 loan amount. Impact of loan accessibility on food production revealed that all the respondents 11% who had obtained the loan for a period of one or more years reported increase in food production as less than double. 5.5% respondents reported as convert their food production double after the credit accessibility. Only 1 respondent indicate as increase their food production more than double. The other respondents reported as no increase from their loan without fully utilization of it. Because it has been less than a year ago. The women responded that lack of access to finance remains a considerable barrier to their food production as they need necessary funding to be able to purchase agrochemicals, fertilizers, pay for farm labor and so on. The results show that rural women farmers cannot increase to significant level of their food production even if they access to credit facilities.

Credit accessibility of respondents and food production impact were assessed through the chi-square analysis. The P-values of Pearson Chi-Square value and Cramer's V test

is 0.000 which is less than the significance level (0.05). And also, the relationship is very strong (0.954), we conclude that there is an association between credit facilities accessibility and food production in the study area. Based on the findings of the IBHARHOKANRHOWA, 2016; AINA, 2012 showed that accessibility of credit facilities increases food production among rural women farmers.

CONCLUSION

This study revealed that women farmers in Rathnapura district are medium empowered in their efforts in food production. Decision making ability within the family involves to contributing more weight to the empowerment than the other factors. Such as, spending ability, social participation, access to assets and resources and freedom of mobility. Other factors which are responsible for the empowerment are highlighted as education, monthly income and number of extension services participated. Under impact on empowerment, lower access to modern agricultural techniques engendered by improper institutional participation failures. They have not enough money to spend for the modern farming equipment and poor knowledge about the innovative agriculture.

However, When considering about the constraints regarding the empowerment of by women farmers as land ownership and accessibility aspects of it. Because most of the women farmers gain their farmland through their husbands. Accessibility of credit facilities and agricultural extension program participation showed that there was a considerable impact on food production rather than the cultivable land size and utilization of modern farming technologies for food production.

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SCIENTIFIC PAPER

INTERNATIONAL STUDENTS IN HUNGARIAN HIGHER EDUCATION

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Abstract: *Overall, higher education in Hungary is popular with students from abroad, even if there are significant differences in terms of its structure. The ever-faster increase in the annual headcount of the international student body serves as proof to this statement. The expansion of the size of the body of international students is of special importance in higher education since in 2016 the Hungarian government set the objective of having 40,000 international students by 2023 (EMMI, 2016).*

Numerous studies have been published on this topic, usually focusing on specific issues, including, for example, the countries from which we receive most of the students, the most popular majors, possible economic advantages due to the presence of a great number of international students, and how internationalization takes place in higher education in Hungary.

By means of processing data published by the Hungarian Educational Authority [Oktatási Hivatal], this paper aims to present the changes in the number of international students in Hungary over the past ten years. This also includes the discussion of the structure of these changes related to a variety of issues such as relations, types of institutions and their ownership, levels and types of programs, as well as gender proportions. However, even with this effort, the officially available statistics are suitable for presenting a properly detailed assessment of the situation only to a limited extent.

Keywords: *higher education, international students, Hungarian education*
(JEL Code: I23)

INTERNATIONAL STUDENTS IN HIGHER EDUCATION INSTITUTIONS

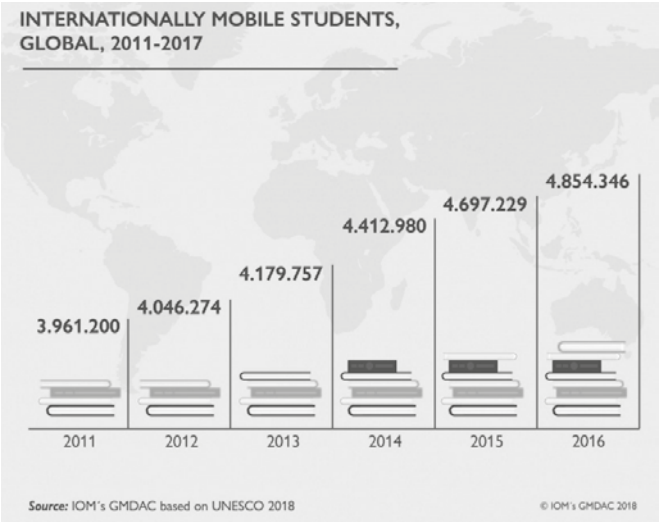
The number of international students[11] in higher education has been growing exponentially since the turn of the century – (Figure 1) [in comparison with 2 million students in 2000 [18]. there were over 5.3 international students by 2017), and according to forecasts, this number is expected to reach 8 million by 2025. This means that the value associated with studying abroad has been showing continuous, long-term increase. [8]

Some global factors may influence the future of higher education, affecting the operation of the institutions. Changes in the economy, on the labour markets, in the methods of learning, as well as an increase in the number of non-traditional students are just some of the market trends that may have an impact on the future of higher education.

Factors encouraging student mobility may also include demographic, economic, political and technological changes. According to statistical data, more than half of international students today are enrolled in programmes in six countries: the United States of America, the United Kingdom, Australia, France, Germany, and the Russian Federation. Countries from which most international students arrive include China, India, Germany, South Korea, Nigeria, France, Saudi Arabia and several Central Asian countries. The USA continues to be the most popular destination country; however, owing to its increasingly strict immigration policy in recent years, the number of international students is decreasing (Karzunina et al., 2017).

1 An internationally mobile student is "an individual who has physically crossed an international border between two countries with the objective to participate in educational activities in a destination country, where the destination country is different from his or her country of origin" [19].

Figure 1: Internationally mobile students, global, 2011-2017



The internationalization of higher education poses new challenges for institutions, resulting in fierce competition between them in many cases. National programmes of excellence, on the other hand, are increasing the differentiation of higher education and call attention to the best performing institutions. In the words of Wit et al. (2015), "the intentional process of integrating an international, intercultural or global dimension into the purpose, functions and delivery of post-secondary education, in order to enhance the quality of education and research for all students and staff, and to make a meaningful contribution to society." This indicates a clear intention whereby "internationalization cannot be a goal in itself, but needs to be directed toward quality improvement" (de Wit, 2020).

In the following, we will briefly review the factors and data characterising the five countries that receive the highest number of international students.

United States of America

In the United States, the number of international students, which was over one million in 2018/19, reached the highest level of all times for the fourth consecutive year. International students account for 5.5 percent of the higher education student population in the USA. [17]

International education is a sector that has been developing continuously, from the most popular subjects to the various services. Institutions that are able to keep up with frequently changing needs and can provide the education, research and service activities at a higher standard can maintain their advantage in the competition for enrolling international students.

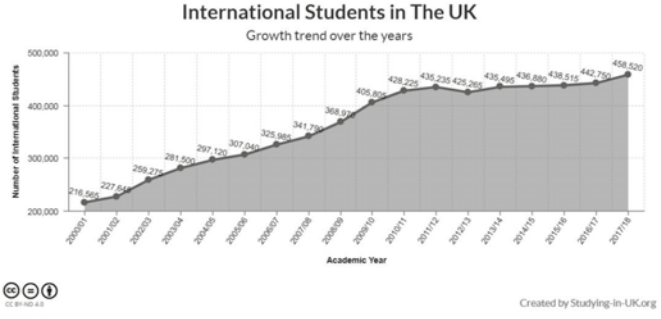
In the past 10 years, the USA has been able to increase the number of international students enrolled by 38.6%. Some further characteristics of international education in the USA [6]:

- Emerging economies dominate among the 25 countries from which most international students arrive.
- In the 2018/19 academic year, California, New York and Texas remained the three most popular destination states for international students. New York University is where most international students are enrolled.
- China, India and South Korea continued to be the most important countries of origin; the number of Chinese students increased by nearly 350% in 10 years (Report on Open Door, 2019).
- The most popular are the university, postgraduate and OPT[2] programmes. In the USA, more than half of international students pursued studies in STEM[3] education in the 2018/19 academic year. The most popular area was engineering, which accounted for approximately a fifth of all international enrolments (21.1%); at the same time, O'Connel and Resuli (2020) examined the challenges experienced by engineering students in the USA, the most significant of which were transfer credit issues, as well as overcoming language difficulties.
- What is behind such a marked increase in the number of international students is partly the decline in state appropriations for higher education, since students arriving from emerging economies mean a significant source of income for the institutions (Bound et al., 2020).
- Small and medium-sized American private universities in the USA allocate significant resources to assist international students arriving at different levels of preparation, in the form of courses before their starting their first terms (Shane et al., 2020).

United Kingdom

The United Kingdom is the second most popular destination country for international students. According to the official international enrolment figures (Figure 2), there were a total of 458,520 students enrolled at universities in the United Kingdom up to the 2017/18 academic year. At that point, international enrolments at British universities increased by 3.6% from the previous year. The newly enrolled students (247,685 persons) account for 54% of all students living in the United Kingdom. [12]

Figure 2: International students in the UK, 2000-2017



2 Optional Practical Training (OPT) is "a period during which undergraduate and graduate students with F-1 status who have completed or have been pursuing their degrees are permitted by the United States Citizenship and Immigration Services (USCIS) to work in the USA." [20]

3 STEM is a curriculum based on the idea of educating students in four specific disciplines (science, technology, engineering and mathematics) in an interdisciplinary and applied approach. Rather than teach the four disciplines as separate and discrete subjects, STEM integrates them into a cohesive learning paradigm based on real-world applications. [5]

Major important findings pertaining to international students:

- The five most important EU countries of origin of international students enrolled at universities in the United Kingdom are Italy, France, Germany, Spain, and Greece. Until 2017/18, there were 13,985 students from Italy, 13,660 from France, and 13,545 from Germany. [18]
- Until the 2017/18 academic year, a total 377,140 students attended university in England, 54,235 in Scotland, 21,350 in Wales, and 5,765 in Northern Ireland. The number of EU students reported by English universities was 108,335, followed by Scotland with 21,605, Wales with 6,640 and Northern Ireland with 2,565 students.
- The five most preferred subject areas of education for international students in the United Kingdom are business and administrative studies, engineering and technology, social studies, creative arts and design, and biological sciences.

The recent decades have seen a continuous increase for higher education institutions in the United Kingdom in terms of the enrolment of international students; however, on the basis of certain predictions, this tendency is likely to stop to be replaced by a decline. Higher education has its own limits, and public universities are not able to move to the second and third stages of internationalization, with the exporting of education being difficult to implement. Recent years already brought some surprises for a few British institutions because they were not able to reach their planned enrolment numbers, leading to financial difficulties (Healey, 2019).

Brexit, the withdrawal of the United Kingdom from the European Union, will also result in a decrease in the number of international students, since EU students will most likely not be eligible for student loans to cover their tuition fees (Chankseliani, 2017).

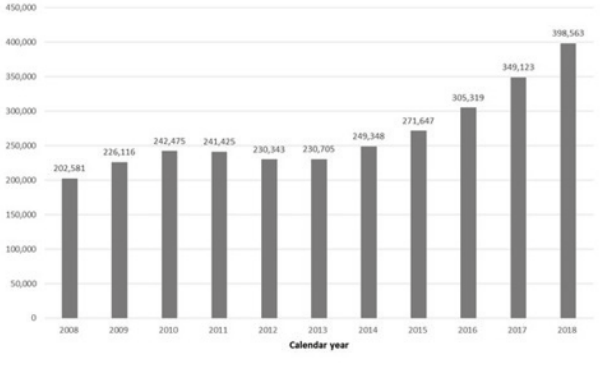
Australia

Australia is the third most popular destination country for international students worldwide, especially for those coming from the Asia-Pacific region. In 2018, a total of 395,563 international students were enrolled in institutes of higher education in Australia (Figure 3). [11]

According to the most recent annual report of OECD, international students account for 21% of the total student population in Australia, compared with the average of 6% in other countries. [10] In big cities across Australia, overpopulation is causing significant problems, which was attributed in the past to immigrants arriving with permanent visas; however, today this is rather the result of the arrival of international students and other holders of temporary visas (Birrell, 2019).

- In recent years, the biggest source of revenue increase for Australian universities was overseas student fees. [4]
- In 2017, 70% international students from the most popular countries of origin studied in Australian higher education institution. China, India, Brazil, Nepal and Malaysia are the top 5 countries.
- The states attracting most international students are New South Wales and Victoria.
- In comparison with the 27% share in case of OECD and partner countries, the proportion of new students entering undergraduate programmes in the area of STEM is lower in Australia (21%).
- Almost half of all enrolled students and one-third of doctoral students at Australian universities are international students, resulting in a very disproportionate exposure of the country's higher education to the foreign markets. [10]

Figure 3: International students in Australia, 2008-2018



Source: DoE, Basic pivot table 2015-2019, December 2018

France

Approximately 2.5 million students study in higher education in France. 12% of them are from abroad, making France the fourth most popular destination country for international students, as well as the number one non-English speaking country. In the 2017/18 academic year, there were 340,000 international students enrolled at universities in France, which is more than double of the number 15 years. [16] France enjoys this high level of popularity despite the fact that the country's political attitude to international students is quite peculiar, and for a long time, international students were only admitted on the basis of a strict selection process. At the same time, it is very attractive that after they are enrolled, international students enjoy the same social security benefits as their French counterparts, and they also have better opportunities to stay in the country and settle there (Levatino, 2018).

Universities in France award such national diplomas (bachelor's, master's and doctoral degrees) that have the same academic value. [3]

- It is hardly surprising that the number of international students from countries where French is an official language is particularly high (in the 2017/18 academic year, 39,855 students came from Morocco and 30,521 from Algeria). The top 10 countries also include Tuni-

sia (12,842 students), Senegal (10,974 students), Ivory Coast (8,085 students) and Cameroon (6,872), each of which were French colonies at times in history, resulting in French being an official language in these countries. The third largest group of international students are from China (a total of 30,072 students came to China to France in the 2017/18 academic year). From European countries, Italy sent the most students (13,341), followed by Germany (8,459), Spain (7,826), Portugal (5,091) and Belgium (4,798). [18]
- Most applications are submitted to Parisian universities, which is not surprising as there are more than 20 higher education institutions in the capital city, while in other French cities, one can select from a maximum of 3 institutions only.
- Much more students participated in master's (18%) and doctoral programmes (41%) than in undergraduate programmes. In terms of subject areas, the most dynamic growth was seen in the past 10 years in business and engineering programmes. [2]

Germany

According to the official data provided by the Federal Statistical Office of Germany, approximately 380,000 international students study in the country. [13] Tuition-free higher education and world-class professors are the chief factors of motivation in selecting a destination country for higher education. [14]

Currently, there are over one hundred accredited higher education institutions in Germany, including private and state universities. [13]

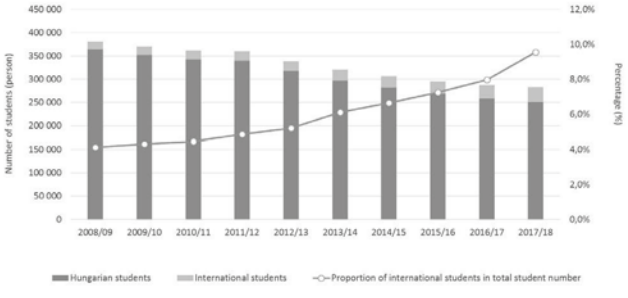
- Most international students come from China (27,765) and India (13,387), with Austria, another German-speaking country, in the third place (10,631). They are followed by Russia with 9,620 and then by France with 7,057 students. [18] In the patterns of international student mobility, Germany is an important destination country, since it is oriented towards Northern Europe and, via Austria, also towards South-eastern Europe (Kondakci, 2018).
- The most popular university is the Technical University of Munich, where nearly a third of all students are international students. The second most popular on the list is Ludwig Maximilian University of Munich, a university of undeniable reputation for its excellence of education, where 17% of the student population are international students. Ranking third is the Karlsruhe Institute of Technology, where the most popular programmes are in the subject areas of engineering, mathematics, law, economics and social sciences.
- In 2017, most international students at German universities were in engineering programmes (37%), followed by law, economics and social sciences (27%).
- In 2017, 36.5% of international students were enrolled in bachelor's, 36% in master's, and 10% in doctoral programmes. [14]

INTERNATIONAL STUDENTS IN HUNGARIAN HIGHER EDUCATION IN FIGURES

The internationalization of higher education is a dynamic process that is taking place all over the world. In an international comparison, the ratio of foreign or international students participating in Hungarian higher education is exceptionally high: the 2015 figure for the percentage of international students in higher education in OECD countries was 5.6%, while in Hungary, it was 8.9% (OECD, 2017). In the 2017/2018 academic year, one in 9 students was from abroad, while 10 years ago, this ratio was one in 23, whereas 15 years ago, it was only one in 32.

Figure 4 illustrates how the structure of Hungarian higher education was transformed during the course of 10 years and how it became dependent on international students in a certain part of institutions and programs (see later).

Figure 4: The number and proportion of Hungarian and international students in Hungarian higher education between 2008 and 2017
Source: Compiled on the basis of data from OH [Educational Authority]



During the ten-year time period between 2008 and 2017, there were 17-32,000 students of foreign nationality

Table 1: The number of international students in Hungarian higher education and its changes between 2008 and 2017

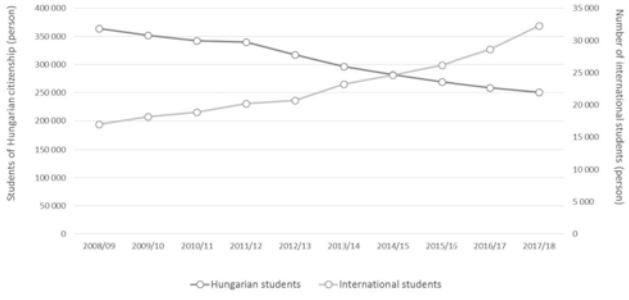
Number of students (persons)										
Denomination	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18
Total number of international students	16 916	18 154	18 850	20 176	20 694	23 208	24 598	26 155	28 628	32 309
Change (%)										
Compared to base year		7.3	11.4	19.3	22.3	37.2	45.4	54.6	69.2	91.0
Compared to previous year			4.1	7.8	3.1	14.9	8.2	9.2	14.6	21.8

Source: Compiled on the basis of data from OH [Educational Authority]

enrolled in Hungarian higher education institutions, which means an average of almost 23,000 persons. As compared to 2008, this figure increased by 91 percentage points by 2017, i.e., it almost doubled. This increase was sometimes rather uneven: scattered between the values of 3.1% and 21.8% in the individual years, but still steadily growing. (Table 1)

Within the headcount of the total number of students in Hungarian higher education institutions, the proportion of international students increased from 4.4% to 11.4%. As an annual average, this represents an increase of 7.2%. A key reason for the increase in the proportion of international students was the marked decrease in the number of Hungarian students: their number decreased by 25 percentage points compared to the base year (Figure 5)

Figure 5: The number of Hungarian and international students in Hungarian higher education between 2008 and 2017



Source: Compiled on the basis of data from OH [Educational Authority]

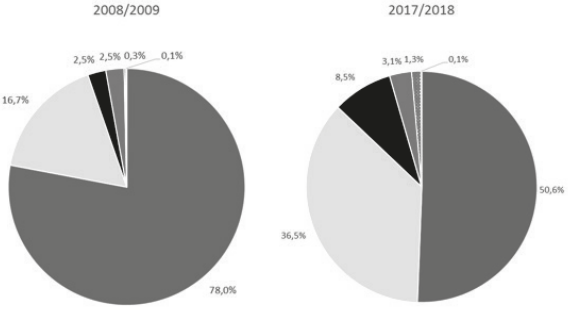
When looking at the trend of the changes in the total number of international students, we notice that the proportion of full-time students displays a continuous increase: compared to the 81% in 2008, it grew by 13 percentage points by 2017. This number, just like the total number, increased year by year but the extent of its growth from year to year was higher (scattered between 5% and 12%).

THE COMPOSITION OF THE INTERNATIONAL STUDENT BODY BROKEN DOWN TO CONTINENTS AND COUNTRY-GROUPS

In 2017, students came to Hungarian higher education institutions from as many as 161 countries[4]. This figure was the result of a 36.4 percentage-point increase in the course of nine years. Figure 6 shows the number of students participating in Hungarian higher education at the beginning and at the end of the time interval from the individual countries, broken down to group categories. The vanishing of the grey areas indicates how the early 61% "coverage of the countries of the world" grew to 80% (as compared to the total number of independent countries in the world).

The distribution of students by continents in the first and last year of the 10-year period respectively is demonstrated in Figure 7, which also displays the expansion of relations and the growth of the number of those coming from individual countries.

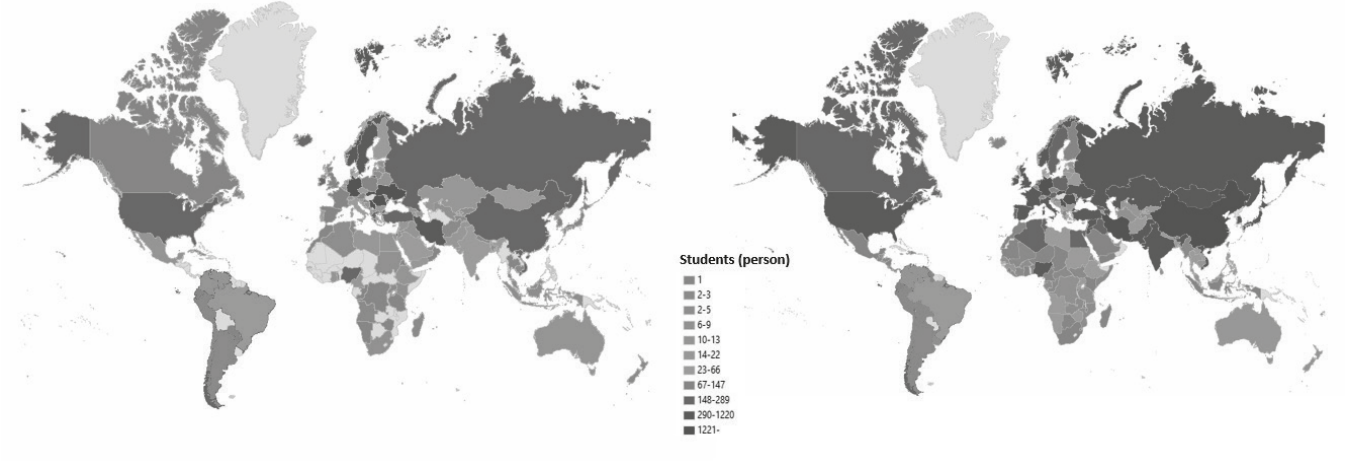
Figure 7: Distribution of international students by source continents



Source: Compiled on the basis of data from OH [Educational Authority]

4 As there were 3 persons of no specific citizenship and another 3 persons from the minor outlying islands of the USA among them, rendering 6 persons to individual countries was not possible.

Figure 6: International students in Hungarian higher education in the academic years 2008/2009 and 2017/2018, broken down to individual countries

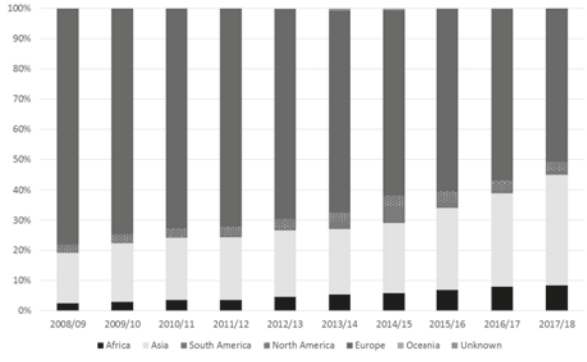


Source: Compiled by Attila Dobos (UD) on the basis of OH [Education Authority] data

In the 2008/2009 academic year, 78% of the international students participating in Hungarian higher education were the citizens of one of the countries in Europe. 16.7% of the students came from Asia, 2.5% from Africa, 2.7% from the Americas, and 0.1% of them from Australia and Oceania. A marked shift in proportions seems to have occurred by the end of the time period under scrutiny: the proportion of students from Europe decreased by 30 percentage points, while at the same time, the ratio of those coming from Asia grew significantly, by 20 percentage points; whereas the number of students from African countries also multiplied 3.5 times. This could happen through the increase of the absolute number of students in each category.

Figure 8 displays the "conquest" of Hungarian higher education by Asia on an annual basis. During the course of 9 years, the total number of international students grew by 15,393 persons, the distribution of which according to continents was as follows: Asia 58.2%; Europe 20.5%; Africa 15.0%; Americas 6.2%; Australia and Oceania 0.1%.

Figure 8: Distribution of international students according to continents, annually between 2008 and 2017



Source: Compiled on the basis of data from OH [Educational Authority]

Americas

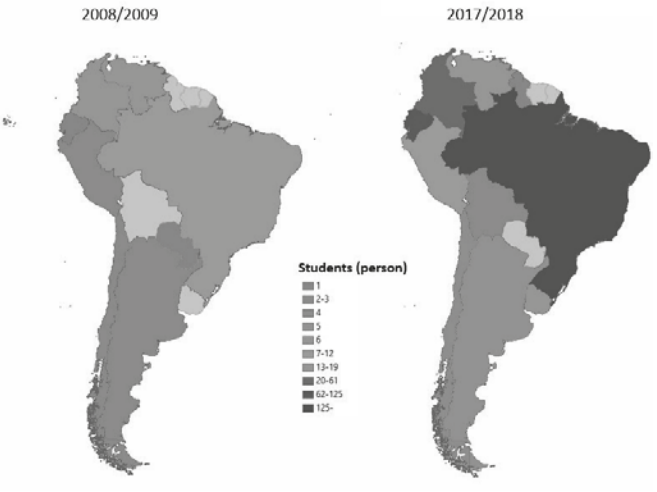
In 2008, students from North and South America came from a total of 12 countries, and this figure grew to 26 by the fall of 2017. In 2017, students out of 15 of the 23 independent countries of North America (65.2%) and 11 of the 12 independent countries of South America (91.7%) were enrolled in Hungarian institutions of higher education. (Figures 9-10)

As regards the overall amounts, the number of students coming from the American continent during the time period under scrutiny tripled.

Figure 9: The number of students from the North American continent and its changes by country

Source: Compiled by Attila Dobos (UD) on the basis of OH [Education Authority] data

Figure 10: The number of students from the South American continent and its changes by country

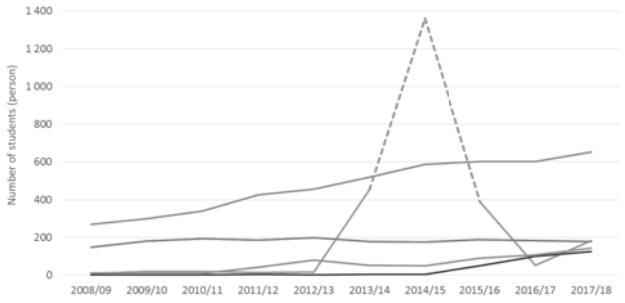


Source: Compiled by Attila Dobos (UD) on the basis of OH [Education Authority] data

As for distribution by country, in 2017, 46.1% of the students from the Americas came from the United States of America, 13.0% came from Brazil, 12.6% from Canada, 10.1% from Mexico, and 8.8% from Ecuador. Figure 11 displays the student trends in the case of these five countries.

- In the case of the United States of America, the growth in student numbers is continuous from year to year, and the 2008 figure of 270 students studying in Hungary grew almost 2.5-fold by 2017.
- In the case of Brazil, the base-year figure was only 9, which grew by the end of the 10-year time period to 184, showing more than a twenty-fold increase. The outstandingly high value in the fall of 2014 was due to the introduction of the scholarship program called Science Without Borders, which was the largest scholarship program of its kind supported entirely by the state. During the academic years 2013/14 and 2014/15, a total of 2,000 Brazilian students were enrolled in as many as 20 Hungarian higher education institutions. At that time, Hungary was the 10th most popular of the 40 host institutions [7].
- The number of Canadian students grew from 147 to 178.
- In the first part of the 10-year period, there were 11 students coming from Mexico, while in the last one, there were 143 people from that country in Hungarian higher education.
- The student number from Ecuador also kept growing year by year. In 2008, there was only one student, while by the end of the time period under scrutiny, there were 125 altogether. This increase was due to the Stipendium Hungaricum scholarship program, which was also facilitated by talks in held at the ministerial level about strengthening economic relations.

Figure 11: TOP5 countries of international students from North and South America between 2008 and 2017



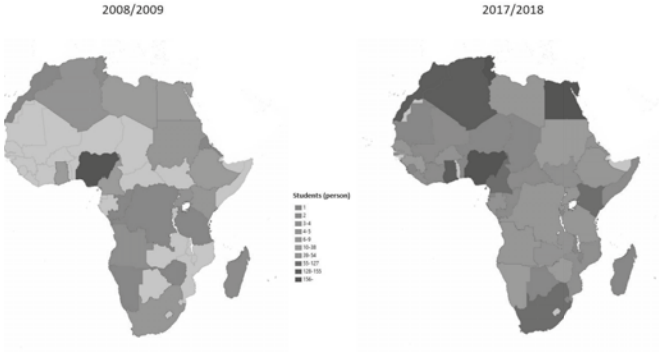
Source: Compiled on the basis of data from OH [Educational Authority]

Africa

While in 2008, students came to Hungary from 24 countries in Africa, by 2017 this number doubled. This means that 90.6% of the 53 independent countries of Africa send their higher education students to Hungary. (Figure 12)

The initial figure of 424 persons increased to 2,731 in 10 years. In the fall of 2017, 36.8% of African students came from Nigeria, 9.9% from Egypt, 8.7% from Tunis, 5.7% from Algeria, and 4.7% from Cameroon. This means that the top 5 countries sending the highest number of students are responsible for more than half of the student number overall from Africa.

Figure 12: The number of students from Africa and its changes by country



Source: Compiled by Attila Dobos (UD) on the basis of OH [Education Authority] data

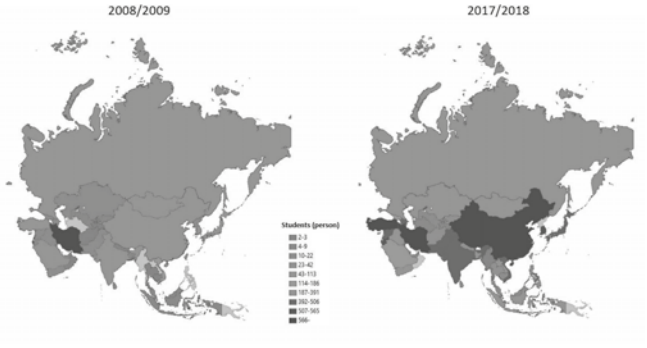
The Hungarian government has been financing the studies of foreigners in our country since 2013, through which it has multiplied its bilateral higher education contacts with respect to third countries. It is partly due to this effort that the number of students coming from Africa has grown more than 6-fold.

Asia

During the course of the past 9 years, the number of students coming from Asia has more than quadrupled with the annual increases scattered between the values of 7.7% and 32.8%. In the past decade, there have been numerous initiatives for establishing diplomatic relations with countries in Asia, which would partly explain the increase in the number of students from that region (Pusztai et al., 2016).

Even in 2008, we had students coming to Hungary from close to 90% of all of the independent countries in Asia, which percentage reached almost 100% by 2017. (Figure 13)

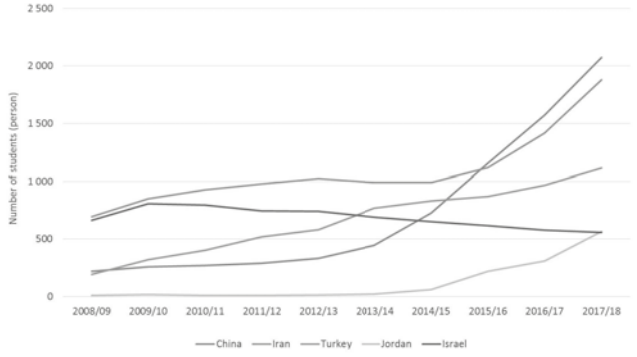
Figure 13: The number of students from Asia and its changes by country



Source: Compiled by Attila Dobos (UD) on the basis of OH [Education Authority] data

In the fall of 2017, 17.6% of the students from Asia came from China, 15.9% of them from Iran, 9.4% from Turkey, 4.8% from Jordan, and 4.7% from Israel. These five countries are responsible for more than 50% of the students from Asia. Figure 14 illustrates the chronological trends relevant to these five countries in Asia.

Figure 14: Student number trends from the TOP5 Asian countries during the 10 years preceding 2017



Source: Compiled on the basis of data from OH [Educational Authority]

The dynamic change in the student numbers from Asia began in the fall of 2014. The Stipendium Hungaricum scholarship, which was launched in 2013, brought students to Hungarian universities mainly from Eastern Asia, the Middle East and Africa under the aegis of the so-called “keleti és déli nyitás” [eastern and southern opening] strategy. In the framework of Stipendium Hungaricum, international students can spend two years in Hungary on scholarship. By 2017, the number of international students staying in our country on scholarships exceeded 5,000, with the largest numbers coming

to our universities from Jordan, China and Azerbaijan.

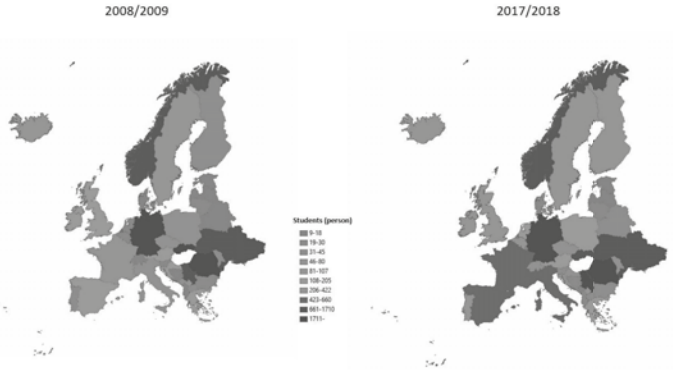
- The growth in the number of students from China is significant. In 10 years, the number of Chinese students in Hungary increased almost tenfold.
- While in the past 6-7 years, the number of students from Iran was notable, it grew suddenly during the past three years. In the time period under scrutiny, their number grew to two and a half times of the original number in the base year, which had been the highest from all five countries to start with.
- The number of students from Turkey increased every year, following a linear trend, and their original number grew six fold by 2017.
- It is notable how the number of students from Jordan grew in a decade: instead of the original nine persons, today there are 559 enrolled students. Their number, which had been stagnant until the 2014/15 academic year, started to grow drastically due to the launching of the scholarship program mentioned above.
- Considering Asia as a whole, students from Israel continue to represent a considerable contingent, yet Israel seems to be the single country out of the five where the student number showed a decreasing trend. As of 2009, the number of Israeli students dropped by almost one third of the original.

Europe

Another indicator of the internationalization of Hungarian higher education – in addition to the marked increase of the number of Asian students - is the growth of the number of students coming from other European countries.

In the fall of 2017, more than 50% of international students came to Hungary from one of the countries of Europe. The 2008 figure, which was about 13,000, grew by the end of the time period under scrutiny to 16,349 persons, which is an increase of 24.0 percentage points. In total, there are students coming to Hungary from as many as 39 European countries, which represents 88.6% of all the independent European countries. (Figure 15)

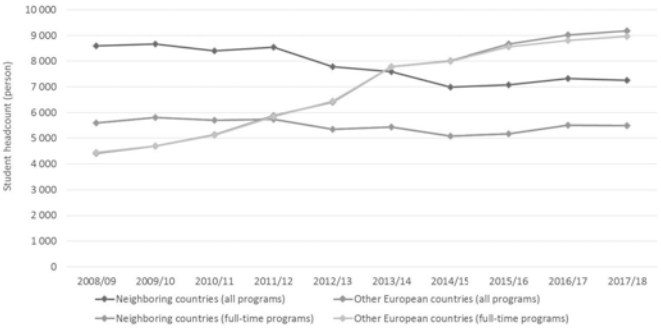
Figure 15: The number of students from Europe and its changes by country



Source: Compiled by Attila Dobos (UD) on the basis of OH [Education Authority] data

In the time period under scrutiny, 66% of the original 13,000 European students were from the countries neighboring Hungary. This ratio basically turned around by the end of the time period, by which time the number of citizens from non-neighboring countries reached 56%. The year when the two groups were more or less equal was 2013. (Figure 16)

Figure 16: International student figures from neighboring countries in Hungarian higher education between 2008 and 2017



Source: Compiled on the basis of data from OH [Educational Authority]

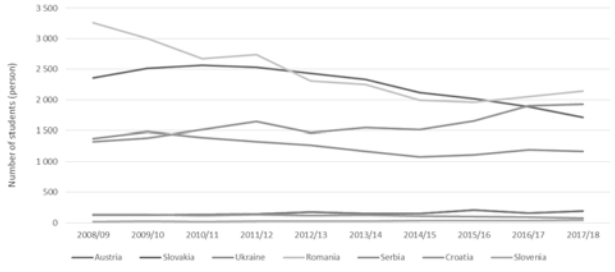
The trend is similar among full-time students: the 55.7% proportion from neighboring countries at the beginning of the period shifted by the end to 62% in favor of the non-neighboring countries. An equal ratio was already reached among full-time students in 2011.

In the 26.3 percentage point surplus of the students from all European countries, the neighboring countries contributed through a 15.5% decrease by the end of the time period, while the number of students from the other countries doubled. The number of full-time students increased by 43.9 percentage points. In this respect, the number of those from the neighboring countries decreased by around 2 percentage points, while the number of students from other countries doubled.

When looking at the data of the 10-year period broken down into individual countries, we see that 85% of the students come from the first 10 countries. In the fall of 2017, the largest group came from Germany (17.7%), with the runners-up being Romania (16.5%), Slovakia (15.2%), Serbia (10.8%) and the Ukraine (8.5 %), while the remaining countries among the top 10 were Norway, Spain, France, Sweden and Italy. In the fall of 2008, at the beginning of the survey, Iceland, Greece and Ireland were among the top 10, while Spain, Italy and France were only in the top 20.

A remarkable tendency in the past few years has been the decrease in the student numbers from Romania, Slovakia and the Ukraine, primarily because of slackening number of cross-border Hungarians. (Figure 17) Although their proportion among international students can still be considered sizable, it keeps decreasing from year to year.

Figure 17: Student numbers from neighboring countries in Hungarian higher education between 2008 and 2017



Source: Compiled on the basis of data from OH [Educational Authority]

The structure of the student body from neighboring countries during the 10-year period is made up of 3 distinct groups (Figure 18):

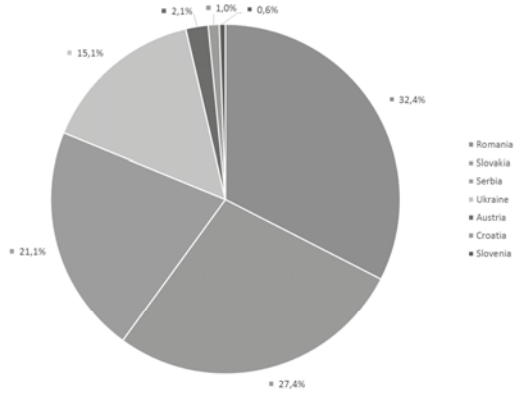
- one of which is made up of Romania and Slovakia, from where more than 20,000 students have come to Hungary in the past 10 years respectively;
- the second group comprises Serbia and the Ukraine (with the number of incoming students between 10 and 20,000);
- while the third group includes the remaining neighboring countries, from where significantly less students come to study in Hungarian higher education.

Figure 18: The number of students from neighboring countries and its changes by country

Source: Compiled by Attila Dobos (UD) on the basis of OH [Education Authority] data

Figure 19 shows the average distribution of students from neighboring countries for 10 years.

Figure 19: Distribution of student numbers from neighboring countries between 2008 and 2017



Source: Compiled on the basis of data from OH [Educational Authority]

Among the neighboring countries, Austria is worth mentioning for its special status. The number of Hungarian students in Austrian higher education increased almost by twenty percent in a year, which means that this is the most popular country among Hungarian students who plan to go to university abroad. While the number of Hungarian students here is higher than in Germany or in the United Kingdom [15], the number of students in Hungary from Austria grew only to a slight extent (from 123 to 193) during the 10 years surveyed.

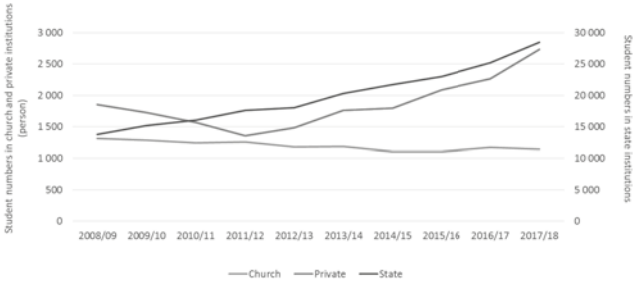
THE NUMBER OF INTERNATIONAL STUDENTS IN PUBLIC AND PRIVATE INSTITUTIONS

The major groups of institutions catering for the needs of international students correspond to the overall domestic structure of higher education in terms of ownership: the system consists of public, church and private-funded institutions.

During the course of the past 10 years, 86.7% of the international students enrolled in Hungary went to state-owned institutions, 5.2% to church-owned institutions, and 8.1% to privately-owned institutions. The share of the different institutions in establishing this ratio differed from one another both in terms of extent and in terms of tendencies:

- in 2008, the proportion of international students in institutions run by the state was 81.3%, and this grew to 88.0% by the end of the time period surveyed;
- the proportion in institutions owned by one of the churches shifted from 7.8% to 3.5%;
- whereas in the case of private institutions of higher education, the respective figures were 10.9% and 8.5%.
- This means that during the past 10 years, the proportion of international students who went to state institutions increased, while that of the international students who went to church or private institutions decreased. Figure 20 demonstrates the changes in student numbers in the background of the shifts in proportions.

Figure 20: International student figures according to the ownership of the institutions between 2008 and 2017



Source: Compiled on the basis of data from OH [Educational Authority]

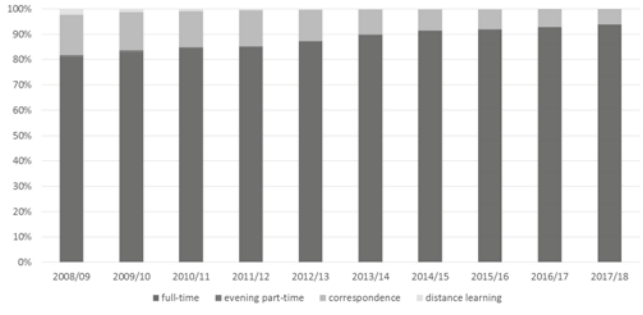
The figure shows that the number of international students in state-owned institutions doubled by the fall of 2017, while the number of those enrolled in church-owned institutions decreased by 13.3 percentage points, and there

was an increase of 47.3 percentage points in the number of international students studying in private institutions. In the last case, we also notice a continuous drop compared to the base year up until 2011 (a change of -26.6 percentage points), following which the number of international students doubled here by the end of the time period surveyed, with annually differing values.

FULL-TIME AND PART-TIME ATTENDANCE AMONG INTERNATIONAL STUDENTS

Similarly to the growth in the total number of international students, the full-time programs also play a decisive part in the transformation of student proportions according to program type in higher education. (Figure 21)

Figure 21: International student numbers according to program type between 2008 and 2017



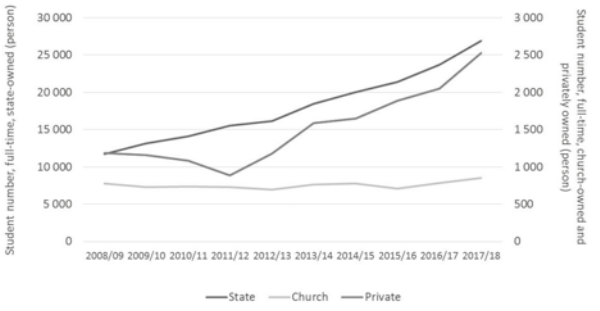
Source: Compiled on the basis of data from OH [Educational Authority]

Between 2008 and 2017, 88.7% of the total number of approximately 230,000 international students in Hungary attended courses full time. In 9 years, the overall headcount grew by a total of 90.1 percentage points, in which the full-time students played the key part through a more than double increase in their number. The categories of all the other types of programs displayed decreasing student numbers. Evening classes and distance learning practically lost most of their significance: the former dropped by half, while the latter shrank tenfold. The number of international students participating in correspondence education contracted by 28.2 percentage points, after an initial increase in their number up until 2011, which was then followed by an annual cutback from the original circa 2,700 students to 1,900.

When examining the types of programs and the operational structure at the same time, we notice a marked difference by type of ownership: the institutions offer a range of possibilities, while the students go for different services. The process worked as follows:

- Full-time education is of primary importance for every one of the owners, although not equally so. In this respect, state institutions are especially decisive: their average figure for the proportion of full-time students during the entire time period was 90.9%. The same proportion in the case of church-owned institutions was 62.9%, while for private institutions it was 81.8%. As regards the tendency, it is clear that the expansion of full-time student numbers was the largest in state-owned institutions, which were followed by private institutions, and the lowest growth was experienced in church-owned institutions. In the case of private institutions, however, the number of students declined up until 2011, only to grow almost threefold by the end of the time period surveyed. (Figure 22)

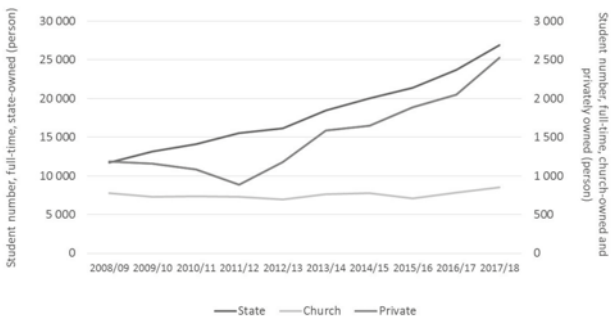
Figure 22: The number of full-time international students by type of ownership between 2008 and 2017



Source: Compiled on the basis of data from OH [Educational Authority]

- Out of the four types of programs, correspondence education is the second most popular, although the proportion of students participating in this kind of education decreased in the case of all three types of owners. The average proportion of correspondence students for 10 years was the lowest in state-run institutions: 8.4%, which started out at the beginning of the surveyed time period at 13.0% to drop to 5.1% by the end of it. The proportion of correspondence students was the highest in church-owned institutions: 35.7%, which dropped from 39.3% to 24.4%. The average for private institutions was 15.5%, which started from 21.7%, and dropped back to 7.4% by the fall of 2017. All in all, the number of correspondence students decreased by almost 30 percentage points, which was the slightest in the case of state-owned institutions (18.2%), while in private and church-owned institutions, the number of students dropped to almost half of the original figure. (Figure 23)

Figure 22: The number of full-time international students by type of ownership between 2008 and 2017



Source: Compiled on the basis of data from OH [Educational Authority]

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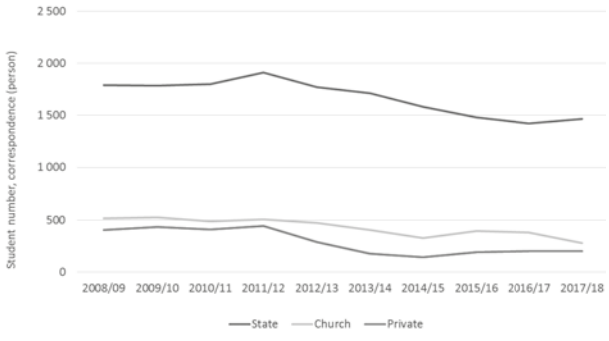
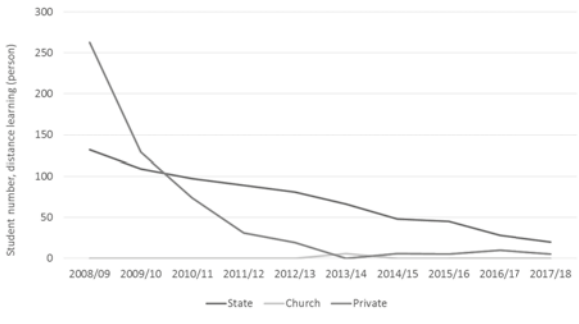
Figure 23: International student figures in correspondence education by type of ownership between 2008 and 2017



Source: Compiled on the basis of data from OH [Educational Authority]

– Distance learning is available at present only in state and private institutions, with average figures for the 10 years at 0.4% in state-owned institutions and 2.9% in private institutions. Distance learning, in a way similarly to correspondence education, is practically getting close to being phased out. (Figure 24)

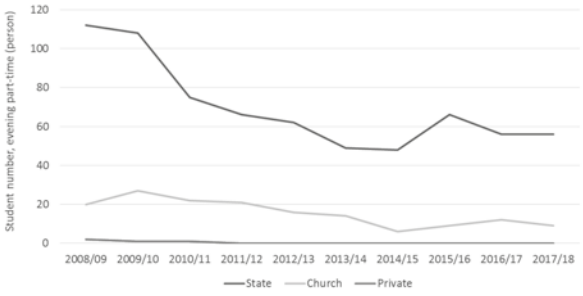
Figure 24: International student figures in distance learning by type of ownership between 2008 and 2017



Source: Compiled on the basis of data from OH [Educational Authority]

– The lowest number of students participate in part-time education (referred to as evening program). The decisive actors in this scene are also the state-owned institutions, while in the case of private institutions, this type of program has not been available since the 2011/2012 academic year. Overall, there was a general decrease of participants in evening part-time education both in state-owned institutions and in church-owned institutions, with varying degrees of fluctuation. (Figure 25)

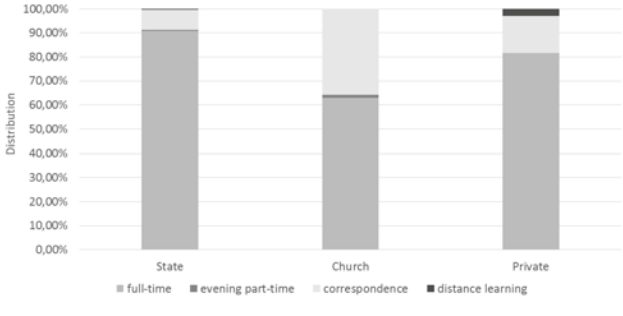
Figure 25: International student figures in part-time education by type of ownership between 2008 and 2017



Source: Compiled on the basis of data from OH [Educational Authority]

Figure 26 shows the 10-year average of the operating structure figures by type of ownership. The full-time percentage for international students in state-owned institutions is 90%, which is higher than the average 78.5%, while in the case of the other two types, it is 63% and 82%, respectively. The average part-time figure is 0.6%, which is higher only in the case of church-owned institutions, as there is no such possibility available in private institutions any longer. The average proportion for correspondence education is 19.6%, which is the aggregate of the state-owned 8.4%, the church-owned 35.7%, and the privately owned 15.5% figure. Last, the distance learning average percentage of 1.1% is a composite of the higher proportion in private institutions (almost 3%) and the lower figure in state-owned institutions (0.36%), while there has been no such format of education in church-owned institutions since 2014.

Figure 26: 10-year average of the operating structure of programs according to type of program by ownership

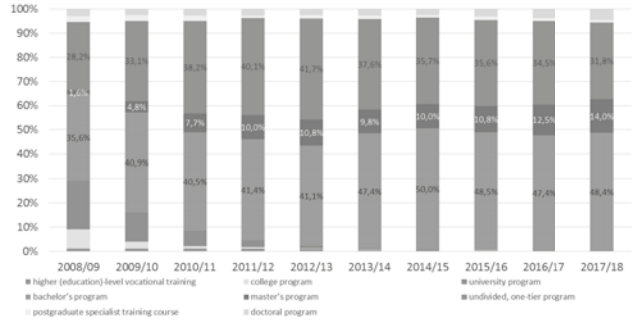


Source: Compiled on the basis of data from OH [Educational Authority]

INTERNATIONAL STUDENT FIGURES BY PROGRAM LEVEL

The number of students at various program levels changed due to the so-called Bologna process. On average, most international students took BA or BSc courses in the past 10 years, but undivided, one-tier (combined bachelor's and master's) programs were also popular. Figure 27 illustrates the breakdown of student numbers in the time period surveyed according to different program levels.

Figure 27: Distribution of international student numbers by program level between 2008 and 2017



Source: Compiled on the basis of data from OH [Educational Authority]

On the basis of Figure 27, the following observations may be made:

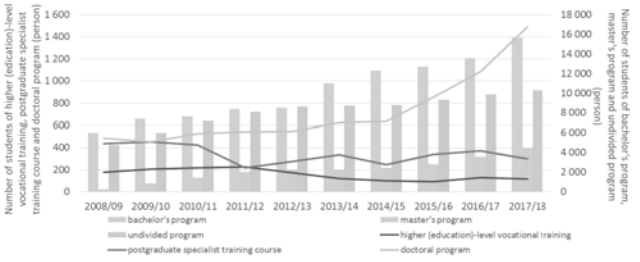
- The number of students participating in traditional college and university programs continuously decreased as a matter of course, and in the 2017/2018 academic year, there were no such international students at all.
- Parallel with the above process, the expansion of bachelor's and master's programs can be observed. In the case of the former, the proportion grew from 35.6% to 48.4%, and in the case of the latter, from 1.6% to 14.0%.
- The share of undivided, one-tier programs did not show significant differences at the beginning and at the end of the time period surveyed, and the average proportion for the 10 years was 35.6%.
- The average proportion of those involved in higher-level vocational training was 0.7%, which fluctuated between the initial 1.0% and the final 0.3% to a variety of extents.
- The proportion of postgraduate specialist training course participants was 1.5%, which kept moving between 2.5% and 1.5% during the 10-year period, displaying a decreasing tendency.
- The average proportion of those participating in doctoral programs was 3.1%, which moved between 2.8% and 4.1% with an increasing tendency.

All in all, in an international comparison – as it has been pointed out above – it is clear that the proportion of international students in Hungary is higher than that of the average of OECD-countries (OECD, 2017). Primarily, this is the consequence of students participating in bachelor's and master's programs. In doctoral programs (despite the above tendency, at least, for the time being) this proportion is lower.

The changes in the student figures at different program levels available in the 2017/2018 academic year is shown in Figure 28.

- Student numbers decreased at two program levels: in higher education vocational training and in postgraduate specialist training. The extent of change in case of the former was 34.5 percentage points, while in the case of the latter, it was 31.2 percentage points.
- In the case of the other program levels, which started out at a significantly different base value, the largest increase was achieved by those participating in master's programs, whose number grew by the end of the time period 16.5-fold (their base value had been the lowest). The number of those enrolled in doctoral programs tripled, while the number of participants in bachelor's programs increased 2.5-fold, while the number of those in undivided programs doubled.

Figure 28: Distribution of international students according to program levels between 2008 and 2017



Source: Compiled on the basis of data from OH [Educational Authority]

Between 2008 and 2017, 88.7% of students in Hungarian higher education were full-time students; the features presented above showed similar trends in the case of those involved in full-time studies.

INTERNATIONAL STUDENTS IN VARIOUS TYPES OF PROGRAMS

When examining data about international students, we differentiate between data concerning mobilities for earning a degree (degree mobility) and mobilities for earning individual credits (credit mobility). The former involves studying abroad for the duration of an entire program, while the latter means a few semesters spent in a foreign country (Berács et al., 2017).

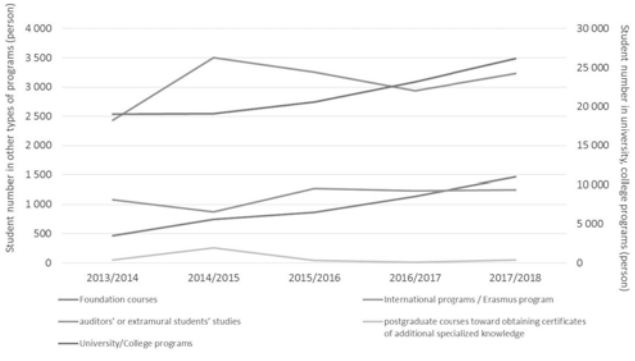
The international student figures registered by the Hungarian Educational Authority include (in this chapter, we are going to call these "types of programs"):

- university and college students enrolled in higher-level vocational training, postgraduate specialist training, bachelor's programs, master's programs, undivided programs, and in doctoral programs;

- students participating in foundation courses;
- participants in programs related to international projects,
- students pursuing extramural studies as auditors, and
- (post)graduate students working toward obtaining a certificate of additional specialized knowledge.
- Relevant data can be presented for the past 5 years, given the fact that OH has collected data in this area according to a different methodology since 2013.
- On the basis of data covering 5 years, on average,
- 80.5% of international students participate in Hungarian higher education at any program level,
- 11.4% are enrolled in programs called "Nemzetközi program képzése / Erasmus képzés" [International programs / Erasmus program],
- 4.2% pursue studies as auditors or extramural students,
- 3.5% take part in foundation courses, and
- 0.3% work toward obtaining certificates of additional specialized knowledge.

78.4% of the increase of more than 9,000 persons is related to students in traditional programs, 10.9% to those in foundation courses, 8.7% to participants in International programs / Erasmus program, and 1.9% to auditors or extramural students. (Figure 29)

Figure 29: International student figures according to type of program between 2013 and 2017



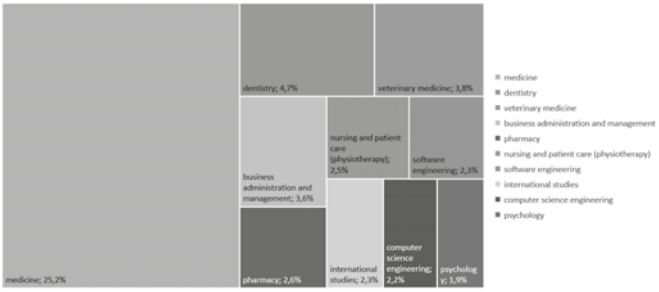
Source: Compiled on the basis of data from OH [Educational Authority]

- In the case of postgraduate courses for obtaining certificates of additional specialized knowledge, the same number of students was involved at the beginning and at the end of the 5-year period surveyed, but there was some annual fluctuation in the years in between. By 2014, the number of students in this field grew more than five-fold, and then it dropped to the 2013 level, which was followed by further decrease (practically, there were no more students left), and by the fall of 2017, the student number was the same as it had been in 2013.
- The number of auditing or extramural students decreased by 2014, and then it grew beyond the original level only to stay stagnant for the past 3 years.
- In the case of International programs / Erasmus program, the student number shows an annual fluctuation, following a similar tendency to that of those involved in postgraduate courses for obtaining certificates of additional specialized knowledge.
- The most significant change occurred in the case of students taking foundation courses, whose number rose more than three-fold with differing annual values of increase.
- The number of those enrolled in university/college programs has displayed a more or less linear increase since 2014.

THE MOST POPULAR MAJORS AMONG INTERNATIONAL STUDENTS

We have also examined the most popular majors in the 2017/2018 academic year. Figure 30 shows which 10 majors were chosen by the highest number of international students, as well as the ratio of their number compared to the total number of students in the given major. The list of majors contains 677 records this year.

Figure 30: The 10 most popular majors in 2017/2018



Source: Compiled on the basis of data from OH [Educational Authority]

Studying medicine is the most popular major among international students: about 30% of the total number is enrolled in medicine and dentistry. The third place goes to veterinary medicine with a 3.9% share, followed by business administration and management at 3.7%. The TOP 10 list also contains other majors related to healthcare: pharmacy (the 5th most popular at 2.6%), as well as nursing and patient care (the 6th most popular with 2.5%). The list continues with software engineering and international studies (both at 2.3%). Among engineering majors, the presence of international students is the most notable in computer science engineering (9th with 2.2%). The last major in the TOP 10 list was psychology (1.9%).

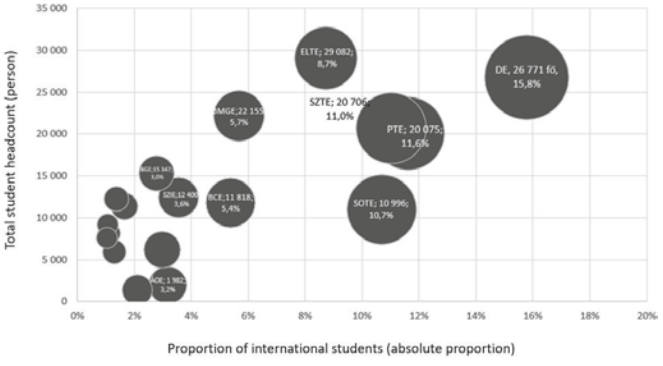
In an international comparison, the proportion of international students stands out in healthcare and medicine as well as in veterinary medicine, while it is lower in the fields of sciences, the humanities and social sciences (OECD, 2017).

HIGHER EDUCATION INSTITUTIONS IN COMPETITION FOR INTERNATIONAL STUDENTS

Figure 31 shows the ratio of international students in Hungarian higher education institutions compared to the total number of international students in the 2017/18 academic year.

The figure contains data about the institutions where this absolute proportion is higher than 1%. The first four places in the list go to institutions where medicine is offered, which is not surprising, given the fact that on the basis of the most popular majors it is clear that more than 30% of the students study medicine and dentistry. Among the four universities, Debreceni Egyetem (DE) [University of Debrecen] attracts the largest number of international students (15.8%), followed by Pécsi Tudományegyetem (PTE) [University of Pécs] (11.6%); while the third place goes to Szegedi Tudományegyetem (SZTE) [University of Szeged] (11.0%) and the fourth place is taken by Semmelweis Egyetem (SE) [Semmelweis University] (10.7%).

Figure 31: The 10 most popular higher education institutions among international students in 2017/2018



Source: Compiled on the basis of data from OH [Educational Authority]

In Table 2, in addition to the absolute proportion, we also show the proportion of international students within the institution itself.

Table 2: The number and proportions of Hungarian and international students in Hungarian higher education in 2017

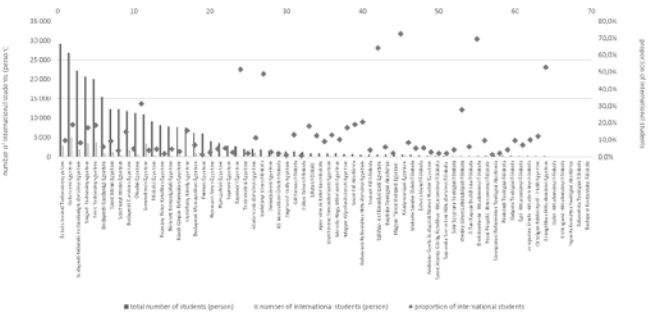
Name of institution	Total number of students (person)	Absolute proportion of international students (%)	Proportion of international students within the institution (%)
Debreceni Egyetem (DE)	26 771	15.8%	19.0%
Pécsi Tudományegyetem (PTE)	20 075	11.6%	18.6%
Szegedi Tudományegyetem (SZTE)	20 706	11.0%	17.1%
Semmelweis Egyetem (SOTE)	10 996	10.7%	31.3%
Eötvös Loránd Tudományegyetem (ELTE)	29 082	8.7%	9.6%
Budapesti Műszaki és Gazdaságtudományi Egyetem (BMGE)	22 155	5.7%	8.2%
Budapesti Corvinus Egyetem (BCE)	11 818	5.4%	14.7%
Szent István Egyetem (SZIE)	12 400	3.6%	9.2%
Állatorvosi Egyetem (ÁOE)	1 982	3.2%	51.5%
Budapesti Műszaki Egyetem (BME)	6 178	3.0%	15.5%
Budapesti Gazdasági Egyetem (BGE)	15 347	2.8%	5.8%
IBS	1 387	2.1%	48.9%
Óbudai Egyetem (ÓE)	11 355	1.6%	4.6%

There is only one private institution among the top 10 most popular institutions: Budapesti Metropolitan Egyetem. The rest of the universities are all state-owned.

Among our institutions of higher education, there are huge differences concerning the number of international students. Three quarters of international students is concentrated in nine institutions (i.e., 14.1% of all the institutions, and 15.5% of the students enrolled here). Typically, the largest groups of international students in Hungary are at institutions offering programs in medicine and healthcare, and applications to the English-language or German-language programs in medicine are well above the quota.

In Figure 32, we show the total student numbers of the institutions and the relevant proportion of international students in them. It seems clear that it is either the largest institutions that can attract high numbers of international students or the small ones with specialized features in their programs. The medium-sized institutions in between them are in a difficult situation, and the proportion of international students is much lower [1]. (Figure 32)

Figure 32: Total student numbers in Hungarian higher education institutions and the proportions of international students in them in 2017



Source: Compiled on the basis of data from OH [Educational Authority]

Among international students, the University of Debrecen is the most popular institution. In the group of major universities, Semmelweis University stands out by having a high proportion of international students (31.3%) compared to the total number of students in this institution. In the case of two smaller universities (IBS and Gyula Andrássy German-Language University of Budapest) the proportion of international students is over 70%.

FEMALE INTERNATIONAL STUDENTS IN HUNGARIAN HIGHER EDUCATION

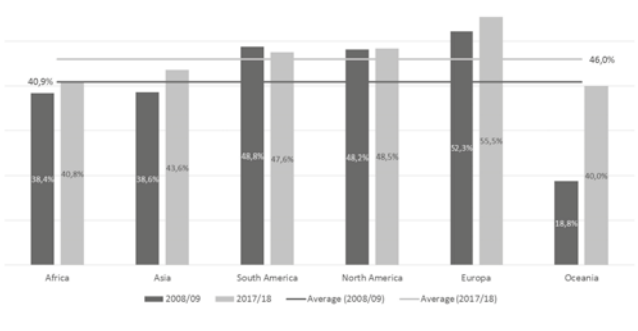
In the past five years, the average proportion of female students of Hungarian nationality was 54.5%, whereas the same indicator among international students was 44.7%.

In the case of international students, the 10-year average figure for this proportion was 43.9%. This value varies for individual continents (presented in a decreasing order); Europe: 54.0%, North America 45.5%, Africa 43.1%, South America 42.9%, Asia 40.5%, and Australia and Oceania 37.2%. Figure 33 illustrates by continent how the proportion of female students changed from the initial to the final year of the survey. In the 2007/2008 academic year, the average proportion of female students was 40.9%, which increased to 46% by the end of the time period surveyed.

In the 2007/2008 academic year, Africa, Asia, and Australia and Oceania were below the average, and they could not catch up to reach that average even by the end of the time period surveyed. At the same time, the proportion of female students grew in all three of these continents.

- The most significant change (21.2 percentage points) occurred in the case of Australia and Oceania, but it is this continent from where Hungary receives the least students, and the proportion of female students from there was very low even in the base year.
- In the case of Africa, the change was 2.4 percentage points, and it was in the 2017/2018 academic year that the average of 10 years before was reached again.
- The change is significant in the case of Asia, where the proportion of female students rose by 5 percentage points.

Figure 33: Proportion of female students by continent in 2008/2009 and 2017/2018



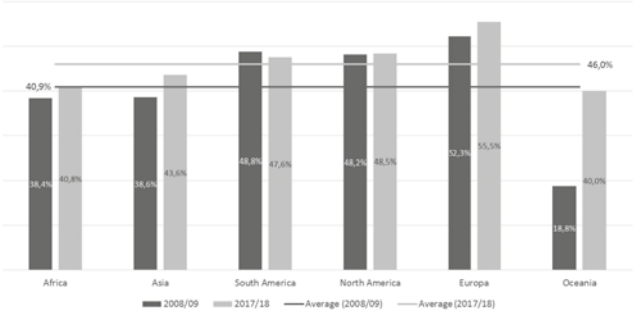
Source: Compiled on the basis of data from OH [Educational Authority]

In the case of South America, North America, and Europe, the proportion of female students was above the average in both years examined.

- South America could not improve in this respect, and the proportion of female students coming from there decreased by 1.2% percentage points.
- In the case of North America, the gender composition of the students hardly changed at all.
- In the 2017/18 academic year, 55.5% of the students from Europe were female, and this meant a 2.2 percentage point rise compared to the figure 10 years before.

During the time period surveyed, the number of female international students, just like the overall student number, increased, and their number almost doubled. The annual change differed each year, with an average of a 9.5 percentage point value, between 4.1 and 18.1 percentage points. (Figure 34)

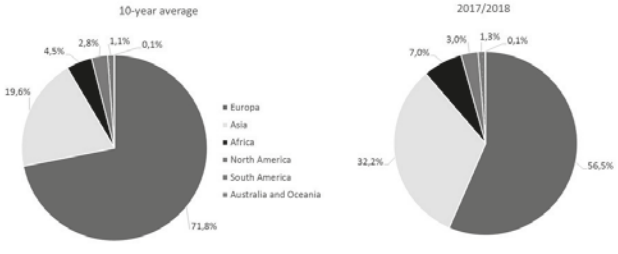
Figure 34: The number of female students by continent between 2008 and 2017



Source: Compiled on the basis of data from OH [Educational Authority]

The 10-year average and the 2017/2018 academic year distribution of the headcount figures by continent is illustrated in Figure 35. On the basis of these data, we can reach similar conclusions concerning the development of the number of female students to the ones we have made about the total international figure. Asia's advance in this case is easy to note, as the number of female students from there almost quadrupled. A marked change is evident in the case of Africa too, where the low base number grew almost seven-fold by the end of the time period surveyed. All in all, the number of female students in the case of the American continent tripled, while the relevant value for Europe was 1.3.

Figure 35: The distribution of the number of female students by continent between 2008 and 2017



Source: Compiled on the basis of data from OH [Educational Authority]

According to program type in terms of credit hours,

- almost 100% of the female students from Africa and Asia are enrolled full time, and this is true for both the

last academic year surveyed and for the 10-year period as well;
- this indicator for South America in the 2017/2018 academic year was 98%, but concerning the 10-year trend, it is notable that the proportion, which started out at 67%, increased in a linear fashion up until 2013, and became stagnant at around 98%;
- In the case of North America, the tendency we can see is the exact opposite, since from the initial 99%, the proportion of female students enrolled full time decreased to 95.4% by 2017/2018 through a number of changes of varying intensity and direction throughout the years;
- Europe displays an increasing tendency, with a value of 74.7% in the base year that grew gradually to 89%.

CONCLUSION

In the course of the past nine years, the number of international students in Hungarian higher education almost doubled, and their share within the total student headcount increased by 10 percentage points. A drastic decrease in the number of Hungarian students in parallel with the increase of the number of international students may be identified behind the dependence of Hungarian higher education, or at least that of a few of its major institutions, on international students.

If we take a look at a world map that is colored based on how many students came to Hungary in 2017 and from where, we might see that 80% of the countries would be colored with a color other than grey. Compared to 2008, the changes in the colors illustrate the prominence of Asia, while we can also witness a significant drop in the student numbers from neighboring countries. Figure 36 shows the changes between the fall of 2017 and 2008.

Figure 36: Number of students from neighbouring countries in the fall of 2017 and 2008

Source: Compiled by Attila Dobos (UD) on the basis of OH [Education Authority] data

If broken down into countries,

- The average data of the 10-year-period surveyed show that the highest number of students to Hungary come from Germany, which is followed by Romania, Slovakia, Serbia and the Ukraine;
- By the fall of 2017, the order did not change in the case of the first two countries: the leading role of Germany and Romania seems to be steady (the latter one despite the fact that its number dropped by 1,100 persons by the end of the time period surveyed), while the third place went to China, the fourth to Serbia and the fifth to Iran.

There is an interesting tendency developing, even if these trends cannot possibly be compared numerically. On the one hand, the popularity of Hungarian higher education in neighboring countries is decreasing. On the other hand, the fact that today we receive students from 80% of the countries in the world means that we also have students from a number of exotic countries: as an example, in the fall semester of 2017, there was one student involved in studies in Hungary from each of the following countries: Botswana, Burundi, Chad, Dominican Republic, Ivory Coast, Haiti, Niger, etc. However, it is not only the so-called exotic countries that we receive students from but also more and more of them come from the developing countries, while Hungarian higher education institutions are also popular with people in Western Europe.

The major groups of institutions where international students are taught correspond to the overall domestic structure in terms of ownership and funding: the system includes public, church and private institutions. In the time period under scrutiny, the number of international students in state-owned institutions doubled, the number of international students in church-owned institutions decreased by 13.6 percentage points, while the number of international students in privately-owned institutions grew by 47.6 percentage points. Concerning the proportions, however, there was an increase only in state-owned institutions.

As regards the type of programs according to credit hours, the most decisive is full-time study and its development. Between 2008 and 2017, 88.7% of the approximately 230,000 international students in Hungary studied full time. Their headcount grew during these years by a total of 90.1 percentage points, with full-time students taking a leading role whose number more than doubled. In the case of the other types, the student numbers decreased, while the part-time schedule and the distance learning forms practically lost their significance, as the former dropped to half of its original level, while the latter to one-tenth.

The number of students at various program levels changed in relation to the so-called Bologna processes. Parallel with the phasing out of the previous traditional university and college (one-tier) programs, students took more and more BA or BSc courses in the past 10 years, but undivided programs were also popular. The numeral increase was also significant in the case of doctoral programs, where especially the 2014/2015 academic year may be considered as a pivotal point.

80.5% of the international students in Hungarian higher education pursue studies at one or the other program levels of university and college programs that may be regarded traditional, while the remaining 20% are involved in other program forms (scholarships, auditor's or extramural studies, foundation studies, etc.) of Hungarian higher education. (2013-2017)

The most popular programs include primarily those related

to medicine and healthcare: the TOP 5 are medicine, dentistry, pharmacy, veterinary medicine, and business administration and management. (fall 2017 data)

International students bring a number of benefits to the universities and thus these institutions (through a variety of means) make significant efforts to recruit them. At the institutional level, the revenues coming from the tuition fees of international students are important (as the institutions charge more substantial tuition fees for programs offered in foreign languages) because these constitute a large portion of their own income. At the level of individual instructors and other members of the teaching staff, the payment received for classes held in a foreign language is higher, which enhances the competitiveness of the work of instructors.

The presence of international students is favourable not only for the higher education institutions. These students are especially important for university towns outside the capital. Both in Debrecen and in Pécs, one in every 40 citizens is an international student, while one in 46 in the case of Szeged. (Table 3) Local economies are also invigorated by the growing presence of international students through their consumption and use of services.

Table 3: Population figures and student numbers in Hungarian cities outside the capital in 2017

City	Statistical number of students (person)	Statistical number of international students (person)	Population (person)	Proportion of students compared to the population (%)	Proportion of international students compared to the population (%)	Population / international students
Debrecen	27 367	5 137	204 156	13.4%	2.5%	40
Szeged	22 006	3 567	164 647	13.4%	2.2%	46
Pécs	20 271	3 748	150 046	13.5%	2.5%	40
Győr	12 416	453	125 139	9.9%	0.4%	276
Veszprém	6 103	419	56 927	10.7%	0.7%	136
Eger	7 597	237	53 505	14.2%	0.4%	226
Gödöllő	12 400	1 145	32 164	38.6%	3.6%	28
Miskolc	9 197	343	161 197	5.7%	0.2%	470

Source: Compiled on the basis of OH and nepesseg.com data

International students also present multiple advantages for Hungary in general. On the one hand, international students tend to spend a lot of money. On the other hand, even if they leave after graduation to go back to their mother country, they continue to represent important contact points, which can play a significant part in making business decisions or investment choices and facilitating the chances of Hungarian companies to access foreign markets. In addition, if they decide to stay in Hungary, they will join the ranks of highly-skilled experts of the labor market, which may prove to be advantageous for compensating the lack of Hungarian workforce due to dwindling population figures and growing affinities to work abroad [1].

Table 4 contains a SWOT analysis concerning international students; however, the present study is not meant to support the implications therein through facts and figures. In quite a few cases, there are no specific and precise data available to justify these statements either, as a part of the assertions come from empirical experience hitherto not validated numerically.

Table 4: SWOT analysis of international students in Hungarian higher education

STRENGTHS	WEAKNESSES
Through the tuition fees paid by international students, the institutions get access to significant amounts of revenue, and this results in sustaining/ improving the level of utilization of the available capacities	The number of places available for students in Hungarian public-funded programs decreases
The range of programs on offer expands, and the number of programs in foreign languages increases	Programs in Hungarian are put into the background, and the level of quality of these programs declines: senior teaching staff members prefer to give courses in foreign languages for a complementary income, whereas the courses in Hungarian are left for the junior teaching staff members
The improvement of the instructors' language skills is significant	An unbalanced situation of workload and salaries develops among the teaching staff members
The competitiveness of the instructors' income brackets improves	Inequality may develop in the evaluation of Hungarian and international students
There is a multicultural environment developing at the institutions, with an expansion for the possibilities of getting to know foreign cultures	Significant additional expenditure may be induced by the process, since all institutional services need to be rendered in Hungarian and at least in English (establishing a separate organization for the administration of international students, in addition to notice boards, web pages, etc.)
	The problem of providing sufficient dormitory capacity is not solved, and Hungarian students will not be favored in the selection process
OPPORTUNITIES	**THREATS**
An impact that invigorates the economy, which in turn, through the incoming foreign capital, generates new enterprises and creates new jobs	Prices on the markets adjust to the existential level of international students (prices of rented apartments around the university, together with prices in nearby stores and cafes, significantly increase)
Competition in higher education becomes more and more fierce at the international level	
A broad market supply develops that follows the demands of international students (new cafes, stores, service providers, etc.)	The declining numbers of places available for students in Hungarian public-funded programs increase the inclination among young Hungarians to move abroad
Foreign companies may implement investments in the areas where major universities are located	
International institutional and personal contacts become stronger	
An environment for learning (in) foreign languages develops, creating an opportunity for an expanding knowledge of foreign languages	
There is a chance that conditions for creating a student-friendly and integrative culture improve	

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SCIENTIFIC PAPER

ANALYSIS OF TIME MANAGEMENT AND SELF-MANAGEMENT WORK PRACTICE BY LEADERS – A FOCUS GROUP STUDY

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Abstract: *Nowadays excellent leadership is one of the foundations of high organizational performance. Leadership excellence is a complex topic but efficiency and effectiveness are important components of it. These are closely linked to self-management and time management. In our focus group research, we asked senior executives about how they organize their average workday. We used two theoretical models: the Blue Ocean model and the Franklin Covey time-matrix. According to the participants the key component of effective self-management is the time management. In their leadership practice they often use a digital task manager, a workshop, an informal meeting as a tool and they find knowledge sharing also very important. They try to approach their employees empathetically. They would like to reduce the administrative tasks, spend less time on correspondence, travel and "small talks". They would like to spend more time on automation and communication, further training and team work and dealing with the employees. They think that strategic planning, market analysis, sales, knowledge development and transfer should require more planning.*

Keywords: *leadership, leadership behaviour, time management, Blue Ocean*
(JEL Code: M12)

INTERNATIONAL STUDENTS IN HIGHER EDUCATION INSTITUTIONS

The mail goal of our paper was the observation of Hungarian managers in their managerial behaviour regarding their time-management and self-management. The topic is part of a large-scale research containing two steps, a small-scale focus-group study which was the basis of a large-scale questionnaire containing a complex topic about the excellence in business.

Self-management is an important consequence of our commitment in our life – our most basic satisfaction of life – the direct role of how we organize the business of our lives - said (STEENBARGER, 2015) in Forbes magazine. According to (MISCHEL, 1973) self-management behaviour can include personal goals, self-directives for achieving goals, self-administered consequences and plans for self-behaviour. To the question of what influences our self-management (BANDURA, 1969) gave the answer: we usually set standards according to 3 factors. These are criteria on past performance, observed activities of others and socially accepted performance. There is no consensus that self-management is a personality trait or a process; whether it can be learned or a natural endowment. In a broader organisational sense self-management refers to how individuals within the organisation take responsibility for their management activities, such as: planning, scheduling, organisation and control.

The most renowned experts in the topic (MANZ and SIMS, 1980) recommend the following self-management processes if someone wants to be more effective:

- in the process of self-observation, we continuously collect data about our own behaviour to establish our self-esteem, which will be the basis for our self-affirmation;
- goal definition is another means of self-management. According to (LATHAM and YUKI, 1975) and (LATHAM and LOCKE., 2007) well-formulated goals lead to better performance. Achievement of a goal has high strengthening properties that leads to the setting of additional goals, thereby helping to realize the goals of the organization;
- cueing strategies (stimulus control) – can be described as the gradual restriction of discriminatory stimuli causing bad behaviour; (MAHONEY and ARNKOFF, 1979)
- incentive change – consists of self-esteem-based self-affirmation and self-punishment. According to BANDURA a self-control individual can strengthen himself as an outsider would reinforce him with supportive behaviour;
- the test – the systematic exercise of achieving the desired performance. (MAHONEY and ARNKOFF, 1979)

Finally, the ability to independently manage our merits and achieve the goals set at the heart of the theory of self-management has not been clarified yet (BERKE, 2010). On the one hand, it is clear that the behaviour of the individual is a primary consideration, but on the other hand it is unclear whether it is a character trait or a process (MARKHAM and MARKHAM, 1995).

We also examined what practical specialists of our time write about self-management. According to business coach Gene Petrov the excellent leader has the following 6 skills of self-management: self-control, reliability, conscientiousness, flexibility, result-orientation and initiative (PETROV, 2020). He and other researchers also write that to become an excellent leader requires self-awareness and self-discipline (PIEROG et al., 2017). Dutch researcher and writer (JOOST, 2018) writes about 16 critical factors (Table 1) in the field of successful self-management. They are separated into different 3 organizational levels: individual, team and organizational levels.

Table 1. 16 critical factors in the field of successful self-management

Individual Level	Team Level	Organization Level
Autonomy	External management	Corporate culture
Roles	Peer regulation	Corporate policies
Driving	Task features	Organizational goals
Skills	Team autonomy	Organizational structure
Experience		Training
		Reward

Source: Based on (JOOST, 2018)

Self-management must be aware of its role as a supporter at all levels of the organization. Not paying attention to these key factors will almost certainly lead to failure or disappointment. (JOOST, 2018) Finally, management coach (HOKANSSON, 2018) based on her own coaching experience defines the following traits and behaviours as the basis for leadership competence:

- ethics – integrity – credibility
- value-based management
- good time management capability – priority of personal meetings and calendar
- flexibility
- adaptability
- exemplary behaviour
- accessibility – control by walking around
- inclusion
- openness
- diversity champion
- self-care. (HOKANSSON, 2018)

According to (STEENBARGER, 2015) self-management begins with self-talk. Self-talk transforms our own relationship with ourselves; it is also a way of organizing ourselves. At the same time it also draws attention to the contact with our body as our body reacts when it goes deep into some positive activity. In this case a "moral ascension" takes place, in which we activate our struggling, flying, and self-comforting responses. We think of moral ascension as a feeling, but it is rather deep in our physiological response patterns.

When studying the difference between a good leader and an excellent leader (KUREC, 2016) included time management as one of the managerial skills that can be learned to develop. Time management is a skill that has a strong influence on the future of the leader, depending on how he allocates his time. Everyone can improve this skill by following the time that their spends on each activity then calendarizing and examining the amount of it per the different activities (BRIGHT et al, 2019), (BÁCSNÉ BÁBA, 2010), (OPENSTAX, 2019).

However, it is not only that we observe how much time we devote to each activity, but it is also important to categorise different activities in terms of importance and urgency. In COVEY'S book of 7 habits this appears as a tool, as the third habit like a quadruped matrix. It was introduced into the public awareness on the basis of the decision support principle of former US President EISENHOWER and has been popular in both management and marketing since then. The principle is to divide tasks in order of urgency and importance with the aim of optimizing the timetable (MFONDOUM et al, 2019).

KIM and MAUBORGNE reconsidered the method and developed the Blue Ocean framework, a market space strategy without any competition, which refers to the blue ocean as a space of endless possibilities as opposed to the red ocean, which is the "stressful" current market space (KIM and MAUBORGNE, 2005). The essence of the Blue Ocean business model is to get the non-consumers become interested in the product instead of concentrating to the competitors. This strategy encourages us to break up with old habits and involve new elements. The strategy is not a

theoretical model, it was developed on the basis of the study of "best practices". The strategy was started to be applied by many and these were studied for example by (LEAVY, 2018), who examined the process of innovation and the practical application of this strategy or (KOMULAINEN and SILTALA, 2018) studied the common motivation for success/failure of Western cooperative consumers in the twentieth century.

(SAKAR and SÜRÜCÜ, 2018) investigated augmented reality in the industry, the applicability of an element of the Blue Ocean strategy in the maritime industry. One of the analytical tools of the Blue Ocean Strategy is the 'four action framework', "a method of defining a business strategy that 'simply' means asking and answering questions about the consumer value factors, what the industry has taken for granted, which one's could be reduced and increased and finally what new factors can be created in addition to what industry has ever offered. Strictly speaking the four action framework is mostly a principle; the principle is that these four questions must always be asked by those who want to create a blue ocean and the answers must be carefully considered" (GYURKÓ, 2009). Within the framework of this thought a net of "cut-down-increase-create" matrix was prepared, which was filled by the leaders who participated in our research. When we installed the model into the field of leadership and management practice an article by (CHAN and MAUBORGNE, 2014) was considered to be authoritative.

MATERIAL AND METHOD

The "Leader`s Habits" research team of the Kaposvár University led by associate professor Szilárd Berke under the project EFOP-3.6.1-16-2016-00007 NK2 entitled "Leadership practice in small and medium-sized enterprises and startups – success-thinking and marketing strategy decisions" has carried out research on the topic between September 2017 – February 2019. The aim of the research was first to map managerial 'success thinking' – how leaders thinking about themselves, their company and some corporate key processes and second to examine value-creating processes and looking for good practices. The research analysed at least six different areas inside the wider topic. The whole research was characterized by exploratory 'pilot' nature, since no validated questionnaire could be found in the chosen contexts that would have analysed both the designated dimensions (BERKE, 2019).

The aim of the research was to explore a general picture of the situation, to establish a "diagnosis", which could be a base later for a national research. Because of this, neither randomness nor representativeness was our goal, and qualitative research has been bearing nearly the same weight in the evaluation of the results as the quantitative procedure.

Methodology of the focus group research

Within the framework of the project two-step studies were carried out, on the one hand a series of focus group interviews, which were conducted both in Hungary and among Hungarian entrepreneurs in Transylvania, as well as a questionnaire study. Within the framework of this article we will select from the results of the first phase.

As a framework for the pilot research we organized 10 focus groups - 5 in Hungary and 5 in Romania (especially: Szeklerland) at different locations - with leaders in the SME sector. Finally, the data contains responds of 44 managers. The focus group interviews were taken place in January-May 2019. The participants of the focus group interviews were contacted and organized based on the personal relationships of the research group. Two to eight people gathered at one location with, whom we conducted a one and a half hour to two hours of conversation. More than 19 hours of interview materials were prepared which typically had to be listened to two, sometimes three times in order to obtain all of the information from the recordings. Among the projective research techniques, the scenario included association games, card games, self-assessments and tests. It consisted of four pages, which of two were test sheets based on various models ((COVEY, 2014); (CHAN and MAUBORGNE, 2014).

In order to process the data, we partly used the qualitative data analysis system nVivo. The advantage of the nVIVO data analysis program is that it allows the hierarchy of categories and the control of hypothetical conceptual structures (SZOKOLSZKY, 2004).

RESULTS AND DISCUSSION

Daily habits and self-management practices

The question was here: what they do every day to make the business more efficient in the market. Our goal was to find good practices, proven ideas that have worked and which could help to others in the future. In terms of good practices, the technical support-backed task management systems and conscious communication were common. Among the answer we have highlighted those that seem effective or can serve as thought provoking.

(1) Communication, task manager, unbound working hours

"I introduced a task management online system with which I have replaced the long and time-consuming conversations, so everyone knew their daily tasks and even the next 10 days' and long distance tasks. Therefore, I had time to observe what communication was like inside the organization and I noticed that within a certain period of time the appearance of the classic situations that disturb me. When I see this, I tell them to talk to each other to make it work because of the aim. That is my approach but as I see my colleagues like it too – in terms of efficiency- that I give them enough free time. I am interested in the results, not the performance. I used to say that one can show performance with zero results. For example, someone might work a lot while moving the earth from one pit to the other pit, but the work doesn't make any sense. Rather I assign as much tasks to the organisation that

have to be done and the deadline of everything is that what really matters. For me, that is the principle... everyone can reach the server from home, so you can work on Sundays, the point is, if I say I need it on Monday, I want it to be done by Monday. I give this kind of freedom to everyone, there are colleagues who use it and there are colleagues who are effective then if they keep themself very rigidly on working hours. This is an opportunity to everyone. I saw results in this, helping the systematization technically and paying attention to communication and giving this degree of freedom bring results. The name of the program what we use is Just Do and it is made by a company from Kaposvár, it can be operated at quite a low cost. Nevertheless, we are developing one of our own now." (Project Office – Municipal Company)

"We also have a task manager because there are routine tasks that it manages on a daily, monthly, quarterly basis because the area is large to be covered and there are so many places you need to pay attention to. It is a program of our own. Individual tasks are essential and we review them alternately to see if the colleagues have entered any problems or deficiencies because we could find problems all the time. It is my way of measuring that there were undiscovered areas or not. On the other hand, you have to constantly walk around the entire work area. Besides of these, I walk around, though not on a daily basis but weekly to see how our employees are doing." (Farm – Contractor)

"There are times when I wake up at night and I think of an idea that I dictate to my phone. We are lucky to have my daughter as the office manager and they have weekly meetings to discuss the problems. We also hold 10 minutes of brainstorming of the given tasks. I think our employees are diverse and their problems need to be handled. There are three-five more important points that you should always pay attention to. We cannot make plans because of the numerous changes in the business, 60-70 percent of our work is incalculable." (Distribution Centre - Food Industry)

(2) A highly active and committed middle manager seeks to increase the efficiency of the company through creative practices motivate and develop the employees.

"For me, my life consists of keeping people and making them willing to work with me. We have given the amount of work that needs to be done. There is a bit of variation, but you have to work with them all the time. We have a weekly meeting about informing them of the current events; lack of the information is typical in the organizations. Usually nobody knows anything. I always tell what I doing today and tomorrow, on the other hand, everyone tells me what he does. If they need help, they can indicate it here. At the end of the discussion everyone gets all of the information about that what the others do at the workplace. It is a regular and important leadership tool.

There are also informal meetings: joint meals and joint pancake afternoons where these issues come up and we can talk about it. These are weekly in the form of breakfast or lunch by setting the table in the conference room. Now we are going to have a yoga class once a month for our colleagues because there is a big demand for this before working hours and it looks like we can even have funds for it. We have a professional day once a month. I hear about a lot of free conferences at the university and I always send someone to participate on it, who can tell us what they have learned. It is knowledge sharing. There is also a cookie contest on this day, so everyone bakes something, usually boys win. What I still do and I like is that I organize the different methodologies that appear in the form of a workshop. For example, the Social Photo Matrix, which is about mapping the subconscious about how someone feels at the workplace. Every colleague had to take a picture of how he/she felt here. At the workshop the images are projected and each photo can only be seen for 20 seconds and you need to associate an idea. Someone collects them, it is partly unconscious, so no one can think, we just have to throw words in, and then we try to figure out what this shows us about the organization itself. Another is the "dispute workshop"; it is a methodology about how to argue without hurting the other. Now there is a regulatory change that calls into question many things what we do. For us the question is that, is there a life after the regulatory change and what we have to do. For this there is also a board game available. Every month or every 2 months, I try to come up with something new to make them feel a little better, because it's hard to work for global companies over long periods." (Financial institution-Multinational Corporation).

"My new business is focused on networking; I need to establish new connections so I write contact lists every day, collect contact information, make calls, which is one of my weaknesses. I don't like phone calls, and I'm still practicing." (Social sphere-NGO)

(3) In start-up businesses, full dedication, engagement and momentum are strongly felt:

"I read 2 hours a day, I listen to YouTube videos 2 hours a day at a speed of 2x, I deal with the company around 100 hours a week. One can work like this for a while, this is Elon Musk's 100-hour work week, but it does have its consequences." (Start-up Company)

(4) Several managers highlighted the importance of personal relationships when communicating with colleagues:

"For me,which worked as a daily routine, which is by instinct a daily routine by the way, is that I call everyone by his/her name. So, if I say hello, for example: Hi, Balázs, I will add your first name. I mean, I often say their names because they like to hear it. However, I am not saying this because I am trying to achieve a goal when I am saying hello. I like to they know it is for them. I do this every day. I mean, what I always put next to, which I am not slothful to add, "How are you?"; "You're pretty!"; "How beautiful your hair is!" etc. So, I throw one more praise. For me this is my daily routine." (Manufacturing Industry-Multinational Company)

"I start the day with "What's up?" I go to the office in the morning and walk around every office to see what is going

on. It rather relaxes the mood, I think. This "What's up?" is a daily morning routine that I practise to relieve the tension a little. Besides, I have been dancing Charleston lately. While I was working in a bank it was a daily routine of getting in the middle of the place and show off a Charleston because we were under a lot of pressure because of the big kick-off meetings in the mornings. This is a very important thing. It is not just discussions, meetings, day launchers, day closing, weekly, Wednesday, Friday meetings, they mean much more to me sometimes. Because this "What's up?" might start a conversation in the office that might not occur in a meeting." (Service industry-Multinational company)

"I don't have a daily routine, but I do have a routine. And it makes it so much easier to eliminate the word daily. Routine means for me the customer visits and the maintain personal relationships at stated intervals, at least once a month. I try to reach everyone in every month because it does matter. E-mail, phone calls, etc. are not enough, you have to go to lunch, discuss not only the work, but also private issues. Which we do not write down. And the other thing is, there is a chance that if something doesn't work out, we can talk about it. Sometimes you look at the results either at work or in the enterprise and you see if you are going where you are supposed to go and if you do not than you can discuss what is that you should to do differently. We need guidance on the one hand and an example on the other. That someone needs to pull you and pull the others, and that is a leadership task." (Furniture Production - Multinational Company)

Appearance of the "Blue Ocean" strategy among executive working methods

Following the Blue Ocean Strategy model, we filled out a test form, and the related question was: What actions and activities would you stop to run the company more effectively? What would you increase? What would you allocate less time to? What kind of activities would require more planning?

Out of the 44 sample (Table 2), 12 people do not want to eliminate any of their current activities in order to increase effectiveness, 4 people do not want to reduce, and interestingly 2 people do not want to create a new one or do not want to include more planning.

The received answers could be summarised as follows: more people would like to reduce administration, bureaucracy and there was one person who would like to eliminate it altogether. The other activities, which several respondents would like to reduce are the time spent on unnecessary correspondence, communication and time that they spent on travelling, both of it in terms of efficiency and time management. If you look at the other answers among the activities to be eliminated or reduced, you can see that the aim of all is to better utilize the time factor and increase efficiency. The number and standard deviation of activities to increase are the largest that we could be grouped together as: increase self-improvement, self-efficiency (such as reading professional books, attending conferences), developing staff and increasing their efficiency, strengthening teamwork and improvement of working conditions, increasing working mood and motivation, and only a few thoughts related to specific marketing and acquiring activities. Among the activities that need more planning are especially the longer-term plans and more specific activities that are related to the strategy.

Table 2. Blue Ocean Strategy - Four Action Frame Answers (n=44)[2]

I would like to eliminate it	I would like to spend less time on it
- administration (n=3) - bureaucratic tasks (n=2) - time consuming activities (n=2) - that I have to do everything - that I could be the solution to everyone - workplace gossip - first round job interviews - travel - customer service - overtime - compliance with state institutions - negative relationships	- administration – (n=8) - reading and replying to non-relevant emails – (n=4) - travel – (n=3) - small talk (n=3) - time consuming persons (n=3) - occupational safety (n=2) - dealing with uncalled problems - worrying - answering questions that don't necessarily need me - long meetings - multitasking - external information - customer service - routine work - Labour Control
I would like to increase it	**I would like to put more planning into it**
- specialist training (n=4) - delegation (n=2) - automation processes (n=2) - communication efficiency (n=2) - teamwork (n=2) - my free time (n=2) - personal or telephone communication (n=2) - marketing effectiveness - the effectiveness of controlling - the team dynamics - number of customer visits - my own commitment, my courage to invest in the future - product portfolio - occasion and time of personal encounters - number of Facebook shares - participation in conferences - teleconferences - time spent with colleagues - telework - regular lunches with staff - supervision of company expenditure - personal training plan - sales efficiency - decision-making of employees - training myself and my people - strategic thinking - require the achievement of the goals - efficiency, productivity - GTD (How to get started) - recharge time - establishment of relations - acquisition - reading textbooks - conversations and feedback with colleagues - the time devoted to creating added value - the verifiability during implementation - transparency of information	- in the preparation of strategic decisions (n=4) - into market analysis, databases (n=3) - image design (n=3) - online marketing (n=2) - into financial planning – (n=2) - into knowledge upgrade (n=2) - exploitation of technical possibilities - working in advance - more thorough development of themes - selection of colleagues - transforming working conditions to make work more creative - compliance with new regulations - business line – 4DX system - categorization of important and urgent, important, but not urgent, urgent, but not important, non-urgent and unimportant tasks - promotions, events - competence increases at managerial level - teach all employees to research and implement continuous efficiency-enhancing elements in their work - a vision created together with colleagues - automation potential - prioritization - sales - contact lists training - client connection - international relations - logistics - exploitation of research and development potential - team development

Source: Interview transcript

CONCLUSIONS

Regarding time management – examining Covey's habit 3 table – we found that the highest rate is in the 2nd quadrant (quadrant for strategic thinking, planning). The executives spend most of their time in the important but non-urgent quadrant, which is an important characteristic of excellent leaders, based on the literature. Based on the Blue Ocean model reshaped into the field, the majority of leaders participated in the research want to reduce administration and bureaucracy. Activities that need to be reduced by several respondents are also: unnecessary correspondence, travel (to work). Delegation skills also return here as an area for improvement. The respondents clearly aimed to make better use of the time factor and increase personal efficacy. Management activities that should be devoted to more time can be divided into several areas, such as: self-improvement, increasing one's own efficacy (for example: reading textbooks, attending conferences); developing employees and increasing their personal efficacy. Furthermore, strengthening teamwork and improving working conditions, increasing work ethic and motivation. These are characteristic of a leader who wants to develop himself to be able and willing to step out of the usual framework and think innovatively and creatively. In summary, according to our research, the leading managers of smaller companies are aware when it comes to time management and self-management - in this point of view they are probably not lagging behind the leading managers of multinational companies. Their daily practice is advanced and up-to-date. The results of the research effectively contributed to the compilation of a questionnaire to examine these areas at the country level as well.

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SCIENTIFIC PAPER

INVESTMENT ANALYSIS OF A PIGLET PRODUCER FARM – A HUNGARIAN CASE STUDY

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Abstract: *The pig population in Hungary was about 8 million in 1990, while this number dropped to only 2.8 million by 2018. The previously so successful integrated domestic pig farming has almost completely disappeared and most of the smaller farms still operating in the 1990s are no longer functioning. At present, a process of concentration can be observed, which was accompanied by the further specialization of pig farming. The main profile of most pig farms is fattening, but there is a smaller number of farms in Hungary today specialized for piglet production, the successful operation of which requires significantly more expertise and more complex technology.*

The main aim of this study is to present the production and economic indicators of a pig farm specialized in piglet production in Hungary as a result of a greenfield investment in the current economic environment, on a case study basis. For this purpose, an economic simulation was prepared based on primary data collection, operating on a deterministic basis, modelling the production and economic processes of the farm. The performed calculation does not derive the economic indicators of the activity from accounting records, but assigns the prices of natural inputs used on the basis of technological data. Primary data and information collection (e.g. technological data, input and output prices, unit cost items, etc.) took place between 2018-2019.

At the purchase prices of pigs in the last two years, which have increased significantly due to the African Swine Fever (ASF), the majority of pig farms in Hungary have an outstanding profit-making capacity. The physical efficiency indicators of the analysed pig farm are almost identical to the average data of such farms in the Netherlands, which has one of the most developed pig industry. The income of the examined pig farm at farm level is about 734 thousand EUR, i.e. 232 EUR per sow. Moreover, this activity is profitable even without subsidies. As a result, the greenfield investment pays off in the 8th year by default (average scenario). The investment has a Net Present Value (NPVr=3%) of EUR 2,609 thousand for 10 years, an Internal Rate of Return of 8.5%, and a Profitability Index (PIr=3%) of 1.3. At the same time, risk factors such as sales prices, output and capacity utilization, and feed costs should be taken into consideration as in extreme cases the return on investment may be unfavourable (pessimistic scenario).

Keywords: *piglet production, farm level data, simulation model, cost-profit analysis, greenfield investment*
(JEL classification: D24, M11, Q12)

INTRODUCTION

Pork has played a prominent role in feeding humanity for thousands of years. Its production and consumption are intertwined with the development of the production culture of agriculture. Throughout history, it has been observed that the consumption of pork increased in parallel with the improvement of agricultural production. Pig farming is most affected by the development and production level of cereal production.

Pigs are amenable to many different styles of farming: intensive commercial units, commercial free range enterprises, or extensive farming. Historically, farm pigs were kept in small numbers and were closely associated with the residence of the owner, or in the same village or town (Ganaba et al., 2011). They were valued as a source of meat and fat, and for their ability to convert inedible food into meat, and were often fed household food waste when kept on a homestead. Pigs have been farmed to dispose of municipal garbage on a large scale. All these forms of pig farm are in use today, though intensive farms are by far the most popular, due to their potential to raise a large amount of pigs in a very cost-efficient manner (Yu and Abler, 2014; Barbour, 2014). In developed nations, commercial farms house thousands of pigs in climate-controlled buildings. Pigs are a popular form of livestock, with more than one billion pigs butchered each year

worldwide, 100 million of them in the USA. The majority of pigs are used for human food but also supply skin, fat and other materials for use as clothing, ingredients for processed foods, cosmetics, and medical use (Anonymous, 2020).

In recent years, most Hungarian pig farms have struggled with profitability problems, and the cost of fattening pigs has been higher than the selling price in several cases, endangering the sustainability of the activity. The higher prime cost typical of the majority of producers in international comparison is mainly due to genetics, housing and feed technology, as well as economies of scale. In the Hungarian pig sector, technology is a key issue, as we lag significantly behind the developed European competitors in this respect. The available capacities are approximately 25 years old, i.e. most of them are obsolete. It is important to emphasize that the modernity of technology fundamentally influences production indicators and, as a consequence, the income generating capacity of the activity (Popp et al., 2015; Apáti and Szőllősi, 2018).

In addition, it is important to highlight the lack of specialization. Pork production basically consists of two well-separable production processes, one is sow keeping and piglet rearing, the purpose of which is the production of raw material for fattening (piglets), and the other is the fattening of pigs, the end product of which is slaughter pigs. Despite the fact that these two processes can be performed most efficiently in farms specialized for the given purpose, sow keeping and fattening are mostly not separated in Hungary, as farms perform both activities at the same time (Apáti and Szőllősi, 2018). It is already a positive thing if these two activities take place on separate farms within a given enterprise. Among the causes of efficiency problems, Kőműves and Horváthné Petrás (2017) also highlight that, in many cases, commodity-producing farms do not pay enough attention to breeding and piglet production by concentrating only on fattening. In their opinion, it is cheaper to use a self-produced gilt for breeding purposes than to buy it from a stock, or to keep a 4-5-year-old self-produced boar for production purposes (even if it does not have the most excellent genetic characteristics), than to obtain a new one from a controlled stock. This questionable farming practice is often reflected in the relatively poor reproductive and fattening rates.

In addition to the shortcomings in the production of raw materials, the problems in the manufacturing industry also make the situation of the supply chain more difficult. Of these problems, small farm size and the inadequate capacity utilization are of paramount importance in international comparison (Szőllősi et al., 2017).

The current global animal health problem today is the Porcine Reproductive and Respiratory Syndrome virus (PRRS) and the African Swine Fever (ASF), which led to significant changes in global pork trade and production. As a result, Hungarian producers are experiencing increased demand and, at the same time, rising purchase prices over the last 1-2 years. Due to rising sales prices, the profitability situation of Hungarian producers has significantly improved, but this market situation will not be maintained in the long run. Therefore, in this income situation, it would be important to invest in increasing efficiency and capacity. The authors of this paper share the standpoint of Popp et al. (2015), i.e. greenfield investments should be given priority in development decisions, since in the case of renovations, the design of farm buildings and their locations on the farm are given, therefore, is not possible to change them substantially. The current investment and interest subsidy system also provides favourable conditions for the establishment of new farms and the modernization of existing ones.

In connection with the above mentioned aspects, the aim of this study is to present the production and economic indicators of a Hungarian farm established as a result of greenfield investment and specialized exclusively in piglet production, in the form of a case study. For this reason, our hypothesis is that (H1) piglet production in Hungary is economically sustainable, i.e. profitable in the current economic environment, and (H2) as a consequence, return is realized on the greenfield investment during its useful life.

LITERATURE REVIEW

Pork production

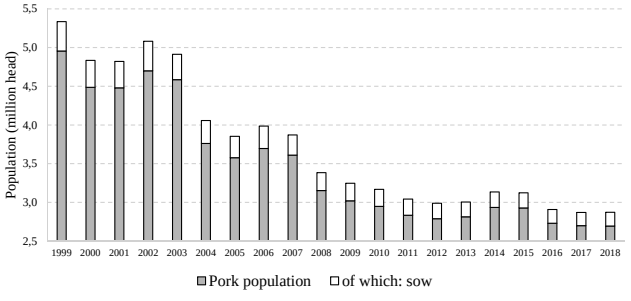
The main product of pig fattening is basically slaughter pigs, which are sold to processors. An increasing number of European companies are also building their own slaughterhouse in the context of vertical integration and processing pork themselves to increase added value. In addition to the production of pigs for slaughter, many companies are also involved in the rearing of pigs for breeding / fattening for the purpose of selling them.

The total amount of meat produced in the world increased by 110 million tonnes from 225 to 335 million tonnes between 1998 and 2017. Of the different meat types, pork was produced in the largest quantities until 2016, but since then poultry has taken the lead. Between 1998 and 2017, pork production increased from 89 million tonnes to 120 million tonnes, which is a 35% increase. The total production of the five most significant pork producing economic units in the world (China, European Union, USA, Brazil and Vietnam) amounted to more than 100 million tons (81%) in 2017. The top five pork producing countries of the EU-28 are Germany, Spain, France, Poland and Denmark (FAO, 2019). Global pork production is projected to grow by 2028, but at a much slower pace than in previous years. This phenomenon is basically due to two main reasons: (1) the population of the more developed countries consider pork one of the so-called unhealthy meats in the spirit of health-conscious diet; therefore, pork is eliminated from their diet at an increasing frequency; (2) due to changes in EU environmental policy, production is expected to decline owing to problems with manure disposal (Balogh, 2017; OECD-FAO, 2019). According to some forecasts, EU meat production will continue to grow in the future, driven mainly by the ASF epidemic in Asia, unless this virus appears or causes an epidemic in European countries (EC, 2019c; EC, 2019d).

In Hungary, pig breeding has played a decisive role in the past. Examining the data of HCSO (2020), it can be stated that

the Hungarian pig population reached its maximum in 1983 (9.8 million pigs), and it has decreased to less than one third during the 30 years since then. About three-quarters (76%) of pigs are owned by companies, and the role of individual farmers in pig farming is steadily declining. While in 2001 and 2002, the proportion of pigs on behalf of enterprises and individual farms was 50-50%, today the proportion of individual farmers is only 24%.

Figure 1. Changes in the number of pigs in Hungary (1999-2017)



Source: Own compilation based on data of HCSO (2020)

Regarding the development of the number of pigs in Hungary (Figure 1), it can be stated that the number of pigs in 1999 (5.5 million) decreased by almost half, to 2.9 million by 2018. The largest decrease was observed in 2004, Hungary's EU-accession. In this year, the Hungarian pig population decreased by 850,000 pigs (HCSO, 2020). To address the problems of the Hungarian pig sector, the Hungarian government introduced the "Pig Strategy" in 2012, in which it aimed to improve the competitive position of pig producers and increase the number of pigs in Hungary (i.e. to double the number of 3 million). Today, however, it can be concluded that this measure proved to be unsuccessful despite the significant capital loss, and it was not enough to boost the sector (Kőműves and Horváthné Petrás, 2017). One of the main reasons for this outcome is that, due to the Russian embargo imposed in 2014, Russia has announced a ban on imports of all agricultural products from EU member states, including pork. As a result, significant quantities of pork have accumulated on the EU's internal market, leading to oversupply, which has led to a sharp fall in market prices (Boulanger et al., 2016; Smutka et al., 2016). The majority of Hungarian producers could not meet this price competition, resulting in a decrease in the stock again nationwide, as opposed to the increase in the number of pigs expected by the "Pig Strategy". However, it should be noted that the current favourable economic situation did not result in the targeted growth of the Hungarian pig population either.

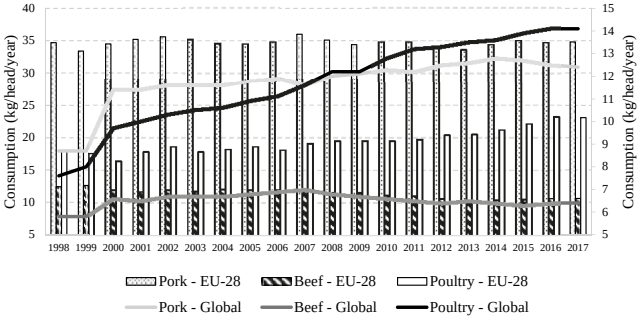
Pork consumption

One of the basic elements of a healthy and balanced human diet is meat consumption (Horn, 2018). People's meat consumption habits differ depending on their financial, cultural and religious situation and personal approach. Pork is one of the most widely consumed meats in the world. In addition, the fact that it has a good feed conversion ratio, a relatively short fattening time and high fertility also played a significant role in the spread of pig farming (Vida and Szűcs, 2020). Ábel and Hegedősné (2015) mention that today's perception of pork – i.e. pork consumption is not healthy – will result in a further decline in demand in the future.

Pigs were originally bred to rapidly gain weight and back fat in the late 1980s. In the more fat-conscious modern days, pigs are now being bred to have less back fat and produce more offspring, which pushes the sow's body too far and is deemed one of the causes of the current prolapse epidemic (Berman, 2018).

Figure 2 shows the per capita consumption of pork, beef and poultry between 1998 and 2017 globally and in the Member States of the European Union. Globally, since 2008, poultry meat consumption has exceeded pork consumption. The latter has grown by 43% in twenty years. In contrast, there has been stagnation in pork consumption in the EU-28. The EC (2019a) predicts that EU per capita pork consumption will decrease by around 2 kilograms by 2030 due to changing consumer habits.

Figure 2. Global and EU meat consumption (1998-2017)



Source: Own compilation based on data of FAO (2019)

The yearly per capita meat consumption in Hungary was in the range of 55-70 kg/person/year in the last decade. As a result of the change in consumer habits, which is also supported by the results of Vida (2012), by the early 2000s, poultry meat consumption increased significantly, exceeding that of pork consumption. The consumption of the two types of meat has been almost the same since 2009 (25-30 kg/person/year), accounting for almost 90% of the total domestic meat consumption together (HCSO, 2020). More expensive types of meat, such as beef, goose, lamb, are consumed in much smaller quantities in Hungarian households, which was also confirmed by several previous studies (Szakály, 2009; Popp et al., 2010; Vida, 2013; Jasák et al., 2014).

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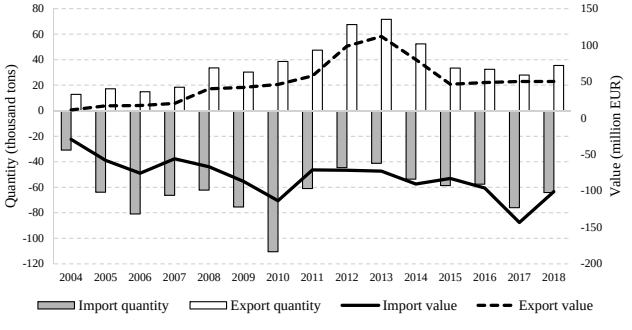
smaller quantities in Hungarian households, which was also confirmed by several previous studies (Szakály, 2009; Popp et al., 2010; Vida, 2013; Jasák et al., 2014).

Trade conditions of pork

Pigs are farmed in many countries, although the main consuming countries are in Asia, i.e., there is a significant international and even intercontinental trade in live and slaughtered pigs. Despite having the world's largest herd, China is a net importer of pigs, and has been increasing its imports during its economic development. The largest exporters of pigs are the United States, the European Union, and Canada (Yu and Abler, 2014; FAO, 2019).

As regards the global import and export volumes in pork, there has been a sustained increase in the long term. The increase in export volumes is mainly due to Brazil and the European Union, the main reason being the increase in demand in China generated by ASF. Demand for both live and processed products is increasing in China (USDA, 2020). It is projected that by 2028, 16% of global meat imports will come from pork. In 2018, 33.6 thousand tons of pork was imported into the EU. The largest quantities – 25.8 thousand tons – came from Norway, Switzerland and Serbia. The EU-28 member states exported nearly 3,870,000 tons of pork to the rest of the world in 2018. 55% of the exported volume went to three countries: China (1,354 thousand tons, 35%), Japan (433 thousand tons, 11.2%) and South Korea (335 thousand tons, 8.7%) (EC, 2019b).

Figure 3. Volume and value of the import and export of live pigs in Hungary (2004-2018)



Source: Own compilation based on data of RIAE PIS (2020)

From Hungary's EU-accession in 2004 until 2010, the value of imported pork increased year by year from EUR 29.3 million to EUR 113.5 million. From 2013 onwards, there was another increase. In the period under review (2004-2018) (Figure 3), Hungarian pig exports (value and quantity) exceeded imports in only one three-year period, between 2011 and 2013. Kürthy et al. (2016) show that imported pigs, even with transportation costs, are cheaper than animals intended for sale by domestic producers.

Table 1. Volume and value of the import and export of live pigs in Hungary (2004-2018)

Years	Quantity (tons)			Value (thousand EUR)[1]		
	Import	Export	Export/ Import	Import	Export	Export/ Import
2004	60 000	81 004	1.35	76 919	142 914	1.86
2005	90 221	84 201	0.93	117 860	153 427	1.30
2006	73 679	86 943	1.18	100 878	174 028	1.73
2007	69 743	95 471	1.37	86 947	171 933	1.98
2008	88 662	102 296	1.15	123 968	187 201	1.51
2009	101 992	111 630	1.09	151 003	209 567	1,39
2010	124 847	165 448	1.33	177 577	295 663	1.66
2011	143 144	161 026	1.12	234 996	307 215	1.31
2012	149 363	143 373	0.96	295 410	303 894	1.03
2013	138 097	140 446	1.02	257 579	294 535	1.14
2014	131 072	139 094	1.06	241 615	317 083	1.31
2015	124 167	143 923	1.16	212 909	309 485	1.45
2016	144 246	137 059	0.95	268 171	317 910	1.19
2017	152 098	141 765	0.93	307 365	344 202	1.12
2018	171 668	133 511	0.78	310 401	280 468	0.90

[1]The data have been converted on the basis of the average HUF/EUR middle exchange rate in 2018 (318.92 HUF/EUR).

Source: Own compilation based on data of RIAE PIS (2020)

In addition to live pigs, pork (carcass, etc.) also plays a significant role in Hungarian foreign trade. This situation is more favourable for Hungary in terms of balance, as the volume of exports exceeds the volume of imports in several years. In the case of ratios of values, the situation is even more favourable, as the value of pork imports exceeded the value of exports only in 2018 (Table 1).

Main physical efficiency indicators of pork production

The average physical efficiency indicators of the main pork-producing countries in the world show significant differences and it needs to be emphasized that countries playing an important role in international trade do not always have the best indicators, as shown in the case of Brazil (Table 2). As regards weaning piglets, Denmark (33.3 pigs/sow/year) and the Netherlands (30.3 piglets/sow/year) perform best, while Hungary (25.5 piglets/sow/year) and Italy (24.8 piglets/sow/year) show the weakest performance. There is also a 20-35% difference between the extreme values, i.e. Hungarian and Italian producers are at a significant competitive disadvantage already at the moment of calving compared to the producers of developed – mostly Western European – nations. In terms of specific feed consumption, Belgium and the Netherlands perform best, with figures of 2.6 kg/kg, while Sweden and Hungary have values of 3.06-3.07 kg/kg. Also, in terms of average body weight gain, Hungarian (753 g/day) and Spanish producers (715 g/day) are lagging behind the most. Finland has the worst farrowing rate, with an average of 164 days between two farrows. This is only 2 days shorter in Hungary.

In contrast, the US (2.44 litters/sow/year, 150 days) and Brazil (2.41 litters/sow/year, 151 days) have outstandingly good values. Accordingly, it should also be said that piglets and fattening pigs also have the highest mortality rates in the US (4.20 and 4.64%, respectively). Belgium and Italy have similarly weak indicators. However, as regards pig mortality, Hungarian producers show the best rate (1.9%), while in the field of pig fattening, only 1.6 out of 100 animals die in Sweden. Hungarian pig farmers also have the weakest labour efficiency (27.1 hours/sow/year in sow keeping and 1.16 hours/pig/year in fattening). Accordingly, it can be seen that Hungary is among the last countries in terms of most physical efficiency indicators as Hungarian producers are not even able to come close to the European Union averages in the case of several indicators.

Table 2. Main production indicators of pig farming countries (2017)

Country	Pigs (weaned/sow/year)	Standardised feed conversion ratios (kg/kg)	Standardised daily live weight gains (g/day)	Farrowing (litters/sow/year)	Rearing mortality (%)	Finishing mortality (%)	Workhours (hour/sow/year)	Workhours (hour/sold/year)
Austria	24.90	2.75	825	2.29	3.00	1.81	15.30	0.35
Belgium	29.80	2.60	767	2.34	4.00	3.10	10.67	0.30
Brazil	27.40	2.81	821	2.41	2.00	2.20	11.04	0.36
Denmark	33.30	2.82	930	2.28	2.28	3.10	25.03	0.18
Finland	27.10	2.84	928	2.23	2.23	2.30	13.10	0.36
France	28.20	2.71	815	2.37	2.79	3.63	12.55	0.15
Germany	29.70	2.77	842	2.33	3.10	2.70	12.00	0.32
Great Britain	25.80	2.94	805	2.29	3.78	2.79	no data	no data
Hungary	25.50	3.07	753	2.25	1.90	3.96	27.10	1.16
Ireland	28.50	2.82	811	2.36	2.91	2.21	15.00	0.28
Italy	24.80	3.04	803	2.25	4.13	2.50	no data	no data
Netherlands	30.30	2.58	845	2.36	2.50	2.40	7.45	0.26
Spain	27.00	2.76	715	2.31	3.69	3.56	9.05	0.22
Sweden	26.60	3.06	883	2.24	2.00	1.60	12.50	0.20
USA	26.40	2.84	847	2.44	4.20	4.64	10.20	0.14
EU average	27.80	2.83	826	2.30	3.02	2.78	13.92	0.33

Source: AHDB (2018)

Price level of main feeds used in the Hungarian pig sector

In Hungarian pig farms, material costs make up a significant part of the annual production cost, of which feed costs account for the largest share. In fattening, mostly feed mixtures are used whose main components are cereals (wheat, maize, barley, triticale) and soybean (Szűcs, 2013). For all these reasons, the actual feed prices fundamentally determine the income situation of the pig sector. The price of feed cannot be influenced by the producer, but how much feed is used depends on the breed / genetics, the farm technology, the recipe, the animal health status and weather (e.g. animals eat less in high heat, resulting in less weight gain). Producers can influence some of these factors, including the average (specific) feed consumption in a given pig fattening farm. Figure 4 shows the average annual producer prices of the most important feeds and feed ingredients in Hungary.

The Hungarian cereal and feed market is basically price following, i.e. it is mainly influenced by European wholesale prices and market events. In the analysed period of 2010-2019, the prices of feed types ranged between 80-150 EUR per tonne, while those of fattening feeds ranged between 175-295 EUR.

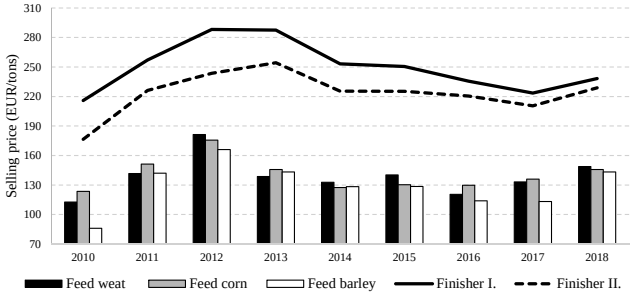


Figure 4. Trends of producer prices of main feed raw materials and annual sales prices of feed for fattening pigs in Hungary (2010-2018)

Note: The data have been converted on the basis of the average HUF/EUR middle exchange rate in 2018 (318.92 HUF/ EUR).

Source: Own compilation based on data of RIAE PIS (2020)

Output prices of the Hungarian pig sector

The Hungarian pig market, similarly to the feed market, is also price-following, i.e. it is mainly influenced by European wholesale prices and global market events. It is more profitable for an increasing number of Hungarian meat processors to obtain the raw material from abroad, because it is often cheaper, even with transport, than from domestic sources. Purchase prices in Hungary are basically determined by the value of German prices adjusted for logistics costs (transport / loading Germany => Hungary) (Marczin et al., 2020). Table 3 shows the prices of Hungarian-produced and imported slaughter pigs between 2010 and 2019. Compared to imports, pork prices in Hungary were 1-6% higher in all years.

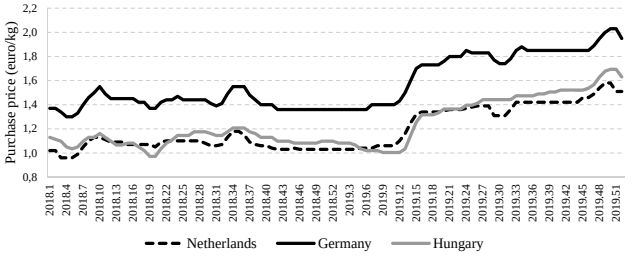
Table 3. Slaughterhouse prices of domestic and imported pigs for slaughter (warm carcass weight) (2010-2019)

Denomination	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Hungarian (EUR/kg)	1.13	1.26	1.48	1.55	1.51	1.34	1.42	1.58	1.41	1.73
Import (EUR/kg)	1.10	1.20	1.43	1.48	1.50	1.31	1.40	1.56	1.39	1.71
Hungarian – Import (EUR)	0.03	0.07	0.06	0.07	0.01	0.04	0.02	0.02	0.03	0.02
Hungarian / Import (%)	103	106	104	105	101	103	102	101	102	101

Source: Own compilation based on data of RIAE PIS (2020) and RIAE MPIS (2020)

Prices of Hungarian live pigs follow the development of German and Dutch market prices with a small lag in time (Figure 5.). There is a strong stochastic relationship between Dutch-Hungarian and German-Hungarian purchase prices (96%), and the r-value and the adjusted R2 explain 92% of the output variables to justify the explanatory variables.

Figure 5. Weekly purchase prices of live pigs (2018-2019)



Note: The data have been converted on the basis of the average HUF/EUR middle exchange rate in 2018 (318.92 HUF/EUR).

Source: Own compilation based on data of Hunland (2020)

Main competitive disadvantages of the Hungarian pig sector

In recent years, several experts analysed the competitive disadvantages of the Hungarian pig sector. Among other things, the following reasons were highlighted: production on an inadequate scale; low level of willingness to invest; inadequate proportion of own or purchased feed; changes in consumer needs; inappropriate manure management; and the presence of ASF in feral pigs.

According to Balogh et al. (2009) and Csörnyei (2015), it is the inadequate farm size, i.e. the operation below the economies of scale of production, that generates a significant competitive disadvantage in the case of pig farms in Hungary. In our opinion, the utilization of production capacities is also an important factor for competitive pork production, as the fixed costs per product unit can be reduced as a function of increasing capacity utilization. Average variable costs at such production sizes do not depend on the utilization of production capacities. In addition, since the average total cost (ATC) is made up of two items, i.e. average variable cost (AVC) and average fixed cost (AFC), one of the most effective ways to reduce the average total cost (ceteris paribus) is to improve the utilization of production capacity in the pig sector.

In addition, in terms of husbandry technology, Hungarian producers lag behind their competitors the most. The tangible assets of Hungarian pig farmers are 25 years old on average (Apáti and Szőllősi, 2018). Older technology requires higher live labour costs, resulting in additional extra costs at the farm level.

Placing the amount of slurry produced during production is a problem even for farms with larger land areas. Use for energy purposes would require a significant additional investment, for which still only few are open in Hungary (Csörnyei, 2015).

According to the authors' summarizing opinion, there are very few modern, European-standard farms in pork production in Hungary. The areas in which Hungarian farms lag behind are genetics, housing technology, economies of scale, and feeding problems. Most of the available capacities are obsolete and their modernization is timely. Technology (housing, feeding and reproduction) is a key issue as it lags far behind advanced European competitors. State-of-the-art technologies significantly reduce specific feed consumption and mortality, but in turn increase daily weight gain and improve overall profitability. The financing of greenfield investments must be given priority, because in the case of renovations, the design, layout and microbial background of the buildings are given, i.e. it is not possible to change them significantly. One way to reduce feed costs is to utilize by-products in pig fattening. At the same time, in Hungary, the inclusion of food and other industrial by-products (e.g. malt sprouts, DDGS, by-product of ethanol production, milling by-product, sunflower meal, rapeseed meal) in the feed system lags behind the EU competitors.

MATERIALS AND METHODS

Primary and secondary data were also used in the preparation of the study. Secondary data come from various international and Hungarian databases (FAO, OECD-FAO, USDA, EC, AHDB, HCSO, RIAE MPIS, RIAE PIS) and technical literature. The primary data collection required for the study took place between 2018 and 2019 at the piglet producing farm of a Hungarian pig farming company. The data collected include production and technology data, input and output prices, and unit cost items. From the data collected at the company, we modelled the production and economic processes of the farm. Accordingly, we performed a deterministic simulation model calculation, similarly to the one created by Cehla et al. (2011), Szőllősi and Szűcs (2014) and Szőllősi et al. (2020). The calculation does not derive the cost-income relations of the activity from the analytical records and accounting data, but assigns prices to the inputs used on the basis of the technological data.

Based on the calculated cost-income data of the farm, we also examined the return on the greenfield investment. Accordingly, we used dynamic investment-economic indicators (NPV, IRR, DPP, PI). Subsequently, we conducted

a sensitivity analysis examining the impact of the extreme (pessimistic and optimistic) states of the most determining factors on economic indicators.

The financial data are presented in EUR, and the middle exchange rate of the Hungarian National Bank in 2018 (318.92 HUF/EUR) was used to convert the data calculated in HUF (HNB, 2019).

The case study nature of the study should be emphasized, the obtained results should be evaluated accordingly and their generalizability is limited.

RESULTS AND DISCUSSION

Cost-income relations of the analysed pig farm

In this chapter, we present the cost-income relations of a pig farm specialized producing breeding stock in Hungary as a result of a greenfield investment, as well as the volume and rate of return on the investment, based on the company's past data, as a case study. The pig farm was built on the basis of a Dutch technology. The 16,500 m2 complex contains 850 farrowing pens capable of producing 90,000 piglets per year. Breeding is carried out from within the farm and no animals are transported to the farm since its establishment. Pigs are registered according to five age groups, of which the main products are suckling piglets (7.5 kg, 27-day-old), weaned piglets (23 kg, 65-day-old) and gilts (125 kg, 175-day-old pigs).

Table 4 compares the main production indicators of the examined farm with the Hungarian, Dutch and EU averages. The farm performs at the same level as the average values in the Netherlands, which is a market leader in terms of weaned piglets (25.5 weaned/sow/year), FCR (2.6 kg/kg), daily weight gain (865 g/day) and working hours per sow (9.1 hours/sow/year). In terms of the mortality of piglets (1.9%) and fattening pigs (3.7%), the farm performs at the same level as the Hungarian average. In terms of the efficiency of working time, an outstandingly favourable value can be observed, resulted by the application of modern, automated technology.

Table 4. Comparison of key physical efficiency indicators

Denomination	Pigs (weaned/sow/year)	Farrowing (litters/sow/year)	Rearing mortality (%)	Finishing mortality (%)	Standardised feed conversion ratios (kg/kg)	Standardised daily live weight gains (g/day)	Workhours (hours/sow/year)
Analysed farm	29.9	2.3	1.9	3.7	2.6	865	9.1
Hungary	25.5	2.3	1.9	4.0	3.1	753	27.1
The Netherlands	30.3	2.4	2.5	2.4	2.6	845	7.5
EU average	27.8	2.3	3.0	2.8	2.8	826	13.9

Source: AHDB (2018) and own data collection and calculation

The farm produces about 1,896 tonnes of live weight per year, of which more than 91% (1,725 tonnes) is sold as a main product. Table 5 shows the main economic indicators of the pig farm. The production value at farm level is 4,470 thousand EUR and 1,411 EUR per sow. This value is about 60% higher than the average production value (878 EUR/sow) of the dominant commodity-producing farms calculated for 2016 on the basis of pilot farm data of the Research Institute of Agricultural Economics (RIAE) (Szili and Szlovák, 2018), 91% of which is realized by the farm from revenues and 9% from subsidies.

The cost of production is 3,736 thousand EUR, of which 3,459 thousand EUR (93%) is direct costs and 277 thousand EUR (7%) is overheads. The production cost per sow is 1,179 EUR, which is 33% higher than the average production cost of the dominant commodity-producing farms calculated for 2016 on the basis of RIAE pilot farm sector data (EUR 891 / sow) (Szili and Szlovák, 2018). 74% of direct costs are material costs, 8% are personnel costs, 17% are depreciation and 1% are other direct costs. Among the cost items, feed is the most significant, as the cost of feeding accounts for 50% of the total cost.

Table 5. Main economic indicators of the analysed pig farm

Denomination		Value (EUR)	Value per sow (EUR/sow)	Value by live weight (EUR/100 kg)
1.	Revenue	4 059 764	1 281	214.1
2.	Subsidies	410 573	130	21.7
3.	Production value (1+2)	4 470 337	1 411	235.8
4.	Material cost	2 557 117	813	134.9
5.	Labour cost	291 255	184	15.4
6.	Depreciation	565 628	179	29.8
7.	Other direct cost	45 187	72	2.4
8.	Total direct cost (Σ 4-7)	3 459 187	1 248	182.4
9.	Gross margin (3-8)	1 011 151	163	53.3
10.	Overheads	276 735	87	14.6
11.	Total production cost (8+10)	3 735 922	1 179	197.0
12.	Income (3-11)	734 415	232	38.8
13.	Income without subsidies (12-2)	323 842	132	17.1
14.	Cost-related profitability (%)		19.7	

Source: own data collection and calculation

The farm, which specializes in piglet production, produces and sells three main products (suckling piglet and weaned piglet for fattening, and gilt for breeding), therefore, we determined the direct cost for all three products. Accordingly, we applied process costing with equivalent units, and we used the feed cost of each age group as the projection basis. The cost of a suckling piglet is 333 EUR / 100 kg, while that of a weaned piglet is 107 EUR / 100 kg, and the cost of a gilt is 205 EUR / 100 kg.

Knowing the production value and the production cost, it can be stated that the examined farm specializing in the supply of fattening pigs continues to produce profitably. The cost-related profitability of the activity is 19.7%, which is significantly higher than usual in the sector. At the farm level, the sectoral result is 735 thousand EUR, which remains

positive even without subsidies (324 EUR). The income per sow is 232 EUR, compared to the national average (average sectoral result of the dominant commodity-producing farms calculated on the basis of RIAE pilot farm sector data (Szili and Szlovák, 2018), which showed a loss of 11.2 EUR per sow in 2016.

RETURN ON GREENFIELD INVESTMENT

The farm housing 3,100-3,200 sows which is presented in the study was established in recent years as part of a greenfield investment. The total cost of the investment was 8.5 million EUR, which included the purchase of the property from design to commissioning, public works, buildings, technological equipment and the initial sow population. The investment cost per sow is 2,650-2,750 EUR. The investment was financed by the company from 20% of its own resources, 37% of a subsidy and 43% of an investment loan. The investment loan is a long-term fixed loan with an interest rate of 1.5%. Accordingly, the funding can be considered very favourable in this respect.

The investment economic analysis was performed for a period of 10 years. The yield of the alternative investment option was set at a calculated discount rate of 3% (opportunity cost), which is the average yield of the 10-year government securities of the Hungarian National Bank between 2016 and 2019 (HNB, 2020). When planning the cash flows for the future, we started from the current cost-income data, and also took into account the planned changes in the price level. We expected a 3% increase in the price level of sales and feed costs, 10% increase in personnel costs and 2-2% increase of other direct costs. We also took into account the effect of the corporate tax shield, which is 9% in Hungary.

According to our calculations, the Net Present Value (NPV) of the investment is 2,609 thousand EUR at the end of the 10th year after the investment and return is realized in the 8th year (Discounted Payback Period, DPP). The Internal Rate of Return (IRR) is 8.5%, which is 5.5% higher than the opportunity cost. The Profitability Index (PI) is 1.3. Altogether, it can be concluded that, although such investments have a significant capital requirement, a return on investment can be realized as a result of more favourable production and economic indicators.

Sensitivity test

A sensitivity test was also conducted in connection with the performed calculations. In doing so, we assessed the impact of the extreme (pessimistic and optimistic) states of the most determining factors on economic indicators with a scenario analysis. Table 6 summarizes the values of these influencing factors (sales prices, sales volume as a function of capacity utilization and unit feed costs) in optimistic and pessimistic cases compared to the base case. The extreme values of the assessment were determined on the basis of the previous years' average data of the HCSO (2020) in the case of the change in sales prices, and, the PIS (2020b) in the case of the specific feed costs. When estimating the more favourable and less favourable values of the sold volume, we took into account the capacity of the pig farm and its level of utilization.

Table 6. Extreme values of factors involved in the study

Denomination	Pessimistic scenario		Basic scenario	Optimistic scenario	
Sales prices	EUR/kg	Dif. (%)	EUR/kg	Dif. (%)	EUR/kg
weaned piglets	2.23	-10	2.48	+5	2.72
gilts	1.16	-10	1.29	+5	1.41
suckling piglets	4.66	-10	5.17	+5	5.69
Sold quantity	Tons	Dif. (%)	Tons	Dif. (%)	Tons
weaned piglets	2.13	-5	2.25	+5	2.36
gilts	1.28	-5	1.35	+5	1.42
suckling piglets	0.92	-5	0.97	+5	1.01
Feed cost	EUR/ produced kg	Dif. (%)	EUR/ produced kg	Dif. (%)	EUR/ produced kg
weaned piglets	0.73	-5	0.70	+5	0.66
gilts	1.51	-5	1.44	+5	1.37
suckling piglets	1.83	-5	1.74	+5	1.82

Source: own data collection and calculation

Table 7. Effect of extreme values of impact factors on key economic indicators

Denomination	Pessimistic scenario	Basic scenario	Optimistic scenario
Income (EUR/sow)	-79	232	425
$NPV_{r=3\%;\ t=10\ years}$ (thousand EUR)	-6 349	2 609	8 029
$IRR_{t=10\ years}$ (%)	-19.5	8.5	18.2
$PI_{r=3\%;\ t=10\ years}$	0.3	1.3	1.9

Source: own data collection and calculation

Table 7 summarizes the results of the scenario analysis. In the pessimistic and optimistic scenarios, all influencing factors included in the test are unfavourable and favourable at the same time, i.e. they show the most extreme conditions. In the worst case (pessimistic) scenario, the estimated annual income per sow is -79 EUR, which is 134% lower than the current values. In a more favourable case (optimistic scenario), this value can be 83% higher. No return is realized on the investment under pessimistic conditions, and the net present value is -6,349 thousand EUR. However, this condition assumes the extreme case in which each influencing factor has unfavourable values for 10 years. In contrast, under the most favourable conditions, even an internal rate of return of up to 18% can be expected. Examining the effect of each factor on the result separately, the sales prices of different age groups play the biggest role.

CONCLUSIONS

In this study, we presented the production and economic indicators of a pig farm specialized in piglet production in Hungary as a result of a greenfield investment, on a case study basis. Especially due to this case study nature, the generalizability of the results is limited. It can be stated that the pig farm, which was established as a result of the

presented greenfield investment and specializes only in piglet production, can be characterized by very good production indicators (farrowing, number of weaned piglets, labour efficiency) in international comparison, and as a result has outstanding income-generating capacity. Accordingly, our hypothesis H1 is confirmed, that is "piglet production in Hungary is economically sustainable, i.e. profitable in the current economic environment".

The case study also confirmed that there is a very significant capital requirement for establishing relatively larger farms, that can also be considered modern at the international level, which we believe is essential for increasing efficiency in all areas of agriculture. In the case of the presented farm, as a result of the excellent production and economic indicators, the capital investment shows a favourable return, which is made even more favourable for businesses by the current support policy and funding environment. Accordingly, we accept our hypothesis H2, according to which "return is realized on the greenfield investment during its useful life". At the same time, attention is drawn to the role of risk factors, which can even adversely affect returns in extreme circumstances.

In our opinion, these favourable production and economic indicators are clearly based on, among other things, modern, automated buildings and technology. As a matter of course, these factors also require and are provided with proper genetics, nutrition and expertise. Our results and findings are in accordance with the findings of several other researchers (Nábrádi et al., 2009; Popp, 2014; Takácsné and Takács, 2016; Horn, 2018; Fountas et al., 2020; Kirkaya, 2020), according to whom improving the parameters of agricultural production (natural efficiency) is of key significance in increasing profitability and international competitiveness, as well as the improvement of environmental sustainability. In addition, these factors can be significantly improved through the complex application of advanced technologies, automation and digitization, as well as the required expertise.

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ABSTRACT

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